MONTESSORI AUSTRALIA

# Montessori National Curriculum

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**Contact details:**
Montessori Australia Foundation
3 Myoora Road
Terrey Hills NSW 2084
Australia
Telephone: 02 9986 2282
Facsimile: 02 9986 2281
Email: info@montessori.org.au

**Edited by:** Dr Susan Feez, School of Education, University of New England and Dr Jean Miller, Director of Training, Association Montessori Internationale

**Cover and text design:** Megan Tyne

## Summary

The document includes an overview of Montessori principles and developmental characteristics for each plane or stage of development from birth to eighteen years. A summary of content strands, knowledge, skills and understanding as well as resources and activities are included in a table for each of the curriculum areas for children aged birth to twelve years. An outline of possible topics and areas of study for the adolescent aged twelve to eighteen is also included.

The Montessori National Curriculum is endorsed by the Australian Montessori Teacher Education Teacher Foundation Limited (AMTEF) and the Montessori World Education Institute (Australia) Inc. (MWEI).

## Acknowledgements

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# Preface

The Montessori Australia Foundation firmly believes in the Montessori idea of 'Education as an aid to life'. We believe that the child is born with amazing potentialities and is entitled to support, time and opportunities to maximise these through the provision of appropriate learning environments and with the support of adults who understand child development and how to support, encourage and extend the child's learning.

The Montessori Australia Foundation is very committed to promoting Montessori, improving the quality of programmes, and supporting Montessori schools, staff, administrators and boards.

We know that education of the young child, and the adult that this child will become, begins at birth within the family and that the home and school environments must work in collaboration to support the child's optimal growth and development.

The production of the Montessori National Curriculum provides a curriculum outline for the child from birth to eighteen years and helps to ensure a smooth transition from one developmental stage to the next. This document reflects our commitment to ensuring on-going quality and consistency within Montessori environments.

The Montessori Australia Foundation encourages all Montessori settings to participate in the Montessori Quality Assurance Programme (MQAP). Participation in this programme is one of continual reflection and commitment to offer the best possible educational environment to all children. The development of the Montessori National Curriculum is an important part of the Montessori Quality Assurance process.

The Montessori National Curriculum has been endorsed by the two major Montessori teacher-training organisations in Australia, the Australian Montessori Teacher Education Foundation Limited (AMTEF) and the Montessori World Education (Australia) Inc. (MWEI).

This document draws on the expertise and experience of people in both the international and national Montessori sector representing work with children from birth to eighteen years. We thank all those who generously contributed and look forward to working with all those in Montessori settings as we enter this next exciting stage of ensuring quality Montessori education for all children.

Christine Harrison, President
Megan Tyne, Executive Director
Montessori Australia Foundation

# How to Use this Curriculum Document

The document begins with an *Overview* of the history, principles and practice that are the foundation of the Montessori National Curriculum and from which all elements of the curriculum are derived.

The subsequent curriculum sections of the document are organised according to the three 'planes' of child and adolescent development as understood by Montessori educators. The Montessori understanding of the intellectual interests, social orientation and creative power of children and young people in each plane of development determines the content of the curriculum for each plane and the way in which the curriculum is implemented. The curriculum sections of the document are:

- *The Montessori Early Years Learning Programme for the First Plane of Development from Birth to Six* years aligns with the period of early childhood education.

- *The Montessori National Curriculum for the Second Plane of Development from Six to Twelve Years* aligns with the period of primary school education from Year 1 to Year 6.

- *The Montessori National Curriculum for the Third Plane of Development from Twelve to Eighteen Years* aligns with the period of secondary school education from Year 7 to Year 12.

Each section begins with an introduction to:
- the characteristics of the plane of development from the Montessori perspective
- the learning environment prepared by Montessori educators for children and young people during the period of development
- the learning areas covered by the Montessori curriculum at this plane of development

The curriculum for each learning area is then presented in detail in the form of tables. The tables present the curriculum for each learning area in terms of:
- general content strands
- specific knowledge, skills and understandings students typically develop in each content strand
- details of activities and resources used by Montessori educators to achieve the knowledge, skills and understandings of each content strand

It is important to note that this document is only one element of the comprehensive, integrated approach that is Montessori education. For the curriculum outlined in this document to be implemented in a way that achieves the full potential of the Montessori approach, it must be supported, not only by the preparation of learning environments to meet detailed Montessori specifications, but also expert presentation of the activities and resources detailed in this document. Both the preparation of the Montessori environment for each plane of development, and the presentation of the activities and resources for that plane requires Montessori educators who have undertaken the corresponding specialist training.

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# Montessori National Curriculum
# General Introduction

MONTESSORI AUSTRALIA

# Montessori National Curriculum: Overview

## Introduction

The Montessori National Curriculum brings together in one document the educational goals and curriculum content applied in Montessori schools throughout Australia to support the development of infants, children and young people from birth to adulthood. This is an international curriculum shared by Montessori schools throughout the world. The curriculum is introduced with an overview of the pedagogical principles that guide practice in Montessori schools, principles that emerged from the pioneering research and insights of Dr Maria Montessori.

In 1907 Dr Maria Montessori established a classroom in Rome for children left unattended while their parents worked as day labourers. Within a very short time this classroom became famous around the world because these children, with apparently so few prospects, very quickly became socially and intellectually independent, not through adult coercion, but through their own activity, interest and effort. The learning environment designed by Dr Montessori to enable these children to achieve their potential in such a joyful way was the culmination of years of study and innovation in the fields of medicine, psychology and anthropology. Building on the success of that first classroom, over the last hundred years Montessori educators all over the world have continued to observe and study children and young people, and to design learning materials and environments carefully tailored to their developing interests and needs. The breadth and depth of accumulated knowledge shared by Montessori educators across time and space is perhaps unique in the field of education. Significantly, in recent years, research in the fields of psychology and neuroscience has confirmed many of Dr Montessori's insights (Elliot 2006: 30; Lillard & Else-Quest 2006; OECD CERI 2007).

In the Montessori view, the drive to become independent propels human development. Montessori education aims to provide children and young people, from birth to maturity, with learning environments designed to support the development of social, intellectual and ethical independence. For this reason, Montessori education is often described as 'education for life'. The foundation principle of the Montessori approach is that children learn best when they learn through their own freely chosen activity. Evidence gathered in Montessori schools throughout the world over the last century confirms that children who have the opportunity to learn in this way become self-confident, self-reliant and self-disciplined, with a life-long love of learning and the desire and capacity to contribute to the wellbeing of their social group. They also develop the ability to move with coordination and precision, and the ability to concentrate and to complete tasks independently with both perseverance and creativity.

Australian educators attended the first Montessori training course held in Rome in 1913 and returned to Australia to establish Montessori schools in several states. Since that time Montessori schools have continued to flourish in Australia and today are operating throughout the country (O'Donnell 1996; Peterson 1983). The continuation of Montessori education in Australia over the last hundred years and into the future provides Australian children and their families, and the wider community of Australian educators, with the opportunity to benefit from an internationally-recognised educational tradition that continues to contribute to the wellbeing of infants, children and young people everywhere.

While the Montessori curriculum is international, the curriculum presented in this document has been finetuned where necessary to adapt it to the Australian context and Australian Montessori schools. This curriculum provides infants and young children with everyday social skills and accomplishments, trains sensory perception and movement systematically, and provides a strong foundation in literacy and numeracy. It also engages older children and secondary school students in all areas of educational knowledge, including language, mathematics, science, history, geography, the study of the creative arts - literature, visual arts, music, drama, dance - and physical education.

In Montessori schools learning in the sciences is oriented to understanding the earth and its place in the universe, as well as respect for the natural environment and the web of life, which in today's terms would be described as education for sustainability. The Montessori approach to the humanities is one that celebrates the diversity of human experience across historical time and geographical space, an approach that emerged from Dr Montessori's proposals for educating children for peace.

The Montessori curriculum is shaped by three key concepts central to Montessori education. These include *the tendencies shared by all humans*, *the planes of development* and *the prepared environment*.

## Human Tendencies

In the Montessori view all humans share a set of innate tendencies that operate throughout life, guiding both human development and human behaviour. These include the drive shared by all humans to explore and investigate the environment and the need humans have to orient themselves to the environment in an ordered way. Throughout history and in all parts of the world, humans have communicated with each other, and they have measured their world and calculated quantities. Humans need to be active and to work. This work often involves repetition, which leads to exactness, precision and self-perfection. Humans also tend to imagine things not immediately present to the senses. To feed their imagination, humans build a mental inventory of ordered ideas they have abstracted from their environment. Abstract ideas are the basis of human reasoning and judgement.

Because these tendencies are found in all human beings, regardless of their age, and the place and time in which they live, Dr Montessori called them 'human tendencies'. To optimise learning and development, Montessori educators take these tendencies into account as they design learning environments for each plane of development.

## Planes of Development

Dr Montessori outlined four consecutive planes, or stages, of development from birth to maturity, each plane spanning approximately six-years. At each plane of development children and young people display intellectual powers, social orientations and creative potential unique to that stage. Each plane is characterised by the way children in that plane learn, building on the achievements of the plane before and preparing for the one to follow. The timing and nature of the transition between planes vary from individual to individual.

- The *first plane of development* is the period from birth to, approximately, age six. During this stage children are sensory explorers, learning to become functionally independent in their immediate environment and community. Children at this stage construct their own intellect by absorbing every aspect of their environment, language and culture.
- The *second plane of development* is the period from, approximately, six to twelve years. The developmental focus of this period is intellectual independence, hand in hand with the development of ethics and social responsibility. During this stage children become conceptual explorers. They use reasoning, abstract thought and imagination to explore and develop their understanding of the world.
- From *age twelve to eighteen* young people become humanistic explorers seeking to understand their place in society, and to contribute to society. They have a huge capacity for creative expression, and their style of learning becomes more practical and experiential, an approach they use to explore previously introduced concepts in more depth and in real-life contexts.
- From *eighteen to twenty-four* young adults develop specialist knowledge and skills, preparing them to take their place in the world and to establish social and economic independence.

For each plane of development there is a specific Montessori learning environment. Montessori environments for each plane maintain distinctive Montessori characteristics, including freedom of choice and movement, and an emphasis on independent exploration and self-directed learning. At the same time the design of each environment is customised to the specific needs, interests and potential of each developmental stage.

Within each plane of development there are periods during which children and young people display intense interest in a particular activity or aspect of the environment. These periods were called by Dr Montessori *sensitive periods* for learning, especially in the context of early childhood. The sensitive period for language, for example, is active during the first plane of development from birth to six years. This sensitive period provides a window of opportunity that enables children to learn language with ease and enjoyment. If, for any reason, a child does not learn to speak during this time, the sensitive period disappears and the learning of language requires much greater effort. The particular learning sensitivities and needs of children at each stage of development are reflected in the design of the Montessori environment and in the resources and activities prepared for that stage of development.

# The Prepared Environment

Montessori learning environments are prepared to enable infants, children and young people to learn through their own activity. As much freedom and independence as possible is given for their age and stage, in other words a level of freedom matched to their ability to regulate and discipline themselves. They are also provided with resources and activities that capture their interest and initiate cycles of purposeful activity requiring concentration and judgement.

In the Montessori view the development of infants, children and young people is stimulated by action, and interaction, within their environment. What is offered in the environment will, thus, largely determine how children develop intellectually, emotionally and spiritually. Educational research in recent decades, drawing on theories of place developed by cultural geographers, resonates with the significance Montessori educators over the last century have given to the role of the environment in human development (Ellis 2005; Tuan 1977).

The essential components of a Montessori learning environment are:
- the infants, children or young people
- the trained adults
- the physical surroundings, including the specially designed Montessori educational material.

Montessori learning environments are prepared to nurture children's natural tendency to work and their love of learning. They provide opportunities for children to engage in spontaneous, purposeful activities under the guidance of a trained adult. The design of a Montessori learning environment has four dimensions.
- The *physical* environment is characterised by furniture and implements, matched to the size and strength of the children, and by distinctive educational materials designed to precise specifications and matched to developmental stage.
- The *social* environment comprises a multi-age peer group, a trained teacher and trained teaching assistants as required. This dimension of the environment is designed so infants, children and young people can develop both as individuals and as social beings. It includes real-life activities that link them in meaningful ways to their home, community and culture, as well as activities that develop a concept of their place in the world and the wider Universe.
- The *time* environment is designed to give children the time they need to develop. Wherever possible the school day is made up of unbroken three-hour work periods, so children are able to follow their interests and to achieve their learning goals without being interrupted.
- The *emotional* environment is prepared so children always feel safe, secure and confident enough to follow their interests and to engage in deep concentration.

Preparation of the learning environment is a fundamental task of the Montessori teacher. This task is summarised by Mooney (2000: 29) in the following way:

> Montessori urged teachers not to interfere with the child's patterns and pace of learning. She thought it was the teacher's job to prepare the environment, provide appropriate materials, and then step back and allow time and space to experiment. Open ended scheduling, with large blocks of time for free work and play, is part of Montessori's legacy.

## Developmental Opportunities in the Prepared Environment

A Montessori prepared environment provides a range of developmental opportunities incorporating movement, challenging work, concentration and freedom.

### Movement

Montessori environments are prepared to reflect the understanding that movement is necessary for learning. From birth children strive to construct and refine two types of movement:
- whole body movement and gross motor equilibrium
- refinement of movement of the hand and fine motor hand-eye coordination.

The goal for young children is to bring both types of movement gradually under the control of the mind. Bringing movement under control of the mind is the foundation stone of the independence children and young people continue to develop throughout their formative years.

### Work

Montessori educators describe the spontaneous activity of infants, children and young people as work. When their activity is freely chosen and purposeful, children focus their attention on the activity in order to repeat and perfect what they are doing. As they work, they build their powers of concentration and judgement. Work of this type does not result from external direction; instead it arises out of children's interest, often linked to a sensitive period. This type of activity was described by Dr Montessori as 'work' in recognition of the sense of purpose infants, children and young people display during the activity and to lend dignity to the enormous task of creative self-construction that infants, children and young people are undertaking as they work. Montessori learning environments provide motives for purposeful work that engages and supports development.

### Concentration

When children concentrate, they are integrating all elements of their personality - movement, attention and judgement. They also build confidence in themselves and their ability to act on the world. In the Montessori view, concentration is a natural state of childhood, and, therefore, attainable by all children. The ability to concentrate learnt in early childhood becomes a valuable attribute that greatly enhances the educational experience of older children and adolescents. Deep concentration, at all ages and stages, is more likely to occur when interest reflecting developmental need guides the choice of activity.

### Freedom

From birth children are deeply interested in everything around them. They are driven to explore their world in the service of their own development. If they are to respond to this drive, children need the freedom to explore and discover their environment independently, and to engage their full attention on what interests them with a minimum of interference and interruption.

When infants, children and young people are given freedom in Montessori educational environments, they are free to think for themselves, to make judgements, and to manage the consequences of those judgements. They are free to expand their independence and to take responsibility commensurate with their level of independence.

In Montessori environments infants, children and young people are free to:

- choose activities from among those previously introduced
- work with activities for as long as their interest dictates and until an internal satisfaction is achieved
- choose their place of work and the people they work with
- communicate with others
- work without interruption
- develop their own individual work pattern.

Clear and unambiguous limits to children's freedom are also necessary to ensure their safety and the harmonious functioning of the learning environment, as well as their family and community. Infants, children and young people in Montessori environments are not free to disturb or harm others.

## Features of the Prepared Environment

Montessori prepared environments have two key features. They are beautiful and ordered, and they are designed for multi-age groupings.

### Beauty and Order

Montessori environments are prepared to be both beautiful and ordered.

The beauty of a Montessori environment arises from a combination of elements. Ideally, the room is light-filled, spacious and without clutter so children can move around the room with ease. The outdoor area is as attractive as the indoor area, and available to the children at all times. The design of the furniture is elegant and simple, and light enough for children to move around and arrange by themselves if they wish. The use of colour, fabric, decoration and music is simple and artistic, reflecting the aesthetic values of the children's cultural backgrounds, rather than the mass-produced culture of childhood promoted by media and commercial interests. In the Montessori view, an artistically beautiful environment inspires and uplifts children and helps them to concentrate.

Order and stability are also vital to children's sense of wellbeing. In early childhood, children depend a great deal on external order in the environment to support the construction of an emerging internal mental order. For this reason, during early childhood, children need an ordered, predictable environment from which they can derive meaning and in which they are able to build knowledge and understanding of the world and their place in it. An ordered environment in early childhood helps children construct a stable, internal order.

Over the age of six, children become very interested in expanding the order they have previously internalised, for example, by:

- classifying the world using knowledge systems derived from the educational disciplines
- understanding time and change
- building a sense of moral order
- learning to think in abstractions.

Adolescents, in turn, are interested in applying their knowledge and understanding in practical ways that reflect occupations in the wider community.

## Multi-age Groupings

Montessori environments are prepared for multi-age groupings of children. These groupings operate very like family environments, providing key learning and development opportunities in two ways. First, multi-age groupings encourage children to aspire to the achievements of older peers. New students enter an established and mature environment with effective models of both work and social interaction. Second, multi-age groupings enable older children to learn to treat younger ones with care and respect, providing them with opportunities to reinforce their own learning and understanding through 'peer teaching'. In multi-age groupings children are able to work through the curriculum at their own pace without being limited to one year of the curriculum only.

There are Montessori environments prepared for the following multi-age groupings:

- the *Nido* (early childhood setting for children from birth to children who are walking independently, approximately 15-18 months)
- the *Infant Community* (early childhood setting for children who are walking independently i.e. from 15-18 months to 3 years)
- the *Children's House* (preschool, and/or long day setting for children from 3 to 6 years)
- the primary school (a classroom for children aged from 6 to 9 years and a classroom for children aged 9 to 12 years, or one classroom for children aged from 6 to12 years)
- the secondary school (a learning environment for students aged from 12 to 15 and a learning environment for students aged from 15 to 18 years)

The advantages of multi-age grouping include the following:

- the opportunity to experience three roles i.e. being the youngest, in the middle and the oldest, and the time to develop appropriate behaviours for all three roles
- experiences that stimulate a sense of caring and responsibility for others and the continuation from year to year of the culture of the class as a caring community
- experience of social cohesion and a sense of place gained from being in the same environment for three years
- exposure to a diversity of talents, aptitudes and interests, and a wide curriculum beyond a single year
- participation in peer teaching

- experience of appropriate behaviour and teaching and learning modelled from a broad age range of their peers
- development of self-esteem and a greater understanding of community responsibility from roles as leaders in the group
- groupings of similar interests and learning needs from across the age groups working together at their own pace
- work in the environment prepared for a broad age range, so students can see the whole progression of the curriculum for their group, progress independently in areas of strength and also revisit areas of knowledge comfortably as required
- experience of stability and social cohesion with the same teacher within a stable community for three years
- new students join a community that is already formed, and the teacher builds a solid relationship with each one.
- individual learning is more effectively supported because there is more opportunity for teachers to know the students well
- close knowledge by the teacher of approximately two thirds of the children in the class at the beginning of each new school year, providing ample opportunity to build strong relationships with the new one third who arrive each year.
- younger children observe materials and procedures used by older children, so they already have some familiarity with the materials, procedures and knowledge before the teacher gives them the lesson directly

Contemporary studies in neuroscience support the value of multi-age groupings in educational settings, as argued by Geake (2009: 184) in the following way:

> A school of the future will be structured around multi-age classes within a vertical curriculum structure that has children moving between academic levels for different subjects as needs be. Since brain development is driven by life experiences, rather than chronological age *per se*, individual children's learning needs are best addressed by having them engage in appropriate curriculum for their stage of learning readiness, …

## Elements of the Prepared Environment

The Montessori prepared environment has three main elements:
- the infants, children or young people
- the Montessori teacher (and trained assistant/s as required)
- the Montessori materials.

### The Children

The principles and practice of the Montessori approach have emerged from observing the activity of communities of children in prepared environments. At each stage of development the physical, emotional, psychological, social and intellectual needs of the children govern the preparation of the environment, as well as the design of the materials placed in the environment and the activities offered to the children. Each stage of development offers children a unique opportunity for self-construction. In the Montessori view, if children are able to achieve the promise and potential of their present stage of development, their chance of fulfilling their future potential becomes far more assured.

The 'essential condition' for child development is, in the words of Dr Montessori (1973/1948: 24), 'freedom to act in a prepared environment where the child can be intelligently active'. Children's self-chosen activity is the catalyst for learning in a Montessori environment; in other words, learning is a function of children's active choices motivated by interest.

Montessori environments are prepared for *communities* of children. In other words, they are prepared to encourage children to be responsible and caring citizens able to be a part of a community of peers in preparation for becoming active and contributing members of the wider community. The community of children also provides what, in an era of falling birth rate and single child families, might be called 'pseudo siblings'.

Montessori environments adapt easily to meet the needs of children from diverse cultural and socio-economic contexts, as well as children with special needs and gifts. Montessori educators believe that all children in the community benefit from an inclusive approach. The curriculum is child-centred and customised in ways that create an individual learning pathway for each child.

The starting point for learning is always what individual children know and can do. Learning is then broken down into clear, incremental steps, scaffolded by the Montessori materials and exercises. In each content area individual children are given as much opportunity as they need for repetition, consolidation, application and extension. In this way children become confident learners, willing to take on intellectual challenges, to solve problems and to persevere until they have mastered elements of the curriculum.

## The Montessori Teacher

The Montessori teacher's role is to connect the children with the Montessori prepared environment. In general terms the teacher's role includes:

- preparing the learning environment
- linking the children to appropriate and challenging activities
- leaving children free to engage in an activity until their interest is satisfied, only assisting where required.
- coordinating the dynamic balance between freedom and discipline
- recording children's progress and achievement

Montessori teachers develop warm and supportive relationships with children, marked by respect for the children's abilities and individual developmental needs. While children in the Montessori environment are not given unfettered freedom, they are free to choose their own work. The teacher respects children's work choices, ensuring individual choice does not become secondary to group activities.

Montessori teachers are trained to observe children's interests and activity carefully. The way Montessori teachers observe children's activity can be compared to the 'fluid rather than static' approach to observation advocated by Fleer and Surman (2006: 145) for teachers working in early childhood settings. Knowing how to observe constructively and when, and how much, or how little, to intervene, is one of the most important talents the Montessori teacher acquires during a rigorous course of training. Close observation provides the evidence teachers use to make decisions about how to foster children's interests and meet children's learning needs. Observation is also used to monitor children's progress.

On the basis of their observations Montessori teachers introduce developmentally appropriate challenges by showing children how to work with Montessori materials matched to their current needs and interests. For this reason, Montessori teachers must know the scope, sequence and use of the Montessori materials in sufficient detail to be able to select and present lessons effectively at point of need. The repertoire of Montessori activities and exercises across the curriculum for each stage of development is extensive. Montessori teachers draw on this repertoire as they strive to offer just the right lesson or activity to each child at just the right moment.

In the context of literacy education Snow, Burns and Griffin (1998 executive summary, cited in Freebody 2007: 59) point out that 'the identical mix of instructional materials and strategies' do not 'work for each and every child'. Drawing on their research findings, they argue that 'effective teachers are able to craft a special mix of instructional ingredients for every child they work with' chosen from 'a common menu of materials, strategies and environments'. This is the approach used by Montessori teachers in all content areas for children and young people at all stages of development.

Montessori teachers consult regularly with parents throughout each three-year stage. When necessary, Montessori teachers also work closely with other professionals, including, for example, speech pathologists, occupational therapists and specialist curriculum consultants.

Montessori teachers have Montessori qualifications for one, or more, developmental phases (birth to three, three to six, six to twelve) as well as teaching qualifications recognised by state educational authorities. Each Montessori teacher-training course comprises a full academic year, or equivalent, of a study of the Montessori method as well as Montessori professional experience through practicum.

## The Montessori Materials

The preparation of each Montessori environment includes the careful preparation of the Montessori developmental materials appropriate to that environment. The Montessori materials are sets of objects, each set designed to exacting specifications. In general the materials are designed to:

- capture interest
- invite interaction and manipulation
- encourage precise use
- extend concentration
- challenge the intellect act as an indirect preparation for future experiences.

Children are shown how to use the materials in concise, but very precise lessons, called presentations. Once children have had a presentation and know how to use a set of materials, they are then free to work with the activities and exercises aligned with those materials as often and for as long as they wish. Many of the materials have an inbuilt control of error, thus enabling children to learn independently with a minimum of adult help. As a result, from an early age, children in Montessori settings build confidence in their own abilities and learn to take responsibility for their own learning.

While many of the presentations used in Montessori environments show children how to use the materials, there are also Montessori presentations that show children how to build skills and knowledge without using materials, for example, lessons in movement, social relations or singing.

There are Montessori materials designed to engage children in all areas of human experience and educational learning, including language and literacy, mathematics, visual and performing arts, music, science, biology, geography and history. The materials embody abstract educational concepts, allowing children to discover these concepts through manipulation, exploration and problem-solving. The result is a deeper understanding and more effective recall of what has been learned. This process is described by Feez (2010: 168), in the context of Montessori early childhood education, in the following way:

> Montessori pedagogy is built around sets of objects that 'materialize' educational knowledge in a concrete form children can manipulate with their hands. Children are shown how to use the objects and they are given very exact language to talk about the concepts the objects materialize. After the lesson children are free to work with the objects whenever they choose. Because the objects 'remember' the concepts in a form children can, literally, 'grasp', when children do choose to work with the objects, they are able to do so independently and for extended periods of time. As children grasp and manipulate the objects with their hands, they are learning how to grasp and manipulate the corresponding concepts in their minds.

The Montessori materials are on constant display on open shelves. The materials of each content area are displayed in the sequence they are presented to the children. For this reason, a fully equipped Montessori environment can be said to embody the scope and sequence of the Montessori curriculum for that stage. The children choose from the shelf, at any time, the materials they know how to use. When children are shown how to use the materials, they are also shown how to handle the materials carefully and how to return them to their place once they have finished. Many, though not all, of the materials are designed for individual use, and a common sight in a Montessori early childhood environment is a number of children working with great absorption on individual activities they have chosen themselves, their space and concentration respected by others in their group. As children grow older and make the transition to the primary school, increasingly they work cooperatively on learning activities, research projects, whole-class projects or community projects. Adolescents engage in occupations that reflect the life of the wider society.

# Montessori Pedagogy

The principles that underpin Montessori pedagogy have emerged from observing children's activity and monitoring teaching practice in Montessori learning environments in many parts of the world for more than a century. In other words, the theory has emerged from many decades of practice.

In recent decades a growing body of research has begun to articulate the principles behind Montessori pedagogy in terms recognisable to contemporary educators. This literature includes comparisons of Montessori principles with recent insights into child development and with the characteristics of quality teaching, as well as comparisons of Montessori educational outcomes with national and international benchmarks of educational achievement. Montessori principles and educational outcomes stand up well under this scrutiny, and are being shown to have anticipated many educational goals, issues and understandings that are emerging as important in the twenty-first century. (See, for example, Chisnall and Maher 2007; Cossentino 2005, 2006; Cunningham 2000; Feez 2008, 2010; Foschi 2008; Hughes cited in Schmidt 2009: 85-6; Lillard 2005; Lillard and Else-Quest 2006; Martin 1994; Torrence and Chattin-McNicholls 2005) A review of the literature also reveals interest in the Montessori materials by designers of tangible technologies and digital manipulatives. (For example, Leone 2004; O'Malley and Fraser 2004; Zuckerman, Arida and Resnick 2005)

The ideas that underpin the learning outcomes, teaching and learning practices, assessment and evaluation found in Montessori learning environments have been summarised in the following *Eight Principles of Montessori Education,* identified in research published by Lillard (2005: 29):

- Movement and cognition are closely entwined, and movement can enhance thinking and learning.
- Learning and well-being are improved when people have a sense of control over their lives.
- People learn better when they are interested in what they are learning.
- Tying extrinsic rewards to an activity, like money for reading or high grades for tests, negatively impacts motivation to engage in that activity when the reward is withdrawn.
- Collaborative arrangements can be very conducive to learning.
- Learning situated in meaningful contexts is often deeper and richer than learning in abstract contexts.
- Particular forms of adult interaction are associated with more optimal child outcomes.
- Order in the environment is beneficial to children.

## Teaching and Learning Practices

Drawing on more than one hundred years of experience and experimentation, Montessori educators identify stages of physical, psychological, intellectual and social development, and prepare learning environments and curriculum content suitable for each stage. This knowledge, combined with the teacher's observations and record-keeping, enable Montessori teachers to design lessons that meet the needs of individual children in the Montessori environment at any moment in time. In this way the Montessori curriculum is matched to the readiness and interest of individual children, rather than expecting children to adapt themselves to the curriculum. The teaching and learning practices that result are distinctive. Here are some key features of Montessori teaching and learning.

- The children learn how to use the Montessori materials by watching the teacher demonstrate their use in an exact and precise way. When the children use the materials in the way that shows they understand how to proceed, they are able, through their own work, to discover the concepts inherent in the materials. In this way the children construct their own knowledge and understanding.
- In both the *Infant Community* and the *Children's House* levels, most lessons are given to individuals. After the age of six children who are ready for the same lesson are grouped together and most lessons are presented to small groups. In a multi-age setting this means that younger children have many opportunities to observe lessons presented to older children and the follow-up work done by the older children after the lessons. By the time the younger children are ready for these lessons, they are already familiar with the materials and the activities.
- In all Montessori environments, for all ages and stages, the activities demonstrated or offered by the adult are open-ended. Children are then free to repeat any activity until an inner satisfaction is achieved. Children younger than six usually repeat an activity over and over in the same manner until they reach the level of perfection that produces an inner satisfaction. Children over the age of six usually repeat with plenty of variation and by augmenting the activity. This may result in a 'great work' that gives children of this age a feeling of great accomplishment and satisfaction. Adolescents enjoy participating in socially-valuable projects

in which they have the opportunity to work as apprentices alongside experts of all ages from the wider community.

- In the *Children's House* children tend to work alone as they construct themselves as individuals. When they begin to prefer working in a cooperative manner with other children, it is a sign that they are beginning to take on the characteristics of children ready for the classroom for six to nine year olds. From six to nine years of age children spend a great deal of time working together with others. It is a time when they are learning how to be part of a group and how to work as a team.
- From the age of six children in Montessori classrooms take part in regular individual conferences with the teacher. In these conferences the teacher helps children to develop their ability to evaluate their own work. The last question always asked at the end of an individual conference is: 'Is there a lesson you would like to have that we have not talked about?' In this way children are helped to take ownership of their own educational process. Similarly, adolescents are also encouraged to take ownership of their own educational development. The progress adolescents make through the curriculum is assessed by reference to criteria which the students are aware of from the beginning of the programme. Students use these criteria throughout the programme of study to monitor their own progress. The emphasis is on the progress of the individual and not on comparison with the progress of others. The absence of competition means that adolescents view the assessment process as fair.

## Assessment and Evaluation

The Montessori curriculum is organised in a developmental sequence from one phase of learning to the next. Individual students, however, are able to work successfully through elements of the curriculum in a sequence unique to themselves. For this reason, comparisons between students may not be meaningful. The validity of norm-referenced assessment and the ranking of students are further reduced in the Montessori context because, in a multi-age classroom, there are comparatively small numbers of children at the same age and stage. Assessment in Montessori classrooms, therefore, is based on each student's mastery of skills and knowledge at any point in the sequence, rather than on norm-referenced assessment.

Children display their progress and achievement through a variety of modes, including spoken and written language, interaction with others, creative arts such as drama, visual arts, model-making and, importantly, through applying what they have learned in practical ways.

### Formative Assessment

Montessori teachers keep careful records to ensure the students are provided with appropriate lessons when they are ready. Daily observation of students and detailed record-keeping help teachers plan the lessons individuals will need next. A Montessori teacher keeps records of:

- lessons given
- the follow up work completed by each student
- student progress and achievement
- difficulties encountered by individual students and how those difficulties were resolved

Montessori teaching and learning practices provide enhanced opportunities for formative assessment. Here are some examples:

- Because teachers have children in their class for three years, they come to know each child in a way that is not possible when children move to a new class with a new teacher every school year. Through close observation over three years Montessori teachers become very aware of their students' learning styles, strengths and areas requiring further development.
- Because most lessons are presented to individuals or small groups, the teacher can easily observe and record levels of understanding and mastery in individuals. Before a lesson draws to a close, all children in the lesson are given the opportunity to show they know how to use the materials. Any student who needs further teaching can review the lesson when it is presented to the next group of students ready for the lesson.
- Because so many of the materials are self-correcting, when children have completed the exercises with the materials successfully, both the teacher and the children know that they have mastered the knowledge, skills and understanding designed into the material. The design of the materials also ensures that children are able to work out for themselves when something is not right. They then know they can ask for another lesson,

or repeat the activity until they have mastered it. In this way children come to think of making mistakes as their 'friend', because a mistake is an opportunity for further learning and deeper understanding.
- When children choose their own work, they reveal a great deal about their interests and abilities at any point in time, which teachers are then able to observe and record.
- During regular individual conferences with the teacher students over the age of six become co-assessors of their work with the teacher. By the time they reach the adolescent programme, students monitor their own progress by reference to explicit criteria.

### Summative Assessment

Learner achievement in Montessori classrooms is recorded through observation, the compilation of portfolios and detailed records of progress. Progress can also be measured against achievement benchmarks - or standards-based criteria. In these ways each student's progress can be expressed in terms meaningful to the student, as well as to teachers, parents and the wider community.

While formal testing can be used in a Montessori setting, it is used sparingly and with sufficient contextualisation that all children understand the need for the assessment. Children like to display their knowledge and often ask for tests, for example, in spelling words. Their pride in achievement and their sense of striving for higher goals motivate the testing, rather than a need to submit to a curriculum demand.

Montessori education is designed to meet the needs and interests of individual children. One important need is for children to become valued and contributing members of the culture in which they live. To address this need, Montessori teachers compare the demands of the curriculum mandated by the authorities to the traditional Montessori curriculum. Any areas of the mandated curriculum not covered by the Montessori curriculum are incorporated into the teaching and learning in the Montessori environment. This is most effectively achieved when the new items are offered using the presentation style of the traditional Montessori curriculum.

## The Montessori Vision

In 1947, as the world was recovering from the destruction and tragedy of World War II, Dr Montessori wrote a letter to world governments describing the role children play in human history and society.

> Through the study of children I have scrutinised human nature at its origin both in the East and the West and although it is forty years now since I began my work, childhood still seems to me an inexhaustible source of revelations and—let me say—hope.
>
> Childhood has shown me that all humanity is one. All children talk, no matter what their race or their circumstances or their family, more or less at the same age; they walk, change their teeth, etc. at certain fixed periods of their life. In other aspects also, especially in the psychical field, they are just as similar, just as susceptible.
>
> Children are the constructors of [adults] whom they build, taking from the environment language, religion, customs and the peculiarities not only … of the nation, but even of a special district in which they develop.
>
> ...The child is the forgotten citizen, and yet, if statesmen and educationists once came to realise the terrific force that is in childhood for good or for evil, I feel they would give it priority above everything else. All problems of humanity depend on [humans themselves]; if [humans are] disregarded in [their] construction, the problems will never be solved.
>
> ...[Humans] must be cultivated from the beginning of life when the great powers of nature are at work. It is then that one can hope to plan for a better international understanding.

The Montessori curriculum represents a detailed proposal for achieving Dr Montessori's vision, a vision shared by Montessori educators throughout the world. This vision underpins the Montessori National Curriculum prepared for Australian Montessori schools. More specifically, the curriculum has been developed as the Australian Montessori community's contribution not only to the richness and diversity of schooling in Australia but also to the achievement of the Educational Goals for Young Australians (Australian Education Ministers Declaration, 2008) of promoting equity and excellence in Australian schooling, and supporting young Australians to be successful learners, confident and creative individuals and active and informed citizens.

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# Montessori National Curriculum for the First Plane of Development from Birth to Six Years

MONTESSORI AUSTRALIA

# Montessori Early Years Learning Programme for the First Plane of Development from Birth to Six Years

## The Montessori Early Years Learning Programme: Introduction

### The First Plane of Development

The first six years of life is a period of profound transformation, from apparently helpless newborn to capable, active and articulate six year old. This period of life lays down the foundation on which is built the future adult's potential.

From *birth to three years* of age the physical development of infants is remarkable, inspiring the attention and care of both family and community. In tandem with their physical development, infants are developing psychologically, socially, intellectually and spiritually. During this time they acquire the culture and language of the community into which they are born. This multi-faceted development is accommodated in the Montessori environments prepared for children of this age. Specifically, Montessori learning environments for this age group are designed to foster independence, psycho-sensory-motor development and language development.

Between the ages of *three to six years* children continue the process of self-construction, consolidating, refining and adding to the skills and knowledge they accumulated before the age of three. From the age of three children become conscious of what they are learning through their own freely chosen activity, especially activity with their hands. Montessori environments prepared for this age group provide children with *motives for activity* through which they refine their perception, movement and language, and become independent in everyday life. The extensive repertoire of meticulously designed Montessori materials and exercises offered to the children represent a learning programme organised as an incremental progression of activities. Within this framework children are free to choose their own work, once they have been shown how to use the materials and how to do the exercises.

Children's learning in Montessori early childhood settings falls within the following definition of play-based learning found in the *Early Years Learning Framework for Australia* (DEEWR 2009: 6):

> … learning through which children organise and make sense of their social worlds, as they engage actively with people, objects and representations.

In addition, the advantage of the distinctive features of Montessori early childhood settings are supported by evidence emerging in the research literature. For example, children at age seven show improved language development and cognitive outcomes if they have participated in early childhood settings where activities are child-initiated and selected from a wide variety of available equipment and materials, and where free choice predominates over whole group activities (Montie, Xiang and Schweinhart 2006). Furthermore, the incremental repertoire of Montessori materials and activities addresses some of the concerns raised by researchers in early childhood education in relation to the difficulties teachers can experience in implementing a play-based curriculum (Bennett, Wood and Rogers 1997; Wood and Bennett 2000).

### Characteristics of the First Plane of Development

The *first plane of development* spans the period from birth to approximately age six. During this stage children become functionally independent; they learn to control their movement, to communicate and to work with their hands. Children during this period are also sensory explorers. They use their senses to absorb every aspect of the environment, their language and culture, in the process constructing their own intellects.

Development during this plane is shaped by the special capacity children of this age have for learning and absorbing vast amounts of information, a capacity described by Montessori educators as the *absorbent mind*. The way young children learn is unique to this stage of life. During this plane of development, without being conscious they are learning, children 'absorb' impressions from the environment, impressions that construct their mind and intellect and enable them to adapt to their time and place in history.

Throughout this plane of development children experience periods during which they display heightened sensitivity to, or interest in, particular aspects of the environment. These periods, named *sensitive periods* by Montessori educators, represent windows of opportunity during which children's intense interest, and the spontaneous activity this interest generates, enable children to learn the corresponding knowledge and skill with ease and enjoyment. Montessori educators observe children closely for signs of sensitive periods. They use these observations as a guide to help them choose the optimum time for offering children lessons and activities in, for example, social skills, the refinement of movement and sensory perception, language and mathematics.

The first plane of development is a time of enormous *physical development*. By the age of six children have gained a *functional independence*; they can talk and communicate their needs; they can walk, climb, run and jump by themselves, feed and dress themselves and manage their own toileting. They move with balance and coordination, and are refining the precision and dexterity with which they use their hands. Children's hands, Dr Montessori (1982/1949: 23) argued, are the 'instruments' of their intelligence. In other words, as children refine control of their hand, they are also refining the development of their minds. The importance of having activities in the environment that interest children and that involve the use of their hands is described by Dr Montessori in the following way:

> The ability of a thing to attract the interest of the child does not depend so much upon the quality of the thing itself as upon the opportunity it affords the child for action … it is not enough that a thing should be interesting in itself but that it must lend itself to the motor activity of the child if it is to be interesting to him. There must be, for example, small objects that can be moved from their places. It is then that a child begins to move his hand rather than the objects. A child is delighted to make and unmake something, to place and replace things many times over and continue the process for a long time. A very beautiful toy, an attractive picture, a wonderful story, can, without doubt, rouse a child's interest, but if he may simply look at or listen to, or touch an object but dares not move it, his interest will be superficial and pass from object to object. That is why the environment is so arranged that it lends itself to a child's desire to be active (1967/1948: 104).

Aligned with physical development is *social and emotional development*, development that is enhanced by nurturing, secure environments at home and in early childhood settings. Learning how to be social emerges naturally and spontaneously in the multi-age, mini-communities found in Montessori environments. In these communities older children have the opportunity to be sensitive to the needs of others, while younger children feel able to seek help at any time. In addition, lessons in *grace and courtesy* provide opportunities for young children to practice appropriate social behaviour in a fun and instructive way without public reprimand.

Children from birth to the age of six learn through their senses. Using their senses, they gain first impressions and understandings of the world, impressions and understandings that become woven into the fabric of their minds. This principle, first proposed by Aristotle, is traditionally summarised in the following way: 'There is nothing in the mind that is not first in the senses.'

The first six years of life is a time of rapidly expanding *mental development*. In recent times neuroscientists have begun to describe the development of neurological networks in young children (OECD CERI 2007) and to emphasise the importance of favourable social and physical environments to support this development. Montessori prepared environments provide children with an environment that enhances the construction of the mind and the intellect, for example, by providing concrete materials through which children begin to classify the world around them while learning language for talking about these early classification systems. This work becomes the foundation for learning during the primary school years when ordered systems of abstract knowledge and the imagination become the tools children use for thinking.

Babies are born with a strong urge to *communicate* and to express themselves. By age six children have acquired language, not only spoken language, but also the fundamental skills of writing and reading. At the same time children are using a *mathematical mind* as evidenced by their need for order and sequence and the drive for precision and accuracy. During the first six years of life children construct a foundation for later studies in arithmetic and geometry.

In summary, during the first six years of life young children learn to function independently, to move with control, to communicate and to concentrate. At no other time in children's lives will they be able to develop in

so many significant ways so easily and well. By the age of six children have become socially adapted to their time and place in human history and culture.

## Montessori Prepared Environments for the Early Years

> Beautiful, orderly, child-sized environments and sensory play are part of Montessori's legacy… Montessori thought that early childhood teachers should: provide real tools that work; keep materials and equipment accessible to the children so they can find and put away what they need; and create beauty and order in the classroom (Mooney 2000: 25).

### *The Nido* and *Infants Community*: Environments Prepared for Infants and Toddlers under Three

Montessori environments for infants and toddlers are prepared to be as homelike as possible, and to involve small children in a round of daily activities including quiet times and rest periods. The characteristics of these environments include:

- continuity of care
- an ordered physical environment
- consistency of activity and expectation.

In environments with these characteristics infants build a sense of security, a sense of order and a sense of time. Continuity of care lays the foundation for emotional and social wellbeing. If infants interact with the same people day after day, they feel secure, and they have the opportunity to build lasting relationships and social bonds they can depend on.

An ordered physical environment lays the foundation of an ordered mind. If infants find things in the same place day after day, they learn to recognise those things and where they belong. In such an environment children grow confident in their ability to know and memorise things, in other words, they become confident in their own intellectual capacity.

Similarly, consistency of activity contributes to children's security and intellectual confidence. A daily routine develops in infants an understanding of the passing of time. If, day after day, infants follow the same routines at the same time and the same places, they have further opportunity to discover that they know something when they recognise familiar things and events. If infants take part in the same activities, in the same order day after day, they further consolidate their sense of security, order and time.

There are two prepared environments for infants and toddlers under the age of three years:

- The *Nido,* or *nest*, is a nurturing home-like environment for infants from 2 to 3 months until they are walking independently (around 15/18 months).
- The *Infant Community* is an educational environment prepared for toddlers from the time they are walking independently until they are approximately three years of age. It is a nurturing environment where very young children experience their first structured contact with other children. The focus of the environment is to offer children activity that supports the development of voluntary, controlled movement, spoken language and independence in daily life.

Both these environments are organized and directed by a Montessori trained adult called an *Assistant to Infancy*. *Nidos* and *Infant Communities* can be prepared so children can attend on their own (for example, in sessional or long day care) or so parents can accompany the children. When parents accompany children to the *Nido*, the group is often called a 'parent-infant group'. When parents accompany children to the *Infant Community*, the group is often called a 'parent-toddler group'. The accompanying parents gain information about ways to interact with children based on the modelling of this behaviour provided by the staff. In addition, in this environment parent and child experience a protected time in which their relationship to each other can deepen and grow.

Activities in Montessori environments for children under the age of three are related to real life. They provide children with opportunities to develop voluntary, controlled movement, independence in daily life and spoken language.

Order is a feature of all Montessori early childhood environments. The ability of the child to create order from the stimuli of the environment is an essential factor in normal development from birth to three years.

In addition, parent information sessions and literature also provide an essential component of Montessori early childhood environments prepared for infants and toddlers.

### *The Children's House*: An Environment Prepared for Children Aged from Three to Six Years

The Montessori environment prepared for preschool children from three to six years of age is called the *Children's House*. The *Children's House* is prepared to be homelike, welcoming, aesthetically pleasing and orderly so children come to think of the setting as a 'mini-community' where they learn skills they can apply at home and in the wider community. Cooperation, rather than competition, is encouraged.

The ordered *Children's House* environment provides children with structure and predictability, and helps them orient themselves both to the physical environment of the *Children's House* and to the multi-age 'mini-community' within the environment. There is a strong emphasis on children developing the independence, cooperation and skills for daily living that enable each one to become a valued and independent member of the *Children's House* community. The resources and activities in the *Children's House* are designed to:

- develop coordination of movement
- develop independence
- develop the ability to make informed decisions
- lengthen the amount of time a child can engage in deep concentration
- refine the use of the senses
- encourage exploration
- build social skills
- develop oral communication skills
- develop written communication and the foundations of joyful reading
- develop an understanding of mathematical concepts

The materials in the *Children's House* are displayed on open shelves, always accessible to the children. The children work with these materials during work sessions that are ideally a minimum of three hours in duration with no fixed breaks. In this way children are able to develop and follow their own natural rhythm of activity and rest without unnecessary interruptions.

The prepared environment of the *Children's House* incorporates indoor and outdoor spaces. Both spaces complement each other and are available to the children at all times. The majority of Montessori educational materials are commonly displayed in the indoor environment but their use is not restricted to the indoor environment. *Practical life* activities are part of both the indoor and outdoor environments. Children may also choose to work with materials in the *sensorial*, *mathematics* or *language* areas in the outside environment as long as they are using the materials for the educational purpose for which they have been designed. In addition the outdoor environment includes gardens (both wild and planted), which children care for, and in which they develop a growing awareness of the importance of the natural environment to the well-being of all living things. Activities in the outdoor environment of the *Children's House* develop in children an appreciation of the natural world and an awareness of its importance to the wellbeing of all living things including themselves, as well as a beginning understanding of the important role of human beings in caring for the natural environment.

For this age group lessons are usually given to individual children. Once children have been given a lesson, the activity is added to their repertoire of possible activities and they are free to choose that activity whenever they wish. Small group activities include games used to extend earlier lessons, and language games. Children are invited to join group activities, but are not required to participate. In a mixed age group, older children can validate their learning by becoming the 'experts' in the room. Peer teaching occurs when the older children share their knowledge and skills, take on the role of the caretakers of the classroom and provide role models for younger children. Younger children find a group of willing people ready to help them when help is required. They are also further inspired and motivated to learn as they see older children working on the next step in the progression of lessons.

Freedom of choice is a central feature of the *Children's House* environment. Children learn that free choice carries with it responsibilities and consequences, understandings that become increasingly important as they move through the later school years towards adult life.

There is a strong emphasis in the *Children's House* on the development of independence, cooperation and the skills for daily life that will enable each individual to become a valued and autonomous member of his or her community. For example, in the *practical life* area of the *Children's House*, children can choose from activities such as preparing snacks for themselves and others, laying and clearing the table, and cleaning up. They learn, under strict adult supervision, to use child-sized tools, including knives and glassware, safely and effectively. In the *sensorial* area children fine-tune perception, discrimination and judgement. In the *language* and *mathematics* areas children are introduced to literacy and numeracy skills. As they work through the language activities, children extend emergent and beginning literacy skills leading to fluency in both writing and reading. Mathematics activities lead children from early counting and matching experiences towards increasing understanding of number patterns, the four operations, number facts and two- and three-dimensional shapes. In general teacher/child ratios are carefully planned in the *Children's House* so there is just enough support for the children, but not too much interference from adults in the children's activity. Children are encouraged to be self-reliant, or to solve problems with their peers with as little adult intervention as possible. In this way children develop self-assurance and self-esteem.

Incorporated into the four areas of the *Children's House* curriculum are materials, activities and exercises that introduce children to *visual arts*, *music*, *physical education*, *science*, *geography* and *history*. Montessori educators sometimes say that the *Children's House* is designed to bring the world to the child. For example, in the *Children's House* children listen to stories and learn songs and dances from their own country and around the world, while participating in related *visual arts* activities. They also work with globes, maps, land and water forms, and collections of pictures of life in different cultures. Cultural studies of this type are interspersed within the four main areas of the *Children's House*, particularly within the *sensorial* and *language* areas.

# The Montessori Early Years Learning Programme Birth to Three Years: *The Nido* and *Infant Community*

The Montessori Early Years Learning Programme from birth to three years focuses on the development of movement, language and independence. Attention is also paid to parent education, family support and community outreach. The *Nido*, the Montessori environment prepared for infants who are not yet walking, focuses especially on the development of movement and language. Structured language activities and activities to promote independence and continued development of movement are a feature of the *Infant Community*, the Montessori environment prepared for toddlers. Development of movement continues to be very important in the *Infant Community*, particularly in the outdoor activities. There is also a focus on continued refinement of hand skills.

Overall the Montessori Early Years Programme aims to provide infants and toddlers with learning environments in which they are valued and contributing members of a mini-community. Within this nurturing community infants and toddlers have the opportunity to develop confidence and a love of learning. In addition, the environment provides many opportunities for children to learn how to communicate with others in spoken language, and for early explorations of the wider natural, social and cultural world.

## Development of Movement

Montessori environments prepared for infants and toddlers emphasise the development and refinement of voluntary movement. Activities are designed to help infants and toddlers bring their movement under the control of the mind, at the same time as they increase their independence in the environment. These activities include exercises for building whole body coordination, control of the hand and hand-eye coordination.

Montessori infant-toddler settings include activities designed to support *psycho-sensory-motor development*. The term *psycho-sensory-motor development* refers to the changes in the infant's brain brought about by sensory-motor experiences. As infants build motor skills, and use their senses to explore the environment, there are corresponding changes in the developing brain. Repetition of movement and the use of the senses help to strengthen neuro-pathways, thus, enhancing the infant's potential in all areas of development.

| Content Strand | Knowledge, Skills and Understanding | Material/Activity |
|---|---|---|
| | *Typically children will:* | |
| **Development of equilibrium: in supine position** | Move head and eyes to look at an object<br><br>Transfer objects from hand to hand<br><br>Bring knees then feet up to mouth<br><br>Roll onto front using left/right side<br><br>Cross the midline | Resources include:<br>- movement mat<br>- mobiles<br>- interlocking circles<br>- interlocking rings<br>- mirror<br>- grasping mobiles. |
| **Development of equilibrium: in prone position** | Lie with arms and legs tucked under body<br><br>Put weight on elbows<br><br>Lift head<br><br>Put weight on one elbow and play with other hand<br><br>Roll onto back using left/right side<br><br>Commando crawl using diagonal cross pattern<br><br>Get up on all fours | Resources include:<br>- movement mat<br>- rattles<br>- mirror<br>- floor space. |
| **Control and coordination of body movement** | Learn to control and coordinate movement of body:<br><br>Put self into sitting position<br><br>Pull to stand<br><br>Crawl<br><br>Cruise<br><br>Stand<br><br>Walk<br><br>Sit on a chair | Resources include:<br>- punch ball<br>- cylinder with ball<br>- ottoman<br>- bar and mirror<br>- low heavy table<br>- kiosk with bars<br>- push cart<br>- pull cart<br>- stairs<br>- weaning chair<br>- low slatted chair. |
| | Develop and consolidate skills including:<br>- Running<br>- Jumping<br>- Climbing<br>- Swinging from arm to arm (brachiation) | Resources include:<br>- ramps<br>- climbing frames<br>- ropes<br>- swings<br>- ladders<br>- beams<br>- balls<br>- wagons<br>- wheelbarrows<br>- brachiation bars<br>- pulley lifters and weighted bags<br>- Implements for sweeping, mopping, raking and gardening. |

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| **Development of the hand grasp** | Develop control of the hand | Resources include batting and grasping mobiles made of, for example:<br>- soft balls<br>- wooden balls<br>- wooden figures<br>- bell or ring on a ribbon. |
| | Explore and develop the capacities of the hand leading to development of the hand grasp and fine motor control | Resources include:<br>- ball and tray or drawer<br>- rings on a spindle<br>- box with bins<br>- cube in box<br>- containers to open and close<br>- peg box<br>- balls<br>- preparing food<br>- sand play<br>- cutting with scissors. |
| | Hold and shake rattles successfully | Resources include handmade rattles small enough for a baby's hand to grasp, hold and shake. |
| **Tactile stimulation** | Discriminate objects by sense of touch | Resources are tactile objects for manipulation including:<br>- interlocking discs<br>- beads on a strap<br>- interlocking rings<br>- wooden articles in a<br>- variety of shapes<br>- objects from the home. |
| **Eye-hand coordination** | Develop control of the hand (from batting to a mature pincer grip)<br><br>Coordinate eye and hand movements<br><br>Cross the midline while working<br><br>Use two hands together<br><br>Transfer objects from hand to hand | Resources are psycho-sensory-motor materials, including:<br>- punch ball<br>- box with knitted ball<br>- box with other balls<br>- ring on rocking base<br>- ring on stable base<br>- rings on a peg<br>- rings on a spindle<br>- graded rings<br>- nuts and bolts<br>- furniture with drawers, locks and keys<br>- peg box<br>- cubes and discs on vertical and horizontal dowels<br>- egg in a cup<br>- cube in a box<br>- beads for stringing<br>- box with different shapes for mailing<br>- slotted box and chips<br>- puzzles<br>- range of fastenings<br>- objects for opening and closing<br>- sewing<br>- materials and implements for<br>- cutting and gluing. |
| | Develop concept of object permanence | Resources include: |

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| | | - box with ball and tray<br>- box with ball and drawer. |
| | Sort objects | Resources include collections of three dimensional objects for sorting. |

## Language

Maria Montessori was one of the earliest researchers to observe and describe in some detail the development of language in infants (see, for example, Montessori 1982/1949). She recognised that the foundation for language development is established before birth. After birth, the innate human tendency to communicate with others drives infants to engage with the language used by those around them. Through observation, listening and interaction they learn the language and culture of their community. In the Montessori view this development is related to the development of movement. As infants become able to move about more and more, their field of interest and activity expands, and so does their need for language. The Montessori approach to language for this age group, therefore, starts not with the word but with the child's concrete experiences.

Language development in infants is described by Montessori educators as having the following two phases:

- the *prelinguistic* phase from birth to twelve months when infants may not use words with meaning but are absorbing and internally constructing the rhythms and patterns of language, and training vocal muscles and auditory perception of the sounds of the language in the environment
- the *linguistic* phase from twelve months to three years when infants progress from saying their first intentional words with meaning to complex phrases and simple sentences.

Initially, receptive language in infants is more developed than expressive language so they understand a great deal more than they can say. At about two years of age the indirect and direct preparation of the pre-linguistic and early linguistic phases results in an 'explosion' into language. At this time, instead of using single words and words fused together, young children suddenly combine words into grammatical patterns in order to express their meanings. From this point, language use typically expands rapidly.

In Montessori environments prepared for infants and toddlers Montessori early childhood educators strive to create an enriched language environment. Adults in the environment provide infants and toddlers with good models of language use at all times. They listen attentively, respectfully and responsively to all attempts made by the children in the environment to communicate. They also initiate interactions, ensuring language is directed toward the child, particularly during the pre-linguistic phase.

In the language-enriched Montessori environments children have many opportunities to expand their vocabulary and language use in their first language. They also benefit from hearing speakers of other languages if the use of other languages can be integrated meaningfully into the daily routine of the setting. At this age, this works best for children if the adults in the environment each speak only one language to the children. For example, one adult speaks only English and another adult speaks only Chinese when interacting with the children.

| Content Strand | Knowledge, Skills and Understandings | Activities and Resources |
|---|---|---|
| | *Typically children will be able to:* | |
| **Oral language acquisition and development** | Communicate verbally and non-verbally<br><br>Use spoken language to make meaning, with support if needed<br><br>Link words and meanings<br><br>Increase and extend vocabulary<br><br>Extend language use from words to word | Language-enrichment activities include:<br>- being listened to attentively<br>- varied, real, everyday activities that involve incidental language use<br>- adults speaking directly to children, modelling language use children can understand and imitate<br>- listening to and telling stories<br>- questioning exercise<br>- opportunities to speak and hold |

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| | groups, phrases and simple sentences<br><br>Explode into language around 2 years of age<br><br>Communicate confidently | conversations with others<br>- naming objects; naming pictures of objects; identical and similar matching of objects to cards including naming<br>- fishing bags: general, classified and paired objects<br>- songs, rhymes, games, finger plays, stories, poems<br>- access to and being read to from quality children's books.<br><br>Resources include:<br>- an enriched language environment<br>- good models of language use that children can understand and imitate if they wish. |
| | Begin to use language appropriately in different situations to guide their own and others' behaviour | All activities in the environment offer and encourage vocabulary enrichment and language experience. Specific activities include:<br>- seeking assistance<br>- waiting<br>- taking turns<br>- helping another child or an adult<br>- preparing food<br>- making a contribution to the prepared environment.<br><br>Resources include good models of language use and social interaction that children can understand and imitate if they wish. |
| **Preparation of the hand for writing** | Develop a pincer grip and good hand control | Activities include all *practical life* and fine motor movement activities including:<br>- puzzles<br>- hand/eye coordination activities<br>- food preparation.<br><br>Resources include functional objects and implements matched to the children's size, strength and dexterity. |
| | Learn how to hold and use a pencil, paint brush and needle | Activities include:<br>- scribbling<br>- gluing<br>- painting<br>- sewing.<br><br>Resources include functional implements matched to the children's size, strength and dexterity. |

## Development and Education of the Senses

Infants and toddlers make contact with and explore their environment through their senses. They then strive to organise in an ordered way the myriad impressions they gain through this exploration. Through sensory exploration infants and toddlers develop the ability to discriminate variation in colour, form and shape, dimension, texture, temperature, volume, pitch, weight and taste. This ability is further refined in the *Children's House* and becomes the basis for the future ability to work with abstract concepts.

| Content Strand | Knowledge, Skills and Understandings | Activities and Resources |
|---|---|---|
| | *Typically children will be able to:* | |
| Sensorial exploration | Discriminate objects using the senses | Activities include:<br>- *practical life*<br>- food preparation.<br><br>Resources include psycho-sensory-motor materials. |
| | Gain impressions of colour, shape/form, weight, length, dimension, texture, taste, sound | Resources include psycho-sensory-motor materials. |
| | Develop a sense of aesthetics | The environment and all materials are beautifully designed and arranged with just enough carefully-chosen objects to create just the right amount of stimulus. |
| | Begin to classify objects | Activities in which children are given the names for general categories of items in their environment<br><br>Resources include:<br>- *nomenclature* objects<br>- *nomenclature* cards and objects<br>- *nomenclature* cards. |
| Visual discrimination | Discriminate objects by sight | Activities include:<br>- observing and batting mobiles<br>- observing and grasping varied objects<br>- matching. |
| Tactile discrimination | Refine the sense of touch<br><br>Discriminate objects by the sense of touch | Activities include:<br>- sorting<br>- fishing bags<br>- food preparation.<br><br>Resources include:<br>- objects for tactile stimulation<br>- objects for tactile discrimination. |
| Auditory discrimination | Listen to the sounds of objects<br><br>Identify objects by sound | Resources are objects for auditory discrimination, including:<br>- rattles<br>- balls with a rattle inside<br>- shakers. |
| | Experience timbre, rhythm and beat | Activities involving music and movement, including:<br>- singing |

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| | | - using percussion instruments. |
| **Olfactory and gustatory** | Experience and identify different foods by smell, taste and sight | Activities include:<br>- food preparation<br>- work with *nomenclature objects.* |
| **Stereognostic sense**[1] | Gain knowledge of an object by feeling around it | Activities include:<br>- general fishing bag<br>- classified fishing bag<br>- paired objects fishing bag. |

## Fundamental Life Skills in the Infant Community

Learning fundamental life skills, called *practical life* by Montessori educators, is the component of the Montessori Early Years Learning Programme that links Montessori settings for toddlers with the home. The activities in this area of the environment exploit the desire of toddlers to imitate the adults around them, particularly in self-care, food preparation and care of the environment.

Toddlers love order and strive for independence. Both these impulses find expression in Montessori practical life activities designed for this age group. Through these activities toddlers build and refine motor skills, including whole body equilibrium and coordination, as well as fine motor skills, specifically the transition from palming to pincer grip. *Practical life* activities for children of this age originate in the home and capitalise on very young children's intense interest in food and their desire to imitate adults. Independence is fostered and movement refined through the use of these activities.

The child will be shown how to do a *practical life* activity and is then free to choose this activity at any time. When toddlers are engaged in self-chosen *practical life* activities, they strive to execute precise movements to achieve a goal, in the process building and refining voluntary control of both movement and attention through repetition and the opportunity to work at their own pace uninterrupted. When toddlers are free to complete cycles of work without interruption, they learn to bring their attention under voluntary control, to exercise the *will* in Montessori terms, and they are able to concentrate for longer and longer periods. They also experience feelings of satisfaction and achievement that contribute to the development of confidence.
Practical life activities, and the equipment and utensils used in the activities, are already familiar to the children as they are the activities and implements that are used in the culture in which the children are living. They are matched to the children's size, strength and level of independence. *Practical life* exercises and activities are modelled by adults in lessons presented to individual children at point of need.

| Content Strand | Knowledge, Skills and Understandings | Activities and Resources |
|---|---|---|
| **Transition** (from home to Montessori early childhood settings) | *During transition typically children will:* | |
| | Become familiar with an environment outside the home | Activity within the setting, which is familiar, home-like and a culturally appropriate environment |
| | Shake hands and greet another | Activities include:<br>- observing good models of adults greeting and shaking hands<br>- opportunities to interact with others, using culturally-appropriate greetings. |
| | Remove shoes | Resources include:<br>- a place for shoe removal and storage<br>- a low bench to sit on. |
| | Store bag and clothes | Resources include hooks or a cubby for clothing and bag. |

[1] The word 'stereognostic' comes from 'stereo' meaning 'around' and 'gnostic' meaning 'to know'. The term refers to sensory perception that combines visual and muscular exploration and memory. When used in Montessori contexts, it refers to the means through which young children gain knowledge by feeling around an object.

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| | Pour a drink<br><br>Choose and prepare food for themselves | Resources include pre-measured portions located within reach. |
| | Choose an activity<br><br>Set up a mat or table as a workspace<br><br>Wait and take turns | Activities are organised within reach on low shelves. Adults model behaviours.<br><br>Resources include:<br>- child-sized tables and chairs<br>- work mats. |
| | Develop a sense of belonging, being and becoming<br><br>Imitate the social norms of society | Resources include:<br>- a multi-aged group of children within same developmental phase<br>- a supportive adult to observe, model and with whom to interact. |
| | Develop more precise control of voluntary movement and hand/eye coordination | Activities for learning how to:<br>- carry furniture and equipment, e.g. chair, tray, mat, buckets, jugs<br>- pull out and push in a chair<br>- roll and unroll a mat<br>- prepare drinks and food.<br><br>Resources include functional objects and implements matched to the children's size, strength and dexterity. |
| Care of person | *Children develop and consolidate independence in:* | |
| | Drinking | Resources are a water source and glass within reach |
| | Food preparation and eating | Food preparation activities including:<br>- cutting<br>- grating<br>- juicing<br>- mixing<br>- shelling<br>- kneading<br>- peeling<br>- modelling by adult and more expert children.<br><br>Resources include utensils matched to children's size, strength and dexterity. |
| | Toileting | Resources include:<br>- accessible toilet matched to children's size and level of independence<br>- adult support. |
| | Dressing and undressing | Activities that include:<br>- washing hands<br>- cleaning teeth<br>- blowing nose<br>- brushing hair<br>- cleaning shoes<br>- role-modelling by adults and more expert children. |

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| | | Resources include:<br>- storage hooks/cubbies and furniture matched to children's size and strength<br>- grooming area with mirror matched to children's size<br>- *dressing frames* for learning how to use buttons, zips and Velcro<br>- implements matched to children's size, strength and dexterity. |
| **Care of the environment (indoor and outdoor)** | *Typically children will be able to:* | |
| | Clean and care for the indoor environment | Activities include:<br>- dusting<br>- cleaning mirrors and windows<br>- polishing wood<br>- washing cloths<br>- washing and drying dishes<br>- sweeping<br>- beating rugs<br>- scrubbing tables<br>- role-modelling by adults and more expert children.<br><br>Resources include implements matched to children's size, strength and dexterity. |
| | Clean up spills | Activities include wiping, mopping and sweeping using implements matched to children's size, strength and dexterity. |
| | Care for plants and garden<br><br>Observe and appreciate nature | Activities include:<br>- dusting and wiping leaves<br>- arranging flowers<br>- planting and watering plants<br>- growing seeds<br>- raking and sweeping.<br><br>Resources include implements matched to children's size, strength and dexterity. |
| | Care for animals | Activities include:<br>- learning appropriate behaviour around animals<br>- feeding animals<br>- caring for animals' habitat. |
| | Develop a connection with reality and purposeful work | All *practical life* activities |
| | Develop a responsibility for the environment | All *practical life* activities |
| **Social relations** | *Typically children will:* | |
| | Acquire appropriate language | Resources include:<br>- modelling by adults and other children<br>- supportive adults and other children to observe, imitate and with whom to interact. |
| | Experience interactions with others | The resources are adults and other children in the environment. |

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| | Begin to acquire culturally appropriate customs and manners | Adults model behaviours at point of need. |
| | Develop awareness of self and others<br><br>Experience taking turns | Children are respected as individuals and are free to choose and complete their own work.<br>The environment is prepared so children have space for their own work.<br>The number of each set of materials is limited, generally only one of each set. In this way children lean to value each activity and to take turns. |
| | Preparing food for others to share | Food preparation activities include:<br>- making bread<br>- cutting up fruit. |

## Mathematics

One of the human tendencies is to measure the world and to calculate quantities. Infants are born with this tendency, which is called the 'mathematical mind' by Montessori educators. From birth infants observe and respond to measurable physical relationships in their environment in order to be able to orient themselves to the environment and to make sense of it. They assess, measure, hypothesise, order and classify as they explore their environment with their senses and learn to operate in their environment. To crawl or walk from A to B involves assessment and calculation. Up to three years of age this is done unconsciously and by using the senses.

Many of the activities in Montessori settings prepared for infants and toddlers provide sensory experience of mathematical relationships. Some examples are:

- The Montessori materials provide experiences with dimension and form, sequencing, patterns, order and comparison. They also encourage reasoning and calculation.
- The Montessori environment and programme provides experiences in shape and space, time and predictability and enhances working memory.
- Food preparation activities provide experience with measuring, quantity, weight, volume, sequencing and fractions.
- Puzzles, exact matching of nomenclature objects and cards, table setting, and flower arranging provide one-to- one correspondence.
- Language materials provide classification experiences.
- Washing hands, dishes and cloths provides experience with volume, weight and sequencing.
- Sand play provides experience with quantity, volume, weight, measurement and area.
- Songs, poems and finger plays provide experience with number.
- Counting books provide number experience
- Mathematical language pervades the environment – 'more/less', 'right/left', 'up/down', 'high/low', 'in/out', 'big/little', 'large/small', 'heavy/light', 'some', 'full/empty', 'same/different', 'near/far', 'under/over', 'open/close', 'here/there', 'fast/slow', 'today/yesterday', etc.

These experiences in the *Nido* and *Infant Community* provide indirect preparation for the introduction of more formal concrete mathematical materials in the Montessori preschool setting, the *Children's House*.

## Science, Geography and History

Children from birth are interested in the world around them. They observe the natural world and absorb the culture of the society into which they are born. Children are fascinated by the way the world works, by the life of plants and animals, by the features of the places they find themselves in and by the customs and stories of the people around them.

In later educational contexts these interests are taken up formally in the study of science, geography and history. In the Montessori Early Years Learning Programme they are integrated across the curriculum. Often children pursue their interest in science, geography or history as an extension of the exercises of the senses, because it is through the senses that children first perceive, observe and explore phenomena related to these fields of study.

In the *Nido* and *Infant Communities*, children experience nature informally through sensory experiences inside and outside the classroom. Many experiences happen spontaneously in the garden, for example:

- planting seeds
- watering plants
- cleaning leaves
- raking leaves
- arranging flowers
- observing animals

## Creative Arts

### Music

Music, in the Montessori view, is like language; it is an aspect of human expression that is integrated into daily life. From birth children delight in and respond to music. Often this delight is expressed through movement. The exercises of practical life build foundation skills in whole body and fine motor control of movement and hand-eye coordination children can use to participate more effectively in musical activities and exercises.

In *Infant Communities* music and movement are integrated in activities that include:

- listening activities in which children move to music
- playing simple percussion instruments
- sense exercises in auditory discrimination
- games involving singing and movement.

| Content Strand | Knowledge, Skills and Understandings | Activities and Resources |
|---|---|---|
| | *Typically children will:* | |
| Music:<br>*auditory discrimination* | Listen to the sounds of objects<br><br>Identify objects by sound<br><br>Experience timbre, rhythm and beat | Activities include:<br>- singing<br>- identifying different voices.<br><br>Resources include:<br>- rattles<br>- balls with a rattle inside<br>- percussion instruments<br>- sounds in the environment. |
| Music:<br>*timbre* | Listen to and play simple instruments | Resources include a range of percussion instruments. |
| Music:<br>*self expression* | Develop the skills to express themselves | Activities involving self-expression in music, movement and drama, including:<br>- singing<br>- movement and dancing<br>- playing percussion instruments<br>- movement games<br>- finger plays. |

### Movement and Dance

The development and refinement of movement is an integral part of the child's development from birth to six years of age. The ability to appreciate dance and to be able to move one's body as a form of expression is an important facet of children's development. The focus on specific movements can assist children's development in many other areas, for example whole body coordination. Dance is also an important aspect of health and physical exercise. Young children have a natural sense of rhythm and often lack inhibition so dance comes naturally and spontaneously to them.

In *Infant Communities* movement is one of the most critical components of the environment. Dance is experienced through movement and music activities.

### Visual Arts

Artistic expression was considered by Dr Montessori to be one of the fundamental needs of humans. In particular, she encouraged children to draw. She felt that if children have fine motor control of the hand, learned through the exercises of practical life, combined with trained skills in perception, learned through the exercises of the senses, they would be able to create visual art works of a high quality.

In *Infant Communities* art activities include sewing, cutting, painting, gluing, drawing, working with clay and flower arranging.

## Parent Education

Montessori education is *an aid to life* and is not restricted to the prepared environment. An important part of Montessori education is working with parents, families and the community to foster understanding and appreciation of the extraordinary development of young children from birth to three years of age.

Montessori educators provide parents with as much information as possible about child development at this stage, how parents can nurture that development and the way the Montessori approach can support that development. The ways this is achieved include:

- parent information evenings
- open days
- provision of videos, DVDs, books and articles
- discussion groups
- home visits.

Throughout the year there are regular individual meetings offered to parents and prospective parents.

When parents attend with their children in the parent-infant or parent-toddler groups, they can:

- observe the development of the children in the group
- engage with their child in the environment
- seek guidance from and be guided by the Montessori trained adult.

Adults awaiting the birth of a baby and those waiting to adopt may also be invited to attend these environments to observe and gain understanding of infant development. It is part and parcel of the role of the trained Montessori *Assistant to Infancy* to promote understanding of development at all times. For this reason, parent information sessions are not restricted to parents of children attending Montessori centres.

## Family Support

Early childhood settings are often the first point of contact for families needing additional support. Montessori early childhood settings aim to be a welcoming community centre, a place of learning, and a safe place for children. The Montessori approach recognises that children come from widely-varied family settings, and that culture, home life and family situation all affect learning and development. Family support may include consultations in the home or at the centre, referrals to other services, support in crisis situations, and informal information and advice.

## Community Outreach

The role of Montessori *Assistants to Infancy* includes sharing their knowledge and expertise in the field of early childhood development, with other professionals and the wider community. This may involve formal or informal presentations and talks including the following:

- speaking at public conferences and workshops
- speaking to other early childhood professionals and professional organisations, such as nursing mothers associations, paediatricians, paediatric nurses, speech pathologists, occupational therapists and child psychologists
- building links with non-government organisations who work with children, particularly disadvantaged children
- giving talks to adolescents to prepare them for future parenthood.

# The Montessori Early Years Learning Programme Three to Six Years: *The Children's House*

The scope and sequence of the Montessori *Children's House* curriculum is embodied in the sets of materials displayed on open shelves at the children's level in the *Children's House* and in the sequence in which these materials are typically presented to the children. The resources and activities in the *Children's House* are organised into four main areas:

- the *exercises of practical life*
- the *exercises of the senses*
- language
- mathematics.

Also incorporated into these areas are resources and activities that introduce children to visual arts, music, physical education, science, geography and history.

## Fundamental Life Skills in the *Children's House*

Learning fundamental life skills, or *practical life,* is the component of the Montessori Early Years Learning Programme that links the home environment and the *Children's House*. Children love order, and they love to be independent, and this desire finds expression in the *exercises of practical life*. During these exercises children use a variety of materials and activities to support increased control and refinement of:

- whole body equilibrium and coordination
- fine motor skills
- voluntary control of attention and the ability to concentrate
- the ability to sequence the steps of a task in order to achieve a goal
- everyday living skills.

To achieve the goal of a *practical life* exercise, children must use precise movements. As they strive for precision of movement, children develop their *will*, that is, they develop self-control, the ability to self-regulate, voluntary control over movement, as well as voluntary control over attention, the foundation of the ability to concentrate. If they are free to work at their own pace uninterrupted, children gradually extend the period of time they are able to concentrate. When they have completed a cycle of work, without being disturbed, children typically experience feelings of great satisfaction and increased confidence in their own abilities.

*Practical life* for children aged between three and six years in the *Children's House* encompasses four main areas:

- control of movement
- care of person
- care of environment
- *grace and courtesy*/social relations.

In the *Children's House* the skills needed to succeed at the exercises in these areas are developed initially in a series of 'transitional' exercises in which children practise 'preliminary movements'. These exercises build on the skills learnt by children in the *Infant Community*.

| Content Strand | Knowledge, Skills and Understandings | Activities and Resources |
|---|---|---|
| | *Typically children will:* | |
| **Transition or preliminary movements** | Repeat precise hand movements leading to concentration and self mastery<br><br>Develop control and coordination of whole body movement<br><br>Develop hand-eye coordination<br><br>Make responsible and appropriate choices<br><br>Wait, share, take turns<br><br>Prepare for later work in the environment<br><br>Develop confidence in own ability in both whole body and fine motor movement<br><br>Develop orientation to the physical space and accepted expectations | Activities include:<br>- activities familiar from home that demand hand-eye coordination<br>- water play<br>- art activities such as glue, cutting and painting<br>- language and music activities such as singing and story-telling.<br><br>Resources include:<br>- simple puzzles<br>- sandpit play<br>- building blocks and other construction materials<br>- activities with clay and/or 'play dough'<br>- modelling provided by adults and other children. |
| | Widen social contacts and interact in a group<br><br>Verbally or non-verbally express their needs | Children interact with adults and other children in the environment. |
| **Preliminary activities** | Develop more precise control and coordination of movement<br><br>Repeat precise whole body and hand movements leading to concentration and self mastery<br><br>Prepare for later work in the classroom<br><br>Develop confidence in own ability to complete simple everyday tasks | Activities include:<br>- spooning and pouring<br>- carrying chairs, trays, mats, buckets, jugs etc<br>- folding cloths<br>- opening and closing different types of containers<br>- threading.<br><br>Resources include prepared sets of functional objects and implements, as well as furniture matched to children's size, strength and dexterity. |
| **Care of person** | *Typically children will develop and consolidate independence in the following:* | |
| | Preparing food<br>Eating | Activities include:<br>- hand washing<br>- preparing and serving food<br>- eating meals with others.<br><br>Resources include prepared sets of functional objects and implements matched to children's size, strength and dexterity. |
| | Personal care | Activities include:<br>- blowing nose<br>- washing face<br>- brushing and combing hair<br>- toileting<br>- washing hands. |

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| | | Resources include prepared sets of functional objects and implements matched to children's size, strength and dexterity. |
| | Dressing and undressing | Activities include:<br>- grooming<br>- caring for clothes<br>- sewing<br>- dressing and undressing<br>- cleaning and polishing shoes.<br><br>Resources include dressing frames to practise a variety of fastenings, as well as prepared sets of functional objects and implements matched to the children's size, strength and dexterity. |

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| **Care of environment:** ***indoor and outdoor*** | *Typically children will:* | |
| | Experience caring for plants and animals<br><br>Observe nature and gain an appreciation for the natural world | Activities include:<br>- arranging flowers<br>- wiping leaves<br>- watering plants<br>- gardening<br>- caring for animals<br>- range of experiences enabling children to connect with the natural environment.<br><br>Resources include prepared sets of functional objects and implements matched to children's size, strength and dexterity. |
| | Develop responsibility for self and others<br><br>Connect with reality<br><br>Develop a sense of giving back to the community, leading to feelings of self confidence and empathy | Activities include:<br>- dusting and polishing<br>- sweeping and mopping<br>- beating rugs<br>- washing and drying dishes, washing cloths<br>- ironing<br>- washing windows<br>- washing and scrubbing, for example, tables, chairs, floor.<br><br>Resources include prepared sets of functional objects and implements matched to children's size, strength and dexterity. |
| **Movement:** ***analysis and control*** | *Typically children will:* | |
| | Develop control and coordination of movement<br><br>Develop equilibrium<br><br>Develop self-control and the ability to self- | Activities include:<br>- *walking on the line*<br>- balancing<br>- walking up and down steps<br>- *silence game* and exercises. |

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| | regulate (in Montessori terms, develop the *will*)<br><br>Experience social cohesion<br><br>Experience reflection and silence | Resources include:<br>- a large elliptical line drawn on the floor for the initial walking on the line exercises<br>- designed-in elements of the environment to provide opportunities for practise. |

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| Social relations | *Typically children will:* | |
| | Develop a language for effective and positive interaction with others<br><br>Experience interactions with others<br><br>Begin learning culturally appropriate customs and manners<br><br>Develop awareness of self and others | Activities include:<br>- peer teaching and modelling<br>- celebrations<br>- *how to* lessons e.g. how to introduce, greet, interrupt, request, apologise.<br><br>Resources include:<br>- adults in the environment<br>- a multi-age group of children<br>- visitors from the community. |
| | Experience and understand sharing and turn taking | Activities and resources include:<br>- a limited quantity of each material<br>- a multi-age group<br>- modelling by adults and peers. |

## Development and Education of the Senses

Young children use their senses to explore their environment. Through sensory exploration they receive a myriad of sensory impressions from birth. From about the age of three, the developing human mind, together with the sensitive period of order, naturally strives to discriminate similarities and differences resulting in young children sorting, arranging and classifying the many sensory experiences they have collected so far. The inventory of sensory experience they construct at this age becomes a resource they use both for thinking and creating.

The Montessori materials children use to fine-tune sensory perception and discrimination, the *sensorial* materials, are some of the most distinctive and iconic of all the Montessori materials. The *sensorial* materials are sets of definitive or graded objects designed to precise specifications. Each set isolates one sensory quality only in regular and measurable ways. The qualities isolated by the Montessori *sensorial* materials include: texture, colour, shape, dimension, mass, taste, smell, temperature, pitch and intensity of sound. Children are taught a precise vocabulary to talk about the sensory qualities, and their variations, embodied in the materials. They learn these words in contrasting sets, for example, *red/blue/yellow*; *loud/soft*; *long/short*; *rough/smooth*; *triangle/square/circle*; *cube/sphere*. In addition, children are introduced to the superlative and comparative language for example *longer/shorter, longest/shortest*. This vocabulary then becomes a resource children can use to make more precise meanings about their world. Children use the sensorial materials in the *exercises of the senses*.

The *exercises of the senses* provide children with keys to exploring the world, as well as a means to refine perception and to construct a foundation for abstract thinking and creative expression. Initially, the exercises provide children with opportunities to use each sense to distinguish contrasting perceptions. Later, the children use the exercises to discriminate between increasingly fine variations in order to grade the objects in each set.

The Montessori exercises of the *senses* support and develop skills and dispositions such as exploration, observation, order, questioning and speculation. These exercises prepare for learning in school subject areas, including mathematics, language, science and geography. For example, *exercises of the senses* can be used as a foundation for the following *Years K-2 Curriculum Focus* described in *Shape of the Australian Curriculum: Science* (Commonwealth of Australia 2009: 7).

*Curriculum focus: awareness of self and the local world*
Young children have an intrinsic curiosity about their immediate world and a desire to explore and investigate things around them. Asking questions leads to speculation and the testing of ideas. Exploratory, purposeful play is a central feature of their investigations. Observation, using the senses in dynamic ways, is an important skill to be developed in these years. Observation leads into the idea of order that involves describing, comparing and sorting.

The *exercises of the senses* include exercises through which children learn to attend to their perceptions and to discriminate between finer and finer variation using the following senses:

- visual (dimension, colour, shape)
- tactile (texture, mass, temperature, *stereognostic*)
- auditory (pitch, timbre, rhythm, style, intensity of sound)
- olfactory (smell)
- gustatory (taste)

The *exercises of the senses* help children order sensory impressions in a mental inventory, or classification system, accompanied by a precise vocabulary, which they can use as a resource for thinking and creative expression. These exercises complement children's work with puzzles and construction materials. It culminates in the children's ability to apply the skills they gain in sensory discrimination and judgement to phenomena in the wider environment. The use of the *sensorial* materials also develops children's skill with the precise use of the hand in increasingly exact and controlled movement.

| Content Strand | Knowledge, Skills and Understandings | Activities and Resources |
|---|---|---|
| | *Typically children will:* | |
| **Visual discrimination:** ***dimension*** | Perceive fine variation in dimension<br><br>Learn to use a vocabulary to talk about variation in dimension, including *large/small*, *thick/thin*, *long/short*, as well as the related comparative and superlative adjectives<br><br>Prepare indirectly for counting, solid geometry and later mathematical work | Activities include:<br>- precise and engaging demonstrations offered by the adult<br>- opportunities for children to choose and continue working with the materials without interruption.<br><br>Resources include:<br>- *cylinder blocks*<br>- *pink tower*<br>- *brown stair*<br>- *red rods.* |
| **Visual discrimination:** ***colour*** | Match and grade colours<br><br>Learn a vocabulary of colour<br><br>Develop a sense of aesthetics<br><br>Prepare indirectly for visual arts | Activities include:<br>- precise and engaging demonstrations offered by the adult<br>- opportunities for children to choose and continue working with the materials without interruption.<br><br>Resources include *colour boxes* 1, 2 and 3. |
| **Visual discrimination:** ***shape (form)*** | Explore and discover variation in two-dimensional shapes and the relations between them<br><br>Prepare indirectly for the study of plane geometry | Activities include:<br>- precise and engaging demonstrations offered by the adult<br>- opportunities for children to choose and continue working with the materials without interruption.<br><br>Resources include:<br>- *geometry cabinet* and cards<br>- *geometric solids*<br>- *botany/leaf cabinet* and cards. |

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| **Visual discrimination:** ***mixed*** | Apply knowledge, skills and understandings of dimension, colour and shape, as well as relations between them | Activities include:<br>- precise and engaging demonstrations offered by the adult<br>- opportunities for children to choose and continue working with the materials without interruption<br>- art and design work.<br>Resources include:<br>- *knobless cylinders*<br>- superimposed figures/graded geometric figures<br>- objects in the environment. |
| **Tactile discrimination:** ***texture*** | Experience, match and grade variations in texture<br><br>Prepare indirectly for handwriting | Activities include:<br>- precise and engaging demonstrations offered by the adult<br>- opportunities for children to choose and continue working with the materials without interruption.<br><br>Resources include:<br>- *touch boards*<br>- *touch tablets*<br>- *fabric boxes.* |
| **Tactile discrimination:** ***mass (baric sense)*** | Experience, match and grade variation in mass<br><br>Prepare indirectly for measuring mass | Activities include:<br>- precise and engaging demonstrations offered by the adult<br>- hefting and weighing activities<br>- using scales.<br><br>Resources include:<br>- the *baric tablets*<br>- simple scales<br>- objects in the environment. |
| **Tactile discrimination:** ***temperature (thermic sense)*** | Experience, match and grade variation in temperature<br><br>Prepare indirectly for measuring temperature | Activities include:<br>- precise and engaging demonstrations offered by the adult<br>- applying knowledge in the environment.<br><br>Resources include:<br>- *thermic bottles*<br>- *thermic tablets*<br>- objects in the environment. |
| **Tactile discrimination:** ***stereognostic***[2] | Use perception of tactile qualities to identify three-dimensional objects<br><br>Prepare indirectly for the study of solid geometry | Activities include:<br>- precise and engaging demonstrations offered by the adult<br>- sorting activities.<br><br>Resources include:<br>- *geometric solids*<br>- *stereognostic bags*<br>- mystery bags. |

[2] The word 'stereognostic' comes from 'stereo' meaning 'around' and 'gnostic' meaning 'to know'. The term refers to sensory perception that combines visual and muscular exploration and memory. When used in Montessori contexts, it refers to the means through which young children gain knowledge by feeling around an object.

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| **Auditory discrimination:** ***dynamics/intensity of sound*** | Explore variation in sound and its qualities<br><br>Learn to use a vocabulary to talk about variation in sound (*loud*/*soft*, as well as the related comparative and superlative adjectives)<br><br>Prepare indirectly for the study of music, dance and poetry | Activities include:<br>- listening games<br>- playing percussion instruments<br>- listening to different instruments<br>- listening to different types of music<br>- listening and moving to poetry<br>- moving to music<br>- singing<br>- dancing.<br><br>Resources include:<br>- *sound boxes*<br>- *Montessori bells* (accurately pitched; diatonic C major scale, plus the five sharps/flats that will turn the C major scale into a chromatic scale)<br>- percussion instruments<br>- live and recorded music and poetry. |
| **Auditory discrimination:** ***pitch*** | Perceive, match and grade variations in pitch<br><br>Distinguish and label *high* and *low*<br><br>Play known tunes<br><br>Compose own tunes | Activities include:<br>- precise and engaging demonstrations offered by the adult<br>- opportunities for children to choose and continue working with the materials without interruption.<br><br>Resources include:<br>- the *Montessori bells* (accurately pitched; diatonic C major scale, plus the five sharps/flats that will turn the C major scale into a chromatic scale)<br>- card material. |
| **Auditory discrimination:** ***timbre*** | Experience and identify the timbre of different instruments, voices and non-musical sounds | Activities include:<br>- precise and engaging demonstrations offered by the adult<br>- listening games and activities (indoors and outdoors).<br><br>Resources include:<br>- musical instruments e.g. percussion instruments<br>- music and sounds in the environment. |
| **Auditory discrimination:** ***rhythm*** | Experience, identify and create different rhythms and beats | Activities include:<br>- playing instruments, including percussion instruments<br>- listening to different types of music, songs and poetry<br>- dancing<br>- moving to music.<br><br>Resources include:<br>- musical instruments e.g. percussion instruments<br>- music and sounds in the environment. |

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| **Auditory discrimination:** ***style*** | Experience and identify different styles of music | Activities include listening to different songs and types of music from within the children's own culture and to music of different cultures.<br><br>Resources include live and recorded music. |
| **Olfactory discrimination:** ***smell*** | Distinguish, identify and name different smells | Activities include:<br>- preparing food<br>- arranging flowers.<br><br>Resources include:<br>- *smelling bottles*<br>- a range of items in the indoor and outdoor environment. |
| **Gustatory discrimination:** ***taste*** | Identify, distinguish between and name the main tastes (*sweet, sour, salty, bitter*)<br><br>Experience relations between the senses of smell and taste | Activities include preparing and eating food.<br><br>Resources include:<br>- *tasting bottles*<br>- a range of different foods. |

## Language

Dr Maria Montessori designed an early childhood language programme in which all the elements of spoken and written language are taught in an incremental, yet integrated, way. In the *Children's House* the spoken language children have been developing since birth is further elaborated and refined through a variety of language enrichment activities that include songs, games, poems, stories and sets of classified picture cards. The multi-age grouping of children means younger children have many opportunities to watch and listen to older children reading both story and factual books.

The first, indirect preparation for mastering written language begins with the *exercises of practical life* and the *exercises of the senses*. The *exercises of practical life* develop fine motor skills and the *exercises of the senses* prepare children to distinguish between the different sounds of the language and the different shapes of the letters.

When children first work with the letters of the alphabet, they use *sandpaper letters* as part of activities in which they simultaneously hear the sounds of the letters, and see and trace the shape of the letters. When children know enough letters, they are introduced to a *movable alphabet* made out of wooden or cardboard letters. Children use the letters to compose and write down their own words, phrases, sentences and finally stories. Because children are using their own language to compose with the *movable alphabet*, they may discover that they can read their own writing, especially when the *movable alphabet* work is accompanied by activities that provide children with structured opportunities for decoding practice. They soon transfer their skills to reading books, both to themselves and others. They are later introduced to word study materials and materials for exploring spelling patterns. To increase reading fluency and comprehension, children work with materials that draw their attention to the grammar patterns of the language.

All elements of the Montessori language programme provide children with a platform for building self-confidence and using language creatively across a variety of modes of communication. Children also have the opportunity to enjoy a wide range of good quality and varied literature, as well as factual and reference books.

| Content Strand | Knowledge, Skills and Understandings | Activities and Resources |
|---|---|---|
| | *Typically children will:* | |
| **Spoken language**<br><br>**Vocabulary enrichment** | Experience both non-verbal and verbal communication<br><br>Experience a variety of communication modes (spoken and written language, non-verbal communication, visual images, interactive technologies)<br><br>Expand and extend vocabulary<br><br>Understand the spoken language of others<br><br>Learn to listen to and use spoken language effectively (age appropriate) and with increasing confidence in a variety of situations for both social interaction and self-expression<br><br>Learn to take turns in a spoken exchange<br><br>Learn to appreciate language diversity in others e.g. through experience with languages other than English<br><br>Articulate the sounds of language effectively<br>Use the prosodic features of spoken language effectively, e.g. rhythm and intonation<br><br>Prepare indirectly for working with written language e.g. informal experience with reading, vocabulary and word study and the grammar of the language e.g. tense, singular/plural, collective nouns | Activities include:<br>- a variety of real-life experiences to talk about e.g. excursions, visitors to the classroom from the community, animals in the classroom<br>- a variety of opportunities for communication e.g. conversations, retelling real-life events, describing, expressing opinions, explaining<br>- opportunities to enjoy quality literature and to tell and read stories<br>- opportunities to use age-appropriate factual and reference books<br>- singing and playing music<br>- activities involving rhyme and poetry<br>- finger plays<br>- sorting and matching sets of objects and pictures cards<br>- the *spoken question game*, a spoken presentation scaffolded by an adult.<br><br>Resources include:<br>- adults and other children in the environment<br>- vocabulary enrichment picture cards<br>- sets of classified picture cards. |
| **The mechanics of writing and reading:** ***sound-letter correspondence, letter formation, decoding, handwriting*** | Learn the correspondence between sounds of the language and the letters of the alphabet<br><br>Arrange the letters of the alphabet to make words, phrases, sentences and paragraphs<br><br>Decode written words using knowledge of letter-sound correspondence (single letters, digraphs)<br><br>Develop pencil grip, adaptation of space, lightness of touch and muscular control of the hand<br><br>Use a variety of writing implements and surfaces | Activities include:<br>- precise and engaging demonstrations offered by the adult<br>- scribbling, painting, cutting and gluing<br>- designing with the metal insets<br>- the sound game<br>- matching labels to objects in the environment, miniature objects or pictures in card sets<br>- modelling by adults, or other children<br>- phonetic reading (objects and labels, labels without objects, cards)<br>- blends/diagraphs (moveable alphabet, booklets, charts, labels to match objects)<br>- sight words/puzzle words.<br><br>Resources include:<br>- *sandpaper letters, moveable alphabets, metal insets* |

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| | | - a variety of writing surfaces, including sand, chalkboards, different types and colours of paper<br>- a variety of writing implements, including chalk, crayon, pencil, brush. |
| Written expression:<br>*preparation* | Gain an appreciation of written language in all its forms e.g. literary, factual, reference<br><br>Build confidence in ability to engage with written expression<br><br>Express themselves in writing<br><br>Become familiar with the patterns of written language in preparation for written composition and reading comprehension | Activities include:<br>- reading aloud by adults or other children<br>- writing with the *moveable alphabet*<br>- vocabulary building across the curriculum<br><br>Resources include:<br>- quality children's literature, factual books and a range of other appropriate written material<br>- *sandpaper letters, moveable alphabets.* |
| The functions of words:<br>*parts of speech and their work* | Experience and gain an understanding of the grammar patterns used to organise words into text<br><br>Experience and understand that word order affects the meaning of written language<br><br>Enhance and extend reading skills and reading for meaning | Activities include:<br>- precise and engaging demonstrations offered by the adult<br>- *functions of words* games and exercises.<br><br>Resources include:<br>- a 'mini' environment, e.g. house, farm, zoo, streetscape, and labels<br>- grammar symbols. |
| Reading:<br>*analysis and synthesis*<br><br>Sentence analysis:<br>*words, groups and phrases, clauses and sentences* | Build knowledge and understanding of the grammatical patterns of language<br><br>Explore and understand the importance of verbs<br><br>Explore the structure of a sentence<br><br>Enhance and extend reading skills and reading for meaning | Activities include:<br>- precise and engaging demonstrations offered by the adult<br>- phonetic reading (objects and labels, labels without objects, cards)<br>- blends/diagraphs (moveable alphabet, booklets, charts, labels to match objects)<br>- sight words/puzzle words<br>- *reading/sentence analysis* games and exercises.<br><br>Resources include:<br>- charts and moveable material<br>- prepared sentences in increasing order of complexity<br>- objects in the environment<br>- labels<br>- quality literature and factual books<br>- opportunity to compose sentences independently. |
| Word study | Extend their knowledge and understanding of English vocabulary<br><br>Build words using knowledge of, for example, prefixes and suffixes, compound words, singular and plural<br><br>Build families of words | Activities include:<br>- precise and engaging demonstrations offered by the adult<br>- *word study* games and exercises<br><br>Resources include:<br>- *moveable alphabets* in two or more colours<br>- words on cards<br>- word lists and charts. |

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| **Spelling** | Explore and refine spelling<br><br>Begin making the transition from invented spelling to correct spelling | Activities include:<br>- precise and engaging demonstrations offered by the adult<br><br>Resources include:<br>- moveable alphabet<br>- phonogram cards and booklets<br>- word study<br>- personal word lists<br>- dictionaries<br>- books. |
| **Reading commands**<br><br>**Interpretive reading** | Read for meaning with increasing fluency<br><br>Prepare for drama activities including emotional content of literature<br><br>Experience and understand the effect on meaning of mood and style in literature | Activities include:<br>- acting out increasingly complex written commands<br>- acting out extracts from children's literature.<br><br>Resources include:<br>- command cards<br>- extracts from quality children's literature<br>- quality literature and factual books<br>- poetry<br>- *Who am I?* riddles. |
| **Reading across the subject areas** | Practice and consolidate reading skills<br><br>Use reading skills to gain information and to research topics of interest<br><br>Extend their vocabulary<br><br>Discover and use accurate terminology for phenomena in the world around them | Activities include a range of opportunities to enjoy and practise reading and to extend reading skills across all areas of the curriculum.<br><br>Resources include:<br>- visiting experts<br>- objects, labels, picture cards, jumbled definitions and control booklets<br>- quality age appropriate reference books. |
| **Punctuation** | Explore the conventions of punctuation, including use of capital letters, full stop and commas | Activities include:<br>- precise and engaging demonstrations offered by the adult<br>- *punctuation* games and exercises.<br><br>Resources include:<br>- *moveable alphabet*<br>- punctuation cards. |
| **Musical notation** | Experience and discover musical notation as a means of recording sounds<br><br>Use musical notation for composition<br><br>Read notes in order to play back another person's musical ideas | Activities include:<br>- precise and engaging demonstrations offered by the adult<br>- musical notation games and exercises.<br><br>Resources include:<br>- moveable music notation symbols (e.g. treble and bass clefs, notes, rests, dynamics, tempo) and wooden board with painted staff<br>- rhythm charts<br>- card material. |

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| Cultural extensions:<br>*language across the subject areas:*<br>*history*<br>*geography*<br>*science*<br>*art and music appreciation* | Respect and recognise differences across families, the community and the world<br><br>Explore social relations in a range of contexts<br><br>Experience other cultures<br><br>Appreciate the natural world<br><br>Respect all life forms<br><br>Develop the aesthetic sense | Activities include:<br>- caring for plants e.g. dusting, planting, potting, harvesting<br>- caring for animals<br>- preparing food from around the world.<br><br>Resources include:<br>- artefacts from a range of cultures, including, for example photographs, art works and wall hangings; songs, poetry and stories; tools and musical instruments; food and clothing<br>- land and water form models, picture cards, labels, definitions and booklets<br>- globes, maps and flags<br>- geography and history folders of classified pictures i.e. sets of picture cards, labels and booklets representing different types of clothing, food, shelter, transportation, defence, animals and plants, in different cultures and countries. |

## Mathematics

The study of mathematics is a reflection of the human tendencies for investigation and orientation, for order and classification, for reasoning and making judgements, and for calculating and measuring. In the Montessori *Children's House*, when mathematical concepts are first presented to children, they are embodied in concrete materials.

Mathematics in the *Children's House* builds on and extends the *exercises of practical life* and *the exercises of the senses*, as well as the many mathematical experiences children encounter incidentally in their daily lives, including experiences with:

- visual representation of mathematical concepts
- pattern and order
- problem solving
- cardinal and ordinal numbers
- place value
- operations (addition, subtraction, multiplication, division)
- fractions
- spatial relations e.g. placement of objects, spatial patterns, one-to-one correspondence of objects and two-dimensional shapes
- measurement e.g. length, mass, time, temperature, volume, perimeter, area
- word problems (addition, subtraction, multiplication, division)

As they work with the exercises of the *senses*, children are making judgements in relation to distance, dimension, graduation, identity, similarity and sequence. Building on this foundation, the Montessori mathematics materials introduce children to:

- counting (from 1 to 10, 10 to 90, linear 1 to 100 and 1000, and skip-counting as an introduction to multiplication)
- place value to four digits
- number operations (addition, subtraction, multiplication, division).

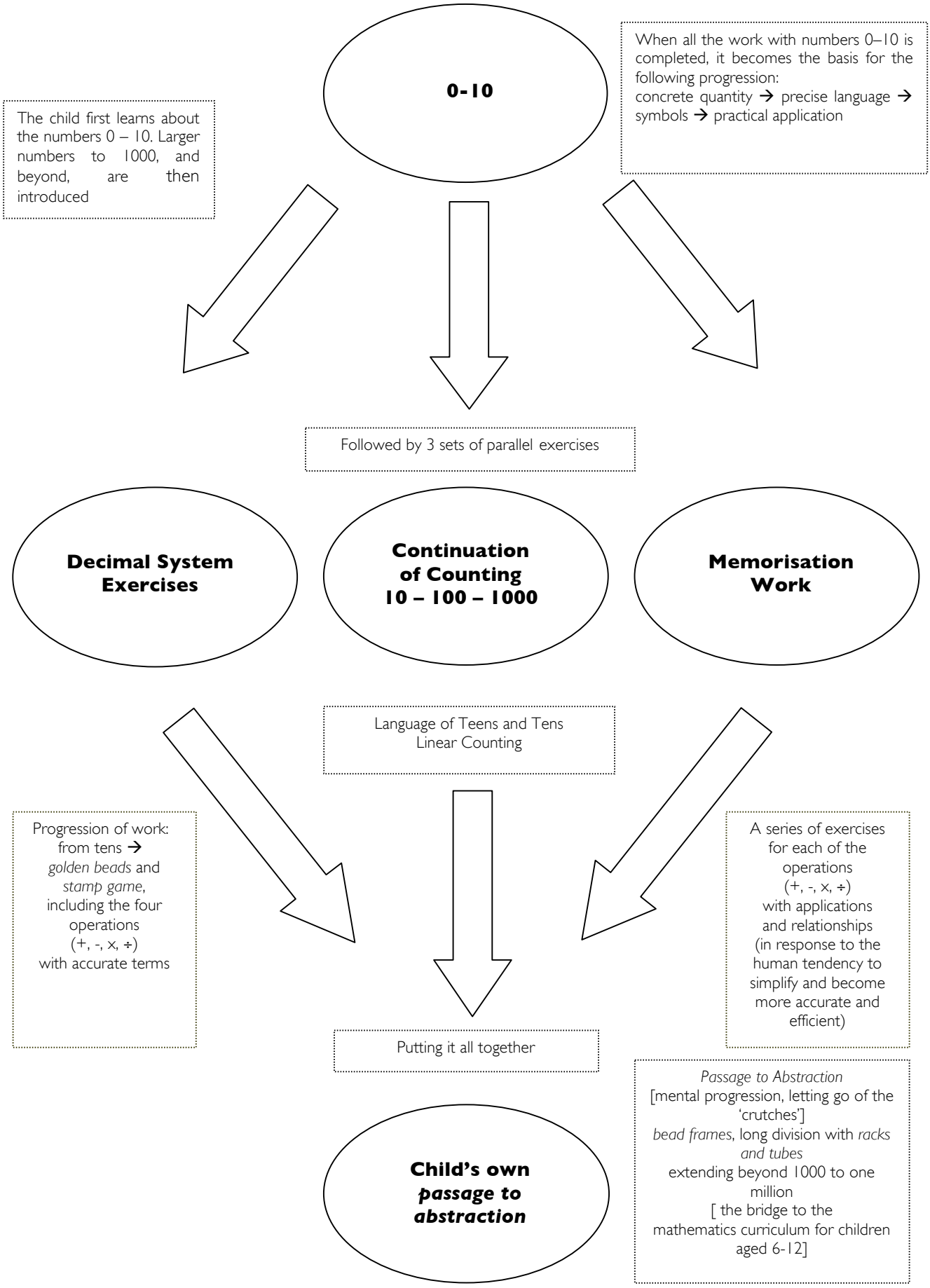
The base ten number system is represented for children in concrete form using *golden beads* organised so they vary simultaneously in quantity, size, mass and geometric shape. Children are also given the corresponding symbol for each quantity. In this way, children experience relations between the hierarchies of the system in

multiple ways. Using this material in active and enjoyable games, children learn to add, subtract, multiply and divide. This material supports the heightened sensitivity for number children tend to experience around the age of four.

The progression of the Montessori mathematics curriculum in the *Children's House* follows a five-step sequence.

1. *Introduction of Concrete Materials:* (The quantity is presented in isolation.)
   Concepts are presented in a concrete form children can manipulate. Children are given accurate language to talk about the concrete impressions. Only after they have experienced the concrete material are they given the symbolic mathematical notation.
2. *Introduction of Symbols*: (The visually recognised symbols are offered in isolation.)
   When the child is comfortable with the concrete representation and the oral language, mathematical symbols are introduced.
3. *Association of the Concrete with the Symbols*: (Accurate language is the link.)
   Only after the child has completed the first two steps are the concrete materials and symbols combined.
4. *Practice*
   After being presented with new information children need the opportunity for repetition. Children are offered a way to practise using and remembering this new knowledge and integrating it with what is already known. They have the opportunity to build and consolidate the knowledge through use of the materials, until it becomes automatic.
5. *Self Assessment*
   Children are given exercises to affirm or verify their own understanding and knowledge, and to establish whether they are ready for the next exercise.

An overview of the mathematics curriculum is represented in the following diagram.



Children work through the Montessori mathematics exercises and games in a supported and incremental way. There is no pressure for children to move onto a new topic before mastering the one they are working on. Students are free to progress through the mathematics curriculum following their own interests, so not all children complete the activities in the same sequence or in the same timeframe.

| Content Strand | Knowledge, Skills and Understandings | Activities and Resources |
|---|---|---|
| | *Typically children will:* | |
| **Language of mathematics** | Understand mathematical terms, for example, *long/short, more/less, share* | Activities include:<br>- everyday tasks<br>- preparing food<br>- gardening<br>- singing and finger plays.<br><br>Resources are the sets of objects in the environment. |
| **Mathematical concepts:**<br>***indirect preparation*** | Know materials have a purpose<br><br>Understand beginning, middle and end<br><br>Have established work habits<br><br>Experience mathematical concepts incidentally, informally and/or indirectly e.g. spatial awareness, one-to-one correspondence, geometry, classification, measurement, set, order, seriation, sequence, matching, grading | Activities include:<br>- movement activities for development of gross and fine motor skills<br>- *practical life exercises*<br>- *exercises of the senses*<br>- language/communication activities<br>- singing and finger plays<br>- classifying, sorting, matching, sequencing and grading<br>- everyday tasks (one-to-one correspondence of, for example, sock to foot, cutlery and place on table setting)<br>- preparing food, including measuring, sequencing actions<br>- puzzles, construction, *stereognostic bags.*<br><br>Resources are the sets of objects in the environment. |
| **Quantities and symbols 1 to 10** | Learn to recognise, sequence and count numbers 0 to 10<br><br>Experience and understand the function of 'zero' as an empty set and as a place holder<br><br>Experience 9 as a counting limit | Activities include:<br>- precise and engaging demonstrations offered by the adult<br>- *numbers to 10* games and exercises.<br><br>Resources include:<br>- *number rods* and cards<br>- *sandpaper numbers*<br>- *spindle box*<br>- *cards and counters*<br>- *memory game of numbers*<br>- games with zero. |
| **Decimal system** | Understand the concept of units, tens, hundreds and thousands<br><br>Make and read composite numbers. | Activities include forming numbers with beads and number cards.<br><br>Resources include *golden bead* material and number cards. |

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| **Language of numbers larger than 10** | Compose and count 'teen' and 'ten' numbers to 100<br><br>Use the language of 'teen' numbers and 'tens' to 100 | Activities include:<br>- precise and engaging demonstrations offered by the adult<br>- games and exercises with teen and ten numbers.<br><br>Resources include:<br>- *teen boards* and coloured beads<br>- *ten boards* and coloured beads. |
| **Counting:** ***continuation*** | Count numbers 1-10, 10-19, 1-100, 100-1000<br><br>Recognise recurring patterns across hierarchies | Activities include:<br>- precise and engaging demonstrations offered by the adult<br>- counting games and exercises.<br><br>Resources include:<br>- *teen boards* and coloured beads<br>- *ten boards* and coloured beads<br>- *100-chain*, *1000-chain* and skip counting chains (1-9) in the *chain cabinet.* |
| **Operations** | Experience, understand and apply the operations and their relationships (addition, subtraction, multiplication, division) | Activities include:<br>- precise and engaging demonstrations offered by the adult<br>- games and exercises with concrete material.<br><br>Resources include:<br>- *golden bead* material and number cards<br>- *dot game*<br>- *stamp game*<br>- word problems. |
| **Expanding the decimal system:** ***beyond 1000*** | Recognise number patterns recurring across hierarchy 'families': simple, family of thousands, family of millions<br><br>Experience and work with large numbers to millions, consolidating earlier work with addition subtraction, multiplication and division | Activities include:<br>- precise and engaging demonstrations offered by the adult<br>- games and exercises with concrete material.<br><br>Resources include:<br>- *wooden hierarchical material*<br>- small and large *bead frames*<br>- *racks and tubes* materials |
| **Memorisation** | Memorise and apply the essential number facts for addition, subtraction, multiplication and division | Activities include:<br>- precise and engaging demonstrations offered by the adult<br>- games and exercises with concrete material.<br><br>Resources include:<br>- *snake games*<br>- addition and subtraction *strip boards* and *finger charts*<br>- box of bead bars<br>- multiplication *bead board* and charts<br>- division *bead board* and charts. |

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| **Geometry** | Recognise and explore 2- and 3-dimensional shapes and their relationships<br><br>Learn and apply accurate terminology<br><br>Experience, discover and explore the constructive power of triangles | Activities include:<br>- precise and engaging demonstrations offered by the adult<br>- games and exercises with concrete material and objects in the environment.<br><br>Resources include:<br>- simple puzzles<br>- *folding cloths*<br>- shapes in the inside and outside environments<br>- *geometry cabinet* and cards<br>- *botany cabinet* and cards<br>- *geometry solids* and bases<br>- superimposed geometric figures/graded geometric figures<br>- *constructive triangle* boxes. |
| **Algebra** | Prepare indirectly for algebra | Activities include:<br>- precise and engaging demonstrations offered by the adult<br>- games and exercises with concrete material.<br><br>Resources include:<br>- *binomial cube*<br>- *trinomial cube*<br>- *sensorial decanomial*<br>- *constructive triangle* boxes. |
| **Time and sequence** | Experience sequence, order and routine<br><br>Begin to understand the concepts of *today, yesterday, tomorrow, past, present, future*<br><br>Begin to tell the time using *o'clock, half past, quarter to, quarter past* | Activities include:<br>- daily and weekly routines<br>- experiencing order and sequence in the environment<br>- celebrating seasons and festivals.<br><br>Resources include:<br>- clocks and card material<br>- calendars. |
| **Fractions** | Experience cutting up and sharing a whole<br><br>Learn the language of fractions (quantities <1)<br><br>Begin to use operations (addition, subtraction, multiplication, division) with fractions | Activities include<br>- preparing food<br>- sharing.<br><br>Resources include fraction circle insets and labels. |

## Cultural Subjects: Science, Geography and History

Children enter the *Children's House* when their interest in observing natural and social phenomena is at its peak. They are in the process of building a framework for classifying the features of the world around them. The *exercises of the senses* develop and refine children's powers of observation and sensory perception. Children learn to appreciate the natural world and social world through their senses.

Activities that provide children with experience of the natural and social world are presented in the same integrated way as all Montessori activities. Knowledge is presented to children in concrete form they can manipulate in purposeful ways. Activities allow for freedom of choice and repetition. Lessons can be given individually, or in small or large groups.

A systematic approach to the study of nature and society in the *Children's House* lays the foundation for *Cosmic Education*, which is the major focus of studies for children aged from six to twelve years.

The curriculum below covers the Montessori Early Years Learning Programme for the *Nido*, *Infant Communities* and the *Children's House*, but most of the activities are designed for the *Children's House* specifically.

### Science

| Content Strand | Knowledge, Skills and Understandings | Activities and Resources |
|---|---|---|
| | *Typically children will:* | |
| Practical life | Care for plants and animals | Activities include:<br>- developing precise hand control<br>- *how to* lessons e.g. how to clean up<br>- gardening, cleaning, sweeping, raking, watering and cleaning leaves.<br>- providing pets with an appropriate habitat or shelter<br>- feeding pets.<br><br>Resources include sets of functional objects and implements needed for the care of plants and animals and matched to children's size, strength and dexterity. |
| Sense exercises | Refine and develop powers of observation and perception<br><br>Recognise very small differences and similarities | Activities include relevant *exercises of the senses* i.e. pairing then grading dimension, colour, shape, texture, sound.<br><br>Resources include the Montessori sensorial materials and the indoor and outdoor environment. |
| | Begin to classify nature | Activities include:<br>- tracing and naming leaf shapes in the *botany cabinet*<br>- matching leaf cards and booklet with real leaf specimens<br>- art and craft activities.<br><br>Resources include:<br>- the botany cabinet<br>- card material<br>- plants in the environment. |

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| | Distinguish the four fundamental tastes<br><br>Distinguish scents of, for example, herbs and spices | Activities include relevant *exercises of the senses.*<br><br>Resources include:<br>- *tasting bottles*<br>- *smelling bottles.* |
| **Physical Science:** ***simple physics and chemistry, time, weather, astronomy*** | Observe and respond to natural phenomena to gain an impression of the scientific properties of such phenomena<br><br>Explore the many features of the world<br><br>Investigate their surroundings by observing, questioning, exploring and reporting | Activities include:<br>- using a magnifying glass<br>- undertaking simple experiments, e.g. magnets, sink/float, air, sound, gravity, light<br>- collecting rocks<br>- telling the time<br>- monitoring the daily weather<br>- observing and learning about clouds<br>- learning about the sun, moon, stars and constellations<br>- cooking<br>- mixing colours<br>- reading age appropriate books about the physical sciences.<br><br>Resources include sets of functional objects and implements matched to children's size, strength and dexterity. |
| **Botany** | Refine and develop powers of observation and perception<br><br>Explore and observe the world of plants<br><br>Develop an appreciation of the wonders of the plant world<br><br>Begin to understand what plants need to survive, grow and thrive<br><br>Learn to care for plants<br><br>Understand the effect of seasonal changes on plants<br><br>Become aware of the interdependency of all living things and the function of each in the web of life | Activities include:<br>- planting and watering<br>- raking and hoeing<br>- weeding, composting, harvesting, re-potting<br>- working with leaves e.g. cleaning, matching to *botany cabinet* shapes, collecting for study; drawing, making leaf collages and prints<br>- experiments including the needs of plants, what seeds need to germinate and grow<br>- nature walks.<br><br>Resources include:<br>- sets of functional gardening implements matched to children's size, strength and dexterity.<br>- selection of age appropriate books about plants and animals<br>- gardens with planted and wild areas, flowering and non flowering plants, with garden beds, raised areas and planter boxes<br>- indoor plants (non-toxic) representing a variety of species e.g. one for each leaf shape in the *botany cabinet.* |

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| **Botany:**<br>***language*** | Build a vocabulary for talking about plants<br><br>Write and read about plants (4-6 years) | *Spoken language*:<br>- names of plants, leaf shapes, parts of a plant, parts of roots, parts of a flower, parts of a leaf<br>- names of gardening activities and tools<br>- stories and poetry about nature<br>- pictures about plants as motives for spontaneous conversations<br><br>*Written language*:<br>- labels for *botany cabinet* leaf shapes; indoor and outdoor plants; wall charts and pictures<br>- picture cards, labels, definitions and control booklets e.g. parts of plants, roots, flowers and leaves, and types of flowers, plants and fruit |
| **Zoology** | Refine and develop powers of observation and perception<br><br>Explore and observe the world of animals<br><br>Develop an appreciation of the wonders of the animal world<br><br>Begin to understand what animals need to survive, grow and thrive<br><br>Learn to care for animals<br><br>Understand the effect of seasonal changes on animals<br><br>Become aware of the interdependency of all living things and the function of each in the web of life | Activities include:<br>- caring for animals (feeding, watering, cleaning)<br>- preparing habitats<br>- studying and sorting different types of shells<br>- observing life cycles e.g. butterfly, frog<br>- learning external parts of the human body.<br><br>Resources may include animals in the environment, both pets (e.g. guinea pigs; rabbits, bird, fish) and short term visitors (e.g. lizards, snails, ladybirds). |

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| **Zoology:**<br>***language*** | Build a vocabulary for talking about animals<br><br>Write and read about animals (4-6 years) | *Spoken language:*<br>- names of animals, types of animals, animal characteristics, parts of animals<br>- picture cards sets of animals: types, parts of, phases of life cycle<br>- pictures about animals as motives for spontaneous conversations<br><br>*Written language:*<br>- classified picture card sets, labels, definitions and control booklets e.g. vertebrates/invertebrates, prehistoric animals, herbivorous/carnivorous animals; marine, desert, forest, jungle, mountain animals; types of animals both invertebrate (e.g. arachnids, crustaceans, insects) and vertebrate (fish, amphibians, reptiles, birds, mammals)<br>- labels for phases parts of the life cycle of animals<br>- labels for the external parts and features of animal bodies and the human body<br>- reading and writing descriptions, stories and poetry about animals<br>- word study activities e.g. male/female, animal young, animal homes, animal groups collective nouns |

## Geography

| Content Strand | Knowledge, Skills and Understandings | Activities and Resources |
|---|---|---|
| | *Typically children will:* | |
| Geography | Develop a logical framework to order and store their impressions of the world<br><br>Gain an initial awareness of the importance of ecology<br><br>Gain initial understandings of features of land, sea and air<br><br>Gain initial impressions of how plants and animals are distributed across the earth<br><br>Begin to appreciate what people across the world have in common, as well as the variation among peoples/cultures<br><br>Begin to appreciate the industry, inventions and creativity of humans all over the world<br><br>Become aware of their place in the cosmos | Activities include:<br>- working with Montessori globes and *puzzle maps*<br>- drawing and labelling maps and flags<br>- listening to and playing music and singing songs from around the world<br>- making land and water forms in sand/clay<br>- drawing or tracing land and water forms.<br><br>Resources include:<br>- sandpaper globe of the world (land and water distribution)<br>- painted globe of the world (continents and oceans)<br>- pairs of land and water forms: island/lake, peninsular/gulf, isthmus/strait, bay/cape, archipelago/group of lakes<br>- political *puzzle maps* of the continents of the world<br>- political map of the states and territories of the children's own country<br>- classified pictures of people, places, plants and animals, products from different countries in each continent<br>- flags of the countries of each continent<br>- picture material of flora and fauna emblems of countries/states<br>- picture material of biomes i.e. life zones with own climate and features such as seasons, plants and animals: forest, savannah, grasslands, desert, ice cap, mountains, wetlands<br>- manufactured and craft items from around the world<br>- clay models depicting land and water forms. |

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|---|---|---|
| Geography:<br>*language* | Build a vocabulary for talking about places and people across the world<br><br>Write and read about places and people across the world (4-6 years) | *Spoken language*<br>- greetings and counting from around the world<br>- names of the continents<br>- names of countries within a continent<br>- names of states and territories in children's own country<br>- names of land and water forms<br>- classified pictures of generic land and water forms<br>- classified pictures of real land and water forms<br><br>*Written language*<br>- writing names of land and water forms, continents, oceans, countries, states etc with moveable alphabet<br>- labels, control of error cards, definition booklets for land and water forms<br>- labels, control of error cards, definition booklets for continents and oceans<br>- labels for hemispheres<br>- labels for countries in a continent, and states and territories of children's own country<br>- identifying and labelling land and water forms on outline maps of the world (isolation maps)<br>- picture cards and descriptions of people's lives in tropic, desert and Arctic regions of the world<br>- collections of classified pictures and labels for each continent based on the needs of humans (material and spiritual)<br>- booklets for different continents written, illustrated and published by the children |

### History

| Content Strand | Knowledge, Skills and Understandings | Activities and Resources |
|---|---|---|
| | *Typically children will:* | |
| History | Gain an impression of time passing<br><br>Gain an initial impression of ages past<br><br>Recognise and appreciate the contributions of individuals, past and present | Activities include:<br>- telling the time using both analogue and digital clocks<br>- labelling the parts of clocks<br>- sorting, matching and labelling card material.<br><br>Resources include (according to interest):<br>- collections of items from a past time e.g. the time when grandparents were children<br>- classified card sets of historical objects and events<br>- collections of pictures for each continent showing people, places and events past and present<br>- classified cards of, for example, famous people past and present<br>- timeline and picture material for learning about the history of transport, lighting, clothing, housing etc. |

## Creative Arts

The Montessori Early Years Programme covers the following areas of the creative arts curriculum:
- music
- visual arts
- movement and dance

### Music

In Montessori early childhood settings music is integrated into the environment and the curriculum. It is not treated as something separate taught only by music experts. It is a form of human expression open to everyone.

In the *Children's House* children are introduced to four parallel series of music activities and exercises in each of the following areas:
- singing
- music appreciation
- music literacy (pitch and notation) with the Montessori bells
- rhythm (notation)
- playing of instruments

The music materials in Montessori early childhood settings have the following features:
- They are always available for the children to use when they choose (except for the percussion instruments).
- They are prepared so children can use them independently.
- They allow for repetition.
- They are designed to lead to concentration, perseverance, success and confidence.
- They are an integral and constant part of the environment.

| Content Strand | Knowledge, Skills and Understandings | Activities and Resources |
|---|---|---|
| | *Typically children will:* | |
| **Music:**<br>***auditory discrimination*** | Explore differences in sound and sound qualities<br><br>Learn language to talk about sound e.g. *soft/loud, high/low* and the comparatives and superlatives<br><br>Apply knowledge and understanding about sound to the outside world. | Activities include:<br>- *sound games* e.g. indicating the direction of sound, describing sounds<br>- *silence game.*<br><br>Resources include:<br>- sounds in the environment<br>- *sound boxes.* |
| **Music:**<br>***singing*** | Sing to a range of music<br><br>Sing varying the volume and pitch (*loud/soft; high/low*)<br><br>Enjoy singing simple songs and melodies<br><br>Sing the scale<br><br>Express oneself through singing<br><br>Develop pitch recognition | Activities include:<br>- singing without accompaniment<br>- singing with accompaniment including the *Montessori bells.*<br><br>Resources include:<br>- simple songs<br>- folk songs. |
| **Music:**<br>***appreciation*** | Learn to appreciate a variety of music in the world | Activities include:<br>- independent listening to recordings of selected pieces of music<br>- learning about the instruments of the orchestra<br>- listening to different instruments<br>- visiting musicians<br>- using musical vocabulary and listening to/reading age appropriate stories and/or reference material about music and musicians.<br><br>Resources include:<br>- live performances<br>- recordings of many kinds of music from around the world labelled with name of piece, composer and type of music. |
| **Music:**<br>***timbre*** | Listen to and play simple instruments | Activities include listening to and playing instruments.<br><br>Resources include percussion and other simple instruments. |

| | | |
|---|---|---|
| **Music:**<br>***pitch and notation*** | Identify pitch<br><br>Hear, match and grade pitch<br><br>Distinguish high/low<br><br>Play known tunes<br><br>Create own tunes<br><br>Use symbol systems to represent musical sounds | Activities include:<br>- sensorial matching and grading activities with the bells<br>- playing and singing simple songs<br>- composing using the bells<br>- writing and reading music.<br><br>Resources include:<br>- the *Montessori bells* (two sets of matching bells accurately pitched diatonic and C Major scale plus the five sharps/flats that will turn the C major scale into a chromatic scale)<br>- moveable wooden notes, G clef, F clef<br>- wooden notation/staff boards<br>- staff paper<br>- musical nomenclature cards. |
| **Music:**<br>***rhythm*** | Experience and recognise a variety of rhythm patterns | Activities include:<br>- walking, running, marching and skipping on the line to music<br>- foot tapping, clapping, swaying during songs<br>- creating rhythms with hands and rhythm instruments.<br><br>Resources include:<br>- Montessori bells or piano or recordings of appropriate music for movement on the line<br>- rhythm cards and charts<br>- a large line on the floor that has long straight lines with gentle curves at the corners for rhythmical movement on the line. |

## Visual Arts

Artistic expression was considered by Dr Montessori to be one of the fundamental needs of humans. In particular, she encouraged children to draw. She felt that if children have fine motor control of the hand, learned through the exercises of practical life, combined with trained skills in perception, learned through the exercises of the senses, they would be able to create visual art works of a high quality.

Dr Montessori (1965/1918: 286) observed that during periods of creative drawing and design work children concentrate 'deeply and wholly' with their 'entire intellect at work'. She describes the process in the following way:

> To confer the gift of drawing, we must create an eye that sees, a hand that obeys, a soul that feels; and in this task the whole of life must cooperate (Montessori 1965/1918: 289).

Art appreciation is also an important aspect of Montessori early childhood settings. By looking at the artworks of others, children learn that it is possible to create different and unique works while using knowledge, skill and techniques developed by others.

Art is integrated into the Montessori approach in ways that include the following:

- the exercises of practical life and the senses are extended into a range of self expression activities, including work with clay, collage, chalk, paint, charcoal, crayon, oil pastel, cutting, soft wire, weaving and printing
- written language work, including creative writing and poetry, is illustrated by the children.

In the *Children's House* art activities include drawing, painting, design work, collage, printing, flower arranging, sewing and handiwork, modelling with clay, colour mixing, art appreciation cards, wall pictures, and stories. Techniques and processes for using different media are shown to the children in discrete activities presented individually or in small groups. All the materials for each activity are kept together, and children are free to choose the activity, and explore the media, and processes involved, independently. There should, however, be a limited amount of art available at any given time. Two, or at the most, three different kinds of media at a time are sufficient.

| Content Strand | Knowledge, Skills and Understandings | Activities and Resources |
|---|---|---|
| | *Typically children will:* | |
| Visual Arts | Experience a variety of art media<br><br>Express themselves through a variety visual art media<br><br>Begin to appreciate artistic expression from around the world | Activities include:<br>- extending skills gained in exercises of *practical life* e.g. how to hold a paint brush, how to clean up, how to hang up painting to dry, how to hold a pencil<br>- extending understanding of colour and shape gained in *exercises of the senses* e.g. *colour boxes*, *geometry cabinet*, *botany cabinet*, *colour boxes*<br>- extending design work with *metal insets*<br>- illustrating and decorating class work<br>- arranging flowers<br>- drawing in a variety of media e.g. pencil, crayon<br>- painting in a variety of media e.g. water colour, acrylic<br>- making collage<br>- printing in a variety of media<br>- sewing and handiwork<br>- modelling in a variety of media e.g. clay, papier maché.<br><br>Resources include:<br>- art appreciation cards<br>- wall pictures<br>- stories about art and artists<br>- art supplies. |

## Movement and Dance

The development and refinement of movement is an integral part of the child's development from birth to six years of age. The ability to appreciate dance and to be able to move one's body as a form of expression is an important facet of children's development. The focus on specific movements can assist children's development in many other areas, for example whole body coordination. Dance is also an important aspect of health and physical exercise. Young children have a natural sense of rhythm and often lack inhibition so dance comes naturally and spontaneously to them.

In the *Children's House* there are many *walking on the line* activities that involve control and coordination of movement. The *silence game* involves practice in inhibition of movement and stillness of the body. Additional movement on the line activities call for increasing control when marching, running and skipping/galloping along with recognition of the rhythmical notation that calls for these kinds of movements.

| Content Strand | Knowledge, Skills and Understandings | Activities and Resources |
|---|---|---|
| | *Typically children will:* | |
| Movement and Dance | Develop further control of whole body movement<br><br>Use movement to express oneself<br><br>Move to music to express oneself<br><br>Enjoy dancing to a variety of music | Activities include:<br>- movement games for whole body control e.g. moving and stopping to a bell, moving without touching anything, following a leader<br>- movement games for equilibrium e.g. *walking on the line*, walking, running, marching, skipping, walking with objects such as flags<br>- games for inhibiting movement e.g. *silence game*<br>- movement for expression e.g. free expression to music both on and off the line; marching variations; arm movements while walking on the line; moving to poetry and songs; rhythmic games<br>- dramatic interpretations of, for example, a seed growing<br>- freeze game<br>- free dancing to a variety of music<br>- basic dance steps such as skipping, stepping, swaying and tapping<br>- folk dances, ethnic cultural dances, bush dances, circle dances.<br><br>Resources include an environment designed to encourage a range of movement. |

## Personal Development, Health and Physical Education (PDHPE)

The Montessori curriculum provides opportunities for students to gain an understanding of their personal development and health while providing opportunities for physical education and fitness.

Dr Montessori was a physician keenly interested in the health of the human body. She incorporated physical activity into her approach to education, devising gymnastic equipment, open-air games and outdoor adventure education for older children. The development of coordinated movement from birth is central to the Montessori approach. Dr Montessori also observed how children's ability to self-regulate, a phenomenon she termed the *will*, develops gradually from infancy through the childhood years if children are supported to become physically and socially independent. The *will* is developed during early childhood, in the Montessori view, when children can choose purposeful activities they find interesting and which involve manipulation, and then are given the freedom to work with those activities for as long they wish. Through such activity, in which the mind and the hand come under voluntary control, children learn how to make appropriate choices, how to accept the consequences of their actions and how to preserve, and how to work towards achievable goals and expectations.

The Montessori PDHPE programme, as in all other areas of the Montessori curriculum, allows children the freedom to choose their own activity and to complete that activity in their own time. The Montessori PDHPE programme includes:

- personal development, incorporating the *lessons of grace and courtesy*
- health awareness
- physical education.

## Personal Development, Incorporating the *Lessons of Grace and Courtesy*

Personal development in Montessori early childhood settings revolves around *the lessons of grace and courtesy*, the Montessori lessons designed to ensure the needs of everyone in the setting are respected and to promote social harmony. These lessons are given to individual children, small groups or to the whole group. The lessons can be given:

- at point of need
- to prepare children for social situations they will experience in the future
- in response to children demonstrating they need more knowledge about how to manage a social situation, but at a later time so not to embarrass the children or make them feel self-conscious

Sometimes *grace and courtesy* lessons take the form of mini-dramas that highlight behaviour and model more effective ways of managing social encounters and interactions. Many *grace and courtesy* lessons are *how to* lessons that model for children how to, for example:

- put a chair under a table without disturbing others
- interrupt politely
- introduce one person to another.

The lessons include information about:

- how to move and use objects with care and control without causing disturbance or harm
- how to gesture appropriately, for example, indicate, smile or shake hands
- what language to use in each situation, for example, politeness terms such as *please*, *thank you* and *excuse me*.

Because there is only one of each set of materials in the environment, children in Montessori settings learn to take turns and consider others. In addition they learn to respect the time and space others need to complete their work undisturbed.

| Content Strand | Knowledge, Skills and Understandings | Activities and Resources |
|---|---|---|
| | *Typically children will:* | |
| Personal Development | Acquire and use appropriate social customs and manners<br><br>Accept responsibility for actions and the consequences that follow<br><br>Use communication and cooperation skills to share feelings and meet basic needs when interacting with others<br><br>Identify ways in which to communicate, cooperate and care for others<br><br>Develop respect for self and for others | Activities include *grace and courtesy lessons* that model and provide practice in appropriate behaviour and manners.<br><br>Resources include a multi-age setting, in which older children model more mature interactions to younger children and older children assist younger children. |

## Health Awareness

Montessori environments recognise the importance of psychological security and wellbeing, encouraging children to become independent, curious, courageous and considered risk takers. Dr Montessori was an early advocate for improving children's health. She emphasised the importance of fresh air, exercise, hygiene and good nutrition for children at a time when these concerns were not yet commonplace. This tradition is maintained in Montessori early childhood settings to this day.

Montessori settings are kept meticulously clean. In the *practical life* area of the curriculum children learn to care for themselves and their surroundings. These lessons begin in the *Infant Community* and continue into the *Children's House*. For example, children learn how to:

- wash their hands, blow their nose, use the toilet, care for their clothes, put on a hat, dress themselves appropriately for the weather, prepare food, eat and clean up after themselves
- keep their surroundings clean, put dirty cloths and clothing into the laundry and ensure equipment, surfaces and work areas are tidy, clean and ready for the next person.

Children are encouraged to plant and care for healthy foods in the school garden and to harvest, prepare and/or cook them, and then serve them to other children and/or family and friends.

Children are engaged in conversations and lessons relating to topics such as nutrition and safety, including sun and road safety.

Children are encouraged to participate in regular physical activity, both indoors and outdoors.

| Content Strand | Knowledge, Skills and Understandings | Activities and Resources |
|---|---|---|
| | *Typically children will:* | |
| Health | Recognise that healthy living is important for growth and development<br><br>Become aware of the factors that influence healthy living and well-being<br><br>Recognise that their safety depends on the environment and the behaviour of themselves and others<br><br>Develop an appreciation for a healthy and safe lifestyle | Activities include:<br>- regular modelling, discussions and activities related to nutrition, grooming and general hygiene<br>- regular modelling, discussions and activities related to safety e.g. road, sun, water, fire, home, school<br>- protective behaviours programme<br>- small group and individual lessons showing children how to care for hair, clean nails, blow nose, cough hygienically<br>- growing vegetables and fruit to prepare and/or cook.<br><br>Resources include:<br>- adults and older children in the environment modelling and talking about healthy and safe choices<br>- elements of the environment designed to encourage healthy and safe choices. |

## Physical Education

Regular physical activity is an essential component of Montessori early childhood settings. Young children move constantly and need movement in order to learn. Montessori settings are prepared to allow children freedom of movement while, at the same time, activities are designed to enable children to develop control of their physical movement. Daily free play outdoors extends opportunities for regular physical activity.

Children also need activities that are challenging and require 'maximum effort', and these are provided in the setting, for example, opportunities to move heavy objects in safe ways. These activities are extended in the *Children's House* to help children develop, strengthen and refine their movement further.

| Content Strand | Knowledge, Skills and Understandings | Activities and Resources |
|---|---|---|
| | *Typically children will:* | |
| Physical Education | Develop gross motor coordination and skills, flexibility and muscle coordination<br><br>Participate in physical activity, recognising that it can be both enjoyable and important for health.<br><br>Understand the relationship between regular physical activity and health<br><br>Improve physical fitness | Activities include:<br>- body control games such as moving and stopping to a bell, moving without touching anything, following a leader (i.e. learning to control movement)<br>- *walking on the line* movements e.g. walking, running, marching, skipping; walking with objects such as flags (i.e. learning to move with equilibrium)<br>- *silence game* (i.e. learning to inhibit movement)<br>- free movement within the classroom<br>- practical life activities including cleaning, tidying, gardening, cooking<br>- movement needed to act out reading commands, as well as interpretive reading and functions of words<br>- small group activities to introduce ball skills and games<br>- vigorous games involving a range of movements e.g. running, skipping, galloping.<br><br>Resources include:<br>- outdoor play area, including a variety of surfaces (e.g. hard, sand, grass), shade, fixed equipment (e.g. climbing equipment, sandpit)<br>- sports equipment e.g. balls, bats, hoops, ropes. |

## Languages Other Than English (LOTE)

In the Montessori view, from birth to the age of six, children are in a sensitive period for language development. For this reason, in Montessori early childhood settings, a great deal of emphasis is placed on supporting and enhancing children's language development. Supporting language development in early childhood settings includes:

- valuing the language/s spoken in each child's home, and the language development achieved by each child when they enter the early childhood setting
- structured support with the development of spoken English, both for children who speak English as a first language and for children for whom English is not the language of the home
- systematic preparation for the development of written English (writing and reading)
- engagement with a language other than English.

Because Montessori educators recognise the special sensitivity to language of children from birth to the age of six, in many Montessori early childhood settings, where possible, children are exposed to a language other than English in order to capitalise on their capacity to absorb whatever language exists in their environment. Montessori educators recognise that young children associate any language spoken in their environment with particular speakers. For this reason, in Montessori early childhood settings where a language other than English has been introduced, the designated adult speaker, ideally a native speaker, speaks only that language to the children without mixing it with English. Young children learn very quickly which language to use whenever they interact with that speaker. Because the use of the language is integrated into the daily activities of the classroom, children use the language unselfconsciously and habitually. They also engage with many of the spoken language enrichment and early literacy activities in the language other than English, in the same way as

they work with them in English, but they do this work with the adult who speaks the language habitually in the environment.

If there is no adult speaker of another language available to spend extended periods of time in the Montessori setting, and especially where there are children whose home language is a language other than English, the teacher will often incorporate awareness of another language into the *lessons of grace and courtesy*, language enrichment and word study activities. For example, in *grace and courtesy lessons* or in language enrichment activities, as well as exploring English expressions and vocabulary, the teacher might ask a child whose home language is not English how they say the same thing at home, or how their parents or grandparents might say it. In word study activities, children might learn that many words used in English have come to us from languages other than English.

Engagement with a language other than English inspires in children interest in and respect for other cultures, especially when the language, and the culture represented by the language, is integrated into the other areas of the curriculum. For example, activities and artefacts from the culture might be integrated into the *practical life* area, or pictures relating to the language and its culture might be included in picture material placed in the language area.

## Digital Technologies and Children Aged from Three to Six

In recent years there has been much debate about the integration of digital technologies, specifically the use of computers, in early childhood settings (see, for example, Edwards 2005). In the view of Montessori educators the disadvantages of computer use in early childhood settings outweigh the advantages. For this reason, computers are generally not found in Montessori early childhood settings for children under six years of age.

In the Montessori view young children learn best through multisensory, concrete experience. This is especially true of children from birth to three years of age, but remains significant for children aged from three to six. During the years from three to six children's development continues to depend on physical movement. Increasingly, children become interested in manipulating real objects to achieve meaningful goals in the concrete and social world around them. During activity of this type, as children learn to regulate and refine the movement of their hands, they are also learning to regulate their mental attention, and thus, their powers of concentration. In addition, purposeful activity that involves manipulating real objects enables children to refine their powers of perception and discrimination using all their senses. During these years children also need to interact with people who are physically present in order to develop the ability to build personal relationships and culturally appropriate behaviour.

When children sit in front of a computer screen, they are not using all their muscles, either large or small. In addition, much of the regulation of the activity is driven by the computer software rather than the children themselves. The range of perceptual and intellectual discrimination and judgement demanded of children is reduced during screen-based activity. Furthermore, children are less likely to interact meaningfully with the people around them because the goals they can achieve with screen-based computer software are less grounded in daily family and community life. In Montessori early childhood settings screen-based activity has the potential to displace children's work with the Montessori materials.

The Montessori approach to the use of screens in early childhood settings is supported by the *Healthy eating and physical activity guidelines for early childhood* (Department of Health and Ageing 2009). In these guidelines screen-time is defined as inactive 'non-productive sedentary behaviour', which over long periods is associated with:

- less active, outdoor and creative play time
- an increased risk of being overweight
- sub-optimal muscle and bone growth
- unhealthy eating habits
- poorer social skills
- fewer opportunities to develop decision-making, self-awareness and self-regulation skills
- slower development of language skills and short-term memory
- television-viewing habits that continue through childhood. (Department of Health and Ageing 2009: 71-3).

For this reason, the guidelines argue for limiting, or even excluding, screen-time from early childhood settings. The limiting of screen time in early childhood settings is also recommended in *I move we move* guide (NSW Health 2009: 7.1).

Montessori educators recognise that there are children who may not have access to digital technologies at home and that this raises questions of equity. Nevertheless, in the Montessori view, the knowledge and skills children develop through work with the Montessori materials prepares them very effectively for later use of digital technologies. Experience in Montessori schools has demonstrated that children who have made the transition from the *Children's House* setting to the next stage of schooling, even if they have not had computer access at home, are able to use computers with ease and success at later stages of schooling. This may be because the skills developed in the *Children's House*, especially in the exercises of *practical life* and *the exercises of the senses*, indirectly prepare children for successful computer use. These skills include:

- fine motor control and coordination that prepare children to use a mouse and a keyboard
- the ability to sequence and to observe
- the ability to manage abstract concepts
- higher order thinking and problem-solving skills
- procedural thinking.

These skills become a resource children apply when they later work with digital technologies. Furthermore, successful engagement with digital technologies demands the ability to be *multiliterate*, in other words, to be literate in 'multimodal ways of communicating through linguistics, visual, auditory, gestural and spatial forms' requiring 'the knowledge and skills needed to read, write and use spoken and written language and sounds and images' (Hill 2007: 56). Montessori educators would argue that the diverse multimodal resources and activities in Montessori early childhood settings equip children *par excellence* with the knowledge and skills that will set them up for success in a world in which digital technologies and multiple forms of literacy play an important role.

Digital technology is, however, a resource used by the adults in Montessori early childhood settings. For example, pictures and information accessed via the Internet are regularly used to prepare and customise resources to meet the specific learning needs of individual children. Digital cameras are also used to record and document children's progress, as well as excursions or other special events. Teachers also use digital technologies to keep records and to communicate with families and colleagues.

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# Montessori National Curriculum for the Second Plane of Development from Six to Twelve Years

MONTESSORI AUSTRALIA

# The Montessori National Curriculum for the Second Plane of Development from Six to Twelve Years

## Introduction to the Second Plane of Development

The first six years of life lay down the foundation for all future development of human beings. During these years children experience extraordinary development in all facets of their lives. Their physical development is phenomenal, as is the development of personality, sociability and spirituality. At the same time, they acquire both language and culture. The second six years of life build on all these developments and acquisitions as children continue the process of self-construction. The nature of this process, however, changes because the characteristics of children beyond the age of six are very different.

The distinguishing features of the Montessori approach continue to underpin the Montessori curriculum for children from six to twelve years. Children are given the freedom to learn through their own activity and exploration, and, in the process, to become increasingly independent. The curriculum aims to develop in children the qualities of self-confidence, self-direction, self-discipline and persistence, in tandem with the ability to concentrate, to move with coordination, to interact with others with grace and courtesy and to take responsibility for the order of the environment and for their own learning. The preparation of the learning environment, and the resources and activities offered to the children, however, are matched to the characteristics of the second plane of development.

## Characteristics of the Second Plane of Development

While the first plane of development is one of rapid physical growth and transformation, the second plane of development is characterised by physical stability and steady growth. Because less energy is being used for physical growth, children in the second plane of development have increased stamina. These stronger, healthier children are more adventurous and daring, often willing to try physically challenging things, and to ignore scrapes and bruises in order to demonstrate their increasing strength and toughness. This increase in physical stamina can also manifest itself as a capacity for sustained intellectual work. Children in this plane of development are more receptive to intellectual learning than at any other time in their lives.

In the Montessori tradition children in the first plane are said to have an *absorbent mind*, because they absorb, unconsciously, every aspect of their environment, language and culture. Before the age of six children are interested in the phenomena around them, both *what* phenomena are and *where* they are located, physically, socially and mentally. From about the age of six, however, the mind loses the ability to absorb the environment unconsciously. Instead children begin to use *reason and logic* to learn about their world consciously. Typical questions asked by children of this age include *why*, *how* and *when*. This is a time when children are developing great intellectual power.

In the second plane of development, just as in the first plane, children first learn about the world through the senses. In the Montessori curriculum for the second plane of development, wherever possible, concrete materials continue to be used to introduce new concepts. For example, children experience in concrete form the regular increase in three dimensions of a graded tower of cubes, or the concrete representation of square root and cube root. The opportunity to manipulate concrete representations of abstract concepts helps children build images of these concepts in their minds. These images, gained initially through sensory experience with concrete materials, help children in the second plane of development to understand and work with, for example, patterns, sequences, algorithms and theorems. In other words, these images become tools for thinking, enabling children to use, and strengthen, their powers of logical reasoning across the discipline areas of the curriculum.

An important task for children in the first plane of development is to learn to recognise what is real and what is not. For this reason, in the Montessori *Children's House*, children are presented with true information about real things, for example, plants, animals and geographical features. Beyond the age of six, however, the *imagination* becomes an important intellectual tool. Children in the second plane of development use their imaginations to learn. This process is described by Dr Montessori (1973/1948: 15-16) in the following way:

> The secret of good teaching is to regard the child's intelligence as a fertile field in which seeds may be sown, to grow under the heat of flaming imagination. Our aim therefore is not merely to make the child understand, and still less to force him to memorise, but so to touch his imagination as to enthuse him to his inmost core. We do not want complacent pupils, but eager ones; we seek to sow life in the child rather than theories, to help him in his growth, mental and emotional as well as physical, and for that we must offer grand and lofty ideas to the human mind, which we find ever ready to receive them, demanding more and more.

The imagination becomes the basis for abstraction, a mental tool developed by children during the second plane of development. The ability to abstract is the ability to retain an image of a sensory experience in the imagination so it can be recalled at any time, even when that experience is no longer physically present.

During the second plane of development children broaden their horizons beyond the confines of the family and into the wider society, most specifically into a new level of social life with their peers. They exhibit a great loyalty to their peer group and the evaluation of the group becomes paramount. During this time children are beginning the process of becoming independent from the family, a step they must take if they are eventually to make mature attachments beyond the family.

Children in the second plane of development are intrigued by the unusual and the extraordinary. They also look up to those they perceive to be heroes. These potential role models inspire children to stretch themselves and better themselves in some way. At the same time children of this age are developing and honing their conscience, their ability to tell right from wrong. Where young children might tend to accept what their parents tell them about right and wrong, beyond the age of six children want to work this out for themselves. They earnestly want to know what is right or wrong, good or bad, fair or unfair, but they also want to know why.

## Montessori Prepared Environment for the Second Plane of Development

The preparation of the Montessori learning environment for the second plane of development and the design of the resources and activities offered to these children are based on the Montessori understanding of the distinctive characteristics of children of this age.

The Montessori environment for the second plane of development is designed for a mini-community of peers. As children begin to disengage from the family, they strive to 'belong' to, and become accepted by, a new community, this time of peers. Membership of this new community supports children as they become increasingly independent of the family, an independence that enables them to do things by themselves, and for themselves and others. A social environment of this type enables children, over time, to mature socially. In a community of peers, the first question children ask is, 'Can we work together?' In the Montessori learning environment this community provides them with the opportunity to collaborate on research projects and to share information.

In the Montessori *Children's House*, children usually choose to work with the Montessori materials on their own. For this reason, most lessons are given to one child at a time. One of the first signs that children are psychologically making a transition to the second plane of development is that they begin to prefer working with other children. This way of working, characteristic of the second plane, is not simply working next to another child using a different material. Instead, it is working with another child, or a small group of children, cooperatively on the same task to achieve a shared goal. For this reason, lessons in the environment prepared for children in the second plane of development are given to small groups of children. Children who have had the same lesson are then able to follow up the work together.

### Transition from the *Children's House* to the Environment Prepared for Children over Six

When, in the *Children's House*, older children choose to work together most of the time, they are ready to visit the environment for children in the second plane of development. This step begins their transition to the new learning environment. Ideally, the environment for the next plane of development is adjacent to the *Children's House* so that children are free to visit whenever they feel ready. Older children are also able to return to the

*Children's House* for a visit. Older children might read to a small group of younger children, give lessons, help with games or with greetings and leave-takings. Service of this type is expected of the older children. If the architecture of the school sets up obstacles to the free movement of children between classrooms, then such opportunities are created through planning.

## *Cosmic Education*: A Curriculum for Children aged from Six to Twelve Years

The curriculum offered in the Montessori environment prepared for the second plane of development is called, by Montessori educators, *Cosmic Education*. This curriculum presents children with a full range of educational disciplines, including mathematics and language, as well as the arts, sciences and social sciences. The materials and exercises for each discipline area help children build a conceptual order, and classification materials associated with each discipline help children construct a mental order. The educational disciplines, however, are not presented to children as discrete areas in defined blocks of time, but in the form of an interconnected, interrelated and open-ended curriculum. The children are shown how each topic is related to other topics in the same subject area and to other subject areas. The interconnections between the disciplines happen at different points of time and in different ways for different children. In this way, the curriculum is experienced as a coherent whole, individualised to each child's interests and learning style, rather than as an assortment of unrelated pieces of information. This approach can be adjusted to match the learning styles of both global and linear thinkers and helps individual children to relate their predominant style of thinking to the thinking styles of others. The range of the *Cosmic Education* curriculum is very broad, and covers topics not always offered in primary school.

### Pedagogy

The Montessori curriculum for children in the second plane of development has evolved over the past one hundred years as, first, Dr Montessori, and later, educators within the Montessori movement**,** experimented and observed:

- *what* children of this age want to learn
- *when* they want to learn it
- *how* they want to learn it
- *what materials and activities* can best help them to learn.

In the Montessori environment prepared for children in this plane of development, most lessons are given to small groups of children. Children spend a great deal of time working with others. Individual children, nevertheless, progress at their own rate.

The are two main types of lessons:

- *great lessons*
- *key lessons*

The *great lessons* are fable-like stories that provide children with an expansive and imaginative overview of a whole area of the curriculum. *Key lessons* are brief lessons that provide students with just enough information about a certain area of knowledge, or a skill, principle or technique they need to master in order for them to explore independently an area of interest emerging from a *great lesson*.

Careful records are kept of all lessons each child receives and the work that each child does. Children participate in regular, individual *conferences* with the teacher. These conferences are conducted so that children learn to evaluate their own level of mastery of materials and activities presented in previous lessons and their readiness for new lessons. In this way they become co-evaluators of their own work with the teacher. At the end of each conference the teacher asks if there are any lessons the child would like to receive that have not yet been mentioned. This helps the children take ownership of their own learning. Information collected at individual conferences is added to the record of lessons for each child. The teacher uses these records to plan future lessons, and groupings of children for these lessons. Occasionally a child needs to repeat a lesson. In this case the child may join the next group of children to be given the lesson or the child may receive an individual lesson if no one else needs the lesson at that time.

## The *Great Lessons*

Dr Montessori observed that children in the second plane of development ask questions about the universe, the earth, life that has evolved on earth, and their place in this universe. In response to their questions she developed five *great stories,* or *great lessons,* that set the stage for an integrated approach to the curriculum offered to answer those questions. The first three *great lessons* introduce children to:

- the formation of the universe, the solar system and the earth
- the evolution of life on earth
- the coming of human beings to the earth.

The fourth and fifth *great lessons* are about the two great human inventions around which the curriculum is structured:

- communication through signs, in particular the alphabet
- development of numbers

These five *great lessons* create a whole view, or overview, of the curriculum, into which details, provided by subsequent lessons, may be placed in relation to the whole and to one another. In this way, education becomes a coherent, interrelated whole rather than an assortment of unrelated pieces of information.

The *Cosmic Education* curriculum begins with the *great lessons*. Instead of giving children tiny, disconnected details, these stories give children the broad vision their expanding intellectual power demands. They become the framework for all subsequent lessons and activities, ensuring the coherence of the curriculum. In response to the children's interests sparked by the *great lessons* the teacher prepares lessons to harness those interests. The environment is designed to provide children with space and uninterrupted time to follow these interests, for example, in a *great work*.

## *Great Work*

Because children in the second plane of development like to exert maximum effort, they often initiate a *great work,* in other words, a work that completely absorbs them for an extended period of time. During such work children develop their ability to cooperate with others as well as to concentrate for longer periods of time.

The follow-up work children complete after each lesson does not take the form of work sheets because, when children come to the end of a worksheet, psychologically they perceive the work as finished. Without the arbitrary limit set by a worksheet, children become very inventive in designing ways to work with the information or to practise the skill. Through invention of this sort, the information becomes their own, or the skill is mastered. When children are free to work in this way, they become completely absorbed in large endeavours. Exerting maximum effort and being creative become habits. This phenomenon has been observed in Montessori environments for children of this age so frequently that it has been named *great work*. For this reason, the Montessori environment prepared for children of this age provides both the space and the uninterrupted time for this kind of activity to occur.

During a *great work* children build and expand their understanding, repeating the original lesson in a variety of ways. With each new understanding children appear to enjoy 'flexing their mental muscles', and often strive to exercise that understanding in a big way. An important aspect of this type of work is the opportunity to talk with their peers. Children of this age love to share and discuss ideas with their friends. This talk is important because it helps children develop their *reasoning*, the reasoning mind being a distinguishing characteristic of this plane of development. Children of this age want to know the reasons for things. When they are investigating a particular topic, they research and discuss using questions such as: *Why is this like this? How did this happen?*

## The Environment

In the Montessori curriculum for children in the second plane of development two environments are offered to the children. The first environment is the classroom and the second is the world outside the classroom. The two environments together are used to:

- deliver the *Cosmic Education* curriculum
- give children the opportunity to engage actively with the curriculum.

The *Cosmic Education* curriculum follows the principle of 'just enough'. This means that environment provides 'just enough' in the way of lessons, materials and information to equip children to proceed on their own. It is not the responsibility of the Montessori teacher to satisfy the vast curiosity children of this age have to know and to learn. Instead the teacher's responsibility is to supply just enough information so the children will be eager to know more and to search for that knowledge and skill independently. The teacher helps them learn how to find out more on their own as well as how to interact with the material, information or skill in order to make it their own.

In summary, the Montessori environment for this age group is not designed to contain all the answers to the children's questions. In fact Dr Montessori warned that offering children too much in the learning environment can be as detrimental as offering too little. Instead the environment provides reasons for children to go out into the world in order to learn more. This is why the second environment for primary children is the world outside of the classroom. The world is made part of children's environment through the *going out* programme.

## Going Out

While occasional field trips planned by the teacher and involving the whole class are one element of the Montessori *Cosmic Education* curriculum, the *going out* programme is something different. *Going out* is initiated, planned and carried out by the children themselves. This generally involves small groups of children who have a common interest. Activities of this kind begin simply and then grow in complexity over the primary years. If the class has a fish tank, for example, younger children may arrange for a trip to the pet shop to buy fish food. Initially, the teacher helps children with the planning process and shows them how to find out when the shop is open and how to get to and from the shop. By the time the children are older, they engage in a more complex process that includes:

- establishing that they have a need to go out
- deciding what kind of outing would serve their purpose
- obtaining the necessary information
- finding out where to go
- finding out how to get there
- researching the costs involved
- establishing the amount of time needed
- planning what needs to be taken on the outing
- inviting chaperones.

The prepared environment includes a range of resources for children to use as they plan an excursion beyond the classroom. These might include:

- brochures and other information about places to go for particular kinds of experiences
- phone books and a telephone
- maps and a street directory
- email and Internet access

To help children prepare for *going out*, they are given *how to* lessons, including:

- how to telephone for information or to make appointments
- how to read a map or street directory,
- how to search for information on the Internet
- how to use email
- how to use public transport
- how to conduct interviews
- how to take notes
- how to write letters of inquiry and *thank you* notes.

At no time do children leave the school unaccompanied; one or more adults always accompany children when they go out. The role of the adult/s is to ensure the children come to no harm. The children themselves take responsibility for all aspects of the trip.

## Abstraction and Imagination

The resources and activities in the Montessori learning environment for this plane of development are designed to aid the progression to *abstraction*. Many Montessori materials represent abstract concepts in concrete form. Children manipulate these materials to discover the concepts, working with the materials for as long as they need. They cease using the materials when they can manipulate the concepts abstractly. The ability to abstract is interwoven with the ability to imagine. With their *imagination* children of this age can experience and learn about all aspects of our universe, whether phenomena far out in space, places on the other side of the world, or particles too small for the human eye to see. When, for example, children of this age have seen a lake and understand what a lake is, they can imagine lakes anywhere in the world. If they have experienced snow, they can imagine the South Pole. Imagination also gives them the power to go backwards in time and imagine what life must have been like before there were grocery shops, a time when human beings had to find all their own food in order to survive. The Montessori learning environment for this age offers children an extensive array of images of this type in the form of stories, charts and experiments.

## Social and Ethical Development

The learning environment also accommodates the hero worship so common to this age group by telling true stories of people from diverse times and places, stories that reveal the characteristics of these people, what they have done and the service they have given. Such stories inspire a sense of gratitude in the children for the contribution of others and may show them ways of contributing to the community and serving humanity themselves.

At the same time, children of this age are developing a sense of right and wrong, a sense of morality. This area of development is supported in the Montessori learning environment where children are free to make their own choices and to choose their own workspace and work companions. This freedom carries with it responsibilities. Socialising and working within a community of peers teaches children how to live and work together. *Lessons in grace and courtesy* provide the knowledge and support children need to succeed in social interactions. At the same time, the *great story of the formation of the universe* introduces children to the laws of physics that operate in the universe. The story demonstrates how these laws preserve and protect the earth and make it possible for life to exist. Children also learn about past civilisations and how they developed laws that enabled them to live together. Through these stories, and the work that follows, children come to understand the benefit of laws and rules in all contexts, natural and social.

Children at this age have a heightened sense of justice and want everything to be fair. They practise negotiation and mediation skills among their own society of peers. There are regular class meetings for children of this age. Topics discussed at these meetings often include the concept of fairness along with issues of right and wrong. The interest children of this age have in understanding morality often leads to a deep sense of justice, as well as compassion for less assertive or younger children and people everywhere who are in need of help.

The *Cosmic Education* curriculum reveals to children the gifts they have received from the natural environment and from human society. The curriculum is designed to develop a sense of gratitude and of responsibility in relation to the care of the earth and to the care of people on the earth. Through their engagement with this curriculum some children may discover their own life's vocation, for example, preserving the natural environment, or attending to the needs of others. As children increasingly understand how richly they are blessed both by the natural world and the work of other humans, their response is often an ambition to offer service of their own.

The Montessori environment prepared for the second plane of development prepares children for *adolescence* by fostering self-regulation, social and intellectual skills and a vision of the place of humanity in the universe. This approach provides a framework that supports young people when they are faced with critical choices in the future.

## *Cosmic Education* and Digital Technologies

As children pursue their research interests across the *Cosmic Education* curriculum, they draw on a vast array of resources, including face-to-face contact with teachers and experts, planning and participating in excursions and

*going out* activities, as well as using paper-based, digital and web-based technologies. As new digital technologies are developed, these are added to the resources available to children in Montessori classrooms in ways that match the children's capacities and interests. Children use a range of technologies as research and production tools, including email, CDs and DVDs, Internet-based communication and computer programs that enable manipulation of words, images and sound. They develop skills in using the technology as they apply it to relevant areas of the curriculum. In this way digital technologies become part of a balanced programme, without displacing paper-based skills, such as using reference books, finding books in a library, handwriting and technical drawing. It is also important that the use of digital technologies does not replace activities involving face-to-face communication and exact physical movement, for example, listening to guest speakers, preparing spoken presentations, interviewing experts, art work and model-making, visiting museums and field work.

The use of digital technologies across the curriculum incorporates development of the following skills:

- experience with a range of computer programs to achieve a variety of goals e.g. producing text, managing data, multimedia presentations, research
- combining text, sound and images to design presentations
- collecting, interpreting, evaluating and managing information gathered through a range of electronic resources
- developing an ethical approach to the use of information and communication technologies
- applying appropriate occupational, health and safety principles to computer use.

The Montessori *great lessons* about the two great human inventions, communication with signs and mathematics, include information to account for advances in technology. Children can research the development of these technologies over time, and in this way build understanding about how the work of earlier generations has enabled humans of today to benefit from technological advances unimaginable to the people who have gone before us. Children can also use their reason and imagination to consider the directions new technologies might take us in the future, and what opportunities and challenges these advances might have in store for us.

Like educators everywhere, since the advent of the digital revolution, Montessori educators have been exploring the consequences of this revolution for children at different stages of their development (See, for example, Gebhardt-Seele 1985). They do this by applying Montessori principles to decisions made about the introduction of digital technologies into learning environments, and by ensuring that the technology matches the children's stage of development and interests. More than a decade ago, Lillard (1996: 78-79) wrote about the use of computers in Montessori environments prepared for children aged from six to twelve:

> The use of computers in the children's research and subsequent projects is a new component in Montessori education. To date it appears that children six to nine years old develop best when their hands are more directly involved with manipulating materials in their work. It is essential during this period that the children learn to think clearly and read and write in an organized manner. Computers are therefore not included in the prepared environment for use in research studies and creative writing until the upper elementary level where the children are nine to twelve years old. By this time, the children's thinking, reading, and writing abilities have a solid foundation. They are ready to make full use of the practical advantages of computers.

Since that time, advances in digital technologies have meant that Montessori educators are reviewing the role these technologies might play in the education of children six to nine years of age, as well as children over the age of nine. While digital technologies are now more likely to be used in Montessori classrooms for children aged from six to nine, for example, digital cameras, Montessori educators strive to ensure that computer use does not detract from, but rather, enhances children's learning. It remains the case that older children in Montessori classrooms make greater use of digital technology in their research and project work for the reasons outlined by Lillard above. Lillard (1996: 79) continues by explaining how other Montessori principles have been applied to computer use in Montessori classrooms:

> The principle of limitation, however, still holds. Even if funds and space are available, there should be only a few computers in the prepared environment. These computers can function for each type of use: one which is part of the Internet or other connecting system for doing research; one for writing; and perhaps another for developing multidimensional images (CAD/CAM) such as might contribute to architectural

or design work. This minimal number of computer assures that the children become familiar with the capabilities of computers without missing the intellectual and social development that the other materials in the environment are meant to facilitate.

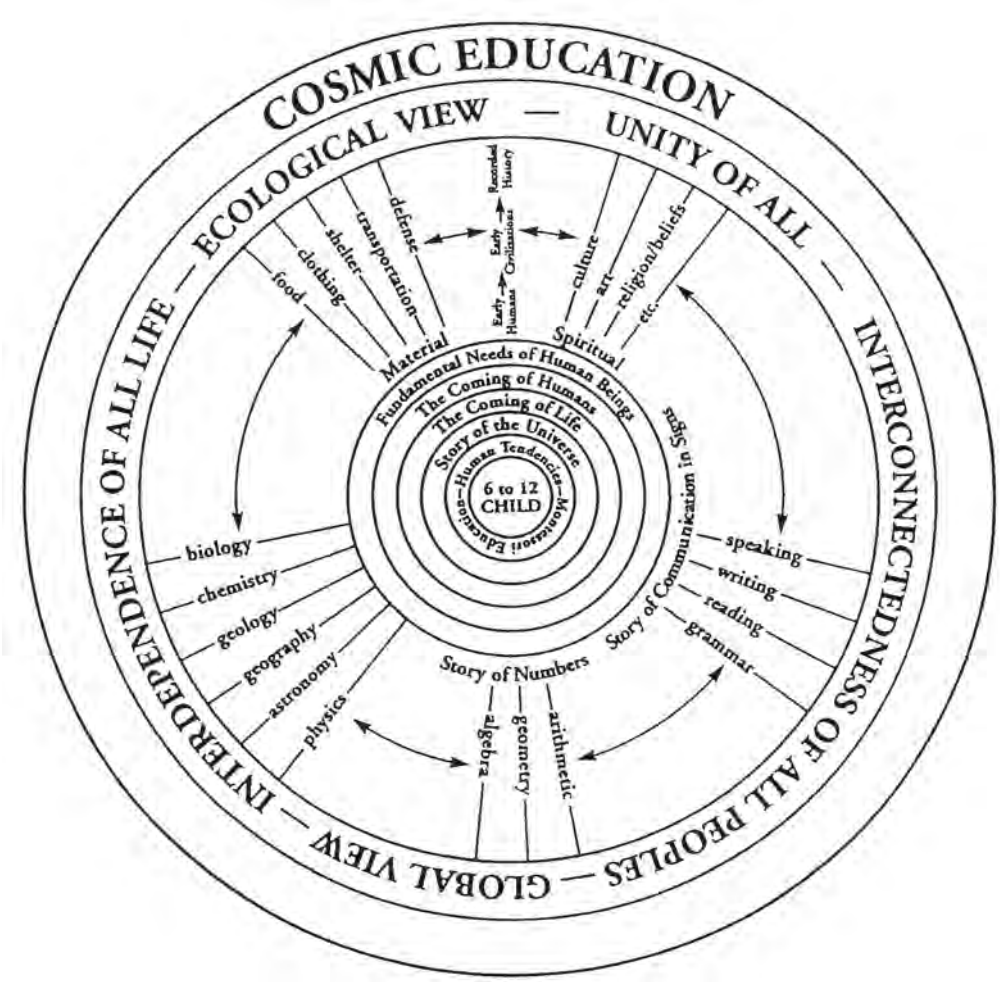
Again, the advance of technology suggests that tying individual computers to separate functions is no longer relevant, but the same principles apply. Children need to master each function separately if they are to become expert users of these technologies, while at the same time they need to participate in a learning programme that balances computer use with other modes of intellectual and social development.

## *Cosmic Education*: An Overview

The *Cosmic Education* curriculum for the second plane of development covers the following interrelated discipline areas:

- Language
- Mathematics, with Geometry and Measurement as distinct areas of study
- History and Geography
- Science, with Biology as a distinct area of study
- Creative Arts
- Physical Education
- Languages other than English

The way the discipline areas of Montessori *Cosmic Education* are interwoven to create an integrated curriculum for children in the second plane of development is represented in the following diagram.




The *Cosmic Education* curriculum has its origins in ideas Dr Montessori proposed a century ago, ideas that have continued to be implemented and developed to the present day in classrooms all over the world. The integrated design of the curriculum offers students a view of whole domains of knowledge, and shows students

how these domains are interrelated. Manipulable materials reveal to children the underlying structure of each domain of knowledge enabling them to follow their interests and to pursue detailed studies of particular topics while retaining a sense of the whole and its interconnections. This approach to curriculum has provided Montessori teachers over the decades with a base from which they can incorporate, in principled ways, extra topics and skills as required, for example, new discoveries (e.g. the discovery of DNA), changed understandings (e.g. no longer considering Pluto to be a planet), technological innovation (e.g. in information and communications technology) as well as specific requirements of local authorities not yet addressed in the Montessori curriculum (e.g. new approaches to problem-solving, changing technical terms).

In Australia, like their international colleagues, Montessori teachers pay close attention to state and national curriculum documents and assessment requirements. They plan how required knowledge, skills and understandings not covered in the Montessori curriculum can be incorporated into the Montessori classroom. This involves locating sections of the Montessori curriculum where the missing knowledge and skill can be effectively integrated. Teachers then adapt or design materials and lessons for presenting the knowledge, skill and/or understanding to students using the Montessori approach.

Older students in Montessori classrooms have opportunities to compare the work they are undertaking with the outcomes required by curriculum authorities. These outcomes are explained to students, and where a student is not meeting an outcome, the student is encouraged to take responsibility, with the teacher's help and guidance, to address the gap. The content areas of the Montessori curriculum for students aged from six to twelve years, however, are very comprehensive, and expand to incorporate knowledge, skills and understandings all students need if they are to participate fully in the social context in which they find themselves. In most domains of knowledge, skill and understanding, moreover, the Montessori curriculum extends beyond state and national curriculum requirements.

The main content areas of the Montessori curriculum are outlined briefly below.

## Language

Language is the ability to symbolise in an abstract form objects, ideas, emotions, and events, taking them out of the immediate context, and holding them in the mind. Language work in the Montessori environment prepared for children in the second plane of development is an exploration of a great human achievement that has made possible the creation of culture and the continuation of societies. Children in the second plane of development strive to put language in context, to explore the reasons for a variety of phenomena, and to use language beyond its literal use. The study of language must therefore be presented very imaginatively; it must appeal to imagination and reason, rather than to surface reality alone.

Areas of study in the Montessori language curriculum include:
- spoken and written language
- the history of language (symbols, etymology and spelling)
- the functions of words (grammar)
- effective communication (listening and speaking, reading and writing).

Using stories, pictures, books and technology children trace the development of language through the ages. Presentations, activities and resources help them understand:
- how humans have named everything found or made and that this process continues
- how and why language constantly changes
- how language is used to express the creative impulse of humanity.

Studying the origins and historical development of words fascinates children of this age. This study becomes a foundation for spelling knowledge and contributes to understanding the history of cultures. The learning environment is a place where children continue to learn to read, to write creatively and to perfect the art of handwriting.

## Mathematics

The power of the human mathematical mind is its ability to quantify with precision and to reason through logic and abstract pattern. The versatility of the mathematical mind is as great as its potential to order and understand. Since the mathematical mind is universal, it belongs to every child as a birthright, and mathematics is part of our human heritage. In addition, human beings have a tremendous capacity for reason. Children who are learning to reason need, therefore, a larger quantity of information about which to reason.

The Montessori learning environment for children in the second plane of development offers new mathematical challenges beyond those found in the *Children's House*. Children in the second plane of development do not want to be tied to concrete materials. They strive for the freedom to work at the level of abstraction. While the Montessori mathematics materials are concrete representations of abstract mathematical concepts, in this environment they are used as stepping-stones, as *keys* only. In the presentation of these materials difficulties are isolated and, in the more complex activities, concepts are synthesised. In this way children are guided towards abstraction, but the actual transition to abstraction itself is achieved by children independently. When children work abstractly without prior concrete experience they can face obstacles to comprehension. The Montessori approach allows children to grasp mathematical concepts by first experiencing and manipulating them in concrete form. Children are given as much time as they need to learn from their successes and their mistakes, while also discovering the rewards of perseverance.

Children of this age love to reach back into history with their imaginations to reconstruct the creation of knowledge systems. Mathematics is a language used to explore and manipulate, to create and measure real objects in a real world. Children learn that mathematics has evolved from a practical need, for example, graphs and fractions as tools for recording and measuring, and algebra for problem solving. Children are encouraged to invent their own problems—especially real-life story problems—for themselves and for their friends, in order to apply and practise their mathematical understanding in practical ways.

When children work with the Montessori mathematics materials, they are presented with concrete images of abstract concepts and processes. Children use the materials to undertake quite complex mathematical processes, for example, long division or square root, much earlier than if the work were introduced using paper and pencil only. As they manipulate the concrete materials, children internalise mathematical concepts, processes and rules embodied in the materials. These are concepts, processes and rules they might otherwise have to learn by rote but without the depth of understanding developed while working with the Montessori materials.

When presenting children with new material, a Montessori teacher first orients children to the material and what it represents. The teacher then guides the children through a sequence of steps or exercises, progressing gradually, one small step at a time, from highly concrete to completely abstract representations. The exercises are sequenced in a manner that introduces a variation in use, or an additional detail, with each step. These new variations and details hold the children's interest.

At some point in the process, each child comes to the realisation that the same steps can be completed much more efficiently without the material, that is they can be completed abstractly, using only numbers, and other mathematical symbols, on paper, to find the answer. Montessori educators call this transition the *passage to abstraction*. In this way each child arrives at abstraction precisely when they are prepared for it. In many cases children come to the realisation on their own and inform the teacher; in other cases the teacher assists a child by asking questions that lead to the realisation. By allowing abstraction to 'arrive' for each child, in the child's own time, the teacher can be assured that the knowledge is now stored in long-term memory, rather than being temporarily memorised, and can be understood and explained by the child.

## Geometry and Measurement

Children first encounter the study of geometry in the *Children's House* during the *exercises of the senses*. In the *Children's House* they are given as much language to talk about geometric shapes as possible. This prepares them for the next level of geometry study they encounter in the environment prepared for children in the second plane of development. In this new environment the study of geometry gives children the tools to explore, understand and measure the world.

In the Montessori geometry curriculum children follow the historical development of the discipline of geometry. Because geometry emerged from concrete experience, with abstractions following at a later time, children study geometry by following the same sequence. Students' initial ideas about shapes and space are based on activity with concrete objects. The work uses the guided discovery approach so that the children discover the relationships, theorems and formulae for themselves.

The field of geometry provides opportunities for both inductive and deductive learning. As the children make their own discoveries, they are interested in learning about the people who first made these discoveries. Throughout the geometry curriculum they are told stories about, and are given opportunities to research, the people behind the geometry we use today. In addition to the enjoyment children exhibit in studying geometry, this work also provides them with a stimulus for intellectual development by giving them experience with logical reasoning, deduction, classification and abstract concepts.

Creative expression in art through geometry is also an integral part of its study. The Montessori geometry materials foster creative activity that involves construction of various two- and three-dimensional forms, artistic drawings and decoration.

The study of measurement in learning environments prepared for six to twelve year olds also has its origins in the *exercises of the senses* in the *Children's House*, specifically, in the discrimination, judgement and precision children apply as they contrast, compare and grade differences and similarities in, for example, size, shape, volume and mass isolated in the *sensorial* materials. When children begin the study of measurement in the environment prepared for six to nine year olds, they learn to attach a number of 'units' to concrete objects, first non-standard and ancient units of measurement based on the parts of the body, and later the standard units of the International Metric System.

## History, Geography and Science

Because the Montessori approach integrates the study of history, geography and science, including biology and technology, these subject areas comprise one area of the *Cosmic Education* curriculum.

### History

The Montessori history curriculum begins with the 'big picture', from the development of the universe, the solar system and the earth, to the evolution of life on earth and the coming of human beings, early civilisations and recorded history. The long labour of humans to accomplish all that is here for us to enjoy in the present is revealed to the children. The history curriculum provides a chronological framework that orders the information presented in the companion areas of study: geology, biology and science. In fact, history is considered to be the foundation of the *Cosmic Education* curriculum. Studies of geography, science and all the related disciplines flow naturally from the study of history. The starting point in any educational discipline extends back in time, and in this way can be linked to any other discipline area, in this interdisciplinary approach.

### Geography

The Montessori geography curriculum is designed to show how the physical configuration of the earth contributes to the history of all people. The study of physical geography (including geology) is the basis for the study of economic geography, which reveals the interdependence of all nations and people. Geography study comprises several interconnecting areas, including:

- physical geography
- scientific understanding of geological formations/geology
- economic geography
- political geography
- mapping and graphing

### Biology

The Montessori biology curriculum includes both botany and zoology. In this study children are given the means to classify plants and animals, and to understand the reasons behind the classification. The study of biology reveals that the classification of living things follows the path of evolution. The ultimate aim of this area of the curriculum is to develop an ecological understanding of the web of life, and a sense of responsibility for the natural environment. Learning systems for classifying plant and animal life also provide children with intellectual tools for ordering and relating information.

### Science and Technology

In the *Cosmic Education* curriculum the study of science and technology is interwoven into the study of history, geography and biology.

- When children study geology and geography, they are also discovering how the universe and the earth were formed. During this study children build foundation knowledge in the fields of physics and chemistry.
- When children explore biology, they are also discovering the history of life on earth.
- The history of human progress is a history of scientific discovery and technological development.

All these areas of study are accompanied by relevant demonstrations, including science experiments, and the use of impressionistic charts and timelines to generate discussion and create mental pictures.

# The Montessori Curriculum for the Second Plane of Development

## Language

Language is the tool used by children to explore all other subject areas, and for this reason, language is involved in all areas of learning.

In the *Children's House* children are introduced to the basic skills that underpin writing and reading. When they make the transition to the learning environment for children older than six, they are introduced to a variety of activities and resources that lead them to fluent reading and more advanced comprehension skills, described by Montessori educators as *total reading.*

Providing children with a variety of means for learning to write and read enables them to select activities and resources that match their learning style. This diverse repertoire of activities for developing knowledge and skills in both spoken and written language makes it possible for all children to experience success and enjoyment with language in all its forms and uses.

### Learning to Write and Read

In the *Children's House*, after they have worked with *sandpaper letters* and the *moveable alphabet*, children often *explode* into written language. Usually, in the *Children's House*, as children learn to analyse words into their sounds, an explosion into writing occurs before reading. Only later, when children learn to synthesise sounds into words, do they begin to read. If children learn to read and write after the age of six, however, they usually learn both writing and reading simultaneously.

In Montessori environments prepared for children over the age of six, learning is no longer based simply on sensory activity and movement. Instead the exploration of language also engages the children's imagination and ability to reason. For example, from the age of six, children are interested in stories about the history of language and written symbols; these stories appeal to children's imagination. Through a *great lesson* children learn how humans began to communicate through signs. They also learn that language is a gift from the past. Listening to the story, and undertaking related research activities, give children the opportunity to develop feelings of gratitude for this gift.

In Montessori environments prepared for children aged from six to nine years, children are made aware of all that they already know about language, including the grammar they have mastered in their spoken language. In a series of active grammar games, using concrete materials, children are given technical terms for labelling the parts of their own language. Children of this age really enjoy thinking and talking about their own language. Through such work they develop clarity and conscious awareness of their language so they can use it more effectively in both its spoken and written modes.

### *Total Reading*

*Total reading* is defined by Montessori educators as the ability to interpret the totality of the meaning expressed by a writer. This includes understanding the subject matter, as well as the opinions and feelings expressed, and the style used by the writer. To help children achieve *total reading*, they are given opportunities to explore:

- the history of language
- words and grammar, and their meanings
- where and how words evolved (the study of etymology)
- punctuation and spelling
- variation in meaning-making across different cultures.

## The Aims of the Montessori Language Curriculum for Children from Six to Twelve Years

The aims of the Montessori language curriculum for children aged from six to twelve years include the following:

- to foster the children's interest in language, the history of language and the history of communication with signs
- to explore the etymology of words
- to develop a respect for all varieties of language
- to develop a love of books
- to understand the grammar of our language and to use this knowledge to improve fluency in reading and writing
- to use language to express thoughts and ideas (self expression)

## Language Curriculum for Children Aged Six to Nine Years

| Content Strand | Knowledge, Skills and Understandings | Activities and Resources |
|---|---|---|
| | *Typically children will:* | |
| History of language | Imagine the origin of spoken language<br><br>Research simple theories of how spoken language might have developed<br><br>Trace the development of the English language<br><br>Link the origin of spoken language to human history and how language enabled humans to communicate with each other about their environment | Activities include:<br>- stories, for example:<br>*How did language start*?<br>*The story of English*<br>- research tasks e.g. tracing the development of languages other than English; exploring how other primates, or other animals, communicate; researching the spoken language traditions of Indigenous Australian culture[3]<br>- drama.<br><br>Resources include:<br>- charts, e.g. *language families* charts<br>- simple research and reference materials (paper-based, digital and web-based). |
| | Trace the development of written language<br><br>Explore early means of communicating with graphic signs, including images and marks found on surfaces such as rock, bark, wood and clay; pictographs, hieroglyphics and ancient alphabets<br><br>Trace the development of the English alphabet<br><br>Learn about the origin and derivation of words in English | Activities include:<br>- *great lesson: Story of Communication in Signs*<br>- reading factual stories<br>- making rock art, clay tablets<br>- creating simple codes<br>- experimenting with pictographs and ancient alphabets<br>- research projects e.g. exploring graphics used by pre-contact Indigenous Australians; tracing the development of alphabets and writing systems for other languages<br>- creating posters and timelines<br>- etymology activities.<br><br>Resources include: |

[3] The term 'Indigenous Australians' is a comprehensive term used in this document to refer to the Aboriginal and Torres Strait Islander peoples of Australia.

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|---|---|---|
| | | - charts and artefacts<br>- research and reference materials (paper-based, digital and web-based) |
| **Spoken language: listening and speaking** | Listen and respond to stories and poems read aloud by teacher, peers and/or performers<br><br>Listen and respond to songs | Activities include:<br>- *grace and courtesy* lessons e.g. *'how to'* be an audience<br>- movement and drama activities<br>- teacher and student presentations and performances<br>- *going out*, excursions and guest performers.<br><br>Resources include:<br>- high quality children's literature and song lyrics. |
| | Develop rhythm and movement in speech<br><br>Recite rhymes and sing songs for an audience<br><br>Read aloud to an audience | Activities include:<br>- *grace and courtesy* lessons e.g. *'how to'* present to an audience<br>- drama activities for voice<br>- class presentations<br>- choral work (speaking and singing).<br><br>Resources include:<br>- card material<br>- high quality children's literature. |
| | Develop active listening skills<br><br>Respond to and give greetings and leave-takings<br><br>Respond to questions<br><br>Follow detailed spoken instructions<br><br>Carry out multi-step instructions<br><br>Take notes from simple spoken presentations | Activities include:<br>- *grace and courtesy* 'how to listen' lessons<br>- learning classroom routines<br>- interacting in class<br>- collaborating with peers<br>- listening games<br>- role-play, drama<br>- class meetings<br>- listening comprehension games<br>- guided note-taking<br>- preparing for *going out*<br>- research tasks.<br><br>Resources include:<br>- class rules developed by peers<br>- audio-visual/multimedia resources. |
| | Use appropriate intonation, gestures and eye contact when speaking<br><br>Make requests and offers<br><br>Ask questions to gain understanding and clarification<br><br>Initiate topic ideas in a group<br><br>Express an opinion and question a point of view | Activities include:<br>- *grace and courtesy* lessons<br>- role-play, drama<br>- preparing for *going out*<br>- collaborating on group projects<br>- conversations<br>- class meetings<br>- engaging with guest speakers.<br><br>Resources include:<br>- telephone<br>- audio-visual/multimedia resources. |

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| | Listen for key ideas and detail in spoken language<br><br>Understand and use different types of speech for different purposes and audiences<br><br>Report on familiar and personal topics<br><br>Re-tell conversations accurately<br><br>Re-tell stories with appropriate sequencing of events<br><br>Relate experiences to peers on a variety of topics<br><br>Use telecommunications effectively | Activities include:<br>- guided activities e.g. a spoken presentation scaffolded by an adult or peer using the spoken *question game*<br>- small group conversations, role-play, drama<br>- preparing for *going out*<br>- *Read-and-retell* games<br>- telling what happened on an excursion or *going out*<br>- talking to parents, teachers, community members e.g. at assembly or open days, when *going out*<br>- interviews<br>- collaborating on group projects<br>- gaining information over the telephone or from a multimedia source.<br><br>Resources include:<br>- command cards<br>- telephone<br>- audio-visual/multimedia resources. |
| | Present spoken reports and simple speeches<br><br>Explain complex concepts<br><br>Participate in discussions | Activities include:<br>- class meetings, debates and discussions<br>- role-play, drama<br>- engaging with audiences and guest speakers<br>- presenting completed projects<br>- arguing for different points of view<br>- research projects to prepare for spoken presentation or discussion.<br><br>Resources include:<br>- command cards<br>- research materials (paper-based, digital and web-based). |
| | Learn basic concepts of voice production<br><br>Experience and appreciate spoken poetry performances<br><br>Read and perform poetry and extracts from literature<br><br>Improvise and act out dramatic roles<br><br>Experience, appreciate and participate in drama performances<br><br>Recognise and appreciate dialogue as an aspect of drama | Activities include:<br>- movement, drama and voice activities<br>- guided individual presentations<br>- choral performances<br>- drama presentations e.g. plays, poetry reading, film and animation making<br>- script-writing<br>- guest performers<br>- excursions to poetry and theatre performances.<br><br>Resources include:<br>- high quality children's literature<br>- card materials e.g. *grammar box* commands, *reading commands* and *interpretive reading* cards<br>- audio-visual/multimedia resources. |

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| **Reading: word level** | Review and consolidate knowledge of letter-sound correspondence<br><br>Use knowledge of single letter-sound correspondence to read and build words<br><br>Read and build words containing blends, recognising blends in both onset and rime<br><br>Build families of words based on spelling patterns involving blends | Activities include:<br>- exercises reviewing all single letter sounds in sets of contrasting or related sounds<br>- vowel-consonant lesson and exercises<br>- sound recognition and discrimination games with single letter sounds (individual and group as needed)<br>- exercises to practise the reading and articulation of blended sounds<br>- labelling objects and pictures<br>- building words with *moveable alphabet*<br>- *word study* lessons and exercises<br>- activities researching blends in words.<br><br>Resources include:<br>- labels for objects and pictures<br>- card materials and word lists<br>- wall charts<br>- *moveable alphabet*<br>- selected reading material. |
| | Review and consolidate knowledge of *phonograms* (digraphs)<br><br>Read words containing *phonograms*, recognising phonograms in both onset and rime<br><br>Build families of words based on spelling patterns involving *phonograms* | Activities include:<br>- *phonogram* lessons and exercises<br>- sound recognition and discrimination games with *phonogram* sounds (individual and group)<br>- *moveable alphabet* activities to explore *phonogram* patterns<br>- labelling objects and pictures<br>- *phonogram* research activities<br>- word study lessons and exercises.<br><br>Resources include:<br>- *phonogram* folders and booklets<br>- card material and word lists<br>- labels for objects and pictures<br>- small *moveable alphabets* in different colours<br>- selected reading material. |
| | Recognise and read *puzzle words* (sight words with non-phonetic spelling) | Activities include:<br>- etymology activities<br>- labelling objects and pictures<br>- *word study* lessons and exercises<br>- *puzzle word* research activities.<br><br>Resources include:<br>- *puzzle word* cards and lists<br>- card material<br>- selected reading material. |
| | Review and consolidate knowledge of letter names<br><br>Review and consolidate knowledge of alphabetical order | Activities include:<br>- games, rhymes and songs to review letter names<br>- alphabetical order and dictionary exercises.<br><br>Resources include:<br>- wall charts<br>- a selection of dictionaries. |

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| **Reading: text level** | Decode and comprehend words, word groups, phrases and sentences<br><br>Read for meaning with increasing fluency<br><br>Develop and extend reading skills and strategies, including:<br>- predicting the meanings in a text using, for example, the title, cover and blurb as clues<br>- navigating written and multimodal texts using, for example, chapters, headings, index, illustrations<br>- skimming a text for the main ideas<br>- scanning a text for detailed information<br>- reading for inferred and/or implied meanings | Activities include:<br>- exercises with *reading folders* (booklets, jumbled text, pictures, labels) in all curriculum areas<br>- exercises to build a range of reading skills and strategies e.g. library activities, modelled and guided reading activities<br>- reading books written for emergent and beginning readers<br>- interpreting the meanings in texts in a variety of ways e.g. written and spoken responses, drama and visual arts<br>- expanding reading repertoire as interest, fluency and comprehension develops.<br><br>Resources include:<br>- card materials and labels<br>- reading folders and command cards in all curriculum areas<br>- literary and factual reading material matched to interest. |
| | Participate in drama and visual arts activities linked to reading | Activities include:<br>- movement and drama activities with *reading commands* and *interpretive reading* cards<br>- acting out increasingly complex commands<br>- interpreting dramatically extracts from literature<br>- interpreting extracts from literature using the visual arts<br>- readers' theatre.<br><br>Resources include:<br>- *reading commands*<br>- *interpretive reading* cards<br>- quality children's literature<br>- a range of visual arts media and resources. |
| | Read for enjoyment | Activities include:<br>- reading literary and factual texts individually; and occasionally in small groups<br>- visiting the library<br>- participating in Book Week activities<br>- authors' visits<br>- readers' theatre<br>- reading to others for fun.<br><br>Resources include:<br>- quality children's literature<br>- quality factual texts. |

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| **Word study** | Recognise and use the parts of words:<br>- word bases,<br>- prefixes<br>- suffixes<br><br>Recognise and use compound words and word families<br><br>Recognise and use synonyms, antonyms and homonyms | Activities include:<br>- *word study* lessons and exercises<br>- word building with *moveable alphabets*<br>- word matching and sorting exercises<br>- *style* study of student's own writing<br>- spelling exercises and practice.<br><br>Resources include:<br>- *word study* charts and cards<br>- small *moveable alphabets* in different colours<br>- grammar symbols. |
| | Use etymology to understand the origins of words and word families | Activities include:<br>- lessons and exercises on word origins<br>- building lists of words with the same origin<br>- providing students with the etymology of each technical or specialised term introduced in all areas of the curriculum<br>- research projects.<br><br>Resources include reference materials, including dictionary, etymological dictionary and thesaurus (paper-based, digital and/or web-based). |
| | Expand vocabulary | Activities include:<br>- *correct expression* matching and sorting exercises<br>- *word study* lessons and exercises<br>- *style* study of student's own writing and of literary and factual texts integrated into the curriculum<br>- learning technical and specialised terms in classified sets in all areas of the curriculum.<br><br>Resources include:<br>- *correct expression* card material<br>- *word study* charts and cards<br>- dictionary and thesaurus (paper-based, digital and/or web-based)<br>- grammar symbols<br>- classified naming material (pictures, labels, jumbled text, booklets). |
| **Grammar study for reading fluency:** ***functions of words*** **and** ***grammar boxes*** | Recognise nouns<br><br>Identify the function of nouns<br><br>Classify types of nouns:<br>- masculine and feminine<br>- common and proper<br>- singular and plural<br>- concrete and abstract<br>- types of concrete nouns (material, collective)<br>- types of abstract nouns (quality, state, action) | Activities include:<br>- spoken language stories, lessons and games<br>- labelling, matching and sorting exercises<br>- dramatising commands based on nouns<br>- writing activities to record work.<br><br>Resources include:<br>- *grammar box I:* noun card material and commands |

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| | | - noun classification charts and card material<br>- noun grammar symbol<br>- dictionary. |
| | Recognise articles<br><br>Identify the function of articles<br><br>Classify types of articles:<br>- definite and indefinite<br>- articles for singular and plural nouns | Activities include:<br>- spoken language stories, lessons and games<br>- using article-noun structures to label objects in a miniature environment<br>- using colour-coded cards to compose noun groups from articles and nouns<br>- using grammar symbols to reveal article-noun pattern<br>- writing activities to record work<br>- using cards to build the system of English articles.<br><br>Resources include:<br>- *article box* objects and labels<br>- *grammar boxes II*: card material and commands<br>- box of grammar symbols<br>- article classification card material. |
| | Recognise adjectives<br><br>Identify the function of adjectives<br><br>Combine adjectives with nouns and articles to build *noun families* (noun groups), using accurate word order<br><br>Identify the members of the *noun family* (article-adjective-noun)<br><br>Classify types of adjectives:<br>- qualitative<br>- interrogative<br>- demonstrative<br>- possessive<br>- numeral (indefinite and definite)<br>- distributive<br>- positive, comparative, superlative | Activities include:<br>- spoken language stories, lessons and games<br>- word order *transposition* game<br>- using *noun families* on cards to label objects in a miniature environment<br>- *grammar boxes III* reading games, commands and experiments: composing *noun families* with colour-coded cards, symbolising, to reveal *noun family* pattern, using adjective labels to reveal fine distinctions<br>- adjective games e.g. the *detective adjective game*, the *paper game*, *what quality is suitable?*<br>- adjective research activities<br>- writing activities to record work.<br><br>Resources include:<br>- grammar symbols, both 3-D and 2-D, for spoken language activities<br>- noun family charts<br>- miniature environment and card material<br>- adjective research chart<br>- *grammar boxes III*: card material and commands<br>- box of grammar symbols<br>- adjective classification charts and card material. |

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| | Recognise verbs<br><br>Identify the function of verbs that represent actions<br><br>Recognise the contrasting functions of verbs and nouns<br><br>Use verbs with *noun family* (article-adjective-noun) in sentences.<br><br>Place verbs in sentences effectively<br><br>Recognise the three main tenses of verbs:<br>- past<br>- present<br>- future | Activities include:<br>- spoken language stories, lessons and games<br>- games to reveal different types of verbs e.g. action v thinking verbs, transitive v non-transitive verbs<br>- *grammar boxes IV* reading games, commands and experiments: dramatising and experimenting with action verb antonyms and synonyms, composing sentences with colour-coded cards, symbolising to reveal grammar patterns<br>- transposition activity to experiment with order of verbs and noun groups in clauses<br>- games that reveal contrast and agreement between verbs and nouns<br>- writing activities to record work.<br><br>Resources include:<br>- grammar symbols, both 3-D and 2-D, for spoken language activities<br>- red sphere (verb symbol) and black square-based pyramid (noun symbol) on special tray<br>- *grammar boxes IV*: card material and commands<br>- box of grammar symbols<br>- *logical agreement of nouns and verbs* card material. |
| | Recognise prepositions<br><br>Identify the function of prepositions<br><br>Use prepositions with the *noun family* (article-adjective-noun), placing them in front of noun groups (phrases)<br><br>Use prepositions in sentences made up of *noun families* (article-adjective-noun) and verbs | Activities include:<br>- spoken language stories, lessons and games<br>- using prepositions to place objects in relation to each other<br>- *grammar boxes V* reading games and commands: dramatising the work of prepositions, composing sentences with colour-coded cards, symbolising to reveal grammar patterns<br>- *transposition* activity to experiment with preposition word order i.e. location of preposition in phrases<br>- writing activities to record work.<br><br>Resources include:<br>- miniature environment and card material<br>- *grammar boxes V*: card material and commands<br>- box of grammar symbols. |

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| | Recognise adverbs<br><br>Identify the functions of adverbs<br><br>Use adverbs in sentences made up of *noun families* (article-adjective-noun), verbs and prepositions<br><br>Place adverbs in sentences effectively<br><br>Classify types of adverbs:<br>- manner<br>- place<br>- time<br>- quantity<br>- comparison | Activities include:<br>- spoken language stories, lessons and games<br>- *grammar boxes VI* reading games and commands: dramatising the work of different types of adverbs, composing sentences with colour-coded cards, symbolising to reveal grammar patterns<br>- *transposition* activity to experiment with adverb word order<br>- games that reveal connection between adverbs and verbs<br>- writing activities to record work.<br><br>Resources include:<br>- *grammar boxes VI*: card material and commands<br>- box of grammar symbols<br>- *logical agreement of adverbs and verbs* card material. |
| | Recognise pronouns<br><br>Identify the function of pronouns<br><br>Use pronouns in sentences made up of *noun families* (article-adjective-noun), verbs, prepositions and adverbs<br><br>Combine pronouns with verbs and adverbs to build *verb families* (clauses), using effective word order<br><br>Classify types of pronouns:<br>- personal<br>- demonstrative<br>- relative<br>- interrogative<br>- possessive | Activities include:<br>- spoken language stories, lessons and games<br>- *grammar boxes VII* reading games and commands: dramatising the work of different types of pronouns, composing sentences with colour-coded cards, symbolising to reveal grammar patterns<br>- *transposition* activity to experiment with pronoun word order<br>- games that reveal agreement between pronouns and verbs<br>- writing activities to record work.<br><br>Resources include:<br>- *verb family* charts<br>- *grammar boxes VII*: card material and commands<br>- box of grammar symbols<br>- pronoun-verb agreement card material. |
| | Recognise conjunctions<br><br>Identify the function of conjunctions<br><br>Use conjunctions in sentences made up of *noun families* (article-adjective-noun), verbs, prepositions, adverbs and pronouns<br><br>Place conjunctions to join clauses accurately | Activities include:<br>- spoken language stories, lessons and games<br>- *grammar boxes VIII* reading games and commands: dramatising the work of conjunctions, composing sentences with colour-coded cards, symbolising to reveal grammar patterns<br>- *transposition* activity to experiment with word order involving conjunctions<br>- writing activities to record work.<br><br>Resources include:<br>- *grammar boxes VIII*: card material and commands<br>- box of grammar symbols. |

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| | Recognise interjections<br><br>Identify the function of interjections<br><br>Use conjunctions in sentences made up of *noun families* (article-adjective-noun), verbs, prepositions, adverbs, pronouns and conjunctions | Activities include:<br>- spoken language stories, lessons and games<br>- *grammar boxes IX* reading games and commands: dramatising the work of interjections, composing sentences with colour-coded cards, symbolising to reveal grammar patterns<br>- *transposition* activity to experiment with word order involving interjections<br>- writing activities to record work.<br><br>Resources include:<br>- *grammar boxes IX*: card material and commands<br>- box of grammar symbols. |
| **Grammar study: detailed *study of the verb*** | Recognise and identify the function of personal pronouns<br><br>Use personal pronouns with verbs in the present tense | Activities include:<br>- spoken language lessons and games<br>- writing activities to record work<br>- spelling exercises<br>- comparing use of English personal pronouns with use of pronouns in a LOTE.<br><br>Resources include:<br>- charts and card material<br>- box of grammar symbols<br>- reading material<br>- reference books. |
| | Recognise and use strong and weak verbs (verbs with irregular and regular past tense forms)<br><br>Recognise and use personal pronouns with strong and weak verbs in present, past and future tenses<br><br>Recognise and use auxiliary verbs (*to be*/*to have*) in present, past and future tenses<br><br>Explore compound tenses<br>- perfect tenses (past, present, future)<br>- continuous/imperfect tenses (past, present, future)<br>- combinations of perfect and continuous<br><br>Explore some of the following aspects of verbs:<br>- negative verb forms<br>- infinitive (non-finite) verb forms<br>- voice (active, passive)<br>- mood (indicative: declarative and interrogative, imperative, subjunctive)<br>- progressive (phased) verb forms<br>- use of reflexive pronouns with verbs<br>- transitive and intransitive verbs<br>- linking (relating) verbs e.g. *to be, appear, seem, look*, and complements<br><br>Use knowledge of verbs in creative and factual writing | Activities include:<br>- spoken language lessons and games<br>- writing activities to record work<br>- spelling exercises<br>- research projects<br>- comparing use of English verbs with use of verbs in a LOTE<br>- related creative and factual writing tasks.<br><br>Resources include:<br>- charts and card material<br>- box of grammar symbols<br>- *sentence analysis* materials<br>- reading material<br>- reference books<br>- wall charts/word banks of different verb forms and types. |

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| **Grammar study for reading and writing fluency: *Sentence analysis* (simple and compound)** | Analyse simple sentences to identify:<br>- subject<br>- predicate<br>- direct object<br><br>Write simple sentences containing subject, predicate and direct object<br><br>Analyse simple sentences to identify:<br>- subject<br>- predicate<br>- direct object<br>- attributive and appositive structures (qualifiers after the noun in noun groups)<br>- adverbials<br>- indirect object<br><br>Write simple sentences to include all parts revealed in *sentence analysis* exercises<br><br>Analyse simple sentences with understood (elliptical) subject<br><br>Analyse simple sentences with the order of the parts inverted<br><br>Analyse simple sentences with verb *to be* and other linking (relational) verbs e.g. *seem, appear, look*<br><br>Identify compound sentences and label the parts<br><br>Identify coordinating conjunctions in compound sentences<br><br>Write compound sentences using coordinating conjunctions | Activities include:<br>- *sentence analysis* lessons<br>- sentence reading and analysis exercises tearing sentences written on strips of paper into parts and labelling and setting out sentence structure with wooden *sentence analysis* material<br>- recording analysis using *sentence analysis* paper<br>- sentence writing activities using chart A as a guide to compose short and long simple and compound sentences<br>- composing short and long simple and compound sentences abstractly<br>- creative writing and research tasks.<br><br>Resources include:<br>- sample simple and compound sentences derived from student writing and student reading material, both literary and factual texts<br>- *sentence analysis* boxes 1 and 2 (wooden circles, arrows, triangles)<br>- *sentence analysis* charts<br>- *sentence analysis* paper<br>- reading material to find sentences to analyse<br>- card material<br>- word banks of coordinating conjunctions. |
| **Study of *style*: writing** | Understand the concept of style (i.e. the composition and arrangement of texts)<br><br>Explore and evaluate own style, and the style of other writers, using knowledge about the elements of writing, including:<br>- structure of different types of text<br>- grammar patterns (grammar symbols, sentence analysis), used to represent plot, characters, setting and atmosphere in literary texts and to organise and relate different types of content in factual texts<br>- knowledge of vocabulary (word study, etymology)<br><br>Develop a vocabulary for describing and evaluating style (e.g. *personal – everyday – factual – literary; entertaining – informative – persuasive; positive – negative; exciting – dull; well-written*)<br><br>Use knowledge about the structure of different | Activities include:<br>- reading circles in which students use knowledge about vocabulary, grammar and text to discuss features of the writing in the books being read, and/or to compare different treatments of the same story, information or issue (e.g. a well-known traditional story, presentation of the same content or issue in different publications or in different media such as film, video or digital representation)<br>- sharing own writing with others who ask questions about, for example, the ideas expressed and the ways they are connected in the writing, how the writer interacts with readers, and how characters interact, as well as the organisation of the writing<br>- reading aloud by teachers and/or students of a range of texts with |

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| | types of texts, as well as grammar and vocabulary patterns, to compare different writing styles<br><br>Evaluate the effectiveness of texts used to organise or explain factual information<br><br>Prepare personal responses and reviews of literary texts<br><br>Describe how persuasive texts influence listeners and readers | discussion about features of text<br>- using grammar symbols to explore style of writing (text and grammar patterns) used in different texts beginning with greatest contrast e.g. comparing a procedure or information text with a poem (The grammar symbols make text and grammar patterns visible and tangible. These patterns can be viewed from a distance where words are no longer legible.)<br>- creating word webs and mind maps to expand vocabulary e.g. create a word web with the word *housing* at the centre adding as many words for housing as possible, including synonyms and adjectives that expand meanings<br>- participating in guided activities to expand and enrich own writing e.g. composing literary, factual and persuasive texts scaffolded by an adult or peer using the written *question game*<br>- searching for different types of texts and writing styles about the same topic e.g. a poem, a story and a scientific text about the same topic<br>- spoken presentations and individual and group writing projects<br><br>Resources include:<br>- box of grammar symbols<br>- *sentence analysis* material<br>- a range of different types of texts, including picture books, advertisements, film segments<br>- sample word webs and mind maps.<br>- dictionary and thesaurus |
| | Explore and experiment with meanings in sentences<br><br>Experiment with different styles when composing different types of texts<br><br>Use knowledge of grammar patterns to expand and enhance meaning-making in sentences and texts<br><br>Adapt the style of own texts according to purpose and audience | Activities include:<br>- identifying and symbolising grammar patterns in sentences and texts, where possible linking patterns with text purpose and audience<br>- transposing the order of words and structures in sentences and texts to create different effects<br>- using grammar symbols, and knowledge of grammar patterns, to explore own writing style, to help with writing and to consider ways to adapt or enhance own writing e.g. by elaborating and expanding clauses, amplifying meanings in sentences<br>- discussing and evaluating variation in meaning resulting from analysing, transposing and amplifying meanings in sentences and texts |

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| | | - use grammar patterns found in the writing of others as the basis for own writing<br><br>Resources include:<br>- *grammar boxes II-IX*<br>- box of grammar symbols<br>- *sentence analysis* boxes and charts<br>- students' own writing<br>- range of literary, factual and persuasive texts. |
| **Study of *style*: viewing** | Understand concept of style in relation to the composition of images<br><br>Explore and evaluate own illustration style, and the style of other illustrators, using knowledge about the elements of images, including use of images to:<br>- represent characters' actions, reactions, interactions and circumstances in literary images<br>- relate and organise different types of content in factual images<br><br>Experiment with different styles when composing images<br><br>Use knowledge about the elements of images to compare different image styles in literary texts, including:<br>- the representation of ideas e.g. characters' actions, interactions, reactions, circumstances<br>- the building of relations of more or less empathy, involvement, power, identification and/or reality between characters and readers e.g. use of gaze (direct, indirect), shot (long, medium, close-up) angle (high, low, eye-level, front on, oblique), colour and background<br>- the organisation of the image e.g. placement, framing, how much elements stand out (size, weight, sharpness, intensity, foregrounding/backgrounding)<br><br>Use knowledge about the elements of images to compare different image styles in factual and persuasive texts, including:<br>- in factual images the arrangement of elements in relation to each other (e.g. part-whole, types of, time line, cause and effect) and the use of symbols<br>- the organisation of the image e.g. placement, framing, how much elements stand out<br>- the use of images to influence or persuade<br><br>Use Visual Arts curriculum to develop a language for talking about the style of images, including the elements and principles of design and colour, and media tools and techniques | Activities include:<br>- reading circles in which students contribute knowledge about image composition (e.g. from Visual Arts curriculum) to discuss features of images in the books being read, and the relations between them, and/or to compare the images used in different treatments of the same story, information or issue (e.g. a well-known traditional story, presentation of the same content or issue in different publications or in different media such as film, video or digital representation)<br>- introducing students to techniques of portraiture, figure drawing and illustration in Visual Arts and exploring these in own and published images<br>- visual arts activities that provide opportunities to experiment with different image styles, and to manipulate elements of images to create different effects<br>- searching for different types of images representing the same topic e.g. a story illustration and a scientific diagram<br>- discussing the effect and influence of images used in advertisements from print, television and online sources<br>- spoken and written presentations<br><br>Resources include:<br>- the resources of the visual arts curriculum<br>- a range of different types of images, including those found in picture books, popular culture and media, film and video, online/digital images, cartoon and animation |

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| | Explore the way the meanings in images are combined with the meanings in written texts to repeat, add to, contradict and/or multiply those meanings<br><br>Adapt the style of own images according to purpose and audience<br><br>Evaluate the effectiveness of images used to:<br>- organise or explain factual information<br>- illustrate literary texts<br>- persuade or influence | |
| **Reading and viewing literary texts** | Experience and appreciate a variety of quality children's literature:<br>- prose<br>- poetry<br>- picture books<br>- drama, film, multimedia and e-literature<br><br>Gain experience in selecting literary texts for enjoyment at an appropriate reading level<br><br>Select extracts from familiar literary texts to analyse grammar patterns<br><br>Select extracts from familiar literary texts to analyse an author's style<br><br>Explore and understand the elements of literary texts:<br>- setting, characters, plot<br>- dialogue<br>- mood/atmosphere<br>- themes<br>- message or moral<br><br>Present opinions about a literary text supported by simple evidence from the text<br><br>Appreciate historical background of selected literary texts<br><br>Experience figures of speech used in literary texts:<br>- idioms<br>- simile and metaphor<br>- personification<br>- alliteration<br>- onomatopoeia<br>- imagery<br>- irony<br><br>Listen to, read and perform poetry<br><br>Explore concepts of form, rhythm and rhyme in poetry<br><br>Explore types and parts of still and moving images | Activities include:<br>- *going out* e.g. to bookshops, libraries, literary events<br>- guided small-group activities<br>- reading, analysing and discussing literary texts<br>- research projects e.g. creating literary timelines, researching different types of figures of speech to create charts or booklets, researching authors and illustrators<br>- literary projects e.g. preparing an anthology of favourite poems; preparing poetry or prose extracts for performance; model-making based on setting or characters, preparing multi-media presentations based on literary texts; designing illustrations for favourite literary texts<br>- Book Week activities<br>- author visits.<br><br>Resources include:<br>- quality children's literature, both prose and poetry, including picture books and multimedia texts<br>- box of grammar symbols<br>- form and rhyme charts<br>- metre charts and drum<br>- card materials<br>- reference texts<br>- multimedia resources and equipment. |

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| | used in literary texts, including:<br>- elements of images and their composition<br>- use of size, shape and colour<br>- links between words and images<br><br>Explore the work of still and moving images in literary texts | |
| **Reading and viewing factual and persuasive texts** | Read a wide range of factual and persuasive texts for interest and information, both print-based and multimedia texts<br><br>Identify and understand parts of factual texts:<br>- title<br>- author<br>- table of contents/menu<br>- text<br>- illustrations, diagrams and tables<br>- index<br>- bibliography<br>-<br><br>Use reading and/or viewing skills to:<br>- identify main ideas in a text<br>- find specific information in a text<br>- identify the thesis, arguments (point and evidence) of a persuasive text<br><br>Identify and evaluate factual and persuasive texts<br><br>Use factual and persuasive texts when researching topics of interest<br><br>Progress to increasingly complex reading tasks | Activities include:<br>- *going out* e.g. to libraries, bookshops, museums, newspaper offices, radio/television stations, advertising agencies<br>- guided small group reading activities<br>- visits by authors of factual and persuasive texts, journalists, advertising copy writers, web and CD designers<br>- research projects across the curriculum<br><br>Resources include:<br>- quality non-fiction/factual texts in a range of media e.g. books, newspapers, magazines, multimedia CDs, websites, video, television<br>- pictures, card material and booklets from all curriculum areas e.g. geometry, geography, biology, history<br>- simple persuasive texts e.g. newspaper opinion pieces and images, letters to the editor, reviews, advertising (print, images)<br>- reference texts. |
| **Writing: composing literary, factual and persuasive texts** | Recognise and explore a variety of literary texts in a variety of forms, including:<br>- prose and poetry<br>- text, images, multimedia<br>- paper-based, digital and web-based<br><br>Recognise the purpose and parts of a range of literary text types:<br>- literary description<br>- literary recount<br>- narrative<br>- personal response/review<br><br>Explore and experiment with grammar patterns and writing styles used in a variety of literary text types<br><br>Explore a variety of poetic forms<br><br>Compose texts to achieve a range of literary and creative purposes using a range of textual forms (prose, poetry, illustrated texts, multimedia, digital) | Activities include:<br>- guided individual and small group exercises in the writing of literary texts and literary text elements, and the preparation of literary illustrations<br>- guided composition activities e.g. composing literary texts scaffolded by an adult or peer using the written *question game*<br>- identifying purpose and stages of literary texts<br>- sequencing and sorting jumbled literary texts and illustrations<br>- using knowledge of grammar and grammar symbols to find grammar patterns typical of different types of literary texts<br>- modelling 'how to' compose different types of literary texts and illustrations<br>- guided and independent creative writing projects<br>- conferencing with peers and teacher<br>- choosing most effective text type for |

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| | Compose and present written literary texts using the writing process:<br>- planning/outlining<br>- drafting<br>- editing<br>- proofreading<br>- publishing | creative writing projects<br>- using library and Internet to research ideas and models for creative writing and illustration<br>- writing and illustrating creatively for classroom and school publications<br>- writing reviews of literary texts, and other creative works.<br>- sharing own literary texts with other students in a reading circle in which the author responds to questions about the text elements (e.g. setting, plot, characters of literary texts and the accompanying images<br>Resources include:<br>- range of literary texts to use as models for creative writing<br>- card material<br>- poetry cards<br>- box of grammar symbols<br>- variety of media: writing implements, paper, art materials, digital camera, materials for making books, word processing, multimedia and web authoring programs. |
| | Recognise and explore a variety of factual and persuasive texts in a variety of forms, including:<br>- prose, letter-writing, images, diagrams, tables, flow charts, multimedia<br>- paper-based, digital and web-based<br><br>Recognise the purpose and parts of a range of factual and persuasive text types:<br>- factual texts: procedure/instructing, factual description, factual recount, information report/organising information, explanation<br>- persuasive texts: exposition, discussion, challenge<br><br>Explore and experiment with grammar patterns and writing styles for different factual text types<br><br>Compose factual and persuasive texts using a range of textual forms (letter, list, text, diagram, table, flowchart, illustrated texts, multimedia, digital)<br><br>Compose and present written factual and persuasive texts using the writing process:<br>- planning/outlining<br>- drafting<br>- editing<br>- proofreading<br>- publishing | Activities include:<br>- guided individual/small group exercises in the composition of factual and persuasive texts, including drafting text elements and the preparation of images<br>- guided composition activities e.g. composing factual and persuasive texts scaffolded by an adult or peer using the written *question game*<br>- identifying purpose/stages of factual and persuasive texts<br>- sequencing/sorting jumbled factual and persuasive texts and images<br>- using knowledge of grammar and grammar symbols to find grammar patterns typical of factual and persuasive texts<br>- modelling 'how to' compose factual and persuasive texts and images<br>- guided and independent factual and persuasive writing projects across the curriculum<br>- conferencing with peers and teacher<br>- participating in discussions and debates to prepare for the writing of persuasive texts<br>- choosing most effective text type for project work in all areas of the curriculum, and choosing most effective images to contribute to the text's purpose |

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| | | - using library and Internet to research information for factual and persuasive writing<br>- summarising and note-taking exercises (e.g. using graphic organisers) in preparation to write factual and persuasive texts<br>- classroom and school publications<br>- writing letters e.g. to family, penfriends, school executive, local media.<br>- sharing own factual and persuasive texts with other students in a reading circle in which the author responds to questions about the information in factual texts; the arguments and evidence in persuasive texts, and the accompanying images<br><br>Resources include:<br>- range of factual and persuasive texts to use as models for writing<br>- card material<br>- box of grammar symbols<br>- variety of media (writing implements, paper, art materials, digital camera, materials for making books, word processing, multimedia and web authoring programs). |
| | Recognise paragraphs in a text<br><br>Understand the purpose and structure of a paragraph<br><br>Begin to use paragraphs in own written work<br><br>Use a flow of related paragraphs to compose texts<br><br>Recognise, differentiate between and compose groups, phrases, clauses and sentences<br><br>Redraft and reorganise the parts of a sentence to enhance clarity and effectiveness<br><br>Choose words for effect and meaning<br><br>Use literary language, technical terms and abstract vocabulary | Activities include:<br>- composing paragraphs, sentences and parts of sentences with moveable alphabets<br>- modelled, guided and independent writing exercises and activities<br>- writes groups, phrases and sentences<br>- *style* analysis with grammar symbols and/or *sentence analysis* materials<br>- independent writing projects<br>- conferencing with peers and teacher<br>- vocabulary building exercises from across the curriculum.<br><br>Resources include:<br>- moveable alphabets<br>- *grammar boxes* and command cards<br>- box of grammar symbols<br>- *sentence analysis* materials<br>- classified pictures, card material and booklets from all areas of the curriculum<br>- dictionary and thesaurus<br>- model literary and factual texts<br>- reference texts. |

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| **Writing: handwriting and keyboarding** | Use manipulable letters to compose words and short texts, noting orientation of each letter and spaces between words<br><br>Refine/develop fine motor skills required for cursive writing<br><br>Use correct pencil grip and posture for handwriting<br><br>Refine cursive handwriting skills:<br>- letter formation<br>- directionality<br>- slope<br>- starting and finishing points<br>- joins<br>- placement on line<br><br>Experiment with and appreciate a variety of writing implements and writing media<br><br>Develop refinement and precision of letter formation<br><br>Experiment with a variety of writing styles and experience handwriting as an art form<br><br>Use handwriting in everyday tasks<br><br>Prepare handwritten presentations of creative writing and project work | Activities include:<br>- composing words, groups, phrases, sentences and short compositions with moveable alphabet<br>- art and craft e.g. painting, drawing, cutting, tracing, knitting, sewing, clay/wax work<br>- design and illustration work in all areas of the curriculum<br>- guided individual and small group activities<br>- writing in a variety of media e.g. in sand and the air, with chalk, felt pen, variety of pencils, brush, quill<br>- writing exercises with historical or novel alphabets<br>- using handwriting to present completed work<br>- using calligraphy and illumination e.g. to present favourite poems, prepare greeting cards, decorate project work<br>- *grace and courtesy*, *going out* and research activities e.g. writing messages, letters and invitations, thank you notes, note-taking.<br><br>Resources include:<br>- moveable alphabets<br>- metal insets and other materials for design<br>- wall charts<br>- chalk and chalkboards<br>- whiteboards<br>- variety of pencils, brushes and quills<br>- calligraphy materials<br>- variety of papers with different types of lines. |
| | Become familiar with the keyboard and its features<br><br>Build basic knowledge of safe computer use:<br>- seating and posture<br>- distance between eyes and screen<br>- limiting screen time<br>- school ICT code of conduct<br><br>Develop basic skills with computer mouse<br><br>Develop typing skills<br><br>Use word processing, when appropriate, to present completed work<br><br>Use digital technology, when appropriate, for communication, record-keeping, creative writing and project work | Activities include:<br>- guided presentations and individual practice<br>- research projects.<br><br>Resources include:<br>- computer station designed for student use<br>- age-appropriate touch typing programs<br>- computer programs to introduce students to word processing, desktop publishing, spreadsheets, email, multimedia authoring, website design<br>- digital camera<br>- headphones. |

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| **Writing: spelling** | Review sound-letter correspondence<br><br>Review blends, *phonograms* (digraphs) and *puzzle* (sight) *words*<br><br>Experience and begin to apply a variety of spelling strategies:<br>- sounding out<br>- identifying consonant and vowel patterns<br>- identifying onset and rime<br>- syllabification<br>- visualization<br>- etymology<br>- spelling patterns<br>- association with known words<br><br>Use a dictionary or technology to confirm spelling<br><br>Experience and begin to apply common spelling rules or patterns | Activities include:<br>- writing words with *moveable alphabet*<br>- tracing words<br>- creating words in clay or similar media<br>- writing labels for objects in classroom environment<br>- highlighting spelling patterns using small *moveable alphabets* in different colours<br>- phonogram and puzzle word lessons and exercises<br>- *word study* exercises<br>- working with and researching words containing blends and *phonograms*<br>- working with and researching *puzzle words*<br>- maintaining a personal spelling dictionary<br>- lessons and exercises introducing use of dictionary, spell-check and online dictionaries<br>- providing students with the etymology of each technical or specialised term introduced in all areas of the curriculum<br>- practice activities as needed to reinforce spelling e.g. look-say-cover-write, quizzes.<br><br>Resources include:<br>- *moveable alphabets*<br>- *phonogram* cards and booklets<br>- *puzzle word* lists, booklets and folders<br>- spelling lists, charts, booklets and cards<br>- student's own dictionary<br>- paper-based and online dictionaries covering a range of reading levels<br>- thesaurus. |

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| **Writing: Punctuation** | Understand the purpose and use of punctuation marks:<br>- full stop<br>- comma<br>- question mark<br>- exclamation mark<br>- colon and semi-colon<br>- quotation marks<br>- hyphen and dash<br><br>Understand the purpose and use of capitalisation<br><br>Develop use of correct punctuation in written work<br><br>Proofread and edit written texts, using feedback to improve written work | Activities include:<br>- introductory games to establish function of punctuation e.g. reading a paragraph without taking a breath<br>- introductory games to learn formation of punctuation marks e.g. modelling punctuation marks in a variety of media including body sculpture, clay and artwork<br>- guided individual and small group games and exercises<br>- looking for punctuation marks in a variety of texts<br>- guided exercises in drafting, editing and proofreading<br>- conferencing with peers and teacher<br>- stories and research projects to explore the history of individual punctuation marks.<br><br>Resources include:<br>- card material<br>- *capitalization* charts<br>- noun classification charts (proper/common)<br>- student's own texts<br>- texts matched to interest displaying a variety of punctuation use<br>- research materials (paper-based, digital, web-based). |

## Language Curriculum for Children Aged Nine to Twelve Years

| Content Strand | Knowledge, Skills and Understandings | Activities and Resources |
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| | *Typically children will:* | |
| History of language | Gain further knowledge of the development of spoken language<br><br>Communicate using a variety of means used in the history of written language<br><br>Gain further knowledge about the development of the alphabet<br><br>Gain further knowledge of the development of written language, from its beginnings to the present<br><br>Enhance knowledge of the development of English | Activities include:<br>- *story of communication in signs* (2nd level)<br>- factual stories and historical accounts<br>- experimenting with pictures, pictograms, hieroglyphs, ancient alphabets to communicate<br>- research projects e.g. making models, timelines and charts<br>- note-taking and writing up research.<br><br>Resources include:<br>- charts and artefacts<br>- research materials (paper-based, digital, web-based, multimedia). |
| Spoken language: listening and speaking | Enhance skills in listening and responding to:<br>- stories and poems read aloud or performed<br>- recordings or performances of songs, music, plays<br>- video and film screenings<br>- spoken and multimedia presentations<br>- note-taking<br><br>Enhance skills in spoken interaction:<br>- greetings and leave-takings<br>- requests and offers<br>- asking and responding to questions<br>- giving and following instructions, including multi-step instructions<br>- using questions to build and clarify understanding<br>- initiating topics<br>- expressing opinions<br>- using intonation, gesture and eye contact<br>- relating events, stories or conversations<br>- using different forms of speech for different purposes and audiences<br>- using the telephone to gain information<br>- conducting interviews<br>- using active listening skills<br>- listening for key ideas and for detail<br>- participating in discussions and debates<br>- arguing for a point of view<br>- questioning or challenging a point of view<br>- explaining complex concepts<br><br>Enhance performance skills:<br>- reading aloud<br>- rhythm and movement in speech<br>- reading and performing rhymes, poetry and songs<br>- spoken and multimedia presentations, reports and speeches<br>- voice production<br>- improvising and acting out dramatic roles<br>- use dialogue in dramatic performance | Activities include:<br>- *grace and courtesy* 'how to' lessons/role plays<br>- daily interactions with teachers and peers<br>- preparation for *going out*<br>- collaborative research projects<br>- class meetings<br>- listening comprehension activities<br>- guided speaking activities<br>- guided note-taking<br>- choral and individual performances<br>- presentations, plays and speeches<br>- interviews, discussions, debates, mock trials, mock parliament<br>- guest speakers.<br><br>Resources include:<br>- *grammar boxes* commands<br>- *interpretive reading* cards<br>- command cards in all areas of the curriculum<br>- card material<br>- exemplary speeches from history<br>- student's own work<br>- quality children's literature and factual texts in a variety of forms (paper-based, digital, web-based, multimedia). |

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| **Reading: word and text level (basic skills)** | Competently read words containing blends and *phonograms* (digraphs)<br><br>Competently read *puzzle words* (sight words with irregular spelling)<br><br>Competently decode and comprehend words, word groups, phrases, clauses and sentences | Activities include:<br>- small group lessons and exercises to review knowledge and skills as needed<br>- individual tutorials for students needing to review and practise basic skills<br>- extension of *word study* exercises<br>- drama and visual arts activities based on reading<br>- reading comprehension exercises in all areas of the curriculum.<br><br>Resources include:<br>- *phonogram* folders, cards, booklets and word lists<br>- *puzzle word* lists, booklets and folders<br>- pictures, labels, jumbled text and booklets in all areas of the curriculum<br>- command cards in all curriculum areas<br>- *reading commands*<br>- *interpretive reading* cards. |
| | Develop, consolidate and extend reading skills and strategies, including:<br>- navigating and understanding the structure of written and multimodal texts<br>- predicting the meanings in a text<br>- skimming a text for the main ideas<br>- scanning a text for detailed information<br>- reading for inferred and/or implied meanings<br>- recognising how a text shapes opinions and point of view | Activities include:<br>- exercises to build a range of reading skills and strategies e.g. library activities, modelled and guided reading activities, research projects<br>- interpreting the meanings in texts in a variety of ways e.g. written and spoken responses, drama and visual arts<br>- expanding reading repertoire as interest, fluency and comprehension develops.<br><br>Resources include literary and factual reading material matched to interest and curriculum focus.. |
| | Read a range of texts fluently with expanding levels of comprehension<br><br>Extend reading for enjoyment<br><br>Extend reading for research | Activities include:<br>- modelled, guided and independent reading of factual and literary texts individually and in small groups<br>- interpreting literary texts through drama, creative arts and model-making activities<br>- taking notes, using graphic organisers, drawing maps and diagrams and building models from factual texts<br>- library visits<br>- guided reading for research<br>- reading own and peers' writing for editing, proofreading and conferencing<br>- reading as performance.<br><br>Resources include quality reading material (literary and factual; paper-based, digital and web-based) matched to interest. |

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| **Word study** | Review and extend knowledge of words and their parts:<br>- word bases<br>- prefixes<br>- suffixes<br><br>Review and extend knowledge of synonyms, antonyms and homonyms<br><br>Use study of etymology to explore:<br>- origins of words<br>- word families<br>- changes in usage over time<br><br>Review and extend knowledge of figures of speech:<br>- simile and metaphor<br>- personification<br>- onomatopoeia<br>- alliteration and assonance<br><br>Expand and enhance vocabulary for reading and writing both literary and factual texts | Activities include:<br>- *word study* reviews, exercises and extensions<br>- spelling exercises and extension<br>- *style* study of student's own writing and the writing of others<br>- etymology lessons/research for all technical and specialised words introduced in the curriculum<br>- vocabulary research projects<br>- building word banks.<br><br>Resources include:<br>- *word study* charts and card material<br>- small moveable alphabets in different colours<br>- card sets, wall charts<br>- dictionaries and thesaurus (paper-based and online)<br>- etymological dictionaries (paper-based, digital and/or web-based)<br>- research and reference materials<br>- box of grammar symbols. |
| **Grammar study for reading fluency: *functions of words* and *grammar boxes*** | Complete, review and extend study of word functions and grammar patterns initiated in language curriculum for children aged from six to nine | Activities include:<br>- spoken language stories, lessons and games<br>- *grammar box* reading games, commands and experiments: dramatising the work of grammatical structures, composing word groups and sentences with colour-coded cards, symbolising cards to reveal grammar patterns<br>- *transposition* exercises to explore and experiment with word order<br>- laying out sets of cards in tables and arrays to explore the classification of grammar categories<br>- working with charts to identify grammar patterns<br>- writing activities to record work.<br><br>Resources include:<br>- *grammar boxes* containing cards with target text, loose colour-coded cards for composing, commands, classified card sets<br>- supplementary card material and games to explore function, agreement and classification<br>- 3-D grammar symbols (geometric solids)<br>- boxes of 2-D grammar symbols (plane geometric shapes)<br>- charts to guide analysis<br>- dictionaries. |

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| **Grammar study: detailed *study of the verb*** | Complete, review and extend detailed study of the verb initiated in language curriculum for children aged from six to nine | Activities include:<br>- spoken language lessons and games<br>- writing activities to record work<br>- comparing use of English grammar patterns with the corresponding grammar patterns of a LOTE<br>- research projects.<br><br>Resources include:<br>- charts and card material<br>- *sentence analysis* materials<br>- boxes of grammar symbols<br>- reading and reference material (paper-based, digital and/or web-based). |
| **Grammar study for reading and writing fluency: *sentence analysis* (simple, compound, complex sentences)** | Complete, review and extend *sentence analysis* work initiated in language curriculum for children aged from six to nine<br><br>Use knowledge of simple sentences in writing tasks (creative writing and project work)<br><br>Identify compound sentences and break into parts<br><br>Identify coordinating conjunctions in compound sentences<br><br>Identify complex sentences and break into parts<br><br>Identify relative pronouns in complex sentences<br><br>Identify subordinating and correlative conjunctions in complex sentences<br><br>Recognise different types of conjunction (addition, time sequence, cause and condition, comparison)<br><br>Analyse compound and complex sentences<br><br>Use knowledge of compound and complex sentences in writing tasks (creative writing and project work) | Activities include:<br>- *sentence analysis* lessons<br>- sentence reading and analysis exercises tearing sentences written on strips of paper into parts and labelling and setting out sentence structure with wooden material<br>- recording analysis use *sentence analysis* paper<br>- sentence writing activities using chart A as a guide to compose short and long simple, compound and complex sentences<br>- composing short and long simple, compound and complex sentences abstractly<br>- creative writing and research tasks.<br><br>Resources include:<br>- sample simple, compound and complex sentences derived from student writing and student reading material, both literary and factual texts<br>- *sentence analysis* Boxes 1 and 2 (wooden circles, arrows, triangles)<br>- *sentence analysis* chart A<br>- *sentence analysis* paper<br>- reading material to find sentences to analyse<br>- card material<br>- word banks of coordinating and subordinating conjunctions. |
| **Grammar study for reading and writing fluency: *sentence analysis* (types of clauses)** | Identify clauses in compound sentences (independent clauses)<br><br>Identify clauses in complex sentences and label according to dependency<br>- independent clause<br>- dependent clause<br><br>Identify clauses in complex sentences and label according to type:<br>- main/principal clause<br>- adjectival clauses | Activities include:<br>- *sentence analysis* lessons<br>- sentence reading and analysis exercises tearing sentences written on strips of paper into parts and labelling and setting out sentence structure with wooden material<br>- recording analysis use *sentence analysis* paper<br>- sentence writing activities, with material and abstractly<br>- creative writing and research tasks |

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| | - adverbial clauses<br>- noun clauses used as subject, object or indirect object | Resources include:<br>- *clause analysis* boxes 1 and 2<br>- *sentence analysis* chart B<br>- card material |
| **Grammar study for writing: study of *style*** | Complete, review and extend *study of style* (the composition and arrangement of texts) initiated in language curriculum for children aged from six to nine<br><br>Continue exploration and evaluation of own style, and the style of other writers, using knowledge about the elements of writing, including:<br>- structure of different types of text<br>- grammar patterns (grammar symbols, sentence analysis), used to represent plot, characters, setting and atmosphere in literary texts, to organise and relate different types of content in factual texts and to argue for a point of view in persuasive texts<br>- knowledge of vocabulary (word study, etymology)<br><br>Expand vocabulary for describing and evaluating style, for example vocabulary for:<br>- preparing spoken and written responses and reviews e.g. as *gripping, clear, opaque, economical, convincing, pedantic, one-sided, biased, even-handed, flowery, comical, didactic, inspiring, , colloquial, conversational, self-congratulatory, erudite, well-researched*<br>- identifying different literary genres e.g. *comedy, tragedy, action, mystery, romance, science fiction*<br>- comparing newspaper and factual styles with literary styles e.g. *hard news, feature, comment, fact, opinion, factual description, imagery, headline-lead*<br><br>Use knowledge about the structure of different types of texts, and grammar and vocabulary patterns, to compare and evaluate different writing styles<br><br>Evaluate the effectiveness of texts used to organise or explain factual information<br><br>Prepare reviews of literary texts<br><br>Describe and discuss how persuasive texts influence listeners and readers | Activities include:<br>- reading circles in which students use knowledge about vocabulary, grammar and text to discuss features of the writing in the books being read, and/or to compare different treatments of the same story, information or issue (e.g. a well-known traditional story, presentation of the same content or issue in different publications or in different media such as film, video or digital representation)<br>- using grammar symbols to explore style of writing (text and grammar patterns) used in different texts, including texts in a LOTE<br>- creating word webs and mind maps to expand vocabulary<br>- participating in guided activities to expand and enrich own writing<br>- searching for different types of texts and writing styles about the same topic e.g. a poem, a story and a scientific texts about the same topic<br>- spoken presentations, individual and group writing as part of project work across the curriculum<br><br>Resources include:<br>- box of grammar symbols<br>- sample word webs and mind maps<br>- *grammar boxes II-IX*<br>- *sentence analysis* boxes 1 and 2<br>- *sentence analysis* charts.<br>- a range of different types of texts, including picture books, advertisements, film segments<br>- sample word webs and mind maps.<br>- dictionary and thesaurus |
| | Continue exploration and experimentation with meanings in sentences initiated in language curriculum for children aged from six to nine, including:<br>- experimenting with different styles in relation to different types of texts, audiences and effects<br>- using knowledge of grammar patterns to expand and enhance meaning-making in sentences and | Activities include:<br>- identifying and symbolising grammar patterns in sentences and texts<br>- transposing the order of words and structures in sentences and texts to create different effects<br>- using grammar symbols, and knowledge of grammar patterns, to |

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| | texts<br>- adapting the style of own texts according to purpose and audience | explore own writing style, to help with writing and to consider ways to adapt or enhance own writing e.g. by elaborating and expanding clauses, amplifying meanings in sentences<br>- discussing and evaluating variation in meaning resulting from analysing, transposing and amplifying meanings in sentences and texts<br>- using grammar patterns found in the writing of others in own writing<br>- drafting and editing exercises and workshops<br><br>Resources include:<br>- *grammar boxes II-IX*<br>- box of grammar symbols<br>- *sentence analysis* material<br>- students' own writing<br>- literary, factual and persuasive texts. |
| **Viewing: study of *style*** | Complete, review and extend *study of style* in relation to the composition of still and moving images across a range of media (e.g. paper-based, digital, drama, animation and film/video)<br><br>Continue exploration and evaluation of own illustration style, and the style of other illustrators, using knowledge about the elements of images, including use of images to:<br>- represent characters' actions, reactions, interactions and circumstances in literary images<br>- relate and organise different types of content in factual images<br>- persuade and influence viewers<br><br>Experiment with different styles when composing still and moving images across a range of media (e.g. paper-based, digital, drama, animation and film/video)<br>Use knowledge about the elements of images to compare different image styles in literary texts across a range of media (e.g. print, digital, drama, animation and film/video) and to analyse and interpret the effect of these styles on the way the viewer interprets the image and the literary text as a whole, including:<br>- the representation of ideas e.g. characters' actions, interactions, reactions, circumstances<br>- the way ideas represented in images are combined (in picture books, illustrated texts, comics, graphic novels, animation/film etc) to influence viewer pathways from one image, or image element, to the next e.g. combining elements within images, sequences of images, contrasted images, visual rhyme, the relation between images in hyperlinked digital texts | Activities include:<br>- reading circles in which students contribute knowledge about image composition (e.g. from Visual Arts curriculum) to discuss features of images in the books being read, and the relations between them, and/or to compare the images used in different treatments of the same story, information or issue (e.g. a well-known traditional story, presentation of the same content or issue in different publications or in different media such as photographic, film, drama, video or digital representation)<br>- visual arts exercises that provide opportunities to experiment with different image styles, and to manipulate elements of images to create different effects<br>- searching for different types of images representing the same topic e.g. a story illustration, a photograph and a scientific diagram<br>- discussing the effect of images used in advertisements from print, television and online sources<br>- research images used across a variety of cultures, and the ways they are used and interpreted<br>- spoken presentations, individual and group writing as part of project work across the curriculum<br>- extending exploration of art and art history, and the elements of photography and videography introduced in Visual Arts to build |

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| | - the building of relations of more or less empathy, involvement, power, identification and/or reality between characters and readers e.g. use of gaze (direct, indirect), shot (long, medium, close-up) angle (high, low, eye-level, front on, oblique), colour and background<br>- the organisation, or composition, of the image e.g. placement, framing, how much elements stand out i.e. their salience (relative size, weight, sharpness, intensity, foregrounding/backgrounding)<br><br>Use knowledge about the elements of images to compare different image styles in factual and persuasive texts across a range of media (e.g. paper-based, digital, drama, animation and film/video), including:<br>- the arrangement of elements in relation to each other (e.g. part-whole, types of, sequence, time line, cause and effect) and the use of symbols<br>- the organisation, or composition, of the image e.g. placement, framing, how much elements stand out i.e. salience (relative size, weight, sharpness, intensity, foregrounding/backgrounding)<br>- the sequencing of images in linear texts (paper-based, drama, film/video) compared with viewer pathways from one image to the next made possible in hyperlinked digital texts<br>- the use of images to influence or persuade viewers<br><br>Use Visual Arts curriculum to develop a language for talking about the style of images used across a range of media, including the elements and principles of design, composition and colour, and media tools and techniques<br><br>Explore the way the meanings in images are combined with the meanings in written texts to repeat, add to, contradict and/or multiply those meanings<br><br>Adapt the style of own images according to purpose and audience<br><br>Evaluate the effectiveness of images used to:<br>- illustrate literary texts<br>- organise or explain factual information<br>- persuade or influence viewers | vocabulary for talking about images<br>- composing own picture books, 'graphic novels', photojournalism projects, video news stories or animated stories<br>- taking and editing photographs for school or community magazine or newspaper<br><br>Resources include:<br>- the resources of the visual arts curriculum<br>- a range of different types of image texts, including picture books, cartoons, comics, graphic novels, photographs, advertisements, film and video segments, digital images<br>- equipment and resources for making, editing and managing digital images, including digital camera and video recorder, multimedia authoring software, software for editing and managing images |

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| **Reading and viewing literary texts** | Review and extend reading and viewing of literary texts initiated in language curriculum for children aged from six to nine<br><br>Select extracts of a range of literature to analyse and critique author and illustrator style/s<br><br>Review a range of literary texts (prose, poetry, picture books, drama, film, multimedia texts, e-literature) and support opinions using evidence from the text<br><br>Research and discuss historical background of selected literary texts<br><br>Explore and discuss how individuals and groups of people are represented in wordings and images in a range of literary texts and literary genres across a range of media (books, films, multimedia) and how these influence the reader<br><br>Analyse and critique a selection of poems for form, rhythm and rhyme<br><br>Research figures of speech used in the wordings and images of literary texts:<br>- idiom<br>- simile and metaphor<br>- personification<br>- alliteration and assonance<br>- onomatopoeia<br>- imagery<br>- irony, hyperbole and paradox<br>- symbols | Activities include:<br>- *going out* e.g. bookshops, libraries, literary events cinema<br>- guided small-group activities<br>- reading, analysing and discussing literary texts in small groups<br>- research projects e.g. creating literary timelines, researching different types of figures of speech to create charts or booklets, researching authors and illustrators, researching media used to present literary texts over time<br>- writing and publishing reviews<br>- literary projects e.g. preparing an anthology of favourite poems or poetry or prose extracts for performance<br>- model-making based on setting or characters, preparing multi-media presentations based on literary texts; designing illustrations for favourite literary texts<br>- Book Week activities and author and illustrator visits<br>- reading aloud by teacher or students and pausing when strategies for influencing the reader appear so students learn to 'listen for' these and to evaluate their impact<br><br>Resources include:<br>- children's literature, both prose and poetry, including picture books and multimedia texts<br>- student writing<br>- box of grammar symbols<br>- form and rhyme charts, metre charts, drum<br>- card material<br>- reading and reference material (paper-based, digital and/or web-based)<br>- visual arts resources<br>- multimedia authoring resources. |
| **Reading and viewing factual texts** | Review and extend reading and viewing of factual texts initiated in language curriculum for children aged from six to nine<br><br>Read factual descriptions, information reports and explanations (wordings and images) in order to complete research tasks<br><br>Recognise point of view in the wordings and images of persuasive texts (review, exposition, discussion, advertisements)<br><br>Evaluate evidence and quality of the argument in the wordings and images of persuasive texts | Activities include:<br>- *going out* e.g. to libraries, bookshops, museums, newspaper offices, radio/television stations, advertising agencies<br>- guided small group reading activities<br>- visits by authors and illustrators of factual texts, journalists, advertising copy writers, web and CD designers<br>- using factual texts in research tasks<br>- activities that build media literacy, including activities that build an informed and critical response to advertising |

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| | Understand the production of media texts (news stories, feature articles, opinion pieces, letters to the editor)<br><br>Explore and discuss degrees of objectivity in media texts<br><br>Develop a critical orientation to factual texts<br><br>Extend and enhance research skills | - summarising and note-taking<br>- using graphic organisers and diagrams to record and organise key points and details<br>- evaluating the quality of facts, evidence and/or reasoning used by authors of a variety of factual texts.<br><br>Resources include:<br>- non-fiction/factual texts in a range of media e.g. books, newspapers, journals, multimedia CDs, websites, video, film, television<br>- student writing<br>- pictures, card material and booklets from all curriculum areas e.g. geometry, geography, biology, history<br>- range of persuasive texts e.g. opinion pieces, letters to the editor, reviews, advertising, political speeches (paper-based, digital and/or web-based, multimedia) |
| **Writing: composing literary, factual and persuasive texts** | Review and extend composing of literary, factual and persuasive texts initiated in language curriculum for children aged from six to nine<br><br>Expand repertoire of text types and media used in written composition of creative, literary texts, factual texts and persuasive texts<br><br>Compose texts that achieve complex purposes by combining the features of two or more text types<br><br>Use knowledge of text types, grammar patterns and style in innovative and creative ways in own writing<br><br>Use knowledge of poetry and poetic devices in innovative and creative ways in own poetry<br><br>Adapt and adjust the writing process to a range of writing contexts | Activities include:<br>- guided individual and small group exercises in the composition of literary, factual and persuasive texts, including writing text elements and preparing images<br>- guided composition activities e.g. composing literary, factual and persuasive texts scaffolded by an adult or peer using the written *question game*<br>- identifying purpose and stages of texts<br>- sequencing and sorting jumbled texts<br>- summarising and note-taking exercises<br>- using knowledge of grammar and grammar symbols to find grammar patterns typical of different types of texts<br>- modelled, guided and independent writing projects across the curriculum<br>- conferencing with peers and teacher<br>- selecting and adapting text types, grammar patterns and writing style for creative writing and project work in all areas of the curriculum<br>- using library and Internet<br>- classroom and school publications<br>- drafting and editing exercises and workshops<br><br>Resources include:<br>- range of literary, factual texts and persuasive to use as models for writing<br>- card material<br>- poetry cards |

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| | | - box of grammar symbols<br>- variety of media (writing implements, paper, art materials, digital camera, materials for making books, word processing, multimedia and web authoring programs). |
| | Review and extend knowledge of paragraph and sentence writing initiated in language curriculum for children aged from six to nine<br><br>Recognise the parts of a paragraph<br>- topic sentence<br>- body<br>- concluding sentence<br><br>Extend paragraph-writing ability<br><br>Link paragraphs to compose texts<br><br>Extend ability to craft groups, phrases, clauses and sentences<br><br>Extend ability to redraft and reorganise the parts of a sentence to enhance clarity and effectiveness<br><br>Extend ability to select vocabulary for effect and meaning<br><br>Extend use of literary language, technical terms and abstract vocabulary to correspond with progress through curriculum | Activities include:<br>- modelled, guided and independent writing exercises and activities<br>- style analysis of a variety of texts using grammar symbols and/or *sentence analysis* materials<br>- independent writing projects<br>- conferencing with peers and teacher<br>- vocabulary enrichment exercises across the curriculum.<br><br>Resources include:<br>- *grammar boxes* and command cards<br>- box of grammar symbols<br>- *sentence analysis* materials<br>- classified pictures, card material and booklets from all areas of the curriculum<br>- dictionary and thesaurus<br>- model literary, factual and persuasive texts<br>- reference material (paper-based, digital and/or web-based). |

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| **Writing: handwriting and keyboarding** | Extend and enhance cursive handwriting skill developed from six to nine years<br><br>Refine cursive handwriting and develop personal handwriting style, noting letter formation and directionality, slope, starting and finishing points, joins and placement<br><br>Expand repertoire of writing implements and writing media<br><br>Experiment with a variety of writing styles and experience handwriting as an art form<br><br>Use handwriting in everyday tasks<br><br>Prepare handwritten presentations of creative writing and project work | Activities include:<br>- small group lessons and exercises to review knowledge and skills as needed<br>- individual tutorials for students needing to review and practise basic skills<br>- design and illustration work in all areas of the curriculum<br>- guided individual and small group activities<br>- writing with a variety of implements (pencils, pens, brush, quill, chalk, crayon, charcoal), colours and media (inks, paint, colours, a variety of papers and surfaces)<br>- writing exercises with historical or novel alphabets<br>- using handwriting to present completed work<br>- using calligraphy and illumination e.g. to present favourite poems, prepare greeting cards, decorate project work<br>- *grace and courtesy*, *going out* and research activities e.g. writing messages, letters and invitations, thank you notes, note-taking<br><br>Resources include:<br>- materials for design<br>- variety of writing implements and writing media<br>- calligraphy materials<br>- variety of papers with different types of lines |
| | Use computer equipment comfortably and safely<br><br>Enhance touch typing skills and expertise<br><br>Extend knowledge of safe computer use:<br>- seating and posture<br>- distance between eyes and screen<br>- limiting screen time<br><br>Discuss and contribute to school ICT code of conduct<br><br>Use word processing, when appropriate, to present completed work<br><br>Use digital technology, when appropriate, for communication, record-keeping, creative writing and project work | Activities include:<br>- guided presentations and individual practice<br>- individual tutorials for students needing to review and practise basic skills<br>- research projects<br>- discussions<br><br>Resources include:<br>- computer station designed for student use<br>- age-appropriate touch typing programs<br>- computer programs for word processing, desktop publishing, creating spreadsheets, email, multimedia authoring, website design<br>- digital camera<br>- headphones |

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| **Writing: spelling** | Consolidate and extend spelling knowledge and skill initiated in language curriculum for children aged from six to nine<br><br>Spell accurately words containing blends and phonograms (digraphs)<br><br>Consolidate and extend knowledge of puzzle words (sight words and words with irregular spellings)<br><br>Consolidate and extend knowledge of spelling strategies:<br>- sounding out<br>- identifying consonant and vowel patterns<br>- identifying onset and rime<br>- syllabification<br>- visualization<br>- etymology<br>- spelling patterns<br>- association with known words<br><br>Consolidate and extend knowledge of spelling rules or patterns<br><br>Apply knowledge of spelling rules and patterns in written work<br><br>Apply knowledge of word parts, grammar and etymology to the spelling of words in written work<br><br>Spell technical and specialised words with increasing accuracy<br><br>Use a dictionary or technology to confirm or research spelling<br><br>Compare the use of spelling in messaging and emails with its use in the writing of more formal literary and factual texts | Activities include:<br>- individual tutorials for students needing to review and practise basic skills<br>- blend, phonogram and puzzle word review and practice as needed<br>- working with and researching words containing blends and phonograms<br>- working with and researching puzzle words<br>- *word study* exercises<br>- maintaining a personal spelling dictionary<br>- using dictionary, electronic spell-check and online dictionaries<br>- discussing and researching the etymology of each technical or specialised term introduced in all areas of the curriculum<br>- discussing and experimenting with unconventional spelling used in email and messaging, while contrasting it with spelling conventions used in more formal writing<br><br>Resources include:<br>- spelling lists, charts, booklets and cards<br>- *word study* charts and card sets<br>- card material in all curriculum areas<br>- student's own dictionary<br>- paper-based, digital and online dictionaries, thesaurus and etymological dictionary<br>- reading and reference material (paper-based, digital and/or web-based) |
| **Writing: Punctuation** | Consolidate and extend knowledge of punctuation initiated in language curriculum for children aged from six to nine<br><br>Use punctuation with increasing accuracy and skill in written work<br><br>Proofread and edit written texts, using feedback to improve written work<br><br>Research the history, development and purpose of punctuation in English<br><br>Compare and discuss the use of punctuation in messaging and emails with its use in the writing of more formal literary and factual texts | Activities include:<br>- modelled, guided and independent individual and small group exercises and writing tasks<br>- guided exercises in drafting, editing and proofreading<br>- conferencing with peers and teacher<br>- research projects and discussions<br><br>Resources include:<br>- card material<br>- capitalisation charts<br>- noun classification charts (proper/common)<br>- student texts<br>- a range of texts displaying a variety of punctuation use<br>- reference materials |

# Mathematics

## Overview

The *Children's House* provides children with a strong foundation on which to build the more advanced mathematical understandings they gain in Montessori environments prepared for children over the age of six. In the *Children's House* children work with a variety of concrete materials embodying mathematical concepts. When the hand and the mind work together, young children are able to absorb concepts, sometimes without the need for words.

Each Montessori mathematics lesson, in both the *Children's House* and in environments prepared for children over six, has two aims, one indirect and one direct. The *direct aim* is the immediate purpose that is obvious when the concrete materials are presented to the children. The *indirect aim*, often a more abstract aim, is achieved when children work with the concrete materials independently. The indirect aim prepares children for more advanced concepts they will meet later in the curriculum. In the Montessori view, when children work first with concrete materials and move at their own pace toward abstraction with paper and pencil, or towards mental arithmetic, they internalise concepts at a deeper, more lasting level than if they had memorised them by rote.

Beyond the age of six children continue to learn mathematical principles through the manipulation of concrete materials but they do not want to be tied to concrete materials and strive towards the freedom of working at the abstract level. The concrete materials become stepping-stones only, keys to open the door to abstraction whenever a child is ready. By generalising from their experience with the concrete materials, children over the age of six are able to work out mathematical formulae and definitions for themselves. Montessori teachers do not offer help too early, but wait until children have had a chance to work with a problem and come up with a few solutions for themselves. Children also encounter problems to use in their independent work in the form of command cards prepared for all areas of the mathematics curriculum.

In the study of mathematics at this age children use quantities with precision. They also reason using logic and abstract patterning based on observation and imagination. Children work with measurements, patterns, sequences and mathematical relationships, applying these concepts to practical projects. They learn that the creative potential of mathematics is as great as its potential to order and to provide understanding. In the Montessori view, constructing a 'mathematical mind' in this way is the birthright of all children.

The Montessori mathematics curriculum extends children aged from six to twelve further than is normally expected of children at this age and stage. For example, from the age of six children, explore and practise operations with the culture's system of numeration, the decimal system. Once children have mastered this system, usually by the age of nine, they are ready to examine other number systems, with bases other than ten, from both a mathematical and an historical perspective. Children may even perform operations in number systems with bases other than ten. Extension activities of this type allow children to exercise their mental capacities as well as consolidate and reinforce their existing understanding.

As children progress through the Montessori mathematics curriculum, they learn to make connections between concepts. For example, they learn to apply compound multiplication to fractions and decimals, or progress from the four operations of addition, subtraction, multiplication and division to squaring and cubing, and to solving square roots and cube roots.

## Mathematics Curriculum for Children Aged Six to Nine Years

| Content Strand | Knowledge, Skills and Understandings | Activities and Resources and Activities |
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| | *Typically children will:* | |
| History of mathematics | Listen to and read stories about the history of numbers and mathematics<br><br>Research ancient number systems<br>- Indigenous Australian<br>- Babylonian<br>- Egyptian<br>- Mayan<br>- Chinese<br>- Hindu-Arabic<br>- Roman<br><br>Explore the history of the number system used in our culture: the *decimal system* | Activities include:<br>- *great lesson: the story of numbers*<br>- independent research<br>- creating charts, models and timelines<br>- counting and calculating using earlier number systems e.g. Roman numerals.<br><br>Resources include:<br>- charts, card material and artefacts<br>- research and reference materials (paper-based, digital, web-based, multimedia). |
| Numbers to ten (link with *Children's House* curriculum) | Introduce, consolidate and/or review knowledge of numbers to ten<br><br>Recognise odd and even numbers | Activities include:<br>- individual and small group lessons and exercises to introduce, consolidate and/or review and assess knowledge of quantities and symbols as needed<br>- individual tutorials for students needing to review and practise basic knowledge<br>- memory game of numbers<br>- *odds and evens* lesson.<br><br>Resources include:<br>- concrete material and corresponding symbols, including *number rods* (1-10), *spindle boxes* (0-9), *number cards and counters* (1-10), stair of colour-coded bead bars (1-10), *snake game*<br>- basket with numbers (0-10) written on separate paper squares folded to hide the number. |

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| **Counting (link with *Children's House* curriculum)** | Introduce, consolidate and/or review counting 11-20<br><br>Introduce, consolidate and/or review counting 1-100<br><br>Introduce, consolidate and/or review counting 1-1000 | Activities include:<br>- individual and small group lessons and exercises to introduce, consolidate and/or review and assess counting knowledge and skills<br>- individual tutorials for students needing to review and practise basic skills<br>- using concrete material to count in a variety of ways within the range of 1-1000.<br><br>Resources include:<br>- *teen boards* and colour-coded bead bars<br>- *ten boards* and colour-coded bead bars<br>- golden 100-chain ($10^2$) and number labels (multiples of 10) colour-coded to indicate hierarchies<br>- golden1000-chain ($10^3$) and number labels (multiples of 10) colour-coded to indicate hierarchies<br>- short colour-coded skip counting chains ($1^2$ - $9^2$) with number labels for multiples<br>- long colour-coded skip counting chains ($1^3$ - $9^3$) with number labels for multiples. |
| **Study of the decimal system** | | |
| **The decimal system: introduction** | Introduce, consolidate and/or review the formation of concrete quantities (bead material) representing units, tens, hundreds and thousands<br><br>Introduce, consolidate and/or review the formation of numerals to 4-digits using manipulable, colour-coded cards representing units, tens, hundreds and thousands<br><br>Associate concrete quantities (bead material) with symbols (numerals on cards)<br><br>Explore place value using zero as a place holder to build numerals to four digits using manipulable colour-coded number cards<br><br>Exchange 10 of each hierarchy for one of the next hierarchy using concrete quantities (bead material)<br><br>Expanding numbers to 4-digits with colour-coded number cards | Activities include:<br>- demonstrations of the hierarchies of the decimal system (units, tens, hundreds, thousands) with *golden bead* material<br>- counting the zeroes on the colour-coded number cards to identify hierarchies<br>- building arrays of beads and cards<br>- forming numbers using concrete quantities<br>- forming numbers with number cards (hiding zeroes)<br>- playing the change game with *golden bead* material and colour-coded number cards<br>- expanding numbers using colour-coded number cards<br><br>Resources include:<br>- *golden bead* material<br>- colour-coded numerals on cards. |

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| **The decimal system: operations with whole numbers** | Introduce, consolidate and/or review concepts and processes of addition and subtraction<br><br>Use vocabulary for talking about the parts of an addition: *first addend, second addend, sum*<br><br>Use vocabulary for talking about the parts of a subtraction: *minuend, subtrahend, difference*<br><br>Use concrete quantities to add and subtract 4-digit numbers, first without and later with exchanging<br><br>Notate addition and subtraction problems to four digits both horizontally and vertically | Activities include:<br>- games and activities with concrete materials to introduce the concepts of addition and subtraction<br>- using concrete material to add and subtract, with accompanying notation<br>- calculation using addition and subtraction, progressing from concrete representation accompanied by notation (*golden bead* material) to more abstract representation (*stamp game, dot game*), and from calculation without exchanging to calculation with exchanging, including calculation involving zeroes<br>- completing problems on command cards and/or creating own problems<br>- activities to build familiarity with graphic representations of addition and subtraction e.g. number lines.<br><br>Resources include:<br>- *golden bead* material, colour-coded numerals on cards and notation paper with colour-coded numerals<br>- *stamp game* and notation paper with colour-coded lines<br>- *dot game* board and/or paper<br>- command cards. |
| | Introduce, consolidate and/or review concept and process of multiplication as repeated addition of the same number<br><br>Use vocabulary for talking about the parts of a multiplication: *multiplicand, multiplier, product*<br><br>Use concrete quantities to multiply 4-digit numbers by a 1-digit (unit) multiplier, first without and later with exchanging<br><br>Notate multiplication calculations (multiplicand to four digits and 1-digit multiplier) both horizontally and vertically | Activities include:<br>- games and activities with concrete materials to introduce the concept of multiplication as repeated addition of the same number<br>- using concrete material to multiply with accompanying notation<br>- multiplication calculation progressing from concrete representation accompanied by notation (*golden bead* material) to more abstract representation (*stamp game*), and from calculation without exchanging to calculation with exchanging, including calculation involving zeroes in multiplicand<br>- activities to build familiarity with geometric representation of multiplication.<br><br>Resources include:<br>- *golden bead* material, colour-coded numerals on cards and notation paper with colour-coded numerals<br>- *stamp game* and notation paper<br>- command cards. |

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| | Introduce, consolidate and/or review concept and process of division as sharing equally (distributive division)<br><br>Use vocabulary for talking about the parts of a division: *dividend, divisor, quotient*<br><br>Use concrete material to divide 4-digit numbers by a 1-digit (unit) divisor, first without and later with exchanging<br><br>Notate division calculations (dividend to four digits and 1-digit divisor) both horizontally and vertically<br><br>Introduce, consolidate and/or review the concept and process of distributive division with 2- and 3-digit divisors<br><br>Introduce and explore the concept and process of group division with 1-digit, 2-digit and 3-digit divisors<br><br>Notate division calculations with dividend to four digits and 2-digit and 3-digit divisors horizontally | Activities include:<br>- games and activities with concrete materials to introduce the concept of division as sharing equally (from highest hierarchy)<br>- using concrete material to divide with accompanying notation<br>- division calculation progressing from concrete representation accompanied by notation (*golden bead* material) to more abstract representation (*stamp game*), and from calculation without exchanging to calculation with exchanging, including calculation involving zeroes in dividend<br>- early games and exploration in calculating division with 2- and 3-digit divisors using concrete material (*golden bead* material and colour-coded ribbons; *stamp game* with skittles), including calculation with zeroes in the divisor (*stamp game* with skittles and counters) and group division<br>- completing problems on command cards and/or creating own problems (progressing from concrete representation accompanied by notation to increasingly abstract representation)<br>- verifying answers.<br><br>Resources include:<br>- *golden bead* material and notation paper with colour-coded numerals<br>- colour-coded ribbons<br>- *stamp game*, colour-coded skittles and notation paper<br>- command cards. |
| **Inter-relationships between operations** | Explore inverse relationships of addition and subtraction<br><br>Explore inverse relationships of multiplication and division | Activities include:<br>- using concrete materials to explore inverse relationships of addition subtraction<br>- using concrete materials to explore inverse relationships of multiplication and division<br>- using inverse relationships to verify answers.<br><br>*Resources* include:<br>- *golden bead* material<br>- *stamp game*<br>- *bead frames* and notation paper. |

| Memorisation | | |
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| **Memorisation: addition facts** | Explore and record all essential addition facts for sums from 2-18 using concrete material<br><br>Explore and record all addition facts with zero as an addend for sums from 1-18 using concrete material<br><br>Explore and record the doubles of numbers 1-9 using concrete material<br><br>Memorise essential addition facts for sums to18 using finger charts<br><br>Use knowledge of addition facts to solve word problems<br><br>Find equivalent combinations using concrete material (commutative law)<br><br>Prepare for mental calculation of addition combinations (sums to 99) using concrete material:<br>- sums < 10<br>- sums > 10<br>- addends > 10<br>- more than 2 addends<br><br>Form and solve addition combinations with brackets using colour-coded bead bars and manipulable brackets, addition and equal signs (associative law) | Activities include:<br>- activities and games with concrete material (addition *strip board*) to research addition facts for sums to 18<br>- recording sums in prepared tables<br>- games with addition combinations on loose cards and finger charts to develop memorisation of addition facts<br>- games with strip board in which all the ways to make each sum to 18 are researched and recorded<br>- games with concrete material and charts in which the order of the addends is changed and equivalent (turn around) combinations are substituted (commutative law)<br>- solving additions (sums to 18) with different unknowns (first addend, second addend or sum)<br>- games with bead material and manipulable symbols (addition signs, equal signs) to prepare progressively for mental addition of addends to at least 2-digits (sums to 99)<br>- games with bead material and manipulable symbols (brackets, addition signs, equal signs) to form and solve additions and to expand addends (commutative and associative laws)<br>- recording and verifying answers in all games and activities<br>- solving word problems using knowledge of addition facts<br>- follow-up activities to reinforce memorisation of addition facts and to achieve mastery.<br><br>Resources include:<br>- addition *snake game*<br>- addition *strip board*<br>- booklets of prepared tables (colour-coded red) and notation paper<br>- box of loose addition combinations (flash cards) and four addition *finger charts* progressing in abstraction, including bingo game with sums on tiles<br>- word problem card material<br>- box of colour-coded bead bars<br>- manipulable symbols (brackets, addition signs, equal signs). |

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| **Memorisation: subtraction facts** | Explore and record all essential subtraction facts for minuends from 2-18 using concrete materials<br><br>Explore and record all subtraction facts with zero as a subtrahend for minuends from 1-18 using concrete materials<br><br>Memorise essential subtraction facts for minuends to 18 using finger charts<br><br>Use knowledge of subtraction facts to solve word problems<br><br>Prepare for mental calculation of subtraction (minuends to 99) | Activities include:<br>- activities and games with subtraction *strip board* for researching subtraction facts for minuends to 18<br>- recording differences in prepared tables<br>- games with loose cards and finger charts to develop memorisation of subtraction facts<br>- solving subtractions (minuends to 18) with different unknowns (minuend, subtrahend or difference)<br>- recording and verifying answers in all games and activities<br>- solving word problems using knowledge of subtraction facts<br>- follow-up activities to reinforce memorisation of subtraction facts and to achieve mastery.<br><br>Resources include:<br>- subtraction *snake game*<br>- subtraction *strip board*<br>- booklets of prepared tables (colour-coded green) and notation paper<br>- box of loose subtraction combinations (flash cards) and three subtraction *finger charts* progressing in abstraction, including bingo game with differences on tiles<br>- word problem card material. |
| **Memorisation: multiplication facts** | Explore and record all essential multiplication facts for products from 1-100 using concrete materials<br><br>Memorise essential multiplication facts for products to100 using finger charts<br><br>Use knowledge of multiplication facts to solve word problems<br><br>Find equivalent combinations using concrete material (commutative law)<br><br>Memorise the multiples of numbers 1-10 by completing and/or reviewing skip counting of colour-coded bead chains (short chains: $1^2$ - $10^2$; long chains: $1^3$ - $10^3$)<br><br>Find squares and cubes of numbers 1-10 using the bead chains, bead squares and bead cubes<br><br>Discover that, when the multiplier is zero, the product is always zero for all multiplicands<br><br>Form, manipulate and solve multiplication combinations with brackets using concrete material (commutative and distributive laws) | Activities include:<br>- activities and games with multiplication *bead board* for researching multiplication facts for products to 100<br>- recording products in prepared tables<br>- games with loose cards and finger charts to develop memorisation of multiplication facts<br>- solving multiplications (products to 100) with different unknowns (multiplicand, multiplier or product)<br>- games with concrete material and charts in which the order of the factors is changed and equivalent (turn around) combinations are substituted (commutative law)<br>- games in which all ways to make products to 100 are researched and recorded<br>- solving word problems using knowledge of multiplication facts<br>- reciting and recording the series of products/multiples used to skip count the colour-coded bead chains, gradually turning over the labels until reciting each series from memory<br>- folding the bead chains and substituting bead squares and bead cubes<br>- series of games with colour-coded bead |

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| | | bars including multiplication snake game; building multiplication tables; multiplying by10; small multiplications with bead bars; changing the order of the factors (commutative law); building the squares of numbers 1-10; comparing bead bar layouts of combinations to find 'common' multiples<br>- using bead bars to find and record all ways to make the same product (1-100)<br>- series of games using colour-coded bead bars and manipulable symbols (brackets, multiplication signs, addition signs, equal signs) to explore distributive law, including multiplying binomial and trinomial expressions by numbers 1-10 [e.g. (3+5)x6; (4+7+2)x3], multiplying a sum by a sum [e.g. (3+5)(4+7)]; analysing squares into binomial and trinomial representations [e.g. $10^2$ represented as $(3+7)^2$]; using binomials to represent and analyse the progression of squares from $1^2$ to $10^2$, both successive (e.g. $3^2 \rightarrow 4^2$) and non-successive (e.g. $5^2 \rightarrow 8^2$)<br>- drawing representations, recording and verifying answers in all games and activities<br>- follow-up activities to reinforce memorisation of multiplication facts and to achieve mastery.<br><br>Resources include:<br>- multiplication *snake game*<br>- multiplication *bead board*<br>- booklets of prepared tables (colour-coded yellow) and notation paper<br>- box of loose multiplication combinations (flash cards) and four multiplication *finger charts* progressing in abstraction, including bingo game with products on tiles<br>- word problem card material<br>- cabinet of colour-coded bead chains, squares and cubes<br>- box of colour-coded bead bars<br>- manipulable symbols (brackets, addition signs, multiplication signs, equal signs). |

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| **Memorisation: division facts** | Explore and record all essential division facts for dividends from 1-100 using concrete materials<br><br>Memorise essential division facts for dividends to100 using finger charts<br><br>Use knowledge of division facts to solve word problems | Activities include:<br>- activities and games using division *bead board* for researching division facts for dividends to 100<br>- recording quotients in booklets of prepared tables<br>- games with loose cards and finger charts to develop memorisation of division facts<br>- solving divisions (dividends to 100) with different unknowns (dividend, divisor or quotient)<br>- solving word problems using knowledge of division facts<br>- follow-up activities to reinforce memorisation of division facts and to achieve mastery.<br><br>Resources include:<br>- division *bead board*<br>- booklets (colour-coded blue) and notation paper<br>- box of loose division combinations (flash cards) and division *finger charts* progressing in abstraction, including bingo game with products on tiles<br>- word problem card material. |
| **Decanomial: *Table of Pythagoras*** | Build the decanomial, or *Table of Pythagoras*, bead array (concrete representation of all multiplication combinations for numbers 1 – 10)<br><br>Use the commutative law of multiplication to re-arrange the decanomial bead array in a variety of ways | Activities include:<br>- using knowledge of multiplication facts and colour-coded bead bars to build the decanomial array/layout, first vertically and then horizontally<br>- re-arranging the decanomial bead bar array using the commutative law<br>- commuting the decanomial bead bar array to bead squares and then to bead cubes ($1^3$-$10^3$) arranged in a tower (*tower of jewels*)<br>- using card material to build the decanomial array expressed in numerals and algebraic notation.<br><br>Resources include:<br>- box of coloured bead bars (55 of each bead bar)<br>- colour-coded bead squares and bead cubes from the *bead chain cabinet*<br>- numerical and algebraic decanomial cards and envelopes. |

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| **Multiples of numbers** | Explore, analyse and record multiples and factors<br><br>Explore, analyse and record prime numbers and composite numbers | Activities include:<br>- lessons and activities as needed to introduce vocabulary (*multiple, factor, common multiple, prime factor, prime number*)<br>- using concrete materials (long bead chains, products formed with colour-coded bead bars) and/or memory to identify and record multiples of number 1-10<br>- identifying multiples for numbers 1-10 on *Table of Multiples* (numbers 1-100 laid out in a square), to find patterns and locate common multiples<br>- using tables A and B to record all the possible factors of each multiple<br>- using table C to identify prime numbers.<br><br>Resources include:<br>- cabinet of colour-coded bead chains, squares and cubes from the *bead chain cabinet*<br>- box of colour-coded bead bars<br>- *Table of Multiples* charts (to 100)<br>- student records of multiples and factors<br>- tables A, B, C. |
| Passage to abstraction (operations) | | |
| **Passage to abstraction: addition and subtraction** | Combine knowledge of addition and subtraction (concept and process) with memorised essential facts to achieve passage to abstraction (calculation without the support of concrete material) | Activities include:<br>- introduction to *small bead frame* with abacus and *golden bead* material<br>- counting through the hierarchies (units, tens, hundreds, thousands) as represented on the *small bead frame*<br>- forming and reading numbers to 9999 on the *small bead frame*<br>- notating numbers to 9999 on *small bead frame* paper<br>- forming and solving 4-digit additions and subtractions on the *small bead frame* (from calculation without exchanging to calculation with exchanging, including calculation involving zeroes) and recording the calculations on *small bead frame* notation paper<br>- completing the passage to abstraction (calculating additions and subtractions without the support of concrete material; notating addition and subtraction calculations without *small bead frame* notation paper as a guide)<br>- extend calculations to addition and subtraction with 7-digit numbers using *large bead frame* and *large bead frame* paper aligned to interest and need.<br><br>Resources include:<br>- abacus and *golden bead* material for introduction |

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| | | - *small bead frame* and *small bead frame* notation paper<br>- *large bead frame* and *large bead frame* notation paper<br>- command cards; word problems. |
| **Decimal system hierarchies: extension** | Manipulate, name and notate numbers to 6-digits<br><br>Recognise number 'families':<br>- 'simple family' of units, tens, hundreds<br>- 'family of thousands': thousands, tens of thousands, hundreds of thousands'<br>- 'family of millions'<br><br>Mark groupings of digits with comma or separation | Activities include:<br>- introduction to *wooden hierarchical material* (observing the colour-coding and relative size; link with *golden bead* material)<br>- naming the concrete quantities (units, tens, hundreds, thousands, ten thousands, hundred thousands, millions)<br>- sorting and labelling quantities by 'family' (hierarchy) using geometric shape, size and colour-coding as a guide<br>- reading aloud and writing the symbols (words and numerals) for the quantities<br>- matching symbols to quantities<br>- expanding numerals into constituent hierarchies<br>- making charts and cards.<br><br>Resources include:<br>- quantities to 1,000 represented in *golden bead* material (bead cube, square, bar, unit and colour-coded numbers on cards)<br>- quantities to 1,000,000 represented in *wooden hierarchical material* and labels (words and numerals). |
| **Passage to abstraction: multiplication** | Combine knowledge of multiplication (concept and process) with memorised essential facts to achieve passage to abstraction (calculation without the support of concrete material) for multiplications with:<br>- 1-digit multiplier<br>- products to 4-digits | Activities include:<br>- introduce and/or review multiplication ×10, × 100 and ×1,000 with *golden bead* material<br>- introduce and/or review multiplication ×10, × 100 and ×1,000 with *small bead frame*<br>- forming and solving small multiplications (1-digit multiplier; products to 4-digits) on *small bead frame* (from calculation without exchanging to calculation with exchanging, including calculation involving zeroes) and recording the calculations on *small bead frame* notation paper<br>- completing the passage to abstraction with small multiplications (calculating multiplication without the support of concrete material; notating calculations without *small bead frame* notation paper as a guide).<br><br>Resources include:<br>- *small bead frame*<br>- *small bead frame* notation paper<br>- command cards; word problems. |

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| | Combine knowledge of multiplication (concept and process) with memorised essential facts to achieve passage to abstraction (calculation without the support of concrete material) for multiplications with:<br>- 2-digit and 3-digit multipliers<br>- products to 6-digits<br><br>Expand 4-digit numbers to constituent hierarchies<br><br>Calculate mentally simple multiplications, including exchanging | Activities include:<br>- introduction to *large bead frame* with *wooden hierarchical material*<br>- counting through the hierarchies (units, tens, hundreds, thousands, ten thousands, hundred thousands, millions) as represented on the *large bead frame*<br>- forming and reading numbers to 6-digits on the *large bead frame*<br>- notating numbers to 6-digits on *large bead frame* notation paper<br>- forming and solving multiplications (2-digit and 3-digit multipliers; 6-digit products) on the *large bead frame* and recording the calculations on *large bead frame* notation paper using expanded hierarchies and partial products<br>- forming and solving multiplications (2-digit and 3-digit multipliers; 6-digit products) on the *flat (golden) bead frame* and recording the calculations, first without and later with partial products<br>- completing the passage to abstraction (calculating short and long multiplications without the support of concrete material; notating short and long multiplication calculations without guide paper).<br><br>Resources include:<br>- *large bead frame* and *large bead frame* notation paper<br>- *flat (golden) bead frame*<br>- command cards; word problems. |
| | Combine knowledge of multiplication (concept and process) with memorised essential facts to achieve passage to abstraction (calculation without the support of concrete material) for multiplications with:<br>- multipliers to 4-digits<br>- multiplicands to 9-digits | Activities include:<br>- introduction to multiplication *checkerboard*: colours and values<br>- using colour-coded squares to build the checkerboard<br>- exploring hierarchies by multiplying and dividing ×10<br>- forming quantities with colour-coded bead bards on the checkerboard, and reading and writing the numbers<br>- representing small multiplications with bead bars<br>- forming and solving multiplications (9-digit multiplicands; multi-digit multipliers) on the *checkerboard* and recording the calculations, first without and later with partial products<br>- using the *checkerboard* to make charts<br>- introduction to the *bank game*: material, roles and rules<br>- using the *bank game* to perform short and long multiplications and develop skills in mental multiplication<br>- completing the passage to abstraction |

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| | | (calculating short and long multiplications without the support of concrete material; notating short and long multiplication calculations without guide paper).<br><br>Resources include:<br>- multiplication *checkerboard*, colour-coded number tiles and quantities represented in colour-coded bead bars<br>- *bank game* card material. |
| **Passage to abstraction: division** | Combine knowledge of division (concept and process) with memorised essential facts to achieve passage to abstraction (calculation without the support of concrete material)<br>- dividends to 4-digits; 1-digit divisor<br>- dividends to 6-digits; multi-digit divisors<br>- zeroes in dividend and divisor<br><br>Perform division calculations using both distributive and group division<br><br>Calculate mentally simple divisions, with exchanging | Activities include:<br>- introduction to *racks and tubes* (test tube material); observing the colour-coding, verifying 10 beads/tube<br>- forming and solving short divisions (1-digit multiplier) using *racks and tubes*, and recording calculation, including divisions with zero in the quotient and the divisor<br>- progressing step-by-step from horizontal notation with single and multi-digit divisors, including recording remainders, to vertical notation with multi-digit divisors recording intermediate remainders ('the next amount to be shared') and 'what has been used'<br>- exploring processes for both distributive and group division<br>- forming and solving long divisions (multi-digit divisors) using *racks and tubes*, and recording calculation (both distributive and group division)<br>- completing the passage to abstraction (calculating and notating short and long divisions without the support of concrete material).<br><br>Resources include:<br>- *racks and tubes*<br>- *stamp game*<br>- command cards; word problems. |

| Fractions | | |
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| **Introduction to fractions** | Understand the concepts 'whole' and 'fraction'<br><br>Name and notate fractions<br><br>Use vocabulary for talking about the parts of a fraction (*numerator, denominator, fraction line*)<br><br>Manipulate and name fractions from halves to tenths | Activities include:<br>- stories, demonstrations, games and activities with concrete materials to build knowledge about the possibilities for dividing a unit into smaller quantities, concluding with emphasis on fractions (dividing the unit into equal parts)<br>- forming fractions with concrete material<br>- learning the names of the parts of a fraction, and their etymology<br>- saying the names of fractions and labelling the parts of fractions<br>- name, label and notate all possible fractions formed with concrete material from halves to tenths (words and manipulable symbols)<br>- making fraction charts and booklets<br>- activities to build familiarity with a range of graphic representations of fractions e.g. shaded squares in a grid or shaded sectors of a pie graph<br>- activities linking knowledge about fractions with the solution of real life problems.<br><br>Resources include:<br>- metal fraction insets (to tenths)<br>- box of manipulable cut-out fractions<br>- manipulable labels (words and symbols)<br>- geometry charts<br>- command cards. |
| **Equivalent fractions** | Identify equivalent fractions<br><br>Reduce fractions to lowest terms<br><br>Explore variation in notation for equivalent fractions | Activities include:<br>- using concrete material to find equivalent fractions within the range halves to tenths<br>- notating equivalent fractions<br>- reducing fractions to lowest terms using concrete quantities and manipulable symbols<br>- creating charts and booklets<br>- creating own problems (progressing from concrete representation accompanied by notation to increasingly abstract representation).<br><br>Resources include:<br>- fraction insets and labels<br>- fraction research sheets<br>- geometry charts<br>- command cards; word problems. |

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| **Operations with fractions: same denominators** | Add and subtract fractions with the same denominators<br><br>Multiply and divide fractions by a whole number | Activities include:<br>- using concrete materials to add and subtract fractions with like denominators, accompanied by notation<br>- using concrete materials to multiply and divide fractions with whole numbers, accompanied by notation<br>- completing problems on command cards and/or creating own problems (progressing from concrete representation accompanied by notation to increasingly abstract representation<br>- activities to build familiarity with a range of graphic representations of operations with fractions e.g. shaded squares in a grid or shaded sectors of a pie graph<br>- activities linking knowledge about operations with fractions and the solution of real life problems.<br><br>Resources include:<br>- fraction insets and labels<br>- geometry charts<br>- command cards; word problems. |
| **Money** | | |
| **History of money** | Research the use of money over time and in different places | Activities include<br>- research projects e.g. history of money; bartering, currency other than coins and notes e.g. shells, gold, money symbols and abbreviations ($ c); animals and people on Australian coins and notes; money used in the past or in different countries<br>- *going out* activities e.g. visiting mint, museums<br>- making charts, timelines, models and artwork, rubbing coins.<br><br>Resources include:<br>- coin and note collections<br>- *fundamental needs of humans* timeline<br>- research and reference materials (paper-based, digital, web-based, multimedia). |
| **Money** | Understand concept and use of money<br><br>Learn units of money (dollars and cents)<br><br>Learn values of coins and notes<br><br>Apply knowledge of the decimal system to use of money<br><br>Performs operations with coins:<br>- add<br>- subtract (make change)<br>- multiply same amounts<br>- divide (share amounts equally) | Activities include:<br>- stories and games to introduce and explore money and its use<br>- individual and group games and exercises with play money and real money in classroom to explore values, notation, exchanging across hierarchies and operations<br>- making charts and booklets<br>- practising mental calculation of money problems<br>- *going out* e.g. to shops to buy items for projects<br>- buying and selling e.g. craft items, food at school fair or fete. |

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| | Performs operations with notes and coins:<br>- add<br>- subtract (make change)<br>- multiply same amounts<br>- divide (share amounts equally) | Resources include:<br>- real and play money<br>- command cards; word problems<br>- commercial resources. |
| Data | | |
| **Collecting, representing and interpreting data** | Count and display objects and images according to previously-established criteria<br><br>Interpret display to make generalisations | Activities include:<br>- sorting items (e.g. by colour or shape), counting numbers in each category and building a display so data can be used to answer questions and to make generalisations (e.g. *What is the most common colour of the cars travelling down our street? What is the least common colour? What is the most common eye-colour in our class?*)<br>- using tally sheets and simple tables to represent data pictorially or symbolically (e.g. number of times particular numbers are thrown on a die)<br><br>Resources include:<br>- objects and events in the environment<br>- dice and tally sheets<br>- command cards; word problems. |
| | Collect data using:<br>- surveys<br>- tally systems<br><br>Collate data and represent visually using displays, such as:<br>- picture graphs<br>- tally graphs<br>- column/bar graphs<br>- pie charts<br><br>Read and interpret data represented in simple displays<br><br>Explore the difference between random and non-random outcomes | Activities include:<br>- designing questions that can be used as the basis for a survey or data collection activity<br>- designing simple tables and matrices to record collected data so they can be used to answer questions and to make generalisations<br>- using images, icons or symbols to represent data categories visually<br>- creating a scale based on size to represent data accurately<br>- displaying data in simple graphs, using simple drawing equipment and/or simple software<br>- interpreting data represented in simple graphs prepared by self and others<br>- applying knowledge of data representation and interpretation to a range of everyday contexts and across the curriculum (e.g. recording weather patterns)<br>- interpret graphs, and other ways of displaying data, and research their use in a range of paper-based and electronic resources<br>- collecting data during *going out* field trips or as part research/project work<br>- collect data to explore random and non-random outcomes e.g. throwing dice, tossing coins |

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| | | Resources include:<br>- objects and events in the environment<br>- dice and tally sheets<br>- graph paper and drawing equipment (paper-based and electronic)<br>- paper-based, digital, web-based, and/or multimedia resources.<br>- command cards; word problems. |

## Mathematics Curriculum for Children Aged Nine to Twelve Years

| Content Strand | Knowledge, Skills and Understandings | Activities and Resources |
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| | *Typically children will:* | |
| History of Mathematics | Explore and research history of mathematical invention and discovery<br><br>Study ancient and modern mathematicians | Activities include:<br>- lessons and demonstrations<br>- making timelines, charts, booklets and models<br>- research projects including preparing biographies of mathematicians and accounts of mathematical systems from other times and places.<br><br>Resources include:<br>- *story of numbers* charts<br>- *Timeline of Mathematicians*<br>- research materials (paper-based, digital, web-based, multimedia). |
| Numeration systems other than the decimal system | Study ancient and contemporary numeration systems other than the decimal system | Activities include:<br>- lessons and demonstrations with concrete material<br>- experimenting with other number systems to count and perform simple calculations e.g. Roman numerals noting the consequences of having no zero; base two/binary, base 5; base 60<br>- making timelines, charts, models and booklets<br>- research projects e.g. use of base 2 in pre-contact Indigenous Australian communities and in computer-based technology; history and use of base 60 to measure angles and calculate time.<br><br>Resources include:<br>- teacher and student-made concrete material for working with other number systems<br>- research materials (paper-based, digital, web-based, multimedia). |
| Memorisation, multiples and divisibility | | |
| Memorisation: review and extension | Review and consolidate knowledge of number facts (addition, subtraction, multiplication, division)<br><br>Develop automaticity, speed and accuracy of number fact recall and application to mastery level | Activities include:<br>- activities to consolidate memorisation of number facts covered in curriculum for children aged from 6-9 years<br>- activities to increase automaticity, speed and accuracy of number fact recall and application, including quizzes and speed tests.<br><br>Resources include:<br>- concrete materials as needed<br>- practice activities and games<br>- paper-based, digital, web-based and/or multimedia resources. |

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| **Multiples of numbers** | Complete, review and consolidate knowledge of multiples | Activities include:<br>- activities to complete, review and consolidate knowledge of multiples covered in curriculum for children aged from 6-9 years.<br><br>Resources include:<br>- concrete materials, charts and tables as needed<br>- paper-based, digital, web-based and/or multimedia resources. |
| **LCM and GCF (HCF)** | Find lowest common multiple (LCM)<br><br>Find greatest (highest) common factor (GCF/HCF) | Activities include:<br>- demonstrations and lessons with pegboard<br>- finding divisors using the pegboard<br>- finding LCM and GCF/HCF using pegboard<br>- finding LCM and GCF/HCF using prime factors<br>- calculating LCM and GCF/HCF abstractly<br>- solving word problems<br>- using knowledge of LCM in operations with fractions.<br><br>Resources include:<br>- pegboard, colour-coded pegs and labels<br>- card material<br>- paper-based, digital, web-based and/or multimedia resources. |
| **Divisibility** | Explore, formulate and recognise rules for establishing divisibility of numbers | Activities include:<br>- exploring divisibility using *golden bead* material<br>- making divisibility charts<br>- applying knowledge of prime factors to study of divisibility<br>- identifying divisibility rules for number groups.<br><br>Resources include:<br>- *golden bead* material<br>- pegboard, colour-coded pegs and labels<br>- divisibility tables and charts<br>- paper-based, digital, web-based and/or multimedia resources. |
| Operations (whole numbers) | | |
| **All operations** | Review and consolidate knowledge of operations with whole numbers<br><br>Master operations with whole numbers<br><br>Perform complex operations with whole numbers | Activities include:<br>- activities to review and consolidate mastery of the four operations with whole numbers covered in curriculum for children aged from 6-9 years<br>- activities to increase automaticity, speed and accuracy of calculations<br>- using technology to verify answers e.g. |

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| | | calculators<br>- applying knowledge of decimal system, memorisation and operations in a range of practical contexts e.g. money, measurement.<br><br>Resources include:<br>- concrete materials as needed<br>- command cards; word problems<br>- paper-based, digital, web-based and/or multimedia resources. |
| **Multiplication** | Develop skill in mental multiplication | Activities include:<br>- group activities with the *bank game*<br>- mental multiplication with continuous exchanging<br>- verifying answers.<br><br>Resources include:<br>- *bank game* card material<br>- paper-based, digital, web-based and/or multimedia resources. |
| | Develop skill in cross multiplication<br><br>Extend skill in mental calculation | Activities include:<br>- demonstrations and lessons<br>- forming and solving long multiplications using cross multiplication<br>- making charts and tables<br>- writing products directly onto paper without concrete material<br>- using technology to verify answers.<br><br>Resources include:<br>- multiplication *checkerboard* and extensions<br>- calculators<br>- paper-based, digital, web-based and/or multimedia resources. |
| **Division** | Complete and master concept and process of distributive division with multi-digit divisors<br><br>Complete and master concept and process of group division with multi-digit divisors<br><br>Develop skill in division with zero in dividend and divisor | Activities include:<br>- demonstrations and lessons<br>- forming long divisions and solving using distributive division, first with, and later without, concrete material (*racks and tubes*), recording calculations including intermediate remainders<br>- forming long divisions and solving using group division, first with, and later without, concrete material (*stamp game*), recoding calculations<br>- verifying answers using concrete material and technology.<br><br>Resources include:<br>- *racks and tubes* material<br>- *stamp game*<br>- calculators<br>- command cards<br>- paper-based, digital, web-based and/or multimedia resources. |

| Fractions and decimals | | |
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| **Fractions: review** | Review and consolidate knowledge of fractions<br><br>Build mastery in the use of fractions<br><br>Review and consolidate knowledge of equivalence<br><br>Review and consolidate ability to reduce fractions to lowest terms | Activities include:<br>- activities to consolidate knowledge of fractions and fraction notation covered in curriculum for children aged from 6-9 years<br>- activities to consolidate knowledge of equivalence covered in curriculum for children aged from 6-9 years<br>- activities to consolidate ability to reduce fractions to lowest terms, first with concrete material and later abstractly<br>- exploring variety of ways for representing fractions e.g. shaded squares in a grid or shaded sectors of a pie graph<br>- activities linking knowledge about fractions with the solution of real life problems.<br><br>Resources include:<br>- metal fraction insets (to tenths)<br>- box of manipulable cut-out fractions<br>- labels (words and symbols)<br>- geometry charts<br>- command cards; word problems<br>- paper-based, digital, web-based and/or multimedia resources. |
| **Types of fractions** | Review equivalent fractions and variation in notation for equivalent fractions<br><br>Explore the following types of fractions and corresponding notation:<br>- proper and improper fractions<br>- mixed numbers<br>- unlike fractions | Activities include:<br>- using concrete material to review equivalent fractions, reducing fractions to lowest terms and corresponding notation<br>- activities with concrete materials and manipulable labels to explore improper fractions, mixed numbers and unlike fractions<br>- creating charts and booklets<br>- creating own problems (progressing from concrete representation accompanied by notation to increasingly abstract representation).<br><br>Resources include:<br>- fraction insets and labels<br>- fraction research sheets<br>- geometry charts<br>- command cards; word problems<br>- paper-based, digital, web-based and/or multimedia resources. |
| **Operations with fractions: unlike denominators** | Find the lowest common multiple of unlike denominators<br><br>Add fractions with unlike denominators<br><br>Subtract fractions with unlike denominators<br><br>Multiply a whole number by fraction | Activities include:<br>- initial lessons and demonstrations with concrete material<br>- forming and solving problems, first with concrete material and later abstractly<br>- finding common denominators using: transparency and grid paper (drawing), raising or reducing, LCM/LCD as needed. |

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| | Multiply a fraction by a fraction<br><br>Divide a whole number by a fraction<br><br>Divide a fraction by a fraction<br><br>Divide fractions using group division<br><br>Perform complex operations with fractions | Resources include:<br>- fraction insets and skittles<br>- handmade transparency<br>- charts<br>- command cards; word problems<br>- notation paper<br>- paper-based, digital, web-based and/or multimedia resources. |
| **Decimals: introduction** | Build knowledge of decimals to millionths (0.000001)<br><br>Use notation for decimals to millionths (0.000001) | Activities include:<br>- activities with concrete materials that reveal relationship between fractions and decimals<br>- identifying and reading aloud decimal numerals to millionths<br>- forming decimals to millionths in quantities and symbols<br>- matching quantities and symbols<br>- counting activities forwards and back<br>- reading and notation activities: comparing decimal quantities and notation; placing the decimal point; comparing whole numbers and decimal numbers; forming complex numbers<br>- making charts; pinwheel, candelabra<br>- representing decimal fractions graphically in a variety of ways.<br><br>Resources include:<br>- fraction insets<br>- *yellow board of decimal hierarchies*, colour-coded beads, charts and colour-coded cards<br>- command cards<br>- lined paper<br>- paper-based, digital, web-based and/or multimedia resources. |
| **Decimals: operations** | Perform four operations with decimals<br><br>Perform complex operations with decimals | Activities include:<br>- demonstrations and lessons in adding and subtracting decimals, with exchanging, using concrete materials and corresponding notation<br>- activities multiplying decimal numbers by 10, 100 and 1000 using concrete material<br>- demonstrations and lessons in multiplying decimal numbers by whole numbers, whole numbers by decimal numbers and decimal numbers by decimal numbers, using concrete material<br>- demonstrations and lessons in dividing decimal numbers by whole numbers, whole numbers by decimal numbers and decimal numbers by decimal numbers, using concrete material<br>- forming and solving own problems with decimal numbers |

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| | | - recording and verifying answers<br>- formulating rules and notation for abstract calculation i.e. without concrete material<br>- verifying answers using concrete material and technology.<br><br>Resources include:<br>- fraction insets<br>- *yellow board of decimal hierarchies*, charts and card material<br>- *decimal checkerboard* with bead bars and tiles<br>- concrete material for division with decimal numbers<br>- command cards; word problems<br>- calculators<br>- paper-based, digital, web-based and/or multimedia resources. |
| **Percentage** | Transfers knowledge of fractions and decimals to explore the concept of percentage<br><br>Applies knowledge of percentages to solve practical problems | Activities include:<br>- demonstrations and exercises with concrete materials to explore the relation between fractions, decimals and percentages<br>- converting fractions such as thirds and sixths to decimals and percentages<br>- calculating 1% and10%<br>- exploring fractions of percentages<br>- formulating rules and notation for calculating percentage problems<br>- solving percentage problems e.g. research projects, discounting, profit and loss, simple interest, compound interest<br>- applying knowledge of percentage to practical problems.<br><br>Resources include:<br>- fraction insets<br>- *yellow board of decimal hierarchies*, charts and card material<br>- hundredth circle<br>- commercial resources<br>- command cards; word problems<br>- paper-based, digital, web-based and/or multimedia resources. |
| Powers of numbers | | |
| **Powers of numbers: introduction** | Understand the concept of powers of numbers<br><br>Express any number as a power of 10<br><br>Sequence powers geometrically | Activities include:<br>- reviewing knowledge of multiples applied making squares and cubes<br>- story: the *kingdom of powers* to introduce 0 power, 1st power, 2nd power, 3rd power<br>- activities to identify a unit and increase its power and to label each power<br>- demonstrations and lessons on the Kingdoms of 10 and of 1<br>- drawing and labelling activities<br>- verifying answers using concrete material and technology. |

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| | | Resources include:<br>- *wooden hierarchical material*<br>- cabinet of colour-coded bead chains, bead squares and bead cubes<br>- *power of 2* material<br>- calculators<br>- paper-based, digital, web-based and/or multimedia resources. |

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| **Powers of numbers: notation and operations** | Use exponential notation<br><br>Use powers in operations | Activities include:<br>- demonstrations to build knowledge of vocabulary for talking about the notation of powers of numbers: *base, index*<br>- using power notation to label bead squares and bead cubes<br>- labelling and sequencing powers represented geometrically<br>- comparing size and shape of powers in a geometric sequence<br>- using power notation to write very large and very small numbers<br>- adding and subtracting; multiplying and dividing powers of numbers (same base/different base)<br>- building the algebraic formula for expanding powers, and operations with powers<br>- forming and solving own problems with powers<br>- verifying answers using concrete material and technology.<br><br>Resources include:<br>- cabinet of colour-coded bead chains, bead squares and bead cubes<br>- wooden cubing material<br>- calculators<br>- command cards<br>- paper-based, digital, web-based and/or multimedia resources. |

| Squaring and cubing | | |
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| **Squaring** | Review and consolidate knowledge of squaring developed in the curriculum for children aged from six to nine years<br><br>Extend knowledge and application of squaring<br><br>Perform operations with squares (addition, subtraction, multiplication, division, combined operations) | Activities include:<br>- constructing squares of numbers 1-10 using concrete material<br>- calculating the passage from one square to another square using concrete materials i.e. calculating the difference between the squares and recording calculation<br>- notating squares of single numbers<br>- completing and reviewing the *decanomial* (bead array and numerical card layout)<br>- building the algebraic formula for squaring<br>- building the algebraic *decanomial* (card layout and notation)<br>- solving problems with squares of numbers (four operations), first with concrete material, and later without<br>- applying knowledge of squaring to decimal numbers using concrete material<br>- verifying squares of numbers using concrete material and technology.<br><br>Resources include:<br>- *golden bead* materials<br>- box of bead bars<br>- numerical and algebraic *decanomial* card material<br>- pegboard, colour-coded pegs and labels<br>- colour-coded decimal beads<br>- colour-coded guide squares<br>- command cards<br>- calculators<br>- paper-based, digital and web-based resources. |
| **Products of binomial and trinomial squares** | Review squaring of binomials $(a+b)^2$ and trinomials $(a+b+c)^2$ covered in the curriculum for children aged from six to nine years<br><br>Use binomial and trinomial representation and notation to expand squares of 2- and 3-digit numbers<br><br>Find products of binomial and trinomial squares:<br>- units only<br>- tens and units<br><br>Consolidate and extend notation of the squares of 2- and 3-digit numbers represented as binomials and trinomials | Activities include:<br>- analysing 100-bead square into a binomial or trinomial<br>- building binomial and trinomial squares with coloured-coded bead bars and *golden bead* material<br>- using colour-coded pegs on a pegboard to represent products and squares of 2- and 3-digit numbers<br>- representing products and squares of 2- and 3-digit numbers symbolically using binomial and trinomial notation<br>- calculating products and squares of binomials and trinomials using concrete and symbolic representation<br>- forming squares of decimal numbers using colour-coded pegs on a pegboard<br>- using guide squares to calculate squares of 2- and 3-digit numbers represented as binomials and trinomials<br>- building the algebraic formula for calculating the square of a binomial and trinomial |

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| | | - cross-multiplication activities.<br>Resources include:<br>- *golden bead* materials<br>- box of bead bars<br>- pegboard, colour-coded pegs and labels<br>- colour-coded guide squares<br>- command cards<br>- paper-based, digital, web-based and/or multimedia resources. |
| **Square roots** | Understand and work with the concept of square root of a number<br><br>Determine the square root of a 2- and 3-digit number represented as a binomial or trinomial<br><br>Find square roots abstractly | Activities include:<br>- naming simple squares and identifying their roots using concrete material<br>- drawing and labelling squares and labelling their roots<br>- finding square roots of 2- and 3-digit numbers represented as binomial and trinomial squares using colour-coded pegs, and recording answers<br>- estimating square roots using concrete materials and records of square root calculations<br>- building the algebraic formula for calculating square root<br>- guided abstract calculation of square roots and recording<br>- verifying answers using concrete material and technology.<br><br>Resources include:<br>- *golden bead* materials<br>- bead squares<br>- pegboard and colour-coded pegs<br>- guide squares and handmade charts<br>- graph paper<br>- command cards<br>- calculators<br>- paper-based, digital, web-based and/or multimedia resources. |
| **Cubing** | Build knowledge of the concept of the cube of a number<br><br>Cube successive numbers using concrete material<br><br>Perform cubing calculations | Activities include:<br>- demonstrations and lessons<br>- using colour-coded concrete material to recognise and name simple cubes, and identify their roots<br>- using concrete material to construct cubes<br>- cubing binomials and trinomials using concrete materials and labelling the parts<br>- building the algebraic formula for cubing<br>- constructing cubes with decimal numbers using concrete material.<br><br>Resources include:<br>- bead cubes<br>- *wooden cubing material*<br>- command cards<br>- calculators<br>- paper-based, digital, web-based and/or |

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| | | multimedia resources. |
| **Cube Root** | Understand and work with the concept of cube root of a number<br><br>Determine the cube root of 2- and 3-digit numbers represented as a binomial or trinomial<br><br>Find cube roots abstractly | Activities include:<br>- finding cube roots of 2- and 3-digit numbers represented as binomial and trinomial cubes using wooden cubing material, and recording calculations and answers<br>- building the algebraic formula for calculating cube root<br>- guided abstract calculation of cube roots and recording<br>- verifying answers using concrete material, 'backtracking' and technology.<br><br>Resources include:<br>- bead cubes<br>- *wooden cubing material*<br>- *binomial cube*<br>- *trinomial cube*<br>- *hierarchical trinomial cube*<br>- box of unit cubes<br>- handmade charts<br>- command cards<br>- calculators<br>- paper-based, digital, web-based and/or multimedia resources. |
| Algebra | | |
| **Simple linear equations** | Solve linear equations in addition, subtraction, multiplication and division in all areas of the mathematics curriculum | Activities include:<br>- using concrete material to find unknown terms in simple linear equations, notating calculations using algebraic conventions and recording answers<br>- forming equations and solving for unknown terms using algebraic notation, and recording answers.<br><br>Resources include:<br>- colour-coded concrete materials<br>- manipulable signs and symbols<br>- command cards<br>- calculators<br>- paper-based, digital, web-based and/or multimedia resources. |
| **Equations with squares of binomials and trinomials** | Identify and manipulate the terms of expanded binomial $(a+b)^2$ and trinomial $(a+b+c)^2$ expressions<br><br>Write and solve equations that include squares of numbers and sums of binomials and trinomials squared | Activities include:<br>- reviewing representation of binomial and trinomial squares using concrete materials and notation<br>- manipulating and constructing concrete representations of binomial and trinomial squares and labelling the terms<br>- drawing squares of 2- and 3-digit numbers represented as binomials and trinomials using colour-coded hierarchies<br>- calculating the squares of binomial and trinomial expressions<br>- using concrete material and manipulable |

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| | | labels to build and balance equations, and isolate unknowns<br>- substituting numerical terms with algebraic terms in equations<br>- forming equations and solving for unknown terms using algebraic notation, and recording answers<br>- verifying answers using concrete material and technology.<br><br>Resources include:<br>- *golden bead* material<br>- box of bead bars<br>- bead squares<br>- pegboard and pegs<br>- grid paper and coloured pencils<br>- *binomial and trinomial cubes*<br>- *wooden cubing material*<br>- command cards<br>- calculators<br>- paper-based, digital, web-based and/or multimedia resources. |
| **Relative numbers** | | |
| **Positive and negative numbers** | Understand the concept of integers<br><br>Explore positive and negative numbers<br><br>Use positive and negative numbers in operations | Activities include:<br>- demonstrations and lessons<br>- using concrete material form and compare positive and negative numbers<br>- forming and solving problems with positive and negative numbers.<br><br>Resources include:<br>- negative *snake game*<br>- number lines<br>- box of bead bars<br>- division skittles<br>- command cards; word problems<br>- paper-based, digital, web-based and/or multimedia resources. |

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| **Rational and irrational numbers** | Explore the concept of rational and irrational numbers<br><br>Recognise and use notation for rational and irrational numbers<br><br>Performing calculations with rational and irrational numbers | Activities include:<br>- activities with concrete materials, recording answers<br>- using concrete materials to form rational and irrational numbers<br>- making charts and booklets<br>- activities to explore rational and irrational numbers using technology<br>- calculation activities with rational and irrational numbers.<br><br>Resources include:<br>- number line<br>- box of bead bars<br>- fraction insets<br>- colour-coded decimal number cards<br>- command cards<br>- paper-based, digital, web-based and/or multimedia resources. |
| | Find square roots of rational and irrational numbers | Activities include:<br>- naming simple squares and their roots<br>- drawing and labelling squares and their roots<br>- finding square roots with concrete materials, recording answers<br>- calculating square roots abstractly<br>- using technology to calculate square roots.<br><br>Resources include:<br>- pegboard, colour-coded pegs<br>- guide squares<br>- handmade charts<br>- command cards<br>- paper-based, digital, web-based and/or multimedia resources. |
| **Repeating and non-repeating decimal numbers** | Explore repeating and non-repeating decimal numbers | Activities include:<br>- demonstrations and lessons<br>- recognizing and identifying a repeating decimal<br>- forming and solving own problems<br>- making charts and booklets<br>- using technology to explore repeating and non-repeating numbers.<br><br>Resources include:<br>- materials for the study of decimal fractions<br>- command cards<br>- paper-based, digital, web-based and/or multimedia resources. |

| Data and statistics | | |
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| **Collecting, representing and interpreting data and statistics** | Review and extend knowledge of data collection, representation and interpretation covered in the curriculum for children from six to nine years<br><br>Use vocabulary for talking about data and data representation to interpret and compare a range of data displays, including: *set, average, mean-median-mode; quantity-category, continuous-discrete; cluster-outlier; sample-census, spreadsheet, database, distribution, frequency, range, statistics, variables, variability, probability*<br><br>Design a key to represent the scale used to represent categories and amounts of data<br><br>Construct line graphs to represent continuous change and use vocabulary for talking about the parts of line graphs (*axes, horizontal axis, vertical axis, scale, point, plot*)<br><br>Build a repertoire of data collection, representation and interpretation techniques and tools, including graphs (bar/column, line, picture, circle/pie, coordinate plane), plots (line, scatter, stem-and-leaf) and frequency distribution (scale, table, matrix), electronic database and spreadsheet, as well as techniques for selecting from this repertoire to compare categorical variables, for example, the use of side-by-side column graphs.<br><br>Develop skills in interpreting and comparing visual displays of data, including the ability to make judgements about reliability and usefulness in the context of specific projects and research tasks<br><br>Using knowledge of fractions and percentages to calculate probability where there are multiple possible outcomes<br><br>Describe probability using language such as *more (or most) likely, less (or least) likely, or equally likely*<br><br>Apply knowledge about data and statistics to a range of analytical, interpretive and problem-solving tasks | Activities include:<br>- lessons on strategies for creating and interpreting visual displays of data (VDD), including bar graphs, line graphs, pie charts and scatter plots<br>- practice activities with collecting data (e.g. survey within school community, use of a variety of media, collecting data on *going out* field trips), creating a variety of VDD's from the data and discussing the strengths and weaknesses of the various VDD's to present chosen dimensions of the data<br>- designing own research questions (for topics across the curriculum) that involve data collection and interpretation (whole class, small group and individual projects)<br>- selecting the most effective data collection, representation, display and interpretation techniques to answer a research question or to solve a project-related problem<br>- using computer databases and spreadsheet programs<br>- interpreting and evaluating data represented in a variety of ways e.g. in the media, text books, reference materials<br>- guest speakers, including community members and/or specialists to talk about the use of data and statistics in their work or research, and to share techniques and insights relating to students' projects<br>- applying interpretation and evaluation of different representations of data across the curriculum e.g. as evidence in persuasive texts - discussions, essays, debates, spoken presentations; to predict probability<br>- applying knowledge of data collection, display and statistics to, for example, the planning of *going out* activities, community projects and/or fund-raising<br>- apply probability trials to prepared experiments (e.g. physics, chemistry and botany experiments)<br><br>Resources include:<br>- text books<br>- materials for data collection and drawing (paper-based and electronic)<br>- command cards; word problems<br>- paper-based, digital, web-based and/or multimedia resources. |

# Geometry and Measurement

## Overview

The word *geometry* is derived from the Greek words for earth and measurement. The word *geometry* literally means 'measuring the earth'. The Montessori approach to teaching geometry involves the use of concrete materials, which engage with the children's sense of wonder and which encourage children to measure for themselves the world they live in.

In the Montessori curriculum the first knowledge about shapes and space is gained through activity with concrete materials in the *Children's House*. This sensory work is extended in the geometry lessons in the environment prepared for children from six to nine years old. All new concepts continue to be introduced through activities in which children manipulate concrete materials, but from the age of six children independently complete a sequence of activities that build deeper understanding and move them towards abstraction. Manipulative work with concrete materials always precedes the presentation of an abstract concept or formula. Ideally, children, during their own independent work, begin to verbalise the concepts and formulae in conversation, although if, unusually, children do not make this step for themselves, an adult will model how to talk about the concept using the language of geometry.

Learning the names of geometric shapes and their parts is an important aspect of the study of geometry. As in the *Children's House* children take part in spoken language lessons in which they learn the names of geometric shapes and their parts, but for children beyond the age of six, naming lessons also include:

- learning the origin, or etymology, of the name
- learning definitions and systems of classification
- reading and writing the names.

In addition to the names, children of this age want to know the reasons for things so they are given opportunities to explore questions such as:

- *Why do we say this is an acute angle?*
- *How many right angles would make a whole angle?*

Following most presentations, children take part in follow-up activities with card materials and booklets.

The lessons in geometry are keys to enable children to follow their own interests in this area of study. They are encouraged to explore the concrete materials to find new relationships, variations and extensions. As in all areas of the Montessori curriculum for children of this age, the initial lessons and the children's use of the concrete materials provides them with the knowledge they need as a starting point for their own exploration and discovery.

The study of geometry for children from the age of six begins with an exploration of the foundation concepts: *point – line – surface – solid*. These concepts are then explored in more detail in a sequence of follow-up lessons. From the same starting point, the actual sequence may vary from child to child. For example, work on lines and angles might be presented parallel to one another, and some early polygon work can be presented parallel to later work with angles. Whatever sequence is followed, work in each area progresses logically, with each new lesson building on the one before. For example, children complete work that builds an understanding of equivalence, before they work with area, and the work with area precedes the work on volume. In the case of the study of circles, the work follows a progression such as the following:

- identification of linear, then surface parts
- relationships between a line and a circle
- relationships between two circles
- relationships between circles and polygons
- circumference, radius and their relationship
- area of a circle

As in all areas of the Montessori *Cosmic Education* curriculum, the study of geometry is designed to encourage activity, repetition, exploration, discovery, logical thinking and reasoning. The initial lessons are clear and succinct, providing children with enough knowledge to allow them to ask pertinent questions, and enough

guidance to initiate independent activity with the materials. It is through this activity that children make the knowledge their own and learn to research and think for themselves.

The study of measurement in the Montessori *Cosmic Education* curriculum, begins with an account of the historical development of measuring, comparing and estimating. The children explore the reasons humans in earlier times might have wanted to, or needed to, measure, compare and estimate. They also experiment with the use of non-standard units and units used in earlier times, in particular, units based on parts of the body, including, for example, the hand, the palm and the cubit. They use these units to measure objects in the environment. During these activities children recognise the need for standardised units, as exemplified, for example, in the story of the royal cubit from Ancient Egypt. They are then introduced to the standard measurement systems in use today, beginning with the International Metric System. As students learn different elements of this system, they apply their knowledge, first, to measuring activities in the everyday environment, selecting the most appropriate standard unit and recording the measurement of, for example, the length of the school hall, the temperature of the classroom, the volume of water in a watering can or the mass of a can of pet food. Finally, students apply their knowledge during activities and research projects across all areas of the curriculum and in the solving of real-life problems, including, for example, calculating how much water the garden needs each day, or how many days the bird food will last before more needs to be purchased.

## Geometry and Measurement Curriculum for Children Aged Six to Nine Years

| Content Strand | Knowledge, Skills and Understandings | Activities and Resources |
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| | *Typically children will:* | |
| History of geometry | Listen to and read stories about the history of geometry and geometry in early civilisations<br><br>Research use of geometry in different cultures and across history | Activities include:<br>- *the story of geometry*<br>- independent research<br>- creating charts, models and timelines<br>- researching the use of geometry in earlier times e.g. Ancient Egypt, Mesopotamia<br>- researching the use of geometry across cultures e.g. Indigenous Australia.<br><br>Resources include:<br>- charts, card material and artefacts<br>- reference and research materials (paper-based, digital, web-based, multimedia). |
| History of measurement | Explore the history and purpose of measurement<br><br>Explore and experiment with non-standard and standard units of measurement | Activities include:<br>- stories and discussions about measurement<br>- brainstorming all the possible phenomena we can measure and ways we can measure<br>- activities to draw attention to the importance of standard units of measurement<br>- activities to become familiar with International Metric System<br>- experimenting with a range of units of measurement e.g. invented units; units used in the past, units used in other countries e.g. imperial units<br>- imagining how humans might measure things in the future<br>- creating timelines, charts and booklets.<br><br>*Resources include:*<br>- *timeline of measurement*<br>- charts, card material and artefacts<br>- reference and research materials (paper-based, digital, web-based, multimedia). |
| Solid Geometry | | |
| Solid Geometry | Introduce, review and/or consolidate knowledge of geometric solids:<br>*cube, square-based prism, triangular-based prism, square-based pyramid, triangular-based pyramid, cone, cylinder, ellipsoid, ovoid, sphere*<br><br>Recognise, name and label geometric solids<br><br>Sort and classify solids | Activities include:<br>- demonstrations and lessons with wooden geometric solids to review names of geometric shapes, and to introduce etymology of names<br>- activities with Montessori geometric solids and manipulable bases<br>- labelling geometric solids (spoken and written)<br>- *game of relationships*<br>- describing and classifying solids e.g. according to base/surfaces |

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| | | - model-making and technical drawing<br>- researching solids in the environment.<br><br>Resources include:<br>- basket of wooden geometry solids and manipulable bases<br>- labels and booklet<br>- construction equipment e.g. modelling clay, construction paper<br>- solids in the environment<br>- command cards<br>- reference and research materials (paper-based, digital, web-based, multimedia). |
| Plane Geometry | | |
| **Plane geometry: introduction** | Review and consolidate knowledge of plane geometric shapes:<br>- *triangle, square, circle*<br>- types of triangles (*scalene, isosceles, equilateral; acute-angled, obtuse-angled, equilateral*)<br>- types of quadrilaterals (*common quadrilateral, rectangle, square, parallelogram, rhombus, kite, trapezium*)<br>- regular polygons (*pentagon, hexagon, heptagon, octagon, nonagon, decagon*)<br>- curved figures (*circle, ellipse, oval*)<br>- compound and curvilinear figures (*curvilinear triangle, 'flowers'*)<br><br>Recognise and name plane geometric shapes<br><br>Draw plane geometric shapes | Activities include:<br>- demonstrations and lessons with *geometry cabinet* to review names of geometric shapes and to introduce etymology of names<br>- sorting shapes and replacing in frames<br>- labelling shapes<br>- tracing, cutting, gluing, drawing and writing activities<br>- making charts and booklets<br>- researching shapes in the environment.<br><br>Resources include:<br>- *geometry cabinet*<br>- shapes in the environment<br>- scissors, coloured paper and glue<br>- technical drawing equipment<br>- command cards<br>- reference and research materials (paper-based, digital, web-based, multimedia). |
| **Plane geometry: constructive triangles** | Use wooden triangles of different types to construct a variety of shapes<br><br>Recognise and name constructed shapes<br><br>Draw constructed shapes | Activities include:<br>- using pairs of triangles to construct a variety of triangles and quadrilaterals<br>- discovering more shapes by sliding, pivoting and flipping triangles<br>- using sets of triangles to construct hexagons, pinwheels and related complex shapes<br>- tracing, cutting, gluing, drawing and labelling activities<br>- research in environment.<br><br>Resources include:<br>- *constructive triangles* (rectangular boxes and triangular boxes)<br>- command cards<br>- scissors, coloured paper and glue<br>- technical drawing equipment<br>- command cards<br>- reference and research materials (paper-based, digital, web-based, multimedia). |

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| **Plane geometry - detailed study: fundamental concepts** | Build knowledge of fundamental geometry concepts: *point, line, surface, solid* | Activities include:<br>- games and activities for exploring concepts with everyday objects and concrete materials<br>- linking geometry (point, line, surface, solid) with concrete mathematics materials (unit bead, ten-bar, hundred-square, thousand-cube)<br>- labelling<br>- creating charts, booklets and models<br>- research in environment.<br><br>Resources include:<br>- everyday objects<br>- *golden bead* material<br>- models, card material and labels<br>- scissors, coloured paper and glue<br>- technical drawing equipment<br>- command cards<br>- reference and research materials (paper-based, digital, web-based, multimedia). |
| **Plane geometry - detailed study: lines** | Identify types of lines:<br>*straight, curved*<br><br>Identify parts of lines:<br>*origin, ray*<br><br>Identify positions of a straight line:<br>*horizontal, vertical, oblique*<br><br>Identify relative positions of two straight lines:<br>*parallel, convergent, divergent, transversal, perpendicular*<br><br>Build definitions related to lines | Activities include:<br>- demonstrations, stories, lessons and games, including lessons to introduce etymology of names<br>- manipulating and labelling models and pictures<br>- introduction to the *box of sticks*<br>- building and reading definitions<br>- drawing activities<br>- creating charts, booklets and models<br>- research lines in environment.<br><br>Resources include:<br>- *box of sticks* (colour-coded and calibrated sticks and arcs used to construct plane geometric figures)<br>- picture, label, definition and booklet material<br>- command cards<br>- drawing equipment<br>- reference and research materials (paper-based, digital, web-based, multimedia). |
| **Plane geometry - detailed study: angles** | Identify parts of angles:<br>*vertex, arm*<br><br>Identify types of angles:<br>*acute, obtuse, whole*<br><br>Build definitions related to angles | Activities include:<br>- demonstrations and activities using concrete materials to construct and label parts of angles and to build different types of angles<br>- learning the etymology of the terms<br>- labelling the parts of angles and types of angles on models and pictures<br>- building and reading definitions<br>- drawing and labelling activities<br>- creating charts and booklets<br>- researching angles in the environment. |

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| | | Resources include:<br>- *box of geometry sticks*<br>- geometry charts<br>- drawing equipment<br>- envelopes with pre-cut paper figures (triangles, quadrilaterals, figures with five or more sides)<br>- picture, label, definition and booklet material<br>- command cards<br>- researching angles in the<br>- protractor, compass and ruler<br>- reference and research materials (paper-based, digital, web-based, multimedia). |
| **Plane geometry - detailed study: measurement of angles** | Understand how to measure the size of an angle i.e. amount of turn<br><br>Use unit of measurement for angles: *degrees*<br><br>Measure angles and record measurements, using protractors<br><br>Explore different types of angles: *whole, convex, reflex*<br><br>Apply knowledge of addition and subtraction to angles<br><br>Explore relations between the angles of polygons | Activities include:<br>- story and demonstrations to introduce the measurement of angles: *story of the star; the Babylonian civilisation*<br>- demonstrations and activities for measuring angles<br>- tracing and measuring the angles of insets e.g. geometry cabinet, small insets<br>- using measurements to identify different types of angles<br>- creating and measuring own angles<br>- demonstrations and activities with concrete materials for operations with angles (addition, subtraction)<br>- bisecting angles using a compass<br>- researching the angles in regular and irregular polygons<br>- measuring angles in the environment<br>- making charts and booklets<br>- applying knowledge to real life tasks e.g. construction projects, model-making, design<br>- research activities e.g. how architects measure angles.<br><br>Resources include:<br>- Montessori protractor<br>- commercial protractors<br>- fraction insets, geometry cabinet insets, small insets<br>- command cards; word problems<br>- reference and research materials (paper-based, digital, web-based, multimedia). |

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| **Plane geometry - detailed study: polygons** | Classify types of plane figures:<br>- *closed curves-polygons, concave-convex*<br><br>Classify types of polygons:<br>- *irregular-regular*<br><br>Classify polygons:<br>- the *seven triangles of reality*, classified according to sides and angles<br>- the *seven quadrilaterals of reality*<br>- polygons with more than four sides<br><br>Identify and label the parts of polygons:<br>- *surface, perimeter, sides, angles, vertices, base, height, diagonal* | Activities include:<br>- demonstrations, stories and lessons to introduce each family of shapes e.g. the *Story of Pythagoras* to introduce the right-angled triangle<br>- constructing, manipulating, comparing and labelling plane figures using concrete material<br>- labelling images<br>- building and reading definitions<br>- drawing and labelling activities<br>- creating charts and booklets<br>- research plane figures in the environment.<br><br>Resources include:<br>- *box of geometry sticks*<br>- geometry charts<br>- drawing equipment<br>- picture, label, definition and booklet material<br>- command cards<br>- protractor, compass and ruler<br>- reference and research materials (paper-based, digital, web-based, multimedia). |
| **Tessellation** | Tessellate figures<br><br>Use knowledge of angles and their measurement to explore the mathematics of tessellation | Activities include:<br>- demonstrations and games with concrete material to explore tessellation: *which tiles? how many ways?,* combining shapes, interstices<br>- command cards<br>- design activities (tracing, cutting, gluing, drawing, constructing, creating mosaics)<br>- activities involving the measurement and addition of angles<br>- researching tessellation in the environment<br>- research projects e.g. tessellation in nature, use of tessellation for building and decoration across time.<br><br>Resources include:<br>- *tiling game* (Box 1 and 2)<br>- *Tangram* activities<br>- command cards<br>- Montessori protractor<br>- reference and research materials (paper-based, digital, web-based, multimedia). |

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| **Symmetry** | Explore and understand the concept of symmetry<br><br>Experiment with the axis of symmetry in a variety of shapes | Activities include:<br>- demonstrations and games with concrete material<br>- exploring etymology of the terms e.g. *symmetry, axis*<br>- paper-folding, construction, drawing, labelling and design activities<br>- research in the environment<br>- applying the concept of symmetry e.g. in visual arts.<br><br>Resources include:<br>- constructive triangles<br>- coloured paper, glue<br>- drawing and visual arts equipment and resources<br>- command cards<br>- reference and research materials (paper-based, digital, web-based, multimedia). |
| **Similarity, congruence and equivalence** | Identify, name and construct congruent, similar and equivalent figures | Activities include:<br>- demonstrations, lessons and games with concrete material<br>- exploring etymology of terms and working with symbols<br>- paper-folding, construction, drawing, labelling and design activities<br>- making charts and booklets<br>- research in the environment<br>- applying concepts e.g. in visual arts, construction<br>- research projects.<br><br>Resources include:<br>- *iron (small) insets*<br>- *constructive triangles* (triangular box, large and small hexagonal boxes)<br>- *insets of equivalence*<br>- command cards<br>- objects in environment<br>- reference and research materials (paper-based, digital, web-based, multimedia). |
| **Measurement** | | |
| **Area of a surface: introduction** | Become familiar with the concept of surface area<br><br>Explore units of measurement for area<br><br>Measure and record area using a grid | Activities include:<br>- informal measurement activities e.g. make a square metre out of paper and use it to measure the area of the classroom<br>- comparing areas of familiar spaces e.g. rooms, playground<br>- using square grids to measure and compare the areas of surfaces e.g. in drawing, construction and mapping activities<br>- applying knowledge to everyday tasks e.g. construction and design projects<br>- simple exercises in counting squares to calculate area. |

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| | | Resources include:<br>- everyday materials<br>- command cards; word problems<br>- reference and research materials (paper-based, digital, web-based, multimedia). |
| **Volume: liquid capacity** | Understand and apply the concept of liquid capacity (volume)<br><br>Learn units of measurement for liquid capacity (litres, millilitres)<br><br>Measure and record liquid capacity<br><br>Choose the most appropriate unit of liquid capacity for amount to be measured<br><br>Research other measurements of liquid capacity | Activities include:<br>- filling and pouring activities to compare the liquid capacity of familiar containers<br>- activities to become familiar with units for measuring liquid capacity including history of the litre, relationship between litre and smaller units (millilitre) and larger units (megalitre), etymology and meaning of the word *metre*, prefixes (*milli-, mega-*), abbreviations<br>- measuring the liquid capacity of a range of containers and recording measurements<br>- displacement activities to measure the volume of air or solids e.g. measuring the liquid displaced when a blown up balloon is put into a bucket of water<br>- creating booklets and tables<br>- applying knowledge to real life tasks e.g. cooking, science experiments<br>- research activities related to liquid capacity e.g. specialised units, units used in the past or in other countries.<br><br>Resources include:<br>- calibrated containers e.g. cups, jugs<br>- card material<br>- containers in environment<br>- command cards; word problems<br>- reference and research materials (paper-based, digital, web-based, multimedia). |
| **Length** | Understand and apply the concept of length<br><br>Learn units of measurement for length (metre, centimetre, millimetre, kilometre)<br><br>Measure and record length of objects<br><br>Measure and record heights (centimetres, metres)<br><br>Research and record distances (kilometres)<br><br>Choose the most appropriate unit of length depending on size of object, distance etc<br><br>Research other measurements of length | Activities include:<br>- activities to become familiar with units for measuring length including history of the metre, relationship between metre and smaller units (centimetre, millimetre) and larger units (kilometre), etymology and meaning of the word *metre* and prefixes (*milli-, centi-, kilo-*), abbreviations<br>- measuring the length of a range of objects, heights and distances and recording measurements<br>- researching and recording heights, distances of familiar journeys<br>- creating booklets and tables<br>- applying knowledge to real life tasks e.g. construction projects, planning journeys, classroom height chart, making clothes or costumes<br>- research activities related to length e.g. specialised units, units used in the past or in other countries, units used in sport. |

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| | | Resources include:<br>- ruler, metre stick and tape measure<br>- card material<br>- objects and people in environment<br>- grid paper<br>- command cards; word problems<br>- reference and research materials (paper-based, digital, web-based, multimedia). |
| **Mass** | Understand and apply the concept of mass<br><br>Learn units of measurement for mass (gram, milligram, kilogram)<br><br>Measure and record mass of objects<br><br>Choose the most appropriate unit of mass depending on object<br><br>Research other measurements of mass | Activities include:<br>- activities to become familiar with the concept of mass e.g. using informal units to measure mass; hefting activities to compare and estimate the mass of objects<br>- activities to become familiar with standard units for measuring mass including history of the gram, relationship between gram and smaller units (milligram) and larger units (kilogram), etymology and meaning of the word *gram* and prefixes (*milli-, kilo-*), abbreviations<br>- measuring the mass of a range of objects, and recording measurements<br>- creating booklets and tables<br>- applying knowledge to real life tasks e.g. cooking, science experiments, health<br>- research activities related to mass e.g. specialised units, units used in the past or in other countries.<br><br>Resources include:<br>- ruler, metre stick and tape measure<br>- card material<br>- objects and people in environment<br>- grid paper<br>- command cards; word problems<br>- reference and research materials (paper-based, digital, web-based, multimedia). |

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| **Temperature** | Understand and apply the concept of temperature<br><br>Learn units of measurement for temperature (degrees)<br><br>Measure and record temperature<br><br>Research other measurements of temperature | Activities include:<br>- using hands/fingertips to estimate and compare temperatures of familiar objects and materials<br>- activities to become familiar with units for measuring temperature (degrees) including history, etymology and abbreviations<br>- using a liquid thermometer to measure the temperature of liquids<br>- measuring the outside and inside temperature at different times of the day, in the sun and in the shade etc<br>- using a thermometer to measure own temperature or record body temperature changes over a day<br>- creating booklets and tables<br>- research activities related to temperature e.g. units used in the past or in other countries, meaning of changes in body temperature, meaning of average temperatures in climate science.<br><br>Resources include:<br>- different types of thermometers<br>- card material<br>- command cards; word problems<br>- reference and research materials (paper-based, digital, web-based, multimedia). |
| **Estimation** | Estimate measurements of a range of phenomena | Activities include:<br>- all introductory measurement activities<br>- activities involving estimation, comparison and graphing<br>- applying estimation skills to real life tasks e.g. in cooking, science experiments, planning *going out* activities and trips.<br><br>Resources include:<br>- all measurement materials<br>- command cards; word problems. |

## Geometry and Measurement Curriculum for Children Aged Nine to Twelve Years

| Content Strand | Knowledge, Skills and Understandings | Activities and Resources |
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| | *Typically children will:* | |
| History of geometry | Explore and research development and application of geometry through history and across cultures<br><br>Study ancient and modern scholars in the field of geometry | Activities include:<br>- research activities e.g. application of geometry past and present; use of geometry in agriculture, engineering, visual art and design etc<br>- creating charts, models and timelines<br>- preparing biographies e.g. Euclid, Leonardo da Vinci<br>- working with and designing geometry-based puzzles.<br><br>Resources include:<br>- charts, card material and artefacts<br>- reference and research materials (paper-based, digital, web-based, multimedia). |
| History of measurement | Explore and research development and application of measurement through history and across cultures | Activities include:<br>- research activities e.g. measurement past and present, International Metric System, measurement in the digital age, measuring very small and very large dimensions<br>- creating timelines, charts and booklets.<br><br>*Resources include:*<br>- *timeline of measurement*<br>- charts, card material and artefacts<br>- reference and research materials (paper-based, digital, web-based, multimedia). |
| Solid Geometry | | |
| Solid Geometry | Review, consolidate and extend knowledge of solid geometry<br><br>Apply knowledge of solid geometry in a range of contexts | Activities include:<br>- exercises to review and consolidate knowledge of basic shapes<br>- exploring the properties of complex geometric solids e.g. polyhedrons<br>- making nets and models<br>- representing 3-D shapes on 2-D surface<br>- technical drawing e.g. perspective<br>- researching solids in the environment.<br><br>Resources include:<br>- construction equipment e.g. modelling clay, construction paper, computer programs<br>- solids in the environment<br>- reference and research materials (paper-based, digital, web-based, multimedia). |

| Plane Geometry | | |
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| **Plane geometry: constructive triangles** | Use wooden triangles of different types to construct a variety of compound and complex shapes<br><br>Recognise and name constructed shapes<br><br>Draw constructed shapes<br><br>Use knowledge of measurement of angles to explore the mathematics of shapes constructed with the triangles | Activities include:<br>- using sets of triangles to construct a variety of composite figures<br>- exploratory activities with the triangles and the shapes they construct e.g. inscribed figures, researching relationships between figures, transforming one composite figure to another<br>- measuring angles to explore relationships between figures<br>- tracing, cutting, gluing, drawing and labelling activities<br>- research in environment.<br><br>Resources include:<br>- *constructive triangles* (Triangular box, large and small hexagonal boxes)<br>- command cards<br>- scissors, coloured paper and glue<br>- technical drawing equipment<br>- reference and research materials (paper-based, digital, web-based, multimedia). |
| **Plane geometry - detailed study:** | Complete, review, consolidate and extend detailed study of plane shapes covered in the curriculum for six to nine year olds, including:<br>- lines<br>- angles<br>- polygons<br>- tessellation<br><br>Extend vocabulary for talking about plane shapes, including *bisect, median, perpendicular, points of concurrency* | Activities include:<br>- demonstrations, exercises and games<br>- learning etymology of terms<br>- manipulating models, pictures, labels and definitions<br>- drawing activities<br>- creating charts, booklets and models<br>- research in the environment.<br><br>Resources include:<br>- *box of sticks* picture, label, definition and booklet material<br>- *tiling game* and *Tangram* material<br>- command cards<br>- drawing equipment<br>- reference and research materials (paper-based, digital, web-based, multimedia). |

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| **Plane geometry - detailed study: angles** | Complete, review, consolidate and extend detailed study of angles covered in the curriculum for six to nine year olds<br><br>Recognise relations between:<br>- pairs of angles<br>- angles formed by two lines and transversal: *interior-exterior, adjacent-opposite, complementary-supplementary*<br><br>Use knowledge of measurement of angles to analyse the relationships numerically<br><br>Explore the sums of angles of polygons<br><br>Explore angle bisectors<br><br>Build definitions related to relations between angles | Activities include:<br>- demonstrations and activities using concrete materials<br>- learning the etymology of the terms<br>- measuring and labelling models and diagrams<br>- building and reading definitions<br>- drawing, measuring and labelling activities<br>- adding, subtracting and bisecting angles<br>- creating charts and booklets<br>- researching angles in the environment.<br><br>Resources include:<br>- *box of geometry sticks*<br>- geometry charts<br>- drawing equipment<br>- picture, label, definition and booklet material<br>- command cards<br>- protractor, compass and ruler<br>- reference and research materials (paper-based, digital, web-based, multimedia). |
| **Plane geometry - detailed study: circle** | Identify and label the linear parts of a circle: *centre, radius, diameter, chord, arc, circumference*<br><br>Identify and label the parts of the surface of a circle: *sector, segment*<br><br>Explore relationships between a circumference and a straight line (*external, tangent, secant*)<br><br>Explore relationships between two circles (*external, internal, externally tangent, internally tangent, intersecting, concentric*) | Activities include:<br>- demonstrations, stories and lessons, including the etymology of the terms<br>- constructing, manipulating, comparing and labelling plane figures using concrete material<br>- labelling images<br>- building and reading definitions<br>- drawing and labelling activities<br>- creating charts and booklets<br>- research plane figures in the environment.<br><br>Resources include:<br>- *box of geometry sticks*<br>- geometry charts<br>- drawing equipment<br>- picture, label, definition and booklet material<br>- command cards<br>- protractor, compass and ruler<br>- reference and research materials (paper-based, digital, web-based, multimedia). |

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| **Symmetry, similarity, congruence and equivalence** | Complete, review, consolidate and extend study of symmetry, similarity, congruence and equivalence covered in the curriculum for children from six to nine years | Activities include:<br>- exercises and games<br>- paper-folding, construction, drawing, labelling and design activities<br>- research in the environment<br>- applying the concepts e.g. in visual arts.<br><br>Resources include:<br>- *iron (small) insets*<br>- *constructive triangles* (triangular box, large and small hexagonal boxes)<br>- *insets of equivalence*<br>- command cards<br>- objects in environment<br>- reference and research materials (paper-based, digital, web-based, multimedia). |
| **Insets of equivalence: detailed study** | Use concrete material to explore 'families' of polygons for relations of equivalence:<br>- triangle<br>- rhombus<br>- common parallelogram<br>- trapezium<br>- regular polygons<br><br>Use concrete materials to build theorems of equivalence, including theorem of Pythagoras | Activities include:<br>- demonstrations, lessons and games with concrete material<br>- exploring etymology of terms and working with symbols<br>- paper-folding, construction, drawing, labelling and design activities<br>- making charts and booklets<br>- research in the environment<br>- applying concepts e.g. in visual arts, construction<br>- research projects.<br><br>Resources include:<br>- *insets of equivalence*<br>- command cards, objects in environment<br>- reference and research materials (paper-based, digital, web-based, multimedia). |
| **Measurement** | | |
| **Area: surfaces** | Review and extend knowledge of surface area<br><br>Explore units of measurement for area (square metre)<br><br>Choose the most appropriate unit of measurement for area<br><br>Use concrete material to build formulae for calculating area of:<br>- rectangle<br>- common parallelogram<br>- triangle (including right-angled and obtuse-angled)<br>- square<br>- circle<br><br>Extend knowledge of area to build formulae for calculating area of other quadrilaterals: rhombus, kite, trapezium, common quadrilateral | Activities include:<br>- demonstrations, games and exercises to introduce the concept of area and its measurement<br>- manipulating concrete materials to build formulae for calculating area of polygons<br>- using paper to extend work with building formulae for polygons<br>- stories, demonstrations and games to build formulae for calculating area of a circle<br>- activities to become familiar with units for measuring area including, relationship between square metre and smaller units (square centimetre), etymology and meaning of words and prefixes, and use of abbreviations ($cm^2$, $m^2$)<br>- calculating area of familiar objects<br>- creating charts and booklets<br>- applying knowledge to real life tasks e.g. construction and design projects |

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| | | - research activities related to area e.g. specialised units, units used in the past or in other countries.<br><br>Resources include:<br>- *yellow area material*<br>- *green and yellow circles*<br>- card material<br>- command cards; word problems<br>- reference and research materials (paper-based, digital, web-based, multimedia). |
| **Volume: solids** | Extend knowledge of volume to solids<br><br>Use unit of measurement for volume of solids (cubic metre)<br><br>Apply the concept of equivalence to volume of solids<br><br>Use concrete material to build formulae for calculating volume of: solids<br>- rectangular prism<br>- other prisms<br>- solids that are not prisms (pyramid, cylinder, cone, sphere) | Activities include:<br>- demonstrations, games and exercises to introduce the concept of volume of solids<br>- exploring displacement with concrete materials<br>- manipulating concrete materials to build formulae calculating the volume of solids<br>- activities to become familiar with units for measuring volume of solids including, relationship between cubic metre and smaller units (cubic centimetre), etymology and meaning of words and prefixes, and use of abbreviations ($cm^3$, $m^3$)<br>- calculating volume<br>- of familiar objects<br>- creating charts and booklets<br>- applying knowledge to real life tasks e.g. construction and design of projects<br>- research activities related to area e.g. specialised units, units used in the past or in other countries.<br><br>Resources include:<br>- volume material<br>- card material, objects in the environment<br>- command cards; word problems<br>- reference and research materials (paper-based, digital, web-based, multimedia). |
| **Length, mass and temperature** | Complete, review, consolidate and extend knowledge of measurement (length, mass and temperature)<br><br>Use knowledge of and experience with measurement to extend and apply estimation and comparison skills<br><br>Apply knowledge of measurement to a range of projects and problems | Activities include:<br>- applying knowledge and experience of measurement to estimation and comparison in everyday tasks and across the curriculum<br>- using measurement in everyday tasks, across the curriculum and in research projects.<br><br>Resources include:<br>- range of measuring equipment<br>- card material<br>- command cards; word problems<br>- reference and research materials (paper-based, digital, web-based, multimedia). |

# History, Geography and Science

Because the Montessori approach integrates the study of history, geography and science, including biology and technology, these subject areas comprise one area of the *Cosmic Education* curriculum.

## History

When children first enter the Montessori environment prepared for children from six to nine years of age, they are introduced to the study of history through a series of *great stories*. This is fitting, as history is in essence a series of 'stories'. In Italian one word, *storia,* is used for both *history* and *story*, that is, for the retelling of events unfolding over time.

Five *great stories*, or cosmic fables, are presented to the children:
1. *the formation of the universe*
2. *the story of the coming of life*
3. *the story of the coming of humans*
4. *the story of communication in signs*
5. *the story of numbers*

Each fable is like one act of an unfolding drama. Each act links back to the last, and foreshadows the next, each introducing another area of study.

- The fable of the *formation of the universe* opens up of the geography curriculum.
- The *story of the coming of life* begins the biology curriculum.
- The *story of the coming of humans* introduces the study of prehistory.
- The *story of communication in signs* enhances the study of language.
- The *story of numbers* enhances the study of mathematics.

Together, the last two stories in the series provide a point of departure for the study of civilisations.

Although these fables are presented as part of the history curriculum, they reveal the overlap and interplay between all the subject areas, in this way exemplifying the concept of *cosmic education*. The sequence of the fables follows our understanding of the process of evolution, from the formation of the universe, to the coming of life, the coming of human beings and then the coming of civilisation. To present these concepts in this order builds children's understanding incrementally, helps them become aware of the inter-dependence of life, and prompts questions such as the following:
- *Could humans exist if there had been no life?*
- *Could life exist without the formation of the Earth?*

The children, however, are never asked questions such as these directly. Instead, their orientation to the universe, and their place in it, and the questions they ask about it develop through independent exploration.

In the *story of the coming of humans*, emphasis falls on the work and service of early humans. Unlike conventional history, there is less reference to the deeds and exploits of famous individuals, but rather a focus on the nameless and faceless ordinary humans, the *uomini senza volto,* who in their efforts to survive and make life easier for themselves, contributed to the progress of all the peoples of the world, and to the benefits we have inherited. To help children explore this 'everyday history', they are given a chart of the fundamental human needs as a guide to explore the lives and contribution of humans in different places and different periods of time.

When children eventually reach the study of human civilisations, they are introduced to the coming of civilisation through the advent of written language and numbers. These momentous human inventions are presented to the children as gifts passed down from ancestors, an inheritance representing many generations of work.

The human story is one of constant change involving many inventions and discoveries brought about by the restless and inquiring nature of the human mind. It is important that children use their imaginations to think about the difference these discoveries have made to the everyday lives of people in all times and places. There are of course many inventors, who will remain nameless, anonymous benefactors who, whether or not they or we are aware of it, have had a remarkable impact upon our lives. For example, it is impossible to know who discovered how to make and control fire, agriculture, shelter, or who first thought of the wheel or the needle, and yet without these discoveries and inventions human life would be very different indeed.

Studying the human story in this way enables children to see themselves as a part of the whole, a protagonist in the drama of the earth. Children are able to see that even if they do not become famous or a powerful public figure, their actions will none the less have an effect, as an ordinary person, not as a passive player but as an actor who can influence the world in positive ways, and that in this way everyone counts. Despite all the war, tragedy, horror and despair that children find out about in their study of human history, are confronted with daily in the media, and, sadly for too many, experience in real life, they will be able to appreciate that there is still much to admire in human achievement, and feel gratitude for those who came before them.

There is another theme that emerges from the levels of work revealed in the great fables. This is that the work undertaken by all non-living and living things, including humans, in order to meet their basic needs, has the potential to lead to a wonderful by-product. All this work has the potential to contribute to the well being of the whole earth and all life on earth. In the process of working from the whole to specifics in this way, children come to the history of their own nation.

In the study of history, children in the Montessori environment for six to twelve year olds examine the concept of migration. Various human groups have built up large banks of knowledge in order to meet their physical and spiritual needs in their particular region of the earth. The way this knowledge has been shared, until recently, has been through migration. This sharing is now possible through modern modes of communication.

In an Advanced Montessori Training Course held in Kodaikanal, India, in March 1944, Dr Maria Montessori described the Montessori approach to the teaching of history in the following way:

> We have to show a different side of history to the children, where history is understood as the documentation and testimony of mankind. Man the worker who transformed the initial desolate landscape, the world in its primordial state into the present Garden of Eden. Man the provider, the generous, the tireless worker, and the one who possesses the great spirit of self-sacrifice. Those are the men who are god's chief agents on earth for continuing the work of creation, all of us.

## Geography

The study of geography in the Montessori *cosmic education* curriculum shows children how the physical configurations of the earth contribute to the history of humans. Children discover how everything, including non-living things such as the air, rocks, water, wind and sun, as well as living things, the plants and animals explored in the study of biology, are interconnected and interdependent, everything working together to make up the ecological whole. Children discover that each non-living element has an important role to play, and that each obeys that set of natural laws that lead to the formation of the universe. The study of physical geography becomes the basis for the study of economic geography, which shows the interdependence of all human beings. In this way, children discover how the physical configuration of the earth contributes to the history of all people who live on the earth.

The study of geography is presented as a series of discussions and stories, with the help of charts and experiments to illustrate key points. Each story or discussion opens up a new area of geography, providing a key to further exploration. These keys enable children to understand the physical world in which they live.

When children have an understanding of how the earth was formed, and the laws that underpin the formation of the earth, they are able to follow their interests to explore any aspect of geography, including:

- oceans
- rivers
- mountains
- winds.

As children follow these interests, they become aware of:
- different geographical regions
- terrains within these regions
- the people who live in these regions and the types of work they undertake, and the industries they have developed over time.

The interconnecting areas of the study of geography include:
- physical geography
- scientific understanding/geology
- economic geography
- political geography
- mapping and graphing.

As in all other areas of the Montessori *cosmic education* curriculum, the geography lessons presented to the children are merely a starting point for learning and discovery. The study begins with concrete experience, first hand observation and participation. As often as possible, children go out into the field to experience and research areas of the curriculum for themselves.

## Biology

In the Montessori *cosmic education* curriculum biology highlights the interdependence of all living and non-living things within the environment and the ways in which these interdependent relationships are sustained. The aim of this area of the curriculum is to foster in children an ecological view of the web of life and a feeling of responsibility for the environment. To provide children with an intellectual tool for ordering and relating information about the biological world, systems for classifying living things are introduced.

The study of biology includes both botany and zoology. Children engage in a range of activities through which they investigate and classify the plant and animal kingdoms. They examine:
- the internal and external parts of plants and animals
- the vital functions of plants and animals, including locomotion, nervous system, respiration, nutrition, reproduction, comparing these functions in different classes of plants and animals across the evolutionary time scale.

In summary, studying biology in this way offers children a means for classifying plants and animals, allowing them to order and relate biological facts. The study reveals how systems of classification follow evolution. Children discover that each life form on earth, while apparently selfishly fighting for its own survival, is in reality serving the good of the whole. Dr Montessori called this phenomenon the *cosmic plan*.

## Science

Montessori environments prepared for children from six to twelve years have fully equipped science areas in which children undertake experiments relating to all areas of science, including:
- astronomy
- physics and chemistry
- geography and geology
- biology, including botany and zoology

When children enter the environment prepared for six to nine year olds, the first science experiments they encounter reveal basic knowledge that helps them understand:
- the formation of the solar system
- the earth and its parts
- life on earth
- the needs of plants and animals.

Subsequent science experiments enable children to explore in more detail topics in geography, history and biology. As children complete the experiments, and design some of their own, they learn about the struggle of life to survive and evolve, and the benefits of this vast work over millennia. Children come to see that they have a place in the universe, and in the web of life, as well as a responsibility to contribute to their world in productive ways. As a result children begin to engage in problem-solving activities relating to themselves and their role in the natural and social environment. Most importantly, they learn that their life is full of meaning.

## The Study of Australia

In Montessori learning environments prepared for six to twelve year olds, the *cosmic education* curriculum introduces children to the study of the universe, the earth and life on the earth. Through this study they come to understand themselves more fully, as well as the contributions they can make to life on earth and human society. Building on this foundation, children also study their homeland, Australia. This work builds on early experiences with Australian Studies presented to children in the *Children's House*. After the age of six children continue their study of Australia, covering the following areas:

- the history and culture of Indigenous Australians (pre- and post-European settlement to the present)
- European voyages of discovery
- the history of European settlement to the present
- physical geography of Australia
- plant and animal life, and ecological systems of Australia
- multicultural Australia
- Australian economic geography
- Australia's neighbours.

In addition, in the environment prepared for nine to twelve year olds, children explore the three tiers of Australian government:

- commonwealth
- state
- local.

Montessori students aged from six to twelve years are also encouraged to participate in community service activities. These activities provide students with opportunities to experience first-hand what it means to contribute as an active citizen to the wider Australian community.

## Inquiry and Research

The foundation of the Montessori interdisciplinary *Cosmic Education* curriculum is the study of history, the study of the unfolding of events over time. In the Montessori context this means a study of time from its beginning when the universe came into being, as well as the history of the Earth and its formation, the history of life on earth, the pre-history of humans and the recorded history of humans from ancient civilisations to the present. This approach provides a chronological framework from which flows the study of geography and of all the sciences: astronomy, physics and chemistry, geology and biology. In the same way, a topic from any of these curriculum areas can be related back to the study of history. This interdisciplinary, cross-curricular approach, established in the telling of the *great stories* and elaborated in the *key lessons*, orients students as they formulate questions for further inquiry and as they design and undertake research projects.

The pedagogy that integrates history, geography and science in the Montessori *Cosmic Education* curriculum is comparable with, but not exactly the same as, project-based and inquiry-based approaches to the study of these subject areas. In the follow-up to the telling of the *great stories* and the presentation of the lessons, students repeat exercises with materials that embody the knowledge as many times and with as many variations as their interest dictates. This may include sorting, labelling and matching activities, and building arrays, with cards and charts, solving prepared puzzles and problems on command cards, or other exercises that reinforce the relevant knowledge, skill or understanding.

Through discussions with classmates, their teacher, and others in their community, and following their own interest, students come to identify one or more aspects of the area of knowledge they wish to research in

more detail. This becomes the basis for a line of inquiry that leads to a *great work*, or project. The work can be done in small groups, pairs or individually. The students choose who they will work with and request assistance from the teacher or other knowledgeable person as needed. Each project represents an opportunity for students to gain, extend, consolidate and enhance knowledge and skill across the curriculum. Initially, the teacher or a more experienced classmate might model how to complete a project, and collaborate on group projects, before students are ready to undertake a project on their own.

The following steps of a great work project are an indication only. The structure, extent and duration of projects are adjusted and adapted to match the students' interests and abilities (See also Harvey 1998).

## The Steps of a *Great Work* Project

- Students identify the research topic and list what they already know about it.
- Students list what they still want to find out about the topic. This will involve some initial browsing through reference materials and perhaps discussion with others, as well as follow-up work with Montessori materials embodying the foundation concepts that structure the knowledge domain.
- Students identify the focus of the research and draft an inquiry question or purpose statement. These will often emerge from ideas and discussions based on a *great lesson*. Students may need support as they learn how to limit the field of their inquiry and to identify a focus for their research. At this point it might be important to establish a 'finish by' date.
- Students plan their research by preparing an outline. This step will often involve the use of Montessori charts and/or card arrays presented in *key lessons*. For example, an outline to guide research into an aspect of history might be based on the *fundamental needs of humans* chart or the *charts of history* questions. An outline to guide research into an aspect of geography or science might, for example, be based on:
  - a series of experiments, for example, experiments that reveal properties of the three states of matter
  - card material classifying the geographical features of the earth
  - a botany chart representing the leaf as the plant's food factory
  - the animal or plant classification charts
  - one 'age' of the *timeline of life*
  - the *great river* chart as a basis of a study related to economic geography
- In discussion with the teacher and classmates, students identify the knowledge and skill they will need in order to undertake the research and to present their findings. As they design their project, students are presented with one or more relevant lessons from any area of the curriculum. Lessons that provide students with knowledge and skill relevant to research projects might cover the following topics:
  - literacy knowledge and skills, including etymology and word study to build vocabulary; relevant reading strategies for researching this topic; *parts of the book* lesson for understanding how to use books for reference; using the library and the Internet; note-taking, summarising, paraphrasing and record-keeping for collecting and collating information; referencing to record and acknowledge sources; writing specific types of texts for presenting findings, editing and proofreading (from the Language Curriculum)
  - types of measurement needed for the project (from the Geometry and Measurement Curriculum)
  - methods for collecting, representing and interpreting data required for the project (from the Mathematics Curriculum)
  - elements, principles and use of instruments and/or variety of media for presenting findings (from Music, Visual Arts, Study of Style: Visual Images in Language, Drama and/or Dance Curriculum tables)
- Students undertake their research, accessing resources as needed. The project might include organising a *going out* field trip, for example, to observe the subject of the inquiry first hand, to visit a museum or library, or to meet an expert in the field.
- When students have gathered all the information and/or data they can, they begin sorting through everything they have. They will think about appropriate ways to organise the information they have collected, for example, in categories or along a timeline. If they have collected measurements, they will apply knowledge of data and statistics to select ways for displaying the data visually and for interpreting what the measurements reveal. This phase of the project might include eliminating material that is no longer relevant, or undertaking more research to fill in gaps. During this phase students will also record what they have not been able to find and questions they might like to pursue in the future.
- Students plan the way they will present their research findings. This will include a project report made up of factual writing and images with bibliography, presented on paper or digitally. Students might also present

what they have found using literary texts, persuasive texts and/or multimodal presentations involving model-making, music, drama and visual arts.
- Students complete drafting, editing and proofreading and/or rehearsing.
- Students present their project report and/or performance.

## History, Geography and Science Curriculum for Children Aged Six to Nine Years

| Content Strand | Knowledge, Skills and Understandings | Activities and Resources |
|---|---|---|
| | *Typically children will:* | |
| Time | | |
| Time:<br>first knowledge | Explore ways to represent the passing of time<br><br>Sequence and record major events of own life in timeline format<br><br>Explore the concepts of past, present and future | Activities include:<br>- recording the passing of time in informal ways<br>- demonstrations and exercises for exploring ways to represent time spatially e.g. on a timeline<br>- activities and games for establishing the importance of a standard measurement of time<br>- creating personal timelines with illustrations and writing e.g. *My Life* in months/years; *My Family* in years<br>- transforming a class 'diary' into a timeline<br>- activities for exploring how the *three fundamental tenses* (past, present, future) are expressed in language.<br><br>Resources include:<br>- *personal timelines* outlines<br>- photographs and drawings; family members<br>- digital camera<br>- the *three fundamental tenses* card material. |
| Measuring time:<br>day | Understand concept of a day<br><br>Measure time across a day in hours, minutes and seconds<br><br>Read analogue and digital clocks (hour, half hour, quarter hour, minute)<br><br>Read digital clocks (24-hour time)<br><br>Research the telling of time in different times and cultures | Activities include:<br>- *parts of the day* demonstrations, games and exercises<br>- learning units of time that subdivide the day, spelling and etymology of their names, abbreviations<br>- creating *My Day* booklets for hours and fractions of hours (e.g. half past, quarter to) and minutes<br>- lessons and exercises to learn tell the time (spoken), accompanied by notation (words and symbols)<br>- recording the timing of daily routines<br>- reading and creating timetables and itineraries e.g. for the class or school, for an excursion or *going out*; television and public transport timetables<br>- *grace and courtesy* e.g. telling the time or estimating time needed to be punctual for a lesson or meeting, or to meet a deadline<br>- researching the telling of time e.g. the way |

| | | |
|---|---|---|
| **Measuring time: day** | Understand concept of a day<br><br>Measure time across a day in hours, minutes and seconds<br><br>Read analogue and digital clocks (hour, half hour, quarter hour, minute)<br><br>Read digital clocks (24-hour time)<br><br>Research the telling of time in different times and cultures | Activities include:<br>- *parts of the day* demonstrations, games and exercises<br>- learning units of time that subdivide the day, spelling and etymology of their names, abbreviations<br>- creating *My Day* booklets for hours and fractions of hours (e.g. half past, quarter to) and minutes<br>- lessons and exercises to learn tell the time (spoken), accompanied by notation (words and symbols)<br>- recording the timing of daily routines<br>- reading and creating timetables and itineraries e.g. for the class or school, for an excursion or *going out*; television and public transport timetables<br>- *grace and courtesy* e.g. telling the time or estimating time needed to be punctual for a lesson or meeting, or to meet a deadline<br>- researching the telling of time e.g. the way people told the time in the past; the link between astronomy, navigation and time; Greenwich mean time<br>- imagining how people might tell the time in the future.<br><br>Resources include:<br>- the *parts of the day* card material<br>- teaching clocks with moveable hands and card material<br>- clock stamps<br>- different types of instruments for telling the time e.g. clocks, watches, a sundial, candle and water clocks<br>- command cards; word problems<br>- reference and research materials (paper-based, digital, web-based, multimedia). |
| | Understand the link between the rotation of the earth and *am*/*pm* notation<br><br>Use *am*/*pm* notation in own work<br><br>Use knowledge of *am*/*pm* to explore time zones around the world | Activities include:<br>- demonstrations and exercises to link earth's rotation with *am*/*pm* notation<br>- activities to explore etymology of terms *ante meridian* and *post meridian*<br>- making *My Day* booklets for *am*/*pm* time<br>- research projects e.g. comparing time zones in two or more parts of the world, time zones and air travel.<br><br>Resources include:<br>- *day and night* chart<br>- models of globe and sun<br>- *time zones* work chart<br>- command cards; word problems<br>- reference and research materials (paper-based, digital, web-based, multimedia). |

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| **Measuring time: year** | Understand concept of a year<br><br>Measure time across a year in months and weeks<br><br>Use a calendar<br><br>Understand sequence and duration of events across years<br><br>Understand the counting and notation of the years | Activities include:<br>- *the year and its parts* demonstrations, games and exercises<br>- counting and notating years e.g. of own life span, family birthdays and life spans<br>- creating a time line of *My Life*<br>- creating a personal calendar<br>- creating charts and booklets<br>- converting a calendar to a timeline<br>- using a calendar or diary to record and/or plan events.<br><br>Resources include:<br>- the *parts of the year* card materials<br>- calendar and card materials<br>- photographs; family members<br>- *golden bead* number cards<br>- command cards; word problems<br>- reference and research materials (paper-based, digital, web-based, multimedia). |
| **Measuring time: century** | Understand concept of a century<br><br>Measure human history in centuries<br><br>Understand the terms BC and AD, and BCE and CE<br><br>Compare the time since the coming of humans to the history of the earth | Activities include:<br>- *BC/AD* stories, demonstrations, games and exercises<br>- extending concept of BC/AD to BCE/CE<br>- student presentations and research projects.<br><br>Resources include:<br>- *BC/AD timeline* and card material<br>- *timeline of millennia*<br>- *long black line*<br>- reference and research materials (paper-based, digital, web-based, multimedia). |
| The history of the Earth | | |
| **The creation of the Universe and the formation of Earth** | Explore and discuss the creation of the universe<br><br>Imagine the dimensions of the universe: the span of time, the vastness of space, the number of stars<br><br>Consider the laws and forces behind the formation of the universe and the earth: cold and heat, energy and matter, time and space, the speed of light, forces of attraction, the three states of matter, the effect of cold and heat on matter (contract/expand), volcanoes and water vapour<br><br>Build knowledge of the history of the earth<br><br>Undertake experiments using knowledge of safe use of materials, tools and equipment | Activities include:<br>- *great story*: *the formation of the universe*, including *the history of the earth,* with demonstrations and experiments<br>- *how to* lessons demonstrating safe use of materials, tools and equipment used in experiments<br>- independent work with experiments and charts<br>- *going out*, excursions and guest speakers<br>- making timelines, charts and models, artwork<br>- student presentations, discussions, factual and creative writing, drama<br>- research projects.<br><br>Resources include:<br>- charts<br>- equipment for demonstrations and experiments<br>- reference and research materials (paper-based, digital, web-based, multimedia). |

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| **The coming of life** | Build an overview of the history of the earth:<br>- formative era<br>- the coming of life: Precambrian era<br>- the coming of plants and animals: Palaeozoic, Mesozoic, Cenozoic, Neozoic eras<br><br>Explore ways of understanding the coming of life on earth (Precambrian era): the work of the sun, air, water and rocks; the cleaning of the oceans by the protozoa, the sponges and the corals<br><br>Build understanding of the geological time scale<br><br>Using the three kingdoms (*mineral, plant, animal*) as a guide/scaffold for thinking about the earth | Activities include:<br>- *great story: the coming of life*<br>- *clock of eras* presentation and activities<br>- etymology lessons for the names of the eras<br>- from *the clock of eras* to *the timeline of eras*<br>- activities to explore *non-living/living*; *live/dead*; *the three kingdoms* (mineral, plant, animal) e.g. sorting activities, research in the environment, discussions<br>- making timelines, charts and models, artwork<br>- student presentations, discussions, debates (e.g. between the sun, air, water, rocks and tiny creatures), factual and creative writing, drama<br>- research projects e.g. creation stories from different times and places used to explain the coming of humans to the earth.<br><br>Resources include:<br>- *clock of eras*<br>- *timeline of eras*<br>- card material<br>- reference and research materials (paper-based, digital, web-based, multimedia). |
| **The evolution of life** | Build understanding of the evolution of life on earth:<br>- eras: *Palaeozoic, Mesozoic, Cenozoic, Neozoic*<br>- ages: *trilobites/invertebrates, sea lilies, fish, amphibians, carboniferous period, reptiles (Triassic and Jurassic), flowers, birds and giant, then smaller, mammals*<br><br>Build understanding of the links between the evolution of life and the changing surface and climate of the earth e.g. volcanoes, ice ages, changes in continents and oceans<br><br>Build understanding of the expanses of time before and after the arrival of life on earth<br><br>Build understanding of the evolutionary time scale<br><br>Consider questions such as:<br>- how over time plants and animals evolved more effective ways to care for and protect their young<br>- how a relatively small creature without sharp teeth or claws, with no scales nor fur, who cared not only for their own young, but for others, could become so influential on the earth | Activities include:<br>- showing the transition from the *clock of eras* to the *time line of life*<br>- the *time line of life* initial presentation and stories of each era and exercises<br>- etymology lessons for terms on the timeline<br>- exploring the symbols in the timeline: ice ages, continent maps, mountains, red lines<br>- working with manipulable symbols and pictures of plants and animals on the blank timeline<br>- making timelines, charts and models, artwork<br>- student presentations, discussions, debates, factual and creative writing, drama<br>- research projects e.g. movement of tectonic plates, volcanoes and ice ages, the rise and fall of different life forms, study of a particular era or age, fossils, making evolutionary timelines for particular plants and/or animals.<br><br>Resources include:<br>- timelines, manipulable pictures and labels, charts, models<br>- reference and research materials (paper-based, digital, web-based, multimedia). |
| **Human history** | | |

| | | |
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| **Fundamental needs of humans** | Recognise and build understanding of the fundamental survival needs of humans, both spiritual (religion, arts/culture, adornment) and material (food, clothing, defence, transport, shelter)<br><br>Understand history in terms of humans attempting to meet their fundamental needs across time and place<br><br>Track the development of ways humans have met each fundamental need across time (vertical study)<br><br>Review the ways humans met all their fundamental needs at one point in history (horizontal study)<br><br>Use the fundamental needs taxonomy to guide/scaffold exploration of customs and practices of family and local community<br><br>Use the fundamental needs taxonomy to guide/scaffold exploration of different cultures in different times and places | Activities include:<br>- *fundamental needs of humans* demonstrations, lessons and discussions<br>- activities with *timeline of millennia* and picture material e.g. transportation through the ages (vertical); how people met their fundamental needs in an ancient civilisation or in Europe in the Middle Ages (horizontal)<br>- *going out*, excursions and guest speakers<br>- making timelines, charts and models, artwork<br>- student presentations, debates, factual and creative writing, drama<br>- research projects using the fundamental needs taxonomy as guide/scaffold e.g. history projects, researching the needs and roles of people (parents, teachers, doctors, fire fighters, farmers, bakers, police) and social institutions in the local community (home, school, library, clubs).<br><br>Resources include<br>- *fundamental needs of humans* charts 1 and 2<br>- *timeline of humans* 1<br>- *timeline of millennia*<br>- card material: pictures, labels and written descriptions for how each human need was met at different points in history<br>- artefacts<br>- reference and research materials (paper-based, digital, web-based, multimedia). |
| **The coming of humans** | Build understanding of the coming of humans on earth<br><br>Build understanding of the expanses of time before and after the arrival of humans on earth<br><br>Build understanding of the links between the changing surface and climate of the earth (e.g. ice ages) and the development of humans<br><br>Build understanding of relative length of time humans have been on the earth<br><br>Gain some understanding of human ancestors, the world they lived in and their special characteristics: adaptable mammals walking upright with free hands, opposable thumbs; ability to think, reason, imagine, love, migrate, communicate<br><br>Explore how early humans in Palaeolithic times learned to meet their fundamental | Activities include:<br>- *great story: the coming of humans*<br>- linking the *timeline of humans* with the *clock of eras, the long black line* and the *timeline of life*<br>- the *hand chart* activities and discussions e.g. the significance of opposable thumbs<br>- tracing the ages of humans from the Palaeolithic to the present<br>- exploring how Palaeolithic humans met their fundamental needs<br>- etymology lessons for the names of early humans and the ages of humans<br>- making timelines, charts and models, artwork<br>- student presentations, discussions, factual and creative writing, drama<br>- *going out*, excursions and guest speakers e.g. Indigenous Australian speakers, members of different communities, museum visits<br>- research projects e.g. creation stories from different times and places used to explain the coming of humans to the earth; |

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| | needs<br><br>Recognise the difference between pre-history and history | human ancestors; early humans<br>.<br>Resources include:<br>- *long black line*<br>- *timeline of life*<br>- *timeline of humans*<br>- *the hand chart*<br>- *fundamental needs of humans* charts 1 and 2<br>- card material<br>- reference and research materials (paper-based, digital, web-based, multimedia). |
| Society and civilisation | Use the fundamental needs taxonomy to guide/scaffold exploration of how different civilisations have met their fundamental human needs<br><br>Build first knowledge of some ancient civilisations e.g. Indigenous Australian, Mayan, Polynesian, Babylonian, Ancient Egyptian, Ancient Greek, Roman | Activities include:<br>- presentations, lessons and discussions<br>- making timelines, charts and models, artwork<br>- student presentations, debates, factual and creative writing, drama<br>- *going out*, excursions and guest speakers e.g. Indigenous Australian speakers, members of different communities, museum visits<br>- research projects e.g. using *fundamental needs of humans* chart to research and prepare a project on an ancient civilisation<br><br>Resources include:<br>- *fundamental needs of humans* charts 1 and 2, and card material<br>- *timeline of millennia*<br>- *timeline of civilisations* (from 4,000 BC)<br>- reference and research materials (paper-based, digital, web-based, multimedia). |
| Australian History | | |
| Our Nation | Build knowledge of the span of the civilisation of Indigenous Australians on the Australian continent<br><br>Build understanding of relative length of time non-indigenous Australians have lived on the Australian continent<br><br>Build first knowledge of key periods and events in Australian history and their significance<br><br>Use the fundamental needs taxonomy to guide/scaffold exploration of how Australians have met their fundamental needs at different times in their history<br><br>Build a first knowledge of the natural resources used by Australians to meet their fundamental needs over time | Activities include:<br>- lessons, activities and exercises to introduce key understandings and topics<br>- building timelines, models, charts<br>- learning history/etymology of place names e.g. Australia = *land of the south; Great South Land*<br>- working with artefacts and primary sources<br>- exploring the ways Australians have met their fundamental needs at different times reading/viewing cultural works related to Australian history e.g. poetry, stories, films<br>- spoken presentations, debates and drama; dance, singing and music-making<br>- factual and creative writing, art work, multimedia composition e.g. historical recounts and biographies<br>- *going out*, excursions and guest speakers<br>- research projects.<br><br>Resources include: |

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| **Our Nation** | Build knowledge of the span of the civilisation of Indigenous Australians on the Australian continent<br><br>Build understanding of relative length of time non-indigenous Australians have lived on the Australian continent<br><br>Build first knowledge of key periods and events in Australian history and their significance<br><br>Use the fundamental needs taxonomy to guide/scaffold exploration of how Australians have met their fundamental needs at different times in their history<br><br>Build a first knowledge of the natural resources used by Australians to meet their fundamental needs over time | Activities include:<br>- lessons, activities and exercises to introduce key understandings and topics<br>- building timelines, models, charts<br>- learning history/etymology of place names e.g. Australia = *land of the south; Great South Land*<br>- working with artefacts and primary sources<br>- exploring the ways Australians have met their fundamental needs at different times reading/viewing cultural works related to Australian history e.g. poetry, stories, films<br>- spoken presentations, debates and drama; dance, singing and music-making<br>- factual and creative writing, art work, multimedia composition e.g. historical recounts and biographies<br>- *going out*, excursions and guest speakers<br>- research projects.<br><br>Resources include:<br>- Australian history timelines e.g. timeline for Indigenous Australia, timeline of Australia since European settlement and/or Federation<br>- artefacts, age-appropriate Australian literature and factual writing, artefacts<br>- *fundamental needs of humans* charts 1 and 2, and card material<br>- *timeline of humans*<br>- *timeline of millennia*<br>- *timeline of civilisations*<br>- artefacts and natural materials<br>- reference and research materials (paper-based, digital, web-based, multimedia). |
| **The Earth** | | |
| **Globes to maps** | Understand how 2D maps are used to represent the 3D globe<br><br>Name and identify parts of the earth: *continents, oceans*<br><br>Review and consolidate knowledge of the names of the continents and of the oceans | Activities include:<br>- demonstrating how continents and oceans on a 3D globe can be represented on a 2D map<br>- locating continents and oceans on the globe<br>- activities to consolidate knowledge of names, including etymology and spelling<br>- labelling continents and oceans on maps<br>- making first maps<br>- *going out*, excursions and guest speakers<br>- research projects.<br><br>Resources include:<br>- sandpaper globe, blue and white globe<br>- puzzle map of continents, labels<br>- reference and research materials (paper-based, digital, web-based, multimedia). |

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| **Landforms** | Review knowledge of and define major landforms:<br>- *island/lake*<br>- *peninsula/gulf*<br>- *isthmus/strait*<br>- *cape/bay*<br>- *archipelago/chain of lakes*<br><br>Locate on maps major land and water forms in:<br>- the world<br>- Australia<br>- home state | Activities include:<br>- demonstrations, model-making and labelling of pairs of landforms with modelling clay and water<br>- building definitions<br>- reading activities: sorting and matching pictures, labels and definitions; organising jumbled definitions, booklets<br>- finding particular land and water forms on maps e.g. world map, map of Australia<br>- making maps, charts, models and booklets<br>- *going out* and excursions e.g. museums, land and water forms in the environment<br>- guest speakers<br>- research projects.<br><br>Resources include:<br>- globe<br>- equipment for making models of *land and water* forms<br>- card material: diagrams, labels, definitions, booklets<br>- photographs and maps<br>- map-making equipment<br>- reference and research materials (paper-based, digital, web-based, multimedia). |
| **Maps and plans** | Understand the cardinal points of the compass and how they are used<br><br>Use a compass<br><br>Read maps to find locations<br><br>Draw simple plans<br><br>Make maps | Activities include:<br>- the *story of direction:* north, south, east, west and intermediate directions e.g. north east<br>- using a compass for orientation and to find the way<br>- measure length and area using both informal and formal units (as detailed in Measurement and Geometry curriculum)<br>- drawing plans for simple objects; using plans to build models<br>- drawing plans and building models of a classroom or house (real and imaginary)<br>- drawing plans of the local area, with a key and with directions marked<br>- learning the *map-maker's alphabet*<br>- creating and reading treasure maps<br>- using maps to find the highest and lowest points on the earth<br>- *going out,* excursions, guest speakers.<br>Resources include:<br>- globes, photographs and maps<br>- equipment for making maps<br>- points of the compass card material<br>- reference and research materials (paper-based, digital, web-based, multimedia). |

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| **The creation of the universe** | Explore and discuss the formation of the universe<br><br>Explore laws and features of the universe: the cold of space, the speed of light, how small the Earth is<br><br>Explore the three states of matter:<br>- *solid/liquid/gas*<br>- *rigid/elastic/plastic solids*<br>- *fluid/viscose liquids*<br>- how matter changes state | Activities include:<br>- *great story*: *the formation of the universe*, including *the history of the earth,* with demonstrations and experiments e.g. experiments comparing solids, liquids and gases and their properties<br>- *how to* lessons demonstrating safe use of materials, tools and equipment used in experiments, as needed<br>- dramatising the three states of matter<br>- independent work with experiments<br>- *going out*, excursions and guest speakers<br>- research projects.<br><br>Resources include:<br>- equipment for demonstrations and experiments<br>- reference and research materials (paper-based, digital, web-based, multimedia). |
| **The Earth and the solar system: the sun's family** | Identify the major bodies of the solar system: *sun, planets, moons*<br><br>Compare the relative sizes of the sun and the planets, and the distances between them<br><br>Learn the names and sequence of the planets<br><br>Explore forces acting on the planets: *attraction, centrifugal and centripetal, inertia, gravity* | Activities include:<br>- solar system demonstrations and lessons; experiments<br>- making charts and models of the solar system, including scale models outdoors<br>- activities to learn names, including etymology and spelling<br>- *going out*, excursions and guest speakers e.g. planetarium, observatory<br>- research projects e.g. individual planets, the moon, the story of Pluto to explore the definition of a planet, comparing planets, other bodies in the solar system such as asteroids and comets, Earth as the 'Goldilocks' planet, crystals.<br><br>Resources include:<br>- sun and solar system charts and models<br>- equipment for demonstrations and experiments<br>- reference and research materials (paper-based, digital, web-based, multimedia). |
| **The formation of the earth** | Build knowledge of the geological development of the earth e.g. cooling of the earth, the settling of heavier and lighter substances<br><br>Explore the changing of matter during the formation of the earth:<br>- the cosmic dance: hot air rises<br>- *the time of the volcanoes*: matter changing state<br>- *the Sun's beautiful daughter*: erosion, evaporation, crystallisation<br><br>Explore the formation of the layers of the earth:<br>- weight/density<br>- *barysphere (core and mantle)*<br>- *lithosphere (crust)* | Activities include:<br>- demonstrations and experiments e.g. how different solids and liquids settle according to weight; how the Earth's surface folds and fractures<br>- independent work with experiments and charts<br>- making simple models e.g. of the earth and its layers, rock strata, folds and fractures; labelling models<br>- collecting different types of rocks; identifying strata, evidence of volcanoes, mountains, folds and fractures in the environment<br>- *going out*, excursions and guest speakers |

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| | - *hydrosphere*<br>- *atmosphere*<br><br>Consider how the surface of the earth (*the mineral kingdom*) was formed:<br>*stratification of rocks, formation of mountains, folds and fractures, types of rocks* | - research projects, including those involving measurement of mass, distance and temperature (See Measurement and Geometry curriculum) and recording, displaying and interpreting of data (See Mathematics curriculum)<br>Resources include:<br>- charts e.g. *cosmic dance* (cooling of the earth), *the sun*, *the time of the volcanoes*, *the sun's beautiful daughter*, *solar system*, *layers of the earth*<br>- equipment for demonstrations, experiments, measurement, recording and displaying<br>- reference and research materials (paper-based, digital, web-based, multimedia). |
| **Geography: first classification** | Review the layers of the earth:<br>- *barysphere (core and mantle)*<br>- *lithosphere (crust)*<br>- *hydrosphere*<br>- *atmosphere*<br><br>Name and explore parts of the atmosphere<br><br>Name and define major features of the earth's surface (lithosphere): *islands, coasts, mountains, plains, valleys*<br><br>Name and define major features of the hydrosphere: *seas, glaciers, rivers, lakes*<br><br>Identify parts of volcanoes | Activities include:<br>- demonstrations and model-making of features; building definitions<br>- activities to learn names, including etymology and spelling<br>- reading activities: sorting and matching pictures, labels and definitions; organising jumbled definitions, booklets<br>- identifying features in the environment e.g. islands, coasts, mountains, volcanoes, plains, valleys, rivers, lakes<br>- finding features on maps e.g. world map, map of Australia<br>- making maps, charts, models and booklets<br>- *going out* and excursions e.g. museums, features in the environment<br>- guest speakers<br>- research projects.<br>Resources include:<br>- equipment for making models<br>- card material: diagrams, labels, definitions, booklets<br>- *layers of the earth* chart<br>- geography charts, photographs and maps<br>- map-making equipment<br>- reference and research materials (paper-based, digital, web-based, multimedia). |
| **Solar energy and the Earth** | Build knowledge of the effects of sun on the Earth:<br>- sunlight absorbed and stored by the earth; visible and invisible heat<br>- the rays of the sun falling on the earth at different angles (perpendicular and oblique)<br>- the sun and the atmosphere: the blanket of the earth, rain (evaporation and condensation), the formation of wind (air takes up space, air and water, warm air expands and rises, cold air sinks, air currents), air pressure (high, low); heating and cooling (timing) | Activities include:<br>- demonstrations using charts, models and card material e.g. globe and light bulb; representations of sun's rays falling on earth; using candle, incense and balloon to demonstrate how heat is stored and dispersed and warm air rises and expands; game of air<br>- activities to learn names, including etymology and spelling<br>- independent work with models<br>- keeping records; making charts, models and booklets |

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| | | - *going out* and excursions e.g. museums, observation in the environment<br>- guest speakers<br>- research projects, including those that involve measurement of volume and temperature (see also Measurement and Geometry curriculum) and recording and displaying of observation data<br>Resources include:<br>- geography charts, photographs, models<br>- equipment for making models and measuring<br>- moveable card material: diagrams, labels, definitions; booklets<br>- reference and research materials (paper-based, digital, web-based, multimedia). |
| **Movement of the Earth** | Build knowledge of the effects of the movement of the earth<br>- the revolution of the Earth around the sun<br>- the rotation of the Earth tilted on its axis<br>- night and day; hottest and coldest parts of the day<br>- time zones: longitude<br>- seasons, solstices, equinoxes<br>- calendars and leap years<br>- latitude and the five parallels: *Equator, Tropics of Cancer and Capricorn, Arctic and Antarctic circles*<br>- the zones of the earth<br>- climate | Activities include:<br>- demonstrations using charts, models and card material e.g. globe and light bulb; what would happen if the earth did not rotate<br>- activities to learn names, including etymology and spelling<br>- independent work with models<br>- keeping records; making charts, models, maps and booklets<br>- *going out* and excursions e.g. museums, observation in the environment<br>- guest speakers<br>- research projects e.g. comparing Australia's time with time in other parts of the world, daylight saving time.<br><br>Resources include:<br>- equipment for making models<br>- card material: diagrams, labels, definitions, booklets<br>- *sun and earth* charts; *time zone* charts<br>- photographs<br>- reference and research materials (paper-based, digital, web-based, multimedia). |
| **Seasons and weather: first knowledge** | Undertake simple atmospheric experiments:<br>- observe weather from season to season<br>- measure weather elements e.g. rain, temperature, air pressure, wind speed<br><br>Build understanding of types of weather, and their causes, in relation to the seasons | Activities include:<br>- demonstrations and models<br>- *how to* lessons for using equipment to measure temperature, rainfall, wind speed and air pressure<br>- *how to* lessons on recording, representing and interpreting weather data, including comparing variables (see Mathematics curriculum)<br>- daily observation and record-keeping<br>- organising data on graphs or charts<br>- *going out*, excursions and guest speakers<br>- research projects.<br><br>Resources include: |

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| | | - weather observation equipment<br>- observation and record-keeping charts<br>- reference and research materials (paper-based, digital, web-based, multimedia). |
| **Economic geography: the work of humans** | Build first knowledge of the economic work of humans and the products humans make and use by exploring questions such as:<br>- *Who are the workers who produce the products we use everyday?*<br>- *Where do food and clothes come from, who produces them and how do they reach us?*<br>- *What do workers need so they can produce the things we use everyday?*<br>- *What do different workers produce?* e.g. the farmer, the baker<br>Develop gratitude for the work of others and how their work benefits us | Activities include:<br>- demonstrations with real products, charts and card material<br>- locating where products come from and exploring why<br>- observation in the environment<br>- *going out*, excursions and guest speakers<br>- making art work, models, maps, drama<br>- student presentations, factual and creative writing<br>- independent research projects e.g. where different products come from, what different producers make; explore the work of those in service industries e.g. nurses, doctors, police, teachers<br>- applying knowledge about money (see Mathematics curriculum) and representing and interpreting data (see Mathematics curriculum) to content covered in Economic Geography lessons and activities<br><br>Resources include:<br>- *economic geography* card material<br>- objects and artefacts<br>- reference and research materials (paper-based, digital, web-based, multimedia). |
| **Biology** | | |
| **The plant kingdom: kinds, parts, functions** | Observe and name the parts of plants:<br>- *leaf, root, stem, flower, fruit, seed*<br><br>Understand the basic needs of plants<br><br>Recognise, name and describe plants of different types in the local environment<br><br>Build awareness of the relations between plants and humans e.g. useful, harmful<br><br>Build first knowledge of a simple plant classification system: non-vascular and vascular, without and with seeds, non-flowering and flowering<br><br>Compare fungi and plants<br><br>Discover links between the system for plant classification and the evolution of plants | Activities include:<br>- *how to* lessons, as needed, demonstrating safe use of materials, tools and equipment used in experiments and for gardening and horticulture<br>- growing plants, gardening, caring for indoor plants<br>- demonstrations and experiments<br>- dissecting plants and labelling parts<br>- drawing and recording<br>- measuring length, mass and temperature as needed (See Measurement and Geometry curriculum)<br>- recording, representing and interpreting data before and after manipulating variables such as water, sunlight, temperature (See Mathematics curriculum)<br>- making models, charts and booklets<br>- building definitions<br>- *first knowledge of the plant kingdom* reading |

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| | Build a first knowledge of the functions of the parts of plants e.g. plants and the nitrogen cycle, plants and the water cycle, roots and erosion, the leaf as a food factory/photosynthesis/making oxygen<br><br>Explore variations in the parts of plants: types of leaves, roots, stems, flowers, fruits, and seeds | and sorting games and exercises<br>- *first classification of the plant kingdom:* lessons, exercises, independent work<br>- *needs and functions of plants:* demonstrations, experiments, independent work<br>- classification of the parts of plants: demonstrations, experiments, observation, independent work<br>- *going out*, excursions and guest speakers, *Bush Care* projects<br>- botanical drawing<br>research projects e.g. one particular plant, the plants in a particular place such as the backyard, the park, a gully, a creek.<br>Resources include:<br>- *first knowledge of the plant kingdom 'Who am I?'* pictures, labels, descriptions, question cards<br>- *first classification of the plant kingdom* demonstrations and exercises the *timeline of life*<br>- botany charts: *needs of the plant*<br>- botany charts: *leaf, root, stem, flower, fruit, seeds*<br>- classification material: pictures, labels, cards, definitions, booklets<br>- plant specimens<br>- reference and research materials (paper-based, digital, web-based, multimedia). |
| **The animal kingdom: kinds, parts, functions** | Observe and build knowledge of a variety of animals<br><br>Build first knowledge of Australian animals (native, domestic and exotic/feral), particularly in the local environment<br><br>Build awareness of the relationships between animals and humans e.g. useful, harmful<br><br>Identify the external parts of vertebrates<br><br>Gain understanding of the classification of animals: *monera, invertebrates, vertebrates*<br><br>Build a first knowledge of the five classes of vertebrates<br><br>Build first knowledge of the functions of internal parts of vertebrates<br><br>Build first knowledge of the external and internal parts of invertebrates<br><br>Discover links between the system for animal classification and the evolution of animals | Activities include:<br>- *how to* lessons for caring for classroom pets safely and in accord with animal welfare guidelines<br>- demonstrations<br>- drawing and recording<br>- making models, charts and booklets<br>- *first knowledge of the animal kingdom* reading and sorting games and exercises<br>- *first classification of the animal kingdom* demonstrations and exercises<br>- demonstrations, lessons, observations, reading and labelling games to explore the external and internal parts of vertebrates and invertebrates<br>- *going out,* excursions and guest speakers<br>- student presentations, factual and creative writing<br>- research projects e.g. particular animals, animals living in a particular place such as the backyard, a rock pool, a farm.<br><br>Resources include:<br>- *first knowledge of the animal kingdom 'Who am I?'* pictures, labels, descriptions, question cards<br>- *first classification of the animal kingdom* |

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| | | charts and card material<br>- *external and internal parts of animals* pictures, labels, cards, booklets and definitions<br>- the *timeline of life*<br>- live animals<br>- reference and research materials (paper-based, digital, web-based, multimedia). |
| **The vital functions of living things** | Develop language to discuss the vital functions of living beings: *element, atom, molecule, cell, photosynthesis*<br><br>Compare vital functions of different classes of plants and animals including:<br>- preserving life/building new cells: *respiration, nutrition, circulation*<br>- preserving life/relating to the outside: *support/skeleton, sensation, movement*<br>- preserving the species: *reproduction, protection of the young* | Activities include:<br>- *comparative study of vital functions* story, demonstrations, activities<br>- reading, labelling and sorting activities<br>- building an array of moveable material to compare vital functions<br>- *going out,* excursions and guest speakers<br>- student presentations, factual and creative writing<br>- research projects.<br>Resources include:<br>- *vital functions* card material and chart<br>- all materials for exploring the kinds, parts and functions of living things<br>- reference and research materials (paper-based, digital, web-based, multimedia). |

## History, Geography and Science Curriculum for Children Aged Nine to Twelve Years

| Content Strand | Knowledge, Skills and Understandings | Activities and Resources |
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| | *Typically children will:* | |
| Time | | |
| Time: extension | Complete, review, consolidate and extend knowledge of time covered in curriculum for children aged from six to nine years:<br>- hours, minutes, seconds<br>- telling the time: analogue/digital; 12-hour/24-hour<br>- days, weeks, months, years<br>- decades, centuries, eras<br><br>Review knowledge of links between passage of time and the revolution and rotation of the Earth:<br>- am/pm<br>- time zones<br>- seasons | Activities include:<br>- activities to consolidate ability to keep track of and record the passing of time covered in the six to nine curriculum<br>- activities to increase automaticity, speed and accuracy with telling, reading and recording the time using a variety of time-keeping methods<br>- activities to build skills in reading a range of different types of timetables and itineraries<br>- activities to build skills with using knowledge of time to plan and record work, experiences, experiments, field trips e.g. work diaries, project timelines, journals<br>- *grace and courtesy* lessons and discussions to consider planning and punctuality<br>- designing timelines for different time scales e.g. hours, days, weeks, months, years, decades, centuries, eras<br>- research projects related to time e.g. the relation between time and space, use of time in navigation and astronomy, researching and building models of different time-keeping devices.<br><br>Resources include:<br>- watches and clocks<br>- journals and diaries<br>- materials in the environment<br>- reference and research materials (paper-based, digital, web-based, multimedia). |
| The great fable of evolution | Explore what the unfolding history of evolution has to teach us:<br>- as species grow more abundant and powerful, they do not necessarily increase in intelligence<br>- less powerful species that are more adaptable and/or intelligent, and with the strongest instinct to protect others, survive the difficult times<br><br>Identify significant evolutionary transitions:<br>- from water to land (plants): algae, lichen, roots for water, leaves for food from sunlight, forests to make oxygen, development of pollen/fruit/flowers<br>- from water to land (animals): gills to lungs, fins to legs, amphibians to reptiles to birds and mammals with feathers and fur, | Activities include:<br>- the *time line of life (2nd level)* presentation and discussion<br>- model-making, artwork, spoken presentations, debates, factual and creative writing, drama<br>- research projects e.g. the rise and fall of different life forms, study of a particular era or age, Charles Darwin, the Wallace line, the evolution of particular plants and/or animals.<br><br>Resources include:<br>- the *timeline of life*<br>- manipulable pictures and labels, charts, models<br>- reference and research materials (paper-based, digital, web-based, multimedia). |

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| | societies of insects<br>- from small to large needing support (shell to exoskeleton to skeleton with spinal column)<br>- enlargement at top of spinal column to brain<br>- development of senses and circulation system with a heart e.g. fish | |
| **The significance of the coming of humans** | Review, consolidate and extend the overview of human history covered in the curriculum for children from six to nine years<br><br>Extend exploration of the relation between geology, climate and the development of early humans and their societies (glacial and interglacial periods)<br><br>Identify distinguishing human features:<br>- erect posture, free hands and opposable thumbs, language, small teeth, developed brain<br>- can only be human if they live in a human community<br>- ability to reflect on the past (i.e. study history) and to work for the future<br>- a conscience i.e. the ability to love, be concerned for and work for others, even those they might never meet<br><br>Compare evolution of specialised organs in animals to adapt to particular environments and the evolution of specialised activities in humans to adapt to many environments (forest, plain, coast, mountain, river, valley; cold, temperate, hot)<br><br>Trace the evolution and development of early humans in more detail: Australopithecus, *homo habilis*, *homo erectus*, Neanderthal, Cro-Magnon and modern humans<br><br>Build an overview of human history from the Palaeolithic to the present<br><br>Trace the evolution and development of human activities: tools, fire, art, clothing, hunting and gathering, shelter, settlement and farming<br><br>Discuss the responsibilities that come with the expansion of human knowledge and power over the earth and the recognition that all non-living and living phenomena are interdependent | Activities include:<br>- review and extension of the great story: *the significance of the coming of humans*<br>- building a framework for studying the activities and achievements of human communities from early humans to the present<br>- discussing the significance and role of humans on the Earth e.g. comparing natural phenomena and human structures and accomplishments; the responsibility of humans to use resources sustainably and to care for plant and animal life; ways humans can work with the environment in harmony with nature<br>- *going out*, excursions and guest speakers<br>- making timelines, charts and models, artwork<br>- spoken presentations, debates, factual and creative writing, drama<br>- research projects e.g. the evolution of the human hand, primates (society, tool use, communication), human origins in Africa, early tools and discoveries, what it means for humans to live sustainably (e.g. representing and comparing population and resource use data to identify trends and critical variables, and their effects)<br><br>Resources include:<br>- *fundamental needs of humans* charts 1, 2<br>- *timeline of humans*<br>- *timeline of the hand*<br>- *timeline of inventions*<br>- *chart of interdependencies*<br>- card material<br>- reference and research materials (paper-based, digital, web-based, multimedia). |

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| **Society and civilization (2nd level)** | Explore the rise and fall of human civilisations<br><br>Consider questions raised by the study of human history, including:<br>- *What is history?* e.g. people and events of the past; both joy and sorrow<br>- *What do we study when we study history?* e.g. change and how it effects people<br>- *What do historians use for evidence?* e.g. objects, graphic and written records<br>- *Why do we read and write biographies?* e.g. to learn about people who shaped the past and influence the present<br>- *Why do we study history?* e.g. to understand how the past shapes the present and influences the future; to understand our country and our world<br><br>Consider questions raised by the study of each human civilisation, including:<br>- *Why did the civilisation thrive in that location?* e.g. temperate climate, near a body of water, fertile soil<br>- *Why did the civilisation fall?* e.g. natural disaster, famine and disease, poor use of resources, climate change, conflict and corruption<br><br>Use the *history question* charts to guide/scaffold the study of a society or civilisation:<br>- environment<br>- tools and activities<br>- culture<br>- relations between people within the society and with other societies<br><br>Recognise the Aboriginal peoples of Australia as the oldest civilisation in the world today<br><br>Explore the civilisation and culture of Torres Strait Islander peoples<br><br>Explore great civilisations of the past including the civilisations of the Pacific, India, China, the Americas (Inuit, native American, Mayan, Toltec, Inca, Aztec, Olmec) Mesopotamia (Sumeria, Babylon, Assyria), Egypt, Phoenician, Hebrew, Persian, Greek, Roman | Activities include:<br>- presentations: *time line of civilisations (2nd level); three phases of history*; using the *history question* charts to guide/scaffold research into different civilisations<br>- making timelines of particular civilisations, charts and models, artwork<br>- student presentations, discussions and debates, factual and creative writing, drama<br>- *going out*, excursions and guest speakers<br>- research projects e.g. in-depth study of one society or civilisation past or present.<br><br>Resources include:<br>- *fundamental needs of humans* charts 1 and 2, and card material<br>- *timeline of millennia*<br>- *timeline of civilisations* (from 4,000 BC)<br>- *timeline of Indigenous Australians*<br>- *history question* charts<br>- *people of different zones* chart<br>- *artefacts*<br>- reference and research materials (paper-based, digital, web-based, multimedia). |

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| **Migration** | Study the movement of humans across the globe over time<br><br>Explore the impact of migration on human history | Activities include:<br>- demonstrations and lessons; *three phases of history, migration charts*<br>- making charts and maps of the migration of particular peoples, artwork and models<br>- student presentations, discussions and debates, factual and creative writing, drama<br>- *going out*, excursions and guest speakers e.g. Indigenous Australian speakers, members of different communities, museum visits<br>- research projects e.g. migration to the Australian continent/Oceania region at different times in history, population data, statistics, trends and effects across time and place<br><br>Resources include:<br>- *fundamental needs of humans* charts 1 and 2, and card material<br>- *timeline of millennia*<br>- *timeline of civilisations* (from 4,000BC)<br>- *history question* charts<br>- *migration* charts<br>- reference and research materials (paper-based, digital, web-based, multimedia). |
| The study of Australia | | |
| **Australia's position on the earth** | Review, consolidate and extend knowledge of Australia's position on the earth:<br>- hemisphere<br>- latitude and longitude<br>- climate zone<br><br>Build knowledge of Australia as a land mass on the earth:<br>- largest island/smallest continent<br>- oceans and seas<br><br>Build knowledge of Australia's region: Oceania<br><br>Build knowledge of Australia's neighbours: New Zealand, New Guinea, East Timor, Indonesia, Antarctica, nations of the Pacific | Activities include:<br>- lessons, demonstrations and discussions<br>- *going out*, excursions and guest speakers<br>- making maps, posters, artwork, models and booklets<br>- research projects, student presentations, factual and creative writing.<br><br>Resources include<br>- maps and models<br>- reference and research materials (paper-based, digital, web-based, multimedia). |
| **Australian physical geography** | Review, consolidate and extend knowledge of Australia's physical geography:<br>- coastline: *seas, coasts*<br>- land and water forms: *islands/lakes, peninsulas/gulfs, straits/isthmuses; capes/bays; archipelagos/chains of lakes*<br>- high country: *mountains, ranges, tablelands*<br>- low country: *valleys, plains*<br>- inland water: *rivers (origins and systems), lakes* | Activities include:<br>- demonstrations and lessons<br>- *going out*, excursions and guest speakers<br>- making maps, posters, artwork and models<br>- research projects, student presentations, factual and creative writing.<br><br>Resources include<br>- maps, models, photographs<br>- reference and research materials (paper-based, digital, web-based, multimedia). |

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| **Australian political geography** | Review, consolidate and extend knowledge of Australia's political geography:<br>- states, capitals and borders<br>- region and neighbours<br>- emblems and symbols<br>- money, stamps | Activities include:<br>- demonstrations and lessons<br>- *going out*, excursions and guest speakers<br>- making maps, posters, artwork and models<br>- research projects, student presentations, factual and creative writing.<br><br>Resources include<br>- maps, models, photographs<br>- reference and research materials (paper-based, digital, web-based, multimedia). |
| **Australian economic geography** | Review, consolidate and extend knowledge of how Australians have met their spiritual needs, past and present:<br>- culture/arts<br>- religion<br>- adornment/decoration<br><br>Review, consolidate and extend knowledge of how Australians have used, valued and managed natural resources from the mineral, plant and animal kingdoms to meet their material needs, past and present: food, clothing, housing, transport, defence<br><br>Build knowledge of how Australians have used, valued and managed natural resources to build infrastructure and industry:<br>- roads and railways<br>- tunnels and passes<br>- harbours and ports<br>- waterways and dams<br>- agriculture<br>- mining and energy<br>- manufacturing<br><br>Design and make goods using Australian natural resources | Activities include:<br>- demonstrations and lessons<br>- *going out*, excursions, conducting interviews, writing letters, listening to guest speakers<br>- making maps, posters, artwork and models<br>- research projects, student presentations, factual and creative writing<br>- individual and group projects in which students design and make goods using natural resources.<br>- applying knowledge of money (See Mathematics curriculum) to content covered in Economic Geography activities as relevant<br>- measuring distance and area as needed (See Measurement and Geometry and curriculum) and recording, representing and interpreting data (See Mathematics curriculum)<br><br>Resources include<br>- *economic geography* card materials<br>- artefacts and natural materials<br>- maps, models, photographs<br>- reference and research materials (paper-based, digital, web-based, multimedia). |

| The study of the world | | |
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| **Study of countries other than Australia** | Build knowledge and understanding of other countries in the world, using the following headings as a guide/scaffold:<br>- position on the earth<br>- physical geography<br>- political geography<br>- economic geography | Activities include:<br>- demonstrations and lessons<br>- *going out*, excursions, conducting interviews, writing letters, listening to guest speakers<br>- making maps, posters, artwork and models<br>- research projects e.g. studying one country in depth; comparing two or more contrasting or similar countries using one or more headings<br>- student presentations, factual and creative writing.<br><br>Resources include<br>- *economic geography* card materials<br>- artefacts and natural materials<br>- maps, models, photographs<br>- reference and research materials (paper-based, digital, web-based, multimedia). |
| **Study of the United Nations** | Build knowledge and understanding of the United Nations, its structure, its agencies and the work of the UN in aid work, food security, development, emergency relief and peace-keeping<br><br>Build knowledge and understanding of other international organisations, both government and non-government, in fields such as aid and development, trade, culture, defence and sport<br><br>Consider relations between nations:<br>- world powers<br>- developed and developing nations<br>- treaties (bilateral, multilateral, international)<br>- effects of one nation's actions on other nations | Activities include:<br>- demonstrations and lessons<br>- *going out*, excursions, conducting interviews and guest speakers<br>- making maps, posters, artwork and models<br>- debates and discussions<br>- research projects e.g. studying one or more agencies or organisations in depth (e.g. Commonwealth of Nations, Pacific Islands Forum, ASEAN, EU); compare and evaluate two or more organisations that work in the same field; find out how children in developing nations meet their fundamental needs<br>- review and interpret data provided by the UN and its agencies as relevant to project work (See Mathematics curriculum)<br>- student presentations, factual and creative writing.<br><br>Resources include<br>- reference and research materials (paper-based, digital, web-based, multimedia). |
| **The study of Australian history and society** | | |
| **Australian history** | Review, consolidate and extend knowledge of the pre-history, history and achievements of Indigenous Australians on the Australian continent and in the Torres Strait Islands<br><br>Extend knowledge of key periods, events and people in Australian history, and their significance:<br>- Indigenous Australia (pre-contact, first | Activities include:<br>- demonstrations, lessons, activities and exercises to introduce topics<br>- making timelines of Indigenous Australia, Australia since European settlement, Australia since Federation<br>- making models, maps, charts and artwork |

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| | contact, since European settlement)<br>- European voyages of discovery<br>- early contact between Europeans and Indigenous Australians<br>- early settlement: European/British, non-European settlers e.g. Afghan, Chinese<br>- colonial period: convicts, Indigenous Australians, women and children, explorers, squatters, bushrangers, agriculture, gold rush. Shearer's strike<br>- period since Federation: world wars, the depression, post-war migration, technological change, land rights and reconciliation, Australia in the 21st century<br>- influential and famous Australians, past and present<br><br>Extend knowledge of the natural resources used by Australians to meet their fundamental needs over time, as well as the impact of that use on the Australian environment | - activities to extend knowledge of primary sources and what counts as evidence in Australian history<br>- experimenting with ways Australians of all cultures past and present used/use natural resources e.g. to meet spiritual needs (dot painting and using ochres, ceremonies and story-telling, making and playing musical instruments;) and material needs (making and throwing a boomerang; weaving containers with grass; making a cabbage tree hat or plaited belt, inventions such as the stump-jump plough, Coolgardie safe, Hills Hoist; gold-panning; shearing)<br>- reading/viewing cultural works related to Australian history e.g. poetry, stories, films<br>- student presentations, discussions, debates and drama; dance, singing and music-making<br>- factual and creative writing, art work, multimedia composition e.g. historical recounts and biographies<br>- *going out*, excursions and guest speakers<br>- research projects.<br><br>Resources include:<br>- Australian history timeline<br>- age-appropriate Australian literature e.g. Henry Lawson, Ruth Park, Oodgeroo Noonuccal, Nadia Wheatley<br>- *fundamental needs of humans* charts 1 and 2, and card material<br>- *timeline of millennia*<br>- *timeline of Indigenous Australians*<br>- *timeline of civilisations* (from 4,000BC)<br>- *history question* charts<br>- *migration* charts<br>- *economic geography* card materials<br>- artefacts and natural materials<br>- reference and research materials (paper-based, digital, web-based, multimedia). |
| **Australian citizenship** | Extend understanding of the responsibilities of living in a community and society: co-operation, communication, leadership<br><br>Link appreciation of the nation of Australia and the rights, responsibilities and privileges of Australian citizens to own actions, activities and future<br><br>Build first knowledge of the Australian Constitution: history, function, constitutional change and referenda<br><br>Extend knowledge of the three tiers of | Activities include:<br>- story of *the great river*<br>- lessons and activities relating to Australian citizenship, the three tiers of Australian government, making laws, social institutions e.g. hospitals and emergency services, police and courts, different types of schools<br>- drawing, model-making, factual and creative writing, biography<br>- discussions, debates and drama<br>- class meetings; mock elections; mock trials; mock parliaments<br>- dramatising the making of a law and a |

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| | Australian government: local, state and Commonwealth<br><br>Build knowledge of how laws are made, changed, implemented and enforced (legal and judicial systems)<br><br>Explore the role and structure of social institutions in Australia<br><br>Explore the role of a range of voluntary organisations<br><br>Study people who have made a significant contribution to Australian society, past and present | trial<br>- *going out*, excursions and guest speakers e.g. local members (state and federal), local council members, visits to parliament (state or federal) or council chambers, visits to courts and other social institutions, contacts with voluntary organisations<br>- participating in community events and community service; projects related to social justice<br>- research projects<br>- review and interpret data provided by Australian government agencies (e.g. ABS) as relevant to project work (See Mathematics curriculum), e.g. relative size and population of electorates; relation between provision of services and population; effects of policy change<br><br>Resources include:<br>- the *great river* chart<br>- Australian history timeline<br>- *history question* charts<br>- reference and research materials (paper-based, digital, web-based, multimedia). |
| The Earth | | |
| **Map reading and making** | Review, consolidate and extend skills in compass and map reading<br><br>Review, consolidate and extend map-making skills<br><br>Review, consolidate and extend skills in drawing plans<br><br>Review, consolidate and extend knowledge of longitude, latitude and degrees | Activities include:<br>- demonstrations and lessons: *the story of direction*<br>- compass reading exercises and projects; making a compass<br>- using the sky to navigate (sun and stars)<br>- map-making exercises and projects; using and extending *the map-maker's alphabet*, designing keys<br>- reading a scale and drawing to scale (*How big is it? How far is it?*)<br>- drawing plans and building models of increasing complexity e.g. street maps, plans of rooms and buildings, plans of models<br>- measuring mountains and representing them on paper<br>- reading and drawing contour lines, large scale ordinance survey maps<br>- *going out*, excursions and guest speakers<br>- research projects e.g. history of cartography and navigation, mapping projects, orienteering.<br><br>Resources include:<br>- relief maps, atlas, different types of maps, street directories<br>- different types of compasses<br>- equipment for making maps |

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| | | - reference and research materials (paper-based, digital, web-based, multimedia). |
| **Universe, solar system and the earth: 2nd level** | Review, consolidate and extend knowledge of the formation of the universe and solar system covered in the curriculum for six to nine year olds, including:<br>- forces that shape the universe: attraction, centrifugal and centripetal, inertia, gravity, friction<br>- the structure of matter: atoms and molecules; elements and compounds; mixtures, suspensions and solutions; structure of crystals<br>- types of energy: solar, kinetic, mechanical, chemical, nuclear, and their production<br>- transfer of energy e.g. heat to mechanical energy<br>- magnetism and electricity<br><br>Review, consolidate and extend knowledge of the Solar System covered in the curriculum for six to nine year olds, including:<br>- the sun and other stars<br>- the relative size of the earth in the Universe and Solar System<br>- the Sun's family: planets, moons, asteroids, comets<br><br>Review, consolidate and extend knowledge of the formation of the earth covered in the curriculum for six to nine year olds, including<br>- cooling of the earth<br>- formation of the oceans<br>- erosion<br>- three states of matter; density<br>- composition and layers of the earth<br>- tectonic plates; continental drift<br>- volcanoes and earthquakes<br><br>Review, consolidate and extend knowledge of the surface of the earth (lithosphere; *the mineral kingdom*) covered in the curriculum for six to nine year olds, including<br>- stratification of rocks<br>- mountain building: folding, faults, fractures<br>- classification of rocks, crystals and gems | Activities include:<br>- demonstrations and lessons with charts, models and experiments<br>- *going out*, excursions and guest speakers<br>- observations and record-keeping<br>- growing crystals, making rocks<br>- independent research projects<br>- artwork, making models and charts, drama<br>- making simple machines and circuits<br>- student presentations<br>- factual and creative writing<br>- measuring volume, mass, temperature and extend to learning about measurement of force and energy<br>- recording observations and measurements and representing and interpreting data (See Mathematics curriculum)<br><br>Resources include:<br>- geography charts<br>- equipment for demonstrations and experiments<br>- reference and research materials (paper-based, digital, web-based, multimedia). |
| **Solar energy and the Earth: 2nd level** | Review, consolidate and extend knowledge of the effects of the sun on the earth covered in the curriculum for children aged from six to nine years, including:<br>- sunlight absorbed, stored and dispersed by the earth<br>- the rays of the sun falling on the earth at different angles (perpendicular and oblique)<br>- the effect of the atmosphere on the sun's rays | Activities include:<br>- demonstrations and lessons with charts, models and experiments<br>- *going out*, excursions and guest speakers<br>- independent research projects<br>- observations and record-keeping e.g. measuring temperature, distance and angles, recording observations and measurements, and representing and interpreting data (See Mathematics |

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| | | curriculum)<br>- artwork, making models and charts, drama<br>- student presentations<br>- factual and creative writing.<br><br>Resources include:<br>- geography charts<br>- equipment for demonstrations and experiments<br>- reference and research materials (paper-based, digital, web-based, multimedia). |
| **Movement of the earth: 2nd level** | Review, consolidate and extend knowledge of the effects of the movement of the earth covered in the curriculum for children aged from six to nine years, including:<br>- the revolution of the Earth around the sun<br>- the rotation of the Earth tilted on its axis<br>- night and day; hottest and coldest parts of the day<br>- time zones: longitude<br>- seasons<br>- latitude and the five parallels: *Equator, Tropics of Cancer and Capricorn, Arctic and Antarctic circles*<br>- temperature zones and climate | Activities include:<br>- demonstrations and lessons with charts, models and experiments<br>- *going out*, excursions and guest speakers<br>- independent research projects<br>- observations, measurements, record-keeping, representing and interpreting data (see Mathematics curriculum)<br>- artwork, making models and charts, drama<br>- student presentations<br>- factual and creative writing.<br><br>Resources include:<br>- geography charts<br>- equipment for demonstrations and experiments<br>- reference and research materials (paper-based, digital, web-based, multimedia). |
| **The work of air: atmosphere and wind** | Build knowledge and understanding of atmospheric phenomena, including:<br>- air pressure<br>- how wind is formed and wind systems<br>- sea and land breezes<br>- the effect of the atmosphere on the earth's temperature<br>- planetary winds<br><br>Build knowledge and understanding of the work of the wind, including:<br>- planetary winds and ocean currents<br>- how waves are formed<br>- wind erosion | Activities include:<br>- demonstrations and lessons with charts, models and experiments<br>- *going out*, excursions and guest speakers<br>- independent research projects<br>- observations, measurements, record-keeping, representing and interpreting data (see Mathematics curriculum)<br>- artwork, making models and charts, drama<br>- student presentations<br>- factual and creative writing.<br><br>Resources include:<br>- geography charts, including *work of the air* charts<br>- card material<br>- equipment for demonstrations and experiments<br>- reference and research materials (paper-based, digital, web-based, multimedia). |

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| **The work of water** | Build knowledge and understanding of the work of water, including:<br>- how rain is formed<br>- clouds<br>- snow and hail<br>- dew, frost and fog<br>- rivers: the origin of rivers, the life of a river, waterfalls, river mouth; rivers of the world; actions of a river<br>- caves: stalactites and stalagmites<br>- water erosion<br>- valleys and canyons<br>- plains<br>- formation of earth pillars<br>- lakes; underground water<br>- destruction of rocks<br>- the work of ice: freezing and thawing<br>- glaciers, glacial valleys, moraines<br>- the water cycle<br>- water and plants | Activities include:<br>- demonstrations and lessons with charts, models and experiments<br>- observing and recording temperature, rain and wind direction; graphing temperature and other data, and comparing trends, variables and effects (see Mathematics curriculum)<br>- reading and making weather maps<br>- making snow flakes, clouds<br>- making a model of a river<br>- artwork, making models and charts, drama<br>- student presentations<br>- factual and creative writing<br>- *going out*, excursions and guest speakers<br>- independent research projects.<br><br>Resources include:<br>- geography charts, including *work of the water* charts, including river and erosion charts, water cycle and weather charts<br>- card material<br>- equipment for demonstrations and experiments<br>- reference and research materials (paper-based, digital, web-based, multimedia). |
| **Economic geography: the work of humans** | Review, consolidate and extend knowledge of economic geography covered in the curriculum for children aged from six to nine, including:<br>- interdependency of all humans<br>- natural resources: non-renewable and renewable<br>- production and consumption; cost of living<br>- imports and exports<br>- movement of products: world trade; balance of trade<br>- movement of peoples: migration, refugees<br><br>Build knowledge of current social and economic problems and opportunities, for example:<br>- poverty and unemployment<br>- social and economic reform<br>- new and emerging technologies; the effects of technological change<br>- global communication<br>- resources: non-renewable, renewable, sustainable<br><br>Undertake an enterprise: design, make and market a product<br><br>Study in detail a person, past or present, whose life's work has been significant or influential | Activities include:<br>- demonstrations and lessons with charts and models e.g. *great river, chart of interdependencies*<br>- *going out*, excursions and guest speakers<br>- independent research projects<br>- making models, charts and timelines<br>- collecting data, making graphs and other visual data displays for interpretation (see Mathematics curriculum)<br>- student presentations and dramatic performances<br>- factual and creative writing, biography<br>- designing, making and marketing a product<br>- community service.<br><br>Resources include:<br>- *chart of interdependencies*<br>- economic geography card material<br>- the *great river* chart<br>- maps and graphs<br>- project timeline<br>- reference and research materials (paper-based, digital, web-based, multimedia). |

| Biology | | |
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| **The plant kingdom: botany** | Review, consolidate and extend knowledge of classification, parts and functions of plants<br><br>Explore and build understanding of the vital functions of plants:<br>- preserving life/building new cells: needs of plants, nutrition, transforming non-living to living, plants and water, roots and their growth, circulation of nutrients and water, transpiration, plants and the sun<br>- preserving life/relating to the outside: plant sensitivity to light, water, gravity and heat; ways plants 'travel', how plants attach themselves<br>- preserving the species: ways plants reproduce; ways seeds travel<br><br>Extend knowledge of plant evolution and adaptation<br><br>Understand the importance of plants in the web of life (ecology): providing food and oxygen, preventing erosion<br><br>Respect and value the gifts plants give humans: converting the sun's energy into food, restoring and protecting the atmosphere and soil, shade, material for building, clothing and heating, beauty, renewable resource | Activities include:<br>- applying knowledge of plants (classification, parts, functions) to gardening and horticulture experiments and projects<br>- demonstrations, observations, measurements and experiments<br>- collecting data, making graphs and other visual data displays for interpretation (see Mathematics curriculum)<br>- exploring the functions of plants in more detail<br>- building layouts with card material<br>- dissecting plants, labelling parts, recording<br>- botanical drawing and diagrams<br>- making models, charts and booklets<br>- building definitions<br>- *going out*, excursions and guest speakers e.g. botanic gardens, herbarium, farm<br>- student presentations, drama<br>- factual and creative writing<br>- research projects e.g. plants in zones/ regions of the earth (arid, temperate, tropical, rainforest, savannah, arctic)<br>- special projects including bush care and bush regeneration, building a vegetable or native garden, building a terrarium, growing and preserving fruit, flowers or grains/seeds, preparing meals with own produce.<br>Resources include:<br>- botany charts, card material, pictures, labels, definitions and booklets (classification, parts and function)<br>- *vital functions* card material and charts<br>- plant specimens<br>- reference and research materials (paper-based, digital, web-based, multimedia). |
| **The chemistry of the plant** | Review:<br>- knowledge of the three kingdoms of nature (mineral, plant and animal)<br>- the needs of plants<br><br>Build first knowledge of chemistry:<br>- the formula and structure of a molecule<br>- the *alphabet of the universe* (periodic table)<br><br>Apply knowledge of chemistry to plants and their functions:<br>- making food (from minerals to proteins)<br>- nitrogen cycle<br>- photosynthesis | Activities include:<br>- demonstrations and lessons with charts and specimens<br>- building molecules with concrete material and notating the formulae<br>- exploring the elements of the periodic table, their characteristics and ways of combining into molecules<br>- applying knowledge of chemistry to the notation of chemical processes relevant to plants<br>- building definitions and formulae<br>- *going out*, excursions and guest speakers<br>- student presentations, drama<br>- factual and creative writing<br>- research projects e.g. the carbon cycle |

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| | | and climate change.<br><br>Resources include:<br>- *vital functions* card material and chart<br>- *periodic table* chart and card material<br>- plant specimens<br>- microscope<br>- manipulable concrete material for constructing models of molecules<br>- dissecting and drawing equipment<br>- reference and research materials (paper-based, digital, web-based, multimedia). |
| **The animal kingdom: zoology** | Review, consolidate and extend knowledge of classification, parts and functions of animals:<br>- invertebrates: *porifera, coelenterates, worms, molluscs, arthropods, echinoderms, cephalochordates and chordates*<br>- vertebrates<br><br>Review, consolidate and extend knowledge of the vital functions of animals:<br>- review the vital functions of animals<br>- preserving life/building new cells: respiration, nutrition, circulation<br>- preserving life/relating to the outside: locomotion, sensation<br>- preserving the species: reproduction, protection of young<br><br>Trace the evolution of each vital function, and the development of specialist organs, from protozoa to mammal<br>Understand the importance of animals in the web of life (ecology): food chain, roles in different environments, biodiversity<br><br>Respect and value the gifts animals give humans: fertilise the soil, food, companionship, beauty | Activities include:<br>- applying knowledge of animals (classification, parts, functions) to the care and well being of animals<br>- observation to explore the functions of animals in more detail<br>- building layouts with card material<br>- learning how to dissect animals or animal parts (invertebrates, fish, frog, chicken, rat, ox heart), labelling parts and recording<br>- drawing and diagrams<br>- making models, timelines, charts and booklets<br>- building definitions<br>- *going out*, excursions and guest speakers e.g. zoo, farm, veterinary clinic<br>- student presentations, drama<br>- factual and creative writing<br>- research projects e.g. animals in a particular zone or region of the earth (arid, temperate, tropical, rainforest, savannah, arctic)<br>- special projects including care of pets and native animals, organisations concerned with the welfare of animals (WIRES, RSPCA, animal refuge), protected endangered species, keeping domestic animals for food or clothing, spinning wool from different mammals.<br><br>Resources include:<br>- zoology charts, card material, pictures, labels, definitions and booklets (classification, parts and function)<br>- *timeline of life*<br>- *vital functions* card material and chart<br>- live animal (if humane)<br>- dissecting and drawing equipment<br>- reference and research materials (paper-based, digital, web-based, multimedia). |

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| **Chinese boxes and Tree of Life** | Expand knowledge of the plant and animal kingdoms to cover the five kingdoms of life:<br>- monera<br>- protista<br>- fungi<br>- plant<br>- animal<br><br>Build knowledge of cells: types and parts<br><br>Study a plant in detail<br><br>Study an animal in detail<br><br>Consolidate and extend knowledge of ecology and ecosystems, including:<br>- water, carbon and nitrogen cycles<br>- ecosystems: interrelations between light, heat, humidity, soil quality<br>- food chains and food webs<br>- environmental threats and opportunities: pollution, climate change, sustainability, biodiversity | Activities include:<br>- demonstrations and building layouts with card material<br>- activities and exercises with *Chinese Boxes* card material and charts<br>- linking *Chinese Boxes* to *Tree of Life*<br>- activities and exercises *Tree of Life* card material and charts<br>- observations and experiments<br>- using a microscope and learning about units of microscopic measurement<br>- drawing and diagrams, labelling parts<br>- making models, charts and booklets<br>- *going out*, excursions and guest speakers<br>- student presentations, drama<br>- factual and creative writing<br>- detailed studies and research projects.<br><br>Resources include:<br>- *Chinese Boxes* card material and charts<br>- *Tree of Life* card material and charts<br>- *chart of interdependencies*<br>- microscope and related equipment<br>- reference and research materials (paper-based, digital, web-based, multimedia). |
| **Human physiology** | Extending knowledge and understanding of the external parts of the human body and their functions<br><br>Building knowledge of the internal parts of the human body:<br>- organs<br>- systems<br><br>Using vital functions as a guide/scaffold for studying human physiology:<br>- preserving life/building new cells: *respiration, nutrition, circulation*<br>- preserving life/relating to the outside: *locomotion, sensation*<br>- preserving the species: *reproduction, protection of young*<br><br>Apply knowledge of human physiology to healthy living and personal development | Activities include:<br>- locating humans in the system for classifying animals<br>- *the great river*: story, chart and card materials<br>- demonstrations and experiments<br>- observing and measuring vital functions e.g. growth (mass and height), pulse rate before and after exercise; energy in food (measured in calories) (see Measurement and Geometry curriculum); record-keeping, displaying and interpreting data; identifying trends, variables and effects (see Mathematics curriculum)<br>- drawing and diagrams, labelling parts<br>- making models, charts and booklets<br>- *going out*, excursions and guest speakers e.g. health professionals<br>- student presentations, drama<br>- factual and creative writing<br>- applying knowledge of human physiology to own health and personal development e.g. nutrition, exercise, sleep, hygiene, eye health, reproductive health (including puberty and sex education), preventative health (including drug and alcohol education); the needs of human infants; first aid; life-saving awards; mental health<br>- research projects e.g. detailed study of an organ or system. |

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| | | Resources include:<br>- the *great river* chart and card material<br>- equipment for experiments<br>- reference and research materials (paper-based, digital, web-based, multimedia). |

# Creative Arts

## Overview

The Montessori classroom provides every child with opportunities to build knowledge, understanding and skills in all areas of the arts, including visual art, music, drama and dance. The primary goal of creative arts education is the aesthetic development of the student. In other words, this area of the curriculum nurtures the expression of creative ideas, while at the same time building knowledge and understanding of aesthetics as a discipline recognised in the wider culture to guide the development and execution of creative ideas. As with the exercises of *practical life*, creative arts activities begin with the music, art, dance and drama that is part of the culture of the country, region or community in which the school is located. Creative arts also become integrated and interrelated with other curricular areas, including language and mathematics, history and geography, as well as biology and the other sciences.

An essential ingredient in the creative process is the ability to concentrate, to immerse oneself in one's work. Children's ability to concentrate is strengthened through the use of materials and exercises offered at the moment of interest, a central component of Montessori pedagogy. Opportunities for independent work and repetition during blocks of uninterrupted time enable students to immerse themselves in creative arts projects alongside, or integrated into, their work in other areas of the curriculum.

The Montessori creative arts curriculum, as with other areas of the Montessori curriculum, are not 'worked through' in a rigid way. The curriculum is an expansive framework within which *key lessons* offer knowledge and skills needed for independent work. In creative arts the key lessons enable children to develop knowledge, understanding and appreciation, as well as the development of skills and techniques that enable then to follow their interests independently.

The Montessori approach to creativity is summarised by Dr Montessori (1965b: 289) in the following way, in this case, with reference to the teaching of visual arts:

> To confer the gift of drawing we must create an eye that sees, a hand that that obeys, a soul that feels; and in this task the whole of life must cooperate.

Similarly, in the context of the Montessori music curriculum, Miller (1996: 4) writes:

> The development of perception is enhanced through all of the Montessori educational materials. The control of the body and hand is enhanced through manipulation of materials, through the arrangement of the environment so that it calls for muscular control, and through specific movement exercises. This basic control of hand and body make possible the further refinement of movement necessary for the development of techniques which are needed for creative expression … Montessori activities are designed for the 'whole child' rather than just for the head, or just for the hands or just for the emotions.

The music curriculum includes the use of concrete materials through which children study the elements of music, including patterns of musical sound as well as musical notation and terminology. Building on this foundation, children develop knowledge and skill in composition and performance. In the same way children are given the opportunity to study the elements of visual art, language arts, drama and dance as a basis for future creative expression in these areas, In this way they build confidence in themselves as doers, thinkers and creators.

The key lessons of the creative arts curriculum, as much as possible, should be delivered by the classroom teacher. There are several reasons for using this approach. The use of specialist teachers interrupts the

extended work period and can inhibit spontaneous musical, artistic, dramatic or dance projects, because children are less likely to apply knowledge gained outside the classroom, from a specialist, to their own classroom work. Furthermore, when specialists are used, some children may feel they also must be 'a specialist' in order to undertake, for example, a simple musical project. Instead, children in Montessori classrooms are exposed to generalist teachers who exhibit confidence in undertaking any artistic study together with their students. In all this work, the purpose is to expose children to the arts, not to perfect techniques. Children whose interests are in perfecting techniques would need to pursue additional studies with private teachers. Specialist teachers, however, might at times be invited to the class to extend children's knowledge and skills in particular areas they wish to pursue in more detail or to a higher level. Specialists might also coordinate large group projects.

The creative arts curriculum outlined below covers a wide variety of strands and topics to enable children to pursue their own interests and abilities at their own pace. For this reason, curriculum documents for children aged from six to nine and for those aged from nine to twelve are the same. A lesson or presentation given at the younger level will be repeated and expanded at the older level, with the expectation that the older children will reach a higher level of achievement. As many of the elements of the content strands are interrelated, more than one area can be combined in a presentation with older children, for example, using household objects to print repeating patterns, using primary and secondary colours. This combines elements and principles of design, repetition, colour, pattern, variety, rhythm, with the technique of printing and the use of the medium of paint.

## Art Appreciation

Art appreciation is an important aspect of the Montessori creative arts curriculum. By looking at the artworks of others children see how others have created unique works using a range of knowledge, skills and techniques. Children are encouraged to think about and discuss why something is painted a particular way, or the historical events that might have influenced the artist and the work. This habit of talking about art also creates a positive climate and a language for discussing their own artworks. In addition, when children explore the artwork of others, they are more able to develop their own ideas and approaches, for example, by emulating the style, technique or feelings conveyed by an artist they have studied. Montessori art appreciation card materials allow children to learn about different artists and their works independently.

Excursions and *goings out* include visiting museums and art galleries, and attending a variety of performances. Professional artists are also invited to visit the classroom, to talk about and demonstrate their works, methods and ideas. These activities widen the children's view of the creative arts and expose them to different cultures and ideas.

The appreciation of the work of artists and designers spans all areas of the curriculum. Because all areas of the curriculum are presented to students in the context of the innovation and creativity of those whose ideas lie behind specific areas of knowledge and skill, students are encouraged, at relevant points in the delivery of the curriculum, to develop their own interest and skills in and critical appreciation of, for example:

- the representation of designs in nature (e.g. images or models from fields such as astronomy, geology, meteorology, botany, biology)
- the design of a science experiment or the solution of a mathematical problem
- the design of an exterior or interior space (e.g. landscaping and garden design, interior design of a new classroom)
- design based on geometric shapes, both 2D and 3D
- works of literature as verbal art
- the composition of works that combine multiple modes of communication and design, for example, presentations (paper-based and electronic); drama and film; graphic novels, cartoons and comics; video and digital works (e.g. websites and other online presentations).

## Visual Arts

The visual arts are integrated into the *Cosmic Education* curriculum because the natural and the human world are sources of inspiration for artistic expression, as described by Pottish-Lewis (2009:44) in the following way:

> The first source of beauty to which a human is exposed is the earth and its inhabitants, whether organic or inorganic. … The world is filled with special kind of aesthetic wonder: beauty surrounds us in the interaction of colour, line, shape and form: the colours of a sunset, the lines of the mountain tops, the shapes and forms created by canyons and hills, the geometric patterns on the shells of snails, the variety of corolla designs. Not only can we find beauty in the natural landscape, we can see it in buildings, bridges, buttresses, and many things that are the creation of the human's inventive mind.

In the Montessori view, educating the hand to draw and the eye to perceive and to make aesthetic judgements provides children with the skills needed to create their own visual art. Inspiration and artistic creation derive from both the development of mechanical technique and freedom of spirit. In Montessori classrooms prepared for children from six to twelve years old children participate in small and large group presentations in which they learn the basics elements and principles of the visual arts. They learn skills and techniques, and how to use a diverse array of media, as well as appreciation of art works relevant to the skill being taught. Each skill and technique is taught in isolation. Children are then given time to experiment with this skill alone, before creating works incorporating other skills and techniques. They are introduced to various art media and techniques in order that they may use it for their own creative expression rather than using it to duplicate someone else's creativity.

The Montessori classroom for children of this age includes an art area that is always available for the children to use. The material in the art area includes activities that isolate skills (e.g. motif design, wood carving, colour blending) and activities that allow for creativity using all the skills acquired in basic exercises. Through the exercises of practical life children are familiar with the routines involved in preparing and cleaning up art materials. Uninterrupted blocks of time allow children to complete artworks at their own pace and to their own satisfaction.

Montessori environments prepared for children aged from six to twelve have the atmosphere of a workshop. Materials for a variety of activities, including art materials, must be available at all times so that the children can integrate art activities into other activities across the spectrum of disciplines. Art activities are not organised as separate and individual activities, but in sets of related media and tools that the children must choose from according to the needs of the activity. Keeping the art materials in order requires cooperation between children and a high level of responsibility. This is very different from the self-contained activities of the *Children's House* and is a major aspect of the *practical life* of the class. There may also be an area or room designated for larger projects, projects requiring specialised equipment and cooperative art activities across levels, although this should not turn art into an activity only done in a specialty room.

Art making and design are frequently integrated across the curriculum, for example, in language (calligraphy, illustration), mathematics and geometry (2D and 3D design, technical drawing, diagrams, data display), the sciences (model-making, botanical drawing) and the social sciences (model-making, illustration, visual arts across time and cultures). Children's artwork is evaluated in its own right, relative to the goal of the work attempted, rather than in comparison to the work of others.

Geometry is an area of the curriculum that is intimately related to art. The Geometry materials are used for design work in a number of ways. Techniques using tools such as the compass, straight edge, protractor and ruler are shown early in the environment for six to nine year olds so that the children can do creative follow-up work with geometric design, angles, lines, shapes and both two- and three-dimensional constructions.

Handwork is an extremely important part of art activity in Montessori environments prepared for six to twelve year olds. It is connected to the 'hand that works' are of the history curriculum. The children benefit from being taught the basics of many types of handwork such as weaving, woodwork, needlework, clay, *papier-maché* and knot work, as well as work with yarn such as spinning, knitting, crocheting and dyeing. These folk traditions have had enormous significance for humanity and connect the children to their historical heritage.

In the Montessori view handwork is very important in a society that has become heavily mechanized. Dr Montessori believed that children, through handwork, stay connected to the source of human technological developments and, therefore, to their own humanity. Handwork also carries much cultural significance and can play an important part in preserving the integrity and identity of an individual culture in a world that outwardly moves towards homogenization. Folk art projects can also extend the children's understanding of other cultures and time periods and provide variety in the ways in which the children explore history and geography.

Visual arts activities also help build community. Beautifying the school, for example, can involve cooperation across age groups. The children might create displays, maintain a gallery of their work and combine efforts to bring art into every area of the school, both inside and outside, using a variety of media, e.g. a quilt or a sculpture garden. A community project might also include the use of a variety of media, including visual and verbal media, digital still and video cameras, online media, and performance, both dramatic and musical, that enable the students to share their work on the project with as many people in the community as possible.

## Art Curriculum for Children Aged Six to Twelve Years

| Content Strand | Knowledge, Skills and Understandings | Activities and Resources |
|---|---|---|
| | *Typically the child will:* | |
| Introduction to Art | Understand the reasons humans have developed and created art | Activities include:<br>- story of art<br>- group discussion<br>- independent research.<br><br>Resources include:<br>- the fundamental needs of humans charts<br>- timelines of humans. |
| Elements and Principles of Design | | |
| The seven elements of design<br>- line<br>- shape<br>- form<br>- colour<br>- value<br>- texture<br>- space | Recognise and understand the use of each design elements<br><br>Experiment with the use of each element in isolation<br><br>Analyse artworks to identify the elements<br><br>Create artworks using each element<br><br>Discuss critically and represent graphically the way elements of design are used to make an image pleasing or significant in some other way e.g. composition, unity, perspective<br><br>Begin generating art works to communicate ideas | Activities include:<br>- discussion of definitions, with examples, for each design element<br>- review of each element<br>- projects and activities relating to each element<br>- integrating art with mathematics and geometry.<br><br>Resources include:<br>- art appreciation cards<br>- prints<br>- older children combine elements in more complex projects. |
| The seven principles of design<br>- emphasis<br>- balance and proportion<br>- contrast<br>- movement<br>- rhythm<br>- pattern<br>- variety<br>- harmony | Recognise and understand the use of each design principle<br><br>Experiment with the use of each principle in isolation<br><br>Analyse artworks to identify the principles<br><br>Create artworks using each principle<br><br>Discuss critically and represent graphically the way principles of design are used to make an image pleasing or significant in some other way e.g. composition, unity, perspective<br><br>Begin generating art works to communicate ideas | Activities include:<br>- group discussion of definitions, with examples of each design principle<br>- review of each principle<br>- projects and activities relating to each principle.<br><br>Resources include:<br>- art appreciation cards<br>- print<br>- older children combine elements in more complex projects. |

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| **Study of colour** | Become familiar with historical colour derivation and use<br><br>Name, recognise and experiment with primary and secondary colours and their relationships to one another<br>Differentiate and experiment with values and hues<br><br>Differentiate and experiment with warm and cool colours<br><br>Differentiate and experiment with complementary colours<br><br>Reflect upon the origin of colour and its use in art through history | Activities include:<br>- the *story of colour*<br>- experiments<br>- using items from nature to derive dyes and other materials to use in art projects<br>- independent projects around the theme of colour<br>- independent projects exploring another design element or principle. |
| **Skills and techniques, tools and media**<br>- drawing and line<br>- collage<br>- painting<br>- pottery<br>- printing<br>- textiles<br>- woodwork<br>- mosaic<br>- photography<br>- electronic drawing tools<br>- equipment for making video and animation | Realise what artists do, who they are and what they make<br><br>Discuss, and represent graphically, qualities that make an image pleasing<br><br>Demonstrate proper tool use, skills and technique in various media<br><br>Begin generating art works to communicate ideas using a variety of skills, techniques, processes, conventions and technologies<br><br>Express opinions and preferences about various media and their usage | Activities include:<br>- group discussion<br>- independent research (e.g. works by Australian artists)<br>- exploration and application of various media<br>- integration with other subject areas, e. g. exploration of different cultures or historical periods, making simple looms or making paper<br>- school events/activities (e.g. exhibition, local competition, end of year concert, school play, book week)<br>- excursions to art galleries, exhibitions, museums, cinema. |
| **Sculpture and Ceramics**<br>- clay<br>- papier maché<br>- wire<br>- recycled materials | Use the forms of sculpture to make artworks according to varying requirements<br><br>Begin to interpret the meaning of 3-D artworks<br><br>Experiment with and appreciate the use of particular techniques | Activities include:<br>- group discussion<br>- independent research (e.g. works by Australian sculptors and ceramicists)<br>- exploration and application of various media<br>- school events/activities (e.g. exhibition, local competition, end of year concert, school play, book week<br>- excursions to art galleries, exhibitions, museums.<br><br>Resources include:<br>- art card materials<br>- art reference books<br>- timelines. |
| Appreciation of visual arts | | |
| **Art History** | Distinguish between contrasting styles of artists on the basis of elements and principles<br><br>Be familiar with some of the names of famous | Activities include:<br>- group discussion and activities revolving around similarities and differences of style |

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| | artists<br><br>Distinguish between contrasting periods in art history<br><br>Discuss periods of art and express preferences using some art terminology<br><br>Recognise and explore different schools of art e.g. Realism, Impressionism, Cubism<br><br>Recognise and explore different art forms of different cultures through time | - independent research<br>- experimentation with creating art works in the style of particular eras and schools<br>- folk art projects.<br><br>Resources include:<br>- art appreciation card materials<br>- art history reference books<br>- prints<br>- art timelines. |
| Artists: life and work | Understand that artists create for different reasons and that various interpretations of their works are possible<br><br>Investigate subject matter as an attempt to represent likeness of things in the world<br><br>Explore the role of art in society<br><br>Identify connections between subject matter in artworks and what they refer to<br><br>Appreciate the use of particular techniques<br><br>Recognise that audiences respond in different ways to artworks and that there are different opinions about the value of artworks | Activities include:<br>- group discussion<br>- independent research, including Indigenous and other Australian artists of the past and present<br>- experimentation with creating art works in the style of a particular artist<br>- preparing responses, reviews and interpretations (spoken and written) to works of visual art.<br><br>Resources include:<br>- art appreciation cards<br>- art history reference books<br>- prints<br>- art history timelines. |
| Folk Art | Experiment with techniques and media used by various peoples around the world<br><br>Gain appreciation for the variety of artistic expression in various cultures<br><br>Find links to work in history, geography and biology | Activities include a variety of activities using different types of media.<br><br>Resources include:<br>- art card materials<br>- art reference books<br>- prints<br>- timelines. |
| Art projects:<br>*drama work and community building* | Experiment with the building of props and scenery, the making of costumes, the creation of sound effects and sound tracks, using still and video cameras<br><br>Participate in art activities that involve cooperative efforts, including dramatic performances, making of videos and animations, and community projects | Art activities related to:<br>- a school event (e.g. an exhibition, local competition, end of year concert, school play, book week)<br>- large cooperative projects for school beautification (The children are involved in all aspects of production.)<br>- large cooperative projects combining a range of visual and other art forms (e.g. school plays and musicals, video and animation) |

# Music

The Montessori music programme includes listening, singing, music theory and ear training, eurhythmics (movement and rhythm), composition, production of music (playing of instruments), history and literature. Children experience, learn about and explore the elements of music, including pitch, rhythm, intensity, timbre, form and style are included. Montessori music activities are based on one of the following two principles:

- isolation of difficulty, where an element of music is isolated for study
- experience of the whole, where children experience a synthesis of musical elements working together to create a whole work

Key lessons in music are given individually, and in both small and large groups. These lessons enable children to use music for self-expression and communication. The lessons are sequenced to build children's skills progressively, but they are also given in response to children's emerging interests.

Music is integrated into the Montessori curriculum. Music lessons are not presented as separate from other curriculum areas. For example, as part of their normal class work, children may research a musical instrument or a composer, practise a musical instrument (with the exception of percussion instruments that might be too disturbing) or compose a short piece of music. For this reason the music materials and activities are always available for the children to use. They are prepared so children can use them independently and with as much repetition as they need. As with other activities and exercises in the Montessori environment, music activities build concentration, perseverance, success and confidence.

Two distinctive music materials found in the Montessori environment for children aged from six to twelve are:

- the Montessori bells
- the Montessori tone bars

The Montessori bells are a tuned musical instrument specially designed for young children to explore musical pitch, and learn to recognise and match musical notes. This instrument comprises two series of matching moveable bells (diatonic and chromatic) in the C Major Scale. The accompanying manipulative materials enable the children to explore, and learn how to use, musical notation.

The Montessori tone bars are a tuned musical instrument designed for older children. This instrument comprises twenty-five moveable tone bars on a wooden keyboard spanning two octaves. Accompanying manipulative materials enable children to explore musical notation further, and to begin experimenting with musical composition.

## Music Curriculum for Children Aged Six to Nine Years

| Content Strand | Knowledge, Skills and Understandings | Activities and Resources |
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| | *Typically children will:* | |
| Listening | Develop listening skills in order to enjoy music | Activities include:<br>- listening games<br>- guided listening activities. |
| Percussion | Experience percussion instruments<br><br>Play percussion accompaniment to a range of music, demonstrating awareness of musical concepts, including rhythm<br><br>Improvise, experiment, select, combine and order sound using musical concepts<br><br>Compose a percussion piece | Activities include:<br>- guided activities and games<br>- demonstration and use of 'invented notation'.<br><br>Resources include percussion instruments, both found and conventional. |

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| **Singing** | Experience different types of singing (e.g. singing softly, singing the scale, singing simple melodies)<br><br>Sing to the accompaniment of a range of music<br><br>Express oneself in song including creating lyrics to a familiar piece of music | Activities include:<br>- guided group activities and games.<br>- group/choral singing<br>- classroom and school productions<br>- independent projects<br><br>Resources include manuals of simple songs. |
| **Music theory with the Montessori bells** | Understand care and use of the bells<br><br>Differentiate high and low sounds<br><br>Explore, create, select and organise sound in simple structures including matching, grading and simple melodies<br><br>Explore and recognise the scale<br><br>Name the notes of the scale<br><br>Explore and recognise whole steps and half steps in relation to the scale<br><br>Experience and use symbols to represent sounds | Resources include:<br>- Montessori bells<br>- Montessori music manipulatives, including card material, wooden discs, notes and clefs, staff boards, paper. |
| **Music theory with Montessori tone bars**<br>- sensorial introduction<br>- naming and notating<br>- names of the degrees of the scale<br>- intervals<br>- sequence of major scales<br>- key signatures<br>- transposition of simple songs | Understand care and use of the tone bars<br><br>Experience, name and use symbols to represent sounds<br><br>Explore, recognise and name the degrees of the scale<br><br>Explore, recognise and name intervals<br><br>Explore, recognise and name the sequence of major scales, including sharps and flats<br><br>Explore, recognise and name key signatures<br><br>Explore the transposition of songs from one key to another | Activities include:<br>- series of exercises with the tone bars<br>- independent notation and composition projects.<br><br>Resources include:<br>- Montessori tone bars<br>- card materials<br>- notation sheets. |
| **Movement**<br>- for control<br>- for expression | Develop controlled movement to assist in acquiring musical skills<br><br>Move to a range of music demonstrating awareness of musical concepts<br><br>Experience and participate in combining music with drama | Activities include:<br>- *walking* on the line<br>- musical movement games<br>- classroom and school performances<br>- excursions. |

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| **Rhythm** | Experience rhythm as clapping and chanting<br><br>Experience rhythm as written note patterns<br><br>Recognise rhythmic patterns in music<br><br>Read and write note patterns | Activities include:<br>- rhythm games<br>- group discussions<br><br>Resources include:<br>- card materials<br>- clapping charts<br>- recordings<br>- Montessori music manipulatives |
| **Music appreciation** | | |
| **Music history and literature** | Recognise and explain different musical eras (e.g. in the Western classical tradition) and traditions of different cultures<br><br>Investigate a range of composers<br><br>Recognise and define contrasts in music, such as vocal/instrumental or solo/ensemble<br><br>Build a vocabulary for talking about musical expression<br><br>Experience, appreciate, respond to, review and evaluate a variety of musical performance<br><br>Express musical likes and dislikes and the reasons for a choice<br><br>Compare traditional European classical music to musical styles from other times and cultures | Activities include:<br>- guided listening activities<br>- group discussion<br>- visiting musicians<br>- visits to musical performances<br>- stories about the lives of composers.<br><br>Resources include:<br>- music history timeline<br>- recordings<br>- card materials<br>- research materials. |
| **Instruments of the Orchestra** | Undertake a scientific exploration of sound<br><br>Experience and discuss sounds made by a variety of instruments (e.g. violin, flute, clarinet, trumpet, electronic keyboard)<br><br>Investigate instruments of the Western classical tradition as well as instruments of different cultures<br><br>Understand the history, construction and use of various instruments<br><br>Become aware of families of instruments (e.g. woodwind, brass, strings, percussion) | Activities include:<br>- science experiments with sound<br>- presentation of each instrument, including experience playing the instrument if possible<br>- visiting musicians and instrument makers<br>- visits to musical performances.<br><br>Resources include:<br>- card material<br>- reference books and other research materials. |

## Music Curriculum for Children Aged Nine to Twelve

| Content Strand | Knowledge, Skills and Understandings | Activities and Resources |
|---|---|---|
| | *Typically children will:* | |
| **Singing** | Sing to an increased range of music including folk, historical, classical, pop and world music<br><br>Experience a variety of songs and appreciate the role of song in history and culture<br><br>Express oneself in song, including creating lyrics to a familiar piece of music<br><br>Build a repertoire of songs | Activities include:<br>- guided group singing activities<br>- group discussion<br>- classroom and school productions<br>- independent song writing projects<br>- visiting performers<br>- visits to singing performances.<br><br>Resources include:<br>- repertoire of songs<br>- music history timeline. |
| **Movement** | Experience and participate in combining music with drama<br><br>Recognise and use movement as an integral part of musical expression in free movement, drama and formal dance | Activities include:<br>- guided group activities<br>- classroom and school productions<br>- visits to performances. |
| **Music theory with Montessori tone bars**<br>- sensorial introduction<br>- naming and notating<br>- names of the degrees of the scale<br>- intervals<br>- sequence of major scales<br>- key signatures<br>- transposition of simple songs | Understand care and use of the tone bars<br><br>Experience, name and use symbols to represent sounds<br><br>Explore, recognise and name the degrees of the scale<br><br>Explore, recognise and name intervals<br><br>Explore, recognise and name the sequence of major scales, including sharps and flats<br><br>Explore, recognise and name key signatures<br><br>Explore the transposition of songs from one key to another | Activities include:<br>- series of exercises with the tone bars<br>- independent notation and composition projects.<br><br>Resources include:<br>- Montessori tone bars<br>- card materials<br>- notation sheets. |
| **Composition: percussion** | Improvise, explore, select, combine and order sound<br><br>Add voice to percussion sound<br><br>Compose simple songs | Resources include:<br>- rhythm cards<br>- research materials<br>- percussion instruments. |

| Music appreciation | | |
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| **Music history and literature** | Recognise and appreciate music, its history, eras, and traditions (e. g. in the Western classical tradition and traditions of different cultures and historical periods)<br><br>Extend vocabulary for talking about musical expression<br><br>Recognise and define contrasts in music, such as vocal/instrumental or solo/ensemble<br><br>Appreciate music from a range of cultures and gain an understanding of the influence of culture on music<br><br>Research composers and eras from a range of musical traditions<br><br>Experience, appreciate, respond to, review and evaluate a variety of musical performances | Activities include:<br>- guided listening activities<br>- group discussion<br>- visiting musicians<br>- visits to musical performances<br>- stories about the lives of composers<br>- preparing responses, reviews and interpretations (spoken and written) of musical performances.<br><br>Resources include:<br>- music history timeline<br>- recordings<br>- card materials<br>- research materials. |
| **Understanding the orchestra** | Identify the use of musical concepts and symbols in a range of repertoires<br><br>Identify the use of musical concepts and symbols in a range of musical styles<br><br>Become aware of different types of orchestra (e.g. symphony, chamber)<br><br>Become aware of the arrangement of an orchestra on stage<br><br>Collaborate to produce a musical piece | Activities include:<br>- listening to recordings<br>- research projects<br>- visits to concerts<br>- class, school and community performances. |

# Drama

Alongside the other areas of the creative arts, drama is integrated into the Montessori curriculum for children aged from six to twelve years. Here are some examples of ways drama is used across the Montessori curriculum.

The Montessori *grace and courtesy* lessons are presented and practised in the form of role-play. Children 'act out' effective, and less effective, ways of managing social situations. Through role-play children learn, for example, how to communicate in the classroom without disturbing others, how to ask for help, how to invite someone to join a group and how to answer the telephone.

Drama plays a key role in several areas of the language curriculum. For example, reading commands are games in which children act out what they have read. In other words, drama is used in the service of enhancing reading comprehension. In the Montessori grammar games children act out the meaning of variations in grammatical structures, in this way, learning the effect on meaning of even the slightest variation in grammatical structure. Through work with reading commands and grammar games children connect language and intentional movement.

The Montessori language curriculum also includes *interpretive reading* cards. Activities with these cards contribute to the drama curriculum for several reasons.

- They involve movement and require cooperation among the members of the group.

- They can be interpreted in a number of different ways, depending on answers to questions such as the following:
  *What happened before the small scene on the card?*
  *What are the relationships between the characters in the scene?*
  *What might happen next?*
- They can be used for dramatic reading as well, helping the children discover the importance of articulation of meaning, character, emotional content, mood and intent through variation in the use of the voice and various speaking techniques, including:
  loudness/softness
  tempo
  intonation
  rhythm
  emphasis
  character: accent, dialect, style of speaking
  articulation and enunciation

Children's independent work in subjects such as history, science and music, often lead them into preparing and performing their own simple dramatic productions. For example, in Science, groups of children act out the movement of particles in solids, liquids and gases to build greater understanding of the three states of matter, or they might prepare a dramatisation of the water cycle. Other excellent sources of material for plays include:

- fairytales and folktales from different cultures
- legends and myths
- timelines of human beings, fundamental needs of different cultures, including the children's own culture
- adaptations of professionally written plays, musicals, operas and operettas
- scenes performed in a language other than English
- dramatisations of biology, history and geography charts, for example the leaf as a food factory

Children learn specific interpretive or performance skills during drama 'games' introduced as part of a particular area of study, not as isolated instruction in drama. They put together small skits, scenes or dramatisations as their interest dictates. The children may also be involved in a play for the whole class, reflecting the work of the class. The children are involved in the writing and staging of scenes, music production, scenery, props and costumes. During projects of this kind the whole group collaborates to achieve a single goal, building community, self-discipline and a realisation of how important every detail is in a group venture on this scale. Individual children may participate at different levels, depending on age, level and interest. Through involvement in the staging of dramatic performances children experience of all the aspects of a complex creative process and come to understand the time and effort required. They also come to appreciate the work involved in theatre productions they attend during excursions and *going out* activities. Ideally, children of this age, who are interested in what happens behind the scenes, should have opportunities to visit back stage and to talk to actors, directors and those involved in staging the production.

Many drama activities can be incorporated into the physical education programme. These include theatre games, role plays and exercises that involve movement, cooperative effort, spatial orientation, coordination, body awareness, breathing techniques, improvisation and mime. An example of this is 'mirroring', where two children stand face to face. One child initiates the movements and one follows, mirroring the movements of the leader. Interpretations of music may also be done in this same context or during music lessons in the classroom.

Whole class and school dramatic and/or musical productions are also often developed and performed to celebrate special events (e.g. Children's Day, graduation). Children play key roles in all aspects of these productions, from inception to performance.

## Drama Curriculum for Children Aged Six to Nine Years

| Content Strand | Knowledge, Skills and Understandings | Activities and Resources |
|---|---|---|
| | *Typically children will:* | |
| Role Play | Enact with guidance the appropriate and inappropriate behaviour for everyday social situations | Activities are *grace and courtesy lessons* i.e. role-plays illustrating correct/incorrect behaviours |
| Drama games | Gain experience of the following:<br>- body awareness and control<br>- spatial awareness and intentional movement<br>- cooperation<br>- coordination of movement<br>- improvisation<br>- mime | Activities include drama and theatre games that:<br>- isolate and build individual skills<br>- combine skills in increasingly complex ways. |
| Interpreting Text | Read and dramatise the text of a specific 'command' | Resources include:<br>- interpretive reading cards<br>- grammar commands<br>- grammar boxes and command cards. |
| Musical interpretation | Move to music to interpret and illustrate musical concepts (e.g. the life cycle of a seed to dramatise the musical scale)<br><br>Move to music to express feelings and emotions conveyed by the music | Activities include:<br>- dramatic music games<br>- free movement to a variety of music. |
| Dramatic Productions | Convey story, depict events and express feelings by using the elements of drama and the expressive skills of movement and voice<br><br>Build dramatic action by using the elements of drama, movement and voice<br><br>Collaborate to communicate dramatic action<br><br>Sequence the action of the drama to create meaning for an audience<br><br>Adapt small stories from a text form to a dramatic form through the use of dramatisation and dialogue<br><br>Participate in performances of plays/dramatic productions | Activities include:<br>- reading and study of plays and dramas<br>- excursions to dramatic performances<br>- presentations on specific structural elements of drama and dramatic skills<br>- group work<br>- adapting fairy tales, narratives and story material from across the curriculum<br>- staging plays written by or for the children in the group<br>- videoing and/or animating plays and performances |
| Related activities | Experience the knowledge and skills needed to stage a dramatic production | Activities include:<br>- costume making and prop making<br>- scenography<br>- creating sound tracks and sound effects<br>- staging and direction. |

## Drama Curriculum for Children Aged Nine to Twelve Years

| Content Strand | Knowledge, Skills and Understandings | Activities and Resources |
|---|---|---|
| | *Typically children will:* | |
| Role Play | Enact with guidance the appropriate and inappropriate behaviour for everyday social situations | Activities are *grace and courtesy lessons* (i. e. role-plays illustrating correct/incorrect behaviours) |
| Drama Games | Gain experience of the following:<br>- body awareness and control<br>- spatial awareness and intentional movement<br>- cooperation<br>- coordination of movement<br>- improvisation and mime | Activities include drama and theatre games that:<br>- isolate and build individual skills<br>- combine skills in increasingly complex ways. |
| History of Drama | Develop an understanding of the role of drama in human life and culture through the ages | Activities include:<br>- research<br>- dramatic story telling. |
| Musical Drama | Use aspects of music to express and convey drama | - Activities include:<br>- musical dramas with percussion instruments<br>- musical dramas with a wider range of instruments music<br>- musical drama with songs, including songs composed by the children<br>- excursions to opera and ballet. |
| Dramatic Performance | Interpret and convey dramatic meaning by using the elements of drama and a range of movement and voice skills in a variety of drama forms.<br><br>Understand there are different types of drama (e.g. plays, pantomimes, movies, puppetry, musicals, opera, ballet, film)<br><br>Understand there are different dramatic genres (e.g. tragedy, comedy, historical) | Activities include:<br>- discuss, read, study and perform dramas in class<br>- experiment with playwriting<br>- excursions to dramatic performances including musical and dance performances (e.g. opera, ballet, pantomimes, puppet shows, poetry readings and dance)<br>- preparing responses, reviews and interpretations (spoken and written) of drama performances. |
| Concert Production | Devise, act and rehearse drama for performance to an audience | Activities include:<br>- key lessons on aspects of dramatic production<br>- rehearsals to prepare for school concert<br>- engaging in all aspects of a dramatic performance (e.g. acting, directing, costume and sets, lighting, front of house). |
| Related activities | Experience the knowledge and skills needed to stage a dramatic production | Activities include:<br>- costume making and prop making<br>- scenography<br>- creating sound tracks and sound effects<br>- staging and direction<br>- videoing and/or animating plays and performances |

# Dance

Learning to dance and learning to appreciate dance are both included in the Montessori creative arts curriculum, and also play a significant role in physical education. Dance is an extension of the many opportunities children in Montessori classrooms have to refine their movement and whole body coordination. Dance is often taught using specialist teachers. In this way children can be introduced to different styles of dance (e.g. folk dance, modern creative movement, jazz dance, bush dance). Children use the knowledge and skill they gain through learning dance in other areas of the curriculum. Dance is also often combined with music and drama performance. For example, the music and dance of different cultures and times may be studied in other areas of the curriculum.

Like other forms of physical activity, dance promotes awareness of the body and its potential. Dance exercises bring the children's awareness to their body alignment and their breathing, as well as the range of movement of each body part in isolation and together. Expressing oneself through dance requires exploration and the learning of techniques designed to extend range of motion, coordinate movements of different body parts, strengthen muscles and improve self-control in order to move with intent. Activities such as yoga and stretching exercises can be incorporated to draw attention to flexibility, concentration and breathing.

As well as learning about the body and its potential for movement, dance teaches the relationship of movement and space and of movement and time. The elements of dance (e.g. tempo, rhythm, dynamics, level, direction, focus and shape) bring the children into direct contact with their environment in a new and exciting way. The intimate relationship between dance and music makes dance a natural part of both the music and physical education curriculum.

Children of this age should be encouraged to practice what they have learned by creating their own dance compositions, individual, interactive and collaborative. Dance is an area of the curriculum where cooperation is encouraged. Many folk dances are excellent ways to promote social cooperation. Movement games often call for children to maintain their personal space, while respecting other's personal space (i.e. moving in different ways without bumping into each other). Other movement games require the children to coordinate different movements into a whole (e.g. creating a 'machine' with many moveable parts).

## Dance Curriculum for Children Aged Six to Nine Years

| Content Strand | Knowledge, Skills and Understandings | Activities and Resources |
|---|---|---|
| | *Typically children will:* | |
| History of Dance | Appreciate the role dancing has played in the human life throughout history | Activities include:<br>- presentations, stories and research relating to the origins of dance as a fundamental human need<br>- using dance to communicate and express meanings and feelings of peoples in different times and places. |
| Principles of Movement and Choreography<br><br>- locomotor (travelling) movement<br>- body awareness<br>- non-locomotor (standing) movement<br>- weight | Demonstrate awareness of the range of movement of the human body and its parts<br><br>Demonstrate kinesthetic awareness and concentration in movement, i.e. ability to mirror another's movements<br><br>Demonstrate non-locomotor movements (e.g. bend, twist, stretch, swing, sway)<br><br>Demonstrate 8 basic locomotor movements (e.g. walk, run, hop, jump, leap, gallop, slide, turn) | Activities include:<br>- movement games and exercises<br>- stretching exercises<br>- dancing to various types of music. |

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| - posture<br>- balance<br>- space<br>- tempo<br>- rhythm<br>- level<br>- shape<br>- direction<br>- gesture<br>- dynamics, energy<br>- emotion | Demonstrate understanding of spatial concepts and locomotor movements (e. g. moving in different pathways without bumping into each other, making various shapes and defining and maintaining personal space<br><br>Demonstrate different types of changes in locomotor movement (e.g. tempo, level, dynamic)<br><br>Identify and demonstrate basic dynamic contrasts (e.g. fast-slow, gentle-strong)<br><br>Demonstrate accuracy in memorizing and reproducing simple movement phrases | |
| **Dancing to Music** | Demonstrate accuracy in moving to a musical beat and respond to changes in tempo and rhythm<br><br>Explore and select movement, using the elements of dance to express ideas, feelings or moods<br><br>Perform dances demonstrating expressive qualities and control over a range of locomotor (travelling) and non-locomotor movement. | Activities include:<br>- movement games with rhythm and tempo<br>- experimental/free dancing to a variety of musical styles<br>- collaboration on projects involving dance<br>- performance. |
| **Composing** | Explore aspects of space (e.g. relationships with others, group tableaux, changing levels and directions of actions)<br><br>Create shapes in response to a stimulus (e.g. curved, square, tall, tired, animal)<br><br>Link shapes by moving from one shape to another in a specific order<br><br>Use elements of dance to vary movements (e.g. pathway, level, direction, tempo, duration)<br><br>Create symmetrical and asymmetrical shapes<br><br>Combine movement ideas in simple sequences<br><br>Demonstrate the ability to use dramatic imagery or themes to improvise simple movement sequences | Activities include:<br>- creating tableaux and dances in response to cues and imagery<br>- composing dances to support work in other disciplines<br>- composing dances to various types of music<br>- composing dances in the context of drama. |

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| Dance Styles | Perform dances from a range of contexts (e.g. bush and folk dancing, multicultural dances, modern, jazz and pop, Indigenous)<br><br>Demonstrate movement skills, expressive qualities and an understanding of the elements of dance<br><br>Explore, select and combine movement, using the elements of dance to communicate ideas, feelings or moods<br><br>Express personal opinions about a variety of dances and their purpose | Activities include:<br>- learning a variety of dances<br>- visiting dancers<br>- excursions to dance performances<br>- dance composition. |
| Appreciation | Look for and identify elements of dance in their own performing and composing experiences<br><br>Look for and identify dance movement in relation to themes (i.e. interpret meaning)<br><br>Look for and identify the use of dance elements in dance pieces<br><br>Gain experience with the vocabulary of dance elements and principles | Activities include:<br>- viewing and discussing performances, live or on video<br>- performing and discussing own performances. |

## Dance Curriculum for children Aged Nine to Twelve Years

| Content Strand | Knowledge, Skills and Understandings | Activities and Resources |
|---|---|---|
| | *Typically children will:* | |
| History of Dance | Perform dances from a range of contexts<br><br>Demonstrate movement skills, expressive qualities and an understanding of the elements of dance | Activities include:<br>- learning a variety of dances from different times and places<br>- research the origin of a dance style<br>- visiting dancers<br>- excursions to dance performances. |
| Principles of Movement and Choreography<br><br>- locomotor (travelling) movement<br>- body awareness<br>- non-locomotor (standing) movement<br>- weight<br>- posture<br>- balance<br>- space<br>- tempo<br>- rhythm | Using accurate vocabulary to describe the parts of the body and types of movement<br><br>Demonstrate the ability to emphasise and isolate specific body parts.<br><br>Perform locomotor and non-locomotor sequences that include more complex coordination of body parts (e.g. arms and legs moving at different tempi and through different planes)<br><br>Demonstrate a wide range of movement quality (e.g. abstract qualities such as sustained/percussive, vibratory, forceful, suspended) | Activities include:<br>- movement games and exercises<br>- stretching exercises, breathing exercises<br>- dancing to various forms of music. |

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| - level<br>- Shape<br>- direction<br>- gesture<br>- dynamics, energy<br>- emotion | Demonstrate movement qualities that represent mood or character in a stylised way.<br><br>Show an ability to vary elements of dance.<br><br>Demonstrate safe dance practices by performing technical exercises correctly and maintaining alignment while standing and travelling.<br><br>Demonstrate accuracy in memorizing and reproducing more complex movement phrases | |
| **Dancing to Music** | Explore, select and combine movement, using the elements of dance to communicate ideas, feelings or moods<br><br>Perform dance sequences to different time signatures | Activities include:<br>- experimental/free dancing to a variety of musical styles<br>- dance appreciation<br>- collaboration on projects involving dance<br>- creating and performing dances<br>- independent work according to interest. |
| **Composing** | Explore more complex aspects of the elements of dance to vary movements in composition (e.g. level, direction, size, pathway, tempo, duration, floor patterns, formations, contrast)<br><br>Combine movement ideas to create phrases of movement, developing simple transitions to move from one shape or movement to another<br><br>Create original shapes and movement qualities that can communicate intent (e.g. pushing/pulling, accelerating/decelerating, aggressive/gentle)<br><br>Demonstrate an ability to compose individually, in pairs and in larger groups<br><br>Explore ways to structure movement (e.g. repetition, contrast, floor patterns)<br><br>Reflect upon the dance compositions they make | Activities include:<br>- composition exercises<br>- improvisation<br>- composing dance pieces as part of dramatising particular themes or researching other areas of the curriculum<br>- composing dances in relation to larger performance pieces<br>- independent work according to interest. |

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| Dance Styles | Perform dances from a range of styles, eras and cultures (e.g. bush and folk dancing, multicultural dances, modern, jazz and pop, Indigenous)<br><br>Demonstrate movement skills, expressive qualities and an understanding of the elements of dance<br><br>Explore, select and combine movement, using the elements of dance to communicate ideas, feelings or moods<br><br>Express personal opinions about a variety of dances and their purpose | Activities include:<br>- learning a variety of dances<br>- visiting dancers<br>- excursions to dance performances<br>- preparing reviews and interpretations (spoken and written) of dance performances<br>- integrate dances of different styles, eras and cultures into larger performances. |
| Appreciation | Discuss and interpret the relationship between content, meaning and context of their own and others' dances<br><br>Formulate questions about dance<br><br>Express opinions about dance based on knowledge of dance elements, the cultural background of the dance and music, using dance specific vocabulary<br><br>Gain experience with the vocabulary of dance elements and principles through exercises and composition | Activities include:<br>- watching performances and discussions<br>- discussing own compositions. |
| School Concert | Work collaboratively to create dances which reflect particular themes and musical styles | Students choreograph, produce and perform dance routines as part of the annual school concert.. |

# Languages Other Than English (LOTE)

## Overview

The rich linguistic and cultural diversity of the Australia community is echoed in the role languages other than English, and the culture they represent, play in the Montessori curriculum. Montessori educators recognise that engaging with a language other than English contributes to:

- a sense of personal achievement
- intellectual enrichment
- a better understanding of the world and Australia's place in it
- a better understanding of and enhanced respect for the many communities in Australia (ALLC 1996: 3)

The study of other languages will enable children to respond positively to future opportunities in a world increasingly shaped by globalisation and linked by information and communication technologies. Through experience with other languages children become increasingly aware of themselves as members of an international community.

Unlike the learning of their first language, to learn another language at school, children must focus consciously on language patterns and how they are used to make meaning. The intellectual challenge of learning another language, and the knowledge and skills gained, enhance all areas of children's intellectual development, including the development of literacy in their first language.

The aims for including the learning of another language in the Montessori curriculum include:
- developing an understanding of the culture and fundamental needs of another human group
- building enhanced communication skills
- focusing on the patterns of languages
- building understanding of the relationship between language and culture
- laying a foundation for a lifelong interest in learning other languages

When another language is introduced into a Montessori learning environment, it is integrated into all areas of the curriculum. Children are offered materials in the other language that mirror the materials they have been working with in their first language. All curriculum areas provide opportunities for the study of another language. Here are two examples:
- Montessori card material, comprising pictures, labels and definitions, in subject areas such as biology, zoology, geography and history can be adapted by adding labels and definitions in the other language to the reverse side of the cards.
- Procedures in the classroom, including classroom rules, experiments and recipes, can also be written in both languages.

As in all areas of the Montessori curriculum, materials and activities designed for learning a language other than English are prepared to enable self-directed, independent work for individuals and groups. These materials are placed on the shelves as another choice available to the children at any time of the day, rather that at one set time in the week only. Children are also involved in research-based projects relating to this language, its history and culture.

The language chosen as the other language to be learned in a Montessori school is determined by the location of the school and the population and culture of the school community. For young children Montessori educators believe that it is essential that they hear the new language spoken by native speakers, so the language will only be included in the school curriculum if there is a teacher available for whom this language is a first language. Children are offered as many opportunities as possible to hear the language spoken in everyday life, and in the context of different areas of the curriculum. When they are ready, they are also offered opportunities to use the language in meaningful ways. Once a language has been chosen, this language and its culture is incorporated into many areas of school life, including celebrations, performances, and excursions (e.g. art exhibitions, shopping trips, markets, restaurants, festivals).

When children are introduced to work with other languages it is important to use familiar material. Vocabulary enriched picture material and labels in classified sets, similar to that used in the *Children's House*, can be used as a model for bilingual vocabulary building material. Each label can have an English word on one side and the corresponding word in the language being learned on one side of the card. The children then have a control of error in their own language. This material can be made for both words and sentences, classified by category or activity (e.g. *Fruits, Playing in the park*).

The Montessori *function of words* grammar games and reading command cards can be duplicated in the language being learned and used for reading exercises, building vocabulary, practising basic grammar and as models for writing exercises. Environment cards, puzzle words and phonogram books and cards can also be developed to help expand vocabulary and give basic spelling rules. Sets of rhyming words can be developed to enhance pronunciation and spelling. *Word study* materials should focus on types of word study that might be peculiar to the language being learned.

As the children progress, the grammar boxes can be duplicated in the language being studied. The children will be challenged to read for understanding at the same time as they are introduced to the basic grammar of the language. *Interpretive reading cards* in the language being learned will also help children explore written expression in the new language.

Classified picture card material and labels in the sciences and history may also be bilingual, as children with particular interests may be more inclined to practise the language if they are working with subject matter they are interested in.

Skits or scenes from longer plays can be made in the language being learned. Songs in the language should be part of the music work and any performances presented by the children.

## LOTE Curriculum for Children Aged Six to Nine Years

| Content Strand | Knowledge, Skills and Understandings | Activities and Resources |
|---|---|---|
| | *Typically children will:* | |
| Language Use: *listening and responding* | Recognise and respond to spoken words, phrases and simple sentences in the language<br><br>Recognise and respond to spoken texts in familiar situations in the language | Activities include:<br>- active listening for and responding to spoken words, phrases, statements, questions, exclamations, requests (e.g. songs, rhymes, dance, actions, games)<br>- identifying the purpose of and responding to short spoken texts in familiar situations (e.g. greetings, requests, statements, questions, exclamations)<br>- listening to spoken presentations in other curriculum areas (e.g. mathematics)<br>- listening to short spoken texts while following the written form<br>- using paralanguage to support communication in culturally meaningful and appropriate ways (e.g. tone, pitch, volume, gestures, facial expressions)<br>- repeating sounds, words and phrases with attention to pronunciation and meaning<br>- functions of words grammar games.<br><br>Resources include:<br>- native speaker/s in the community<br>- CDs/tapes to enable independent student work<br>- reference charts, dictionaries, word lists and glossaries<br>- classified card sets of pictures and labels. |
| Language Use: *reading and responding* | Understand the relationship between printed text and corresponding sound and meanings<br><br>Demonstrate comprehension of written text (e.g. by answering questions, matching written cards to pictures, and doing actions)<br><br>Identify and respond to written language (e.g. stories, cards and messages)<br><br>Identify and respond to written words, phrases and simple sentences in a variety of ways (e.g. matching words with pictures, reconstructing a text, sequencing words/sentences) | Activities include:<br>- recognising symbols, words, phrases and conventions of the written language (e.g. labels, captions, menus, charts, stories, cards, messages)<br>- demonstrating reading comprehension (e.g. acting out, answering questions, matching written language to pictures, reconstructing text, sequencing written words and sentences)<br>- locating key words and phrases in written text<br>- word reading (e.g. environment |

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| | | labels, *puzzle words*, *word study*, rhymes, phonograms<br>- grammar games (e.g. verb commands, logical adjective/adverb, *functions words*, grammar boxes).<br><br>Resources include:<br>- Montessori card material, definitions and booklets<br>- easy to read books on topics of interest, stories and poems. |
| **Language Use:** ***speaking*** | Use known words in the language studied to interact in everyday activities<br><br>Use familiar language to share information | Activities include:<br>- singing, reciting and repeating phrases<br>- participating in social interchanges e.g. greetings, introductions<br>- using the language in classroom activities e. g. *grace and courtesy*<br>- imitating/reproducing accurately pronunciation, intonation and stress<br>- participating in short conversations to ask and respond to questions, make and respond to requests, give and respond to instructions<br>- presentations in other areas of the curriculum.<br><br>Resources include:<br>- recordings on CDs<br>- picture material to elicit conversation. |
| **Language Use:** ***writing*** | Demonstrate developing writing skills by recognising and copying the language studied<br><br>Use models to write text to convey personal information and ideas | Activities include:<br>- writing letters/characters, words and phrases<br>- producing texts using a range of media e.g. greeting cards, posters<br>- using reference materials e.g. charts, dictionaries, word lists, glossaries<br>- using all of the Montessori material as a model for the children's own writing e.g. making own verb commands. |
| **Making Linguistic Connections** | Recognise the diversity of language systems<br><br>Explore ways in which meaning is expressed in the language studied<br><br>Explore relationships between languages such as the influence of globalisation, different language rules, common features of social interaction across languages and similarities and differences in writing systems<br><br>Identify ways in which meaning is conveyed by the sounds, symbols and word order of the language studied | Activities include:<br>- building awareness of the sounds and written forms of languages in the community and the different ways familiar concepts are expressed e.g. greetings, politeness markers<br>- identifying familiar words from other languages e.g. *pizza, sushi, kindergarten, café*<br>- researching different writing systems<br>- attending to sounds and conventions in other languages e.g. in French accents over letters, use of |

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| | | *alors* when starting a new task<br>- attending to appropriate nonverbal communication e.g. gestures, facial expressions. |
| **Moving Between Cultures** | Demonstrate awareness of cultural diversity<br><br>Recognise the link between culture and identity<br><br>Identify cultural practices of communities which speak the language studied | Activities include:<br>- identifying local places of cultural significance e.g. shops, markets, restaurants, places of worship<br>- recognising expressions of culture e.g. music, dance, food, games, celebrations, flags, traditional dress, landmarks<br>- excursions to places where other languages are spoken every day e.g. celebrations, shopping areas, restaurants<br>- observing customs and traditions in social interaction e.g. greetings involving as kissing on both cheeks, shaking hands<br>- researching other cultures<br>- comparing own lifestyle with those who speak the language studied e.g. food, family.<br><br>Resources include:<br>- books, maps, magazines, newspapers, video<br>- community. |

## LOTE Curriculum for Children Aged Nine to Twelve Years

| Content Strand | Knowledge, Skills and Understandings | Activities and Resources |
|---|---|---|
| | *Typically children will:* | |
| Language Use: *listening and responding* | Recognise and respond to spoken words, phrases and simple sentences in the language studied<br><br>Organise and respond to key ideas from spoken texts in familiar situations | Activities include:<br>- identifying the context (e.g. purpose, topic, audience) and key ideas of spoken texts<br>- listening for key words<br>- listening to spoken texts while following the written form<br>- using paralanguage to support communication in culturally meaningful and appropriate ways e.g. tone, pitch, volume, gestures, facial expressions<br>- repeating sounds, words and phrases with attention to pronunciation and meaning<br>- organising information to plan a response to a spoken text<br>- responding in familiar situations<br>- spoken presentations in other areas of the curriculum.<br><br>Resources include:<br>- native speaker/s in the community<br>- CDs/tapes to enable independent student work<br>- reference charts, dictionaries, word lists and glossaries. |
| Language Use: *reading and responding* | Organise and respond to key ideas from written texts in familiar situations | Activities include:<br>- learning strategies for responding to written texts e.g. searching for and selecting relevant information, recognising the purpose and structure of a text, deducing meaning of unfamiliar words from context<br>- using reference resources to assist with comprehension e.g. word lists, glossaries, dictionaries<br>- presenting information in a range of formats e.g. charts, graphs, picture sequences<br>- reading for information relevant to other areas of the curriculum.<br><br>Resources include reference materials e.g. charts, dictionaries, word lists, glossaries. |
| Language Use: *speaking* | Interact with others by sharing key points of information in spoken form in the language studied | Activities include:<br>- planning, drafting and presenting ideas in spoken language<br>- using appropriate ways to open, maintain and close a conversation<br>- recognising the importance of stress patterns and rhythm in conveying meaning |

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| | | - spoken presentations in other areas of the curriculum. |
| **Language Use:** ***writing*** | Write texts to present key points of information in the language studied | Activities include:<br>- using knowledge of context (e.g. purpose, topic, audience) when constructing written texts<br>- using models and applying principles of text organisation to writing texts<br>- engaging the interest of the reader e.g. by using computer technology to create greeting cards, invitations, posters. |
| **Making Linguistic Connections** | Identify ways in which meaning is conveyed by the sounds, symbols and word order of the language studied<br><br>Recognises the importance of context in language use<br><br>Identify patterns and features of the language studied by making comparisons between languages | Activities include:<br>- attending to the distinctive features of the spoken language e.g. pronunciation, word order, formulaic expressions<br>- identifying features of everyday texts e.g. advertisements, posters, postcards<br>- interpreting meanings using contextual knowledge<br>- recognising how language use is shaped by context e.g. playground v classroom language<br>- comparing word order and other language patterns with English and other languages<br>- recognising distinctive features of the written language e.g. spelling patterns<br>- researching distinctive features of the language e.g. Internet, pen pals, native speakers in the community. |
| **Moving Between Cultures** | Identify connections between culture and language use in communities that speak the language studied<br><br>Demonstrate awareness of cross-cultural influences on language and culture | Activities include:<br>- exploring language conventions in social interaction e.g. in French saying *Bon Anniversaire!,* using *tu* or *vous*<br>- exploring the way foreign words are incorporated into English e.g. words relating to food, music, technology<br>- exploring influences of the language and its culture on the local community e.g. restaurants, festivals, religion<br>- exploring what influences the evolution of languages and culture e.g. trade, globalisation, technology, youth culture<br>- researching the significance of specific cultural values and practices<br>- participating in activities associated with the customs and practices of communities speaking the language being studied<br>- comparing traditional and contemporary lifestyles e.g. gender roles, family, food, clothing, religion<br>- research projects and excursions. |

# Personal Development, Health and Physical Education (PDHPE)

## Overview

Movement, fitness and health have been incorporated into the Montessori curriculum from the time of the first school established by Dr Montessori more than a hundred years ago. Drawing on her medical training, Dr Montessori was keenly interested in the health of the human body, and argued strongly that physical activity and good nutrition were essential to the well-being of children. A key component of the Montessori curriculum, from birth, is a focus on the development and refinement of coordinated movement. Dr Montessori also designed gymnastic equipment for the children in her schools, and encouraged games in the open air for younger children and outdoor adventure education for older children.

The Montessori curriculum provides a repertoire of activities to enable individual Montessori schools to develop customised programmes to meet their own requirements and those of local education authorities. For children from six to twelve years, the *Cosmic Education* curriculum provides many opportunities for considering ways of improving quality of life for themselves and others in the classroom and wider community in terms of health and lifestyle, personal relationships, values education, social responsibility and social justice. Here are some examples:

- Children move freely around the classroom during the day to complete their work and to care for their environment. They can vary their place of work depending on need e.g. to sit on a chair or on the floor, to stand or walk, to have more or less light, to talk with others or to work quietly.
- Many of the activities and exercises of the curriculum incorporate physical activity, including reading and grammar games.
- The study of biology includes the story of the great river, a story that initiates the study of human physiology and emphasises the interdependence of all the organs of the human body.
- The study of history is organised around an understanding of the fundamental needs of humans, including spiritual needs (personal and artistic expression and religion), as well as material needs (food, clothing, housing, transport and defence, including defence from disease).

As in all areas of the Montessori curriculum, materials and activities designed for PDHPE are prepared to enable self-directed, independent work for individuals and groups. These materials are placed on the shelves as another choice available to the children at any time of the day, rather that at set times only. Children are also involved in research-based projects relating to PDHPE.

The key components of the Montessori PDHPE programme are:

- personal development (incorporating lessons of grace and courtesy)
- health awareness
- physical education

### Personal Development (Incorporating *Lessons in Grace and Courtesy*)

In the Montessori classroom social behaviour is learned through observation and imitation. The three-year age range includes children at varying stages of social and emotional maturity. Older children have the opportunity to become role models and to assist younger children with resolving issues and building their social skills.

Children are shown how to manage social interactions in effective ways during small group lessons known as the lessons in *grace and courtesy*. These lessons are given at point of need in order draw children's attention to ways of interacting with others that respect everyone in the class community and that promote harmony. These lessons can take several forms, including:

- short role-plays or mini-dramas, often highlighting inappropriate behaviour in humorous ways, then modelling more effective behaviour, or asking the children to act out more effective behaviour
- story-telling
- group discussions

Lessons in *grace and courtesy* (sometimes called *how to* lessons) include:

- how to put a chair under a table without disturbing others

- how to interrupt politely
- how to introduce one person to another
- how to express your feelings without hurting others.

As much as possible appropriate social behaviours are taught through modelling and *grace and courtesy lessons* rather than through correction. It takes time and much repetition of the *grace and courtesy lessons* before children understand and incorporate the appropriate behaviour into their own behaviour. The lessons are, therefore, repeated as necessary, but the teacher never draws attention to a particular child or group of children who 'need' the lesson. In the Montessori view, correction that embarrasses children, or makes them self-conscious, is damaging and usually counterproductive.

At all times respect of oneself and for others is emphasised. Friendships are also valued as these lay the foundation for future extended relationships. Everyday in Montessori classrooms children make their own decisions about their work and their interpersonal relationships. Children are encouraged to work together to create a miniature and harmonious society.

At the beginning of every school year each class meets to work out the rules the class needs to follow if they are to work harmoniously and productively together. The rules are reviewed from time to time and adjusted if needed. Because the children have discussed and voted on the rules themselves, they adhere to them and 'police' them far more rigorously than an adult would. Class meetings continue to be held weekly to discuss problems and issues that have arisen during the week and to work out solutions. In this way children experience the roles and responsibilities of community living.

Students in Montessori schools traditionally involve themselves in community service. This might include participation in voluntary work that assists the school community, such as fund-raising activities or events that strengthen community bonds, for example, days celebrating one or more cultures of families within the school, or activities that promote the health and well-being of members of the school community. It also might include participation in activities that contribute to the well-being of the local or wider community.

## Health Awareness

There are many features of the Montessori curriculum that show children the importance of a healthy lifestyle.

- Through exercises in *practical life* children learn to care for themselves and their environment, including routines for maintaining health, hygiene and cleanliness (e.g. washing hands, cleaning teeth, pouring water to drink, preparing fruit, dressing for the climate, cleaning surfaces, washing up, sweeping floors).
- During the study of history *the fundamental needs of humans* charts initiate discussions of those things humans need to live, including good food, safe and secure housing and defence against disease. Follow-up discussions and research projects extend children's exploration and knowledge to cover nutrition, personal safety and prevention of disease.
- During the study of biology, beginning with the *story of the great river* (a metaphor for the circulation system of the human body), children learn about the functions of the different organs of the body, and the way they work together. With this knowledge children are able to consider how best to keep each organ, and their whole body, healthy and functioning properly.
- During the study of botany, children grow plants. As part of this study, they are encouraged to grow plants for food. They can then harvest and prepare the food.
- As in all other areas of the curriculum children are encouraged to research PDHPE topics, matched to children's age and interest, and to present their research to the class. Topics might include, for example, nutrition, the effect of exercise on the body, sun and road safety, or the uses of medication and/or drugs.

## Physical Education

In 1947, during a training course in India, Dr Montessori described the most effective school for children aged from six to twelve in the following way:

> The school for this age must be full of activity, not only for knowledge, not only for the development of the mind, but also for the development of the body.

Gymnastics was an activity Dr Montessori particular valued for the following reason:

> Just as (with) movement, the gymnastics of children is necessary because, as is well known, muscles which are not exercised become incapable of performing the variety of movements of which the muscular system is capable.

She was also an early advocate of teaching young children to swim from as early as the age of four. Regular physical activity is, therefore, an essential component of the Montessori curriculum.

Very young children, infants and toddlers, are very active. They are constantly moving, whether crawling, walking, running, climbing, jumping, swinging or balancing. It is important, as children grow older, to create an environment in which they can maintain this level of physical activity, and extend their stamina and physical endurance. To achieve this, the school environment must be designed to promote regular physical activity and to extend children's physical skill and capacity. As well as opportunities for free movement in the classroom, children in Montessori schools participate in a range of games and exercises that enable them to build agility, strength and coordination progressively, from individual skills to combined, and increasingly more complex, skills. In addition they participate in a range of fitness activities, including team sport, athletics, water safety/swimming/aquatics, tennis, yoga and dance.

In the Montessori curriculum physical education lessons, materials and activities are designed following the same principles as lessons in other curriculum areas.

- Materials and activities are prepared to enable self-directed, independent work for individuals and groups. The equipment is attractive, child-sized, stored in an orderly fashion and is easily accessible to students.
- Brief initial lessons, called key lessons, give children just enough information to enable independent exploration (e.g. to introduce a skill, the rules of a game or the safe use of equipment).
- Children are free to choose to work with the materials and exercises during the work period and for as long as they like.

The Montessori sports curriculum does not emphasise competitive games. Dr Montessori (1989/1930:17) argued that once children are concentrating on an activity, they are more interested in the activity than in competition. Games are played with an emphasis on:

- enjoyment
- the gaining of new skills
- team work and collaboration
- being a good sport
- safety

Wherever possible new skills are introduced by skilled adults (e.g. certified swimming teacher).

## PDHPE Curriculum for Children Aged Six to Nine Years

| Content Strand | Knowledge, Skills and Understandings | Activities and Resources |
|---|---|---|
| | *Typically children will:* | |
| Personal development (incorporating lessons in *grace and courtesy*) | Acquire and use appropriate social customs and manners<br><br>Accept responsibility for actions and the consequences that follow<br><br>Identify ways to communicate, cooperate and care for others<br><br>Use communication and cooperation skills to share feelings and meet basic needs when interacting with others<br><br>Develop the ability to make decisions as an individual and as a group member<br><br>Develop respect for self and for others<br><br>Develop meaningful and lasting relationships and friendships | Activities include:<br>- lessons in grace and courtesy<br>- collaborating on learning and research<br>- creating and reviewing class rules collectively<br>- regular class meeting<br>- discussing values e.g. respect, care, compassion, responsibility, tolerance, inclusion<br>- discussing class rules that have been composed and agreed upon by the children<br>- story-telling, role-play, drama.<br>- participating in community service, both within and beyond the school<br><br>Resources include:<br>- three-year age range of the class community<br>- whole school and wider community |
| Health Awareness | Recognise that positive health choices can promote well-being<br><br>Recognise that safety depends on the environment and the behaviour of self and others<br><br>Learn safety measures in the home, at school, on the street<br><br>Discuss and understand factors influencing personal health choices<br><br>Develop an appreciation for a healthy lifestyle<br><br>Name and understand the basic internal/external parts and systems of the body and understand their functions | Activities include:<br>- discussing and researching relevant topics e.g. nutrition/diet, grooming, hygiene including teeth, safety including road, sun, water, fire, home, school<br>- growing fruit and vegetables to prepare and/or cook<br>- studying internal/external parts and systems of the human body and their function.<br><br>Resources include:<br>- fundamental needs of humans chart<br>- body function material<br>- the great river story and chart. |

| | | |
|---|---|---|
| **Physical Education:** *basic physical fitness* | Participate in physical activity, recognising that it can be both enjoyable and important for health<br><br>Understand the relationship between regular and varied physical activity and health<br><br>Improve physical fitness | Activities include:<br>- free movement within the classroom<br>- practising a variety of movements e.g. balancing, walking, running, galloping, hopping, skipping<br>- participating in regular aerobic exercise (e.g. jogging, skipping, dance) in 10 minute sessions three to five times a week<br>- exercises of practical life e.g. cleaning, tidying, gardening, cooking<br>- active games across the curriculum e.g. interpretive reading, grammar games. |
| **Physical Education:** *sport – ball skills* | Follow a simple sequence that links basic movement patterns<br><br>Develop eye/hand and eye/foot coordination and balance<br><br>Develop ball handling skills | Activities include practising ball handling skills e.g. catching, dribbling, striking, bouncing.<br><br>Resources include a range of surfaces e.g. hard flat surface, vertical wall with hard surface;, large grassed area) and sports equipment (e.g. balls, bats, hoops, ropes. |
| **Physical Education:** *sport – game skills* | Perform fundamental movement skills with equipment in minor games<br><br>Develop the physical skills necessary for the enjoyment of and participation in a variety of sports<br><br>Develop social skills such as collaboration and a healthy approach to winning and losing<br><br>Develop a sense of fair play and sportsmanship | Activities include:<br>- key lessons and practice e.g. two/three 30 minute sessions per week or a 1- 1½ hour sport session a week<br>- forming and working in teams<br>- discussions, activities and exercises on the meaning of fair play. |
| **Physical education:** *staying safe* | Develop an understanding of safety in the environment and the need for safe behaviours | Activities include discussions, role-plays and exercises around safety and the practice of safe behaviours. |
| **Physical education:** *a selection of activities* | Demonstrate control in performing sequences of introductory gymnastic movements (e.g. static balance; vertical jump; spatial awareness)<br><br>Participate in physical activity, recognising that it can be both enjoyable and important for health<br><br>Participate in physical activity, recognising that it can be both enjoyable and important for health<br><br>Perform simple dance sequences incorporating basic movement skills and patterns | Activities include participating in a range of activities adapted to children's age and capacity and appropriately supervised e.g. gymnastics, yoga, swimming and water safety, dance, athletics, bushwalking.<br><br>Resources include appropriately trained teachers and appropriate venues and facilities. |

| | | |
|---|---|---|
| | Perform familiar movement patterns in a variety of dance situations<br><br>Develop strength, endurance and coordination<br><br>Experience individual accomplishment, teamwork and the value of sportsmanship<br><br>Build endurance and strength while participating in and enjoying the surrounding environment (particularly nature) | |

## PDHPE Curriculum for Children Aged Nine to Twelve Years

| Content Strand | Knowledge, Skills and Understandings | Activities and Resources |
|---|---|---|
| | *Typically children will:* | |
| Personal development (incorporating lessons in *grace and courtesy*) | Display appropriate verbal and physical behaviour in everyday situations<br><br>Use interpersonal processes and the related communication and cooperation skills to contribute to and enhance interpersonal and group interactions<br><br>Make decisions as an individual and as a group member<br><br>Use a range of problem-solving strategies in personal and social situations<br><br>Develop meaningful and lasting relationships and friendships<br><br>Communicate confidently in a variety of situations<br><br>Demonstrate tolerance for others as unique individuals and for their culture and customs<br><br>Come to an understanding of personal strengths and needs<br><br>Act in ways that enhance the contribution of self and others in a range of cooperative situations | Activities include:<br>- *lessons in grace and courtesy*<br>- collaborating on learning and research<br>- creating and reviewing class rules collectively<br>- regular class meetings<br>- discussing values e.g. respect, care, compassion, responsibility, tolerance, inclusion<br>- story-telling, role-play, drama<br>- school camp<br>- peer support and mentoring<br>- participating in community service, both within and beyond the school<br><br>Resources include:<br>- three-year age range of the class community<br>- whole school and wider community |
| Health Awareness | Name and understand the internal and external parts and systems of the body and understand their functions<br><br>Explain the consequences of personal lifestyle choices<br><br>Describe safe practices appropriate to a range of situations<br><br>Study first aid | Activities include:<br>- detailed study of the human body e.g. structure of cells, parts and functions of the brain, glands, genes.<br>- Life Education lessons e.g. nutrition, drug education<br>- guest speakers and visiting health professionals<br>- first aid information and demonstration by qualified instructor. |
| Physical education: *basic physical fitness* | Enjoy physical activity<br><br>Improve physical fitness | Activities include:<br>- participating in regular aerobic exercise (e.g. jogging, skipping, dance, circuits) in10 minute sessions three to five times a week<br>- obstacle course<br>- partner activities. |

| | | |
|---|---|---|
| **Physical education:** ***sport – ball skills*** | Develop appropriate ball skills for particular ball games and sporting situations | Activities include practising ball games regularly (e.g. handball, softball, netball, badminton, table tennis, cricket, tennis, volleyball, squash) in two/three 30 minute sessions a week or once a week at a 1-1½ hour sport session. |
| **Physical education:** ***sport – game skills*** | Participate in and use equipment in a variety of non-competitive games and modified sports<br><br>Apply movement skills in team games and sports that require communication, collaboration, decision-making and observation of rules | Activities include:<br>- non-competitive games and modified sports<br>- discussions, activities and exercises on the meaning of *fair play*. |
| **Physical education:** ***staying safe*** | Develop an understanding of safety in the environment and the need for safe behaviours | Activities include:<br>- discussions, role-plays and exercises around safety and the practice of safe behaviours<br>- peer support and mentoring. |
| **Physical education:** ***a selection of activities*** | Demonstrate coordinated actions of the body when performing gymnastic sequences<br><br>Refine and apply movement skills creatively to a variety of challenging situations<br><br>Show how to maintain and improve the quality of an active lifestyle<br><br>Perform a range of dance styles and sequences confidently<br><br>Develop strength, endurance and coordination<br><br>Experience individual accomplishment, teamwork and the value of sportsmanship<br><br>Build endurance and strength while participating in and enjoying the surrounding environment (particularly nature)<br><br>Build orienteering skills<br><br>Experience success in challenging activities in a collaborative atmosphere | Activities include:<br>- participating in a range of activities adapted to children's age and capacity and appropriately supervised e.g. gymnastics, yoga, swimming and water safety, surfing, dance, athletics, bushwalking, camping, orienteering, cycling, riding<br>- planning for activity e.g. preparing equipment including safety equipment such as first aid kit and mobile phone; organising appropriate venue and safe transport to venue; ensuring appropriate adult supervision is available; becoming familiar with safety procedures<br>- initial training in sport-related skills e.g. coaching, referee, life-saving, first aid, bicycle repair, care of horses<br>Resources include appropriately trained teachers and appropriate venues and facilities.. |

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# Montessori National Curriculum for the Adolescent Programme from Twelve to Fifteen/Sixteen Years

MONTESSORI AUSTRALIA

# The Montessori National Curriculum Framework for the Adolescent Programme From Twelve to Fifteen/Sixteen Years[4]

The *Montessori National Curriculum Framework* included here is based on Montessori principles derived from the *Project 2012 NAMTA Curriculum Framework* materials and outcomes as they have been developed to date. The primary authors of the framework are David Kahn and Laurie Ewert-Krocker. The original framework was provided to the Montessori Australia Foundation by the North American Montessori Teachers' Association (NAMTA). This framework has been adapted below to incorporate additional content where needed to meet Australian curriculum requirements. Copyright of the framework remains with the North American Montessori Teachers' Association and the Montessori Australia Foundation.

## Introduction to the Third Plane of Development

Adolescents are emerging from childhood and preparing themselves for their adult role. From the Montessori point of view, adolescence, like the previous developmental planes of infancy and childhood, is a period of physical, intellectual and social transformation, governed by the special tendencies and dispositions that characterise the age group and generate the developmental achievements of the period. The manifestations of third plane characteristics can be intense. These characteristics represent a new set of needs that educators must address, first by removing obstacles to individual development and, second, by providing an environment that meets the developmental needs of students of this age. As with the Montessori environments prepared for the two previous planes of development, it is the physical, social, ethical, intellectual and spiritual needs of students in the third plane of development that are central to the educational environment prepared by Montessori educators for adolescents.

The Montessori adolescent programme builds on the achievements of the earlier planes.

- Children in the first plane of development explore their world through their senses to construct themselves physically, socially and intellectually. In this way they absorb all aspects of the surrounding culture, including language, social conventions and cultural knowledge. Montessori environments for the first plane provide children with opportunities for self-chosen purposeful work aligned to sensory exploration, and the interests of the absorbent mind.
- Children in the second plane of development explore ideas, abstract concepts and the reasons for things. They strive to expand the limits of their world to encompass the whole of human society, planet Earth and the universe beyond. They are also intensely interested in justice, the difference between right and wrong. Montessori environments for the second plane provide children with opportunities for self-chosen purposeful work aligned to conceptual and ethical exploration, an exploration that exploits the power of the imagination, of abstraction and the interests of the reasoning mind.

Building on this foundation, during the adolescent years, Montessori students explore their place in human society and ways they might contribute to society. The work of the adolescent, according to prominent Montessori teacher trainers Camillo Grazzini and Baiba Krumins Grazzini (2010 [1996]: 96), is to 'take an active part' both in 'society's productive labours' and in 'the regulation of its organization'. Montessori environments for *the third plane of development* provide adolescents with opportunities for self-chosen, purposeful work aligned to manual and intellectual endeavours with social significance and an economic base.

At the conclusion of the Montessori adolescent programme young adults, from age eighteen, are then ready to contemplate their mission in life, and to specialise in a field of endeavour that will enable them to contribute in an independent, meaningful way to society and the world at large. In the Montessori view, young adults reach this point if they have had the opportunity to pass through childhood and adolescence 'from one stage of independence to a higher [stage], by means of their own activity, through their own effort of will', a process which constitutes 'the inner evolution of the individual' (1976 [1948]; epigraph).

[4] © North American Montessori Teachers' Association and Montessori Australian Foundation

Across the entire Montessori curriculum, beginning in the preschool and continuing through the school years, what is described as 'culture' by Montessori educators is covered extensively, perhaps even more extensively than is sometimes the case in other educational contexts. The meaning of the term 'culture', as it is used in Montessori contexts, reflects the meaning of the word in Italian. It refers to discipline knowledge across the subject areas, 'the existing body of human knowledge and understanding' (Krumins Grazzini 2010 [2005]: 85). Montessori educators offer discipline knowledge to children in the first plane of development in sensorial form. In the second plane of development children are offered the expansive *Cosmic Education* curriculum that initiates them into areas of knowledge which, in other educational contexts, may not be introduced until the secondary school. The Montessori adolescent programme builds on this foundation, by offering students opportunities to consolidate, broaden and deepen their knowledge, to explore how this knowledge is applied in the world, and, importantly, to give the adolescents opportunities to apply discipline knowledge in practical, productive and economically meaningful work.

The aim of the Montessori adolescent programme is to provide an educational environment that enables students to:

- transform themselves into independent, self-regulating, resourceful and adaptable adults
- become interested observers, listeners and collaborators, critical thinkers and engaged citizens
- express their own opinions, develop their own talents, make decisions and solve problems, on their own or collaboratively, with a confidence that is grounded in the practical, social and intellectual knowledge, skills and values they are developing in the Montessori environment
- contribute productively, with enthusiasm and integrity, to family, school and community life, and to the wider society, both national and global
- dedicate themselves to the future of humanity

## Characteristics of the Third Plane of Development

Adolescence, the third plane of development, is a period of transformation, a 'creative' plane of development, that echoes, in the Montessori view, the first plane of development. The adolescent is 'a newborn participant in adult society' (Grazzini and Krumins Grazzini 2010 [1996]: 96), no longer a child but not yet an adult, when, at puberty, the transformative developmental work of becoming an adult begins.

The rapid physical growth of adolescence also echoes the rapid physical growth of the first plane of development, but this time physical growth is accompanied by the intense hormonal activity that ushers in sexual maturity. The energy the adolescence needs during periods of rapid physical growth can sometimes diminish the energy the adolescent has available to concentrate on their academic work. Similarly, during both the first and third planes of development, the human brain undergoes significant re-organisation, in the first plane as the baby becomes a child, and in the third plane, as the child transforms into an adult. At the onset of adolescence young people are ready to take further steps away from their families and towards adult independence in society. They also become idealistic and peer-oriented. They can find it difficult to concentrate on structured academic learning but love to interact conversationally and collaboratively with other adolescents in the context of projects and issues that are important to them; they feel supported and nurtured in a cooperative community of peers.

Where the work of the infant is to create a human being, the work of the adolescent is to create a human adult ready to take their place in society. Strong emotional responses, a feature of both infancy and adolescence, are a sign in adolescence of the young person's huge capacity for creative expression. Like the child in the first plane of development, the adolescent is very egocentric, but this now manifests as introspection. For this reason, during adolescence young people grapple with questions such as:

- *Who am I?*
- *Where do I fit into society?*
- *How can I be of use?*

Emerging from the interest in justice and ethics that is a feature of the second plane of development, adolescents have high ideals and place a high value on social justice, but there is a shift in emphasis from justice as an abstract concept that interests the second plane child to a concern in adolescence with how to contribute practically and actively to justice in the immediate social environment and beyond. Similarly, there is

a shift in emphasis from the abstract and intellectual learning style of the child in the second plane to a more practical and experiential learning style in adolescence. The adolescent needs to explore, in more depth, ideas and concepts introduced in the *Cosmic Education* during the primary school years, but with an emphasis on the practical application, and the economic and social value, of these concepts. Adolescents are eager to use their ideals and knowledge to explore possible social roles and to seek economic independence (Montessori 1976 [1948] 97-121).

According to Dr Montessori, adolescence is an 'epoch of inner revelations and of social sensibilities', characterised by 'a state of expectation, a tendency towards creative work and a need for strengthening of self confidence' (Montessori 1976 [1948]: 101). The sensitive period for the third plane is a heightened sensitivity oriented towards developing 'the most noble characteristics' that prepare the individual for social life, specifically, 'a sense of justice and a sense of personal dignity' (Montessori 1976 [1948]: 101). On other hand Montessori recognised that adolescence is a period of vulnerability, a time during which feelings of rebelliousness can lead the adolescent in directions with negative consequences. The Montessori adolescent program aims to channel the energy and challenge of the adolescent years in positive ways. This is achieved by engaging them in authentic social experiences and the achievement of meaningful social goals. From the age of twelve, Montessori (1992 [1949]: 69-70) argues, the adolescent should be 'taking an active part in social life; … producing, selling and working, not [yet] in order to learn a trade, but because working means coming into contact with [adult] life …'. 'To achieve their full potential as adults, adolescents have to prepare for active participation in society as productive workers.'

# Montessori Prepared Environment for the Third Plane of Development

## Introduction

Educational environments prepared for adolescents by Montessori educators are designed to build an adolescent community in which young people gain social experience that prepares them for adulthood. The right environment for adolescents, according to Dr Montessori (1992 [1949]: 109) is one in which they can have 'effective, practical experience of every aspect of social life'. One of the central roles of the Montessori environment prepared for adolescents is to initiate these young people into the world of adult work. The environment prepared for a Montessori adolescent community incorporates two types of working environments:

- an environment that relates to nature and the earth
- an environment that relates to the work of humans

## Physical Environment

The physical environment proposed by Dr Montessori as the place where a community of adolescents, ranging in age from 12 to 15, or 18, years, will ideally live and work together is a *rural setting.* This environment is set up a 'centre for study and work' (Montessori 1976 [1948]: 105). In this environment adolescents are supported so they can become self-regulating and so they can engage in a micro-economy comprising a variety of farming enterprises. By this means, students experience adult productive work and develop practical skills as well as skills in organisation and economic management. The farm school is the prototypical Montessori prepared environment for adolescents. Montessori prepared environments for adolescents in *urban settings* are designed to provide equivalent opportunities for study, self-regulation and productive work. The common theme of both rural and urban environments prepared by Montessori educators for adolescents is that these environments become a setting for a *pedagogy of place*, that is, a place for work and study, a village-like environment, in which all members of the community experience belonging, engagement, shared responsibility, achievement, and awareness of the significance of their contribution and worth, and an investment in each other and in the occupations and projects generated by the community.

## The Montessori Environment Prepared for Adolescents in a Rural Setting

In a rural setting, adolescents have the opportunity to study the agricultural origins of human civilisation, as well as the cycles of production and exchange which underpin the economic foundations of social life. The rural environment might include:

- a farmhouse, with shared living and study space
- a garden
- natural, wild spaces
- a greenhouse
- three farm buildings: one for animals, one for workshops, for example, woodwork and craft workshops, and one to house large equipment
- productive farming land
- a guesthouse, or bed and breakfast, where family members can stay when they visit
- a 'museum of machinery' (Montessori 1976 [1948]: 117) that allows students to engage closely with advances in technology

The rural setting provides a framework for study that puts adolescents into direct contact with real life, both the natural environment and the environment built by humans. In this rural setting specially prepared for adolescents:

> … the exploration is even wider [than in the environment prepared for second plane children], encompassing the farm and the community of the rural area. It echoes what the children explored at the second plane: civilization and how it came about. But now the exploration takes place in reality because the adolescents are actually *doing* it. Cooperation with the land, cooperation in commerce, and cooperation in the cultural life of the rural society *touch* materially the things studied in the second plane and afford the adolescent the opportunity to see his or her place in society (First-generation Montessori teacher trainer Margaret Stephenson, cited in Pendleton 1997: 35).

In the rural setting, under the guidance of experts, adolescents gradually take over the management of the different enterprises that make up the environment. This might include a small shop, or market stall, perhaps in the nearby urban area, where they are able to sell produce from the farm and products, such as crafts, produced in the workshops. Each of these enterprises provides the motivation for constructive and productive activity, and the study of related knowledge and skills. As they learn to manage these enterprises, students apply their academic learning and gain practical skills, while also learning what it means to work collaboratively towards self-regulation and economic independence. The adolescent community is organised by the limits and rules needed to ensure that life in the community remains ordered, harmonious and productive. The organisation of the environment and community life is designed so students have the opportunity to learn that 'self-discipline is an aspect of individual liberty and the chief factor of success in life' (Montessori (1976 [1948]: 113). The higher ideal of such a community is for adolescents to become 'adults who are builders of peace in a multicultural society which is in rapid evolution' (Grazzini and Krumins Grazzini 2010: 103).

The adults who prepare the environment, and whose role it is to ignite the students' interest in the opportunities for work and study in the prepared rural environment, include qualified teachers and instructors, some living on site. The teaching staff is made up of specialists, including specialists in Montessori education and in the secondary school subject areas, with the addition of technical expertise in relevant fields such as horticulture, animal husbandry and agriculture, business management, health and first aid, as well as trades and practical skills, such as carpentry, cooking, housekeeping and general maintenance. The adults in the community show the students how to pay attention to their own physical and emotional health and well being by drawing on specialist knowledge of what adolescents need for optimal health, for example, in terms of nutrition, sleep and physical exercise.

Dr Montessori coined the name *Erdkinder*, meaning land, or rural, children, to describe the adolescents who live in this prepared rural community. This name echoes the term *Kindergarten* so commonly used for educational environments designed for children in the first plane of development. The prepared rural environment is designed to take into account the following dimensions of development:

- physical, including health, fitness and nutrition

- emotional
- social
- intellectual
- moral, or ethical

The prepared rural, or farm, community is the blueprint for integrating study and work in all Montessori adolescent programs.

The prepared rural, or farm, community is the blueprint for integrating study and work in all Montessori adolescent programs.

### The Montessori Environment Prepared for Adolescents in an Urban Setting

While the Montessori adolescent curriculum emerges from the *Erdkinder* blueprint, it is not possible for all Montessori adolescent communities to live and work in rural settings; Montessori adolescent communities are also established in urban settings. The environments prepared for urban centres adapt the principles established by the rural blueprint. The urban setting needs to provide students with connection to the land and nature, to the world of adult work and to the wider community. For this reason, urban settings for Montessori adolescent communities are designed to make possible projects, occupations and micro-enterprises in domains such as the following:

- market gardening, greenhouse or rooftop garden, horticulture, landscaping, hydroponics, worm-farming
- land and bush care
- recycling and managing water resources
- managing all aspects of providing school lunches, ideally based on produce from the garden
- maintenance of bicycles, computers, sports equipment etc
- managing a coffee shop, pizza business or produce market stall
- keeping bees or poultry
- making and marketing items such as clothing, jewellery, belts, soap, candles and baked goods.
- housekeeping services

The urban adolescent programme can also include extended trips, organised by the students, such as camping and outdoor adventure trips or work experience on farms and rural properties.

## The Social Dimension of the Environment

The Montessori environment prepared for adolescents is designed as a 'school of experience in the elements of social life' (1976 [1948]: 102). The experience of social life in this environment has two aspects:

- an environment in which participation in community life and contact with the natural world are combined
- an environment in which work, or occupations, are organised as social activity

### Participation in Community Life and Contact with the Natural World: A Pedagogy of Place

The emphasis in the Montessori adolescent programme on integrating study and work in an environment that combines participation in community life and contact with the natural world, echoes the concept of *place*, and its educational value, as described by Orr (1992) and Hutchinson (1998) In their description, *place*, comprising a human community in contact with the natural world, builds a context for social relations. The value of an education that emphasises both community and contact with nature, is described by Orr (1992: 127) in the following way:

> The idea that place could be a significant educational tool was proposed by John Dewey in an 1897 essay. Dewey proposed that we 'make each of our schools an embryonic community… with types of occupations that reflect the life of the larger society'. He intended to broaden the focus of education, which he regarded as too 'highly specialized, one-sided, and narrow'. The school, its relations with the larger community and all of its internal functions, Dewey proposed to remake into curriculum.

This view resonates with the idea of the 'spirit of place', where community relations and values align with ecological sustainability, as described by Hutchinson (1998: 129) in the following way:

> To know one's place is to have an intimate knowledge of the local environment (both natural and built) and the various professional roles, shared histories, and interdependent relationships that sustain the community over the long term. To further strengthen children's ties to the local community, their participation in community projects that help to nurture culturally significant relationships between young and old can be fostered by way of apprenticeship-style programs and community renewal efforts that arise within ecologically sustainable contexts.

The notion of *place* is also linked to the geographical and social containment of the environment. The ideal environment for an adolescent community is small scale at every level. This includes the building, designed on a scale that supports the sense of community, as well as the neighbourhood and the landholding, both of which can be easily traversed by the students on foot within the school day.

In summary, the *Erdkinder pedagogy of place* encompasses all aspects of a community's environment, an environment which includes sources of food, water, energy, materials, friends, occupation and recreation, in other words, the larger economic, ecological, social, political and spiritual elements of the students' immediate surroundings. *Place* is a *community* in which the adolescent feels he or she both belongs and contributes.

## Work, or Occupations, Organised as Social Life

Through work, the students in the Montessori adolescent community engage with the natural environment and the wider society. The work undertaken with the community are called occupations. Occupations in the adolescent community have the following characteristics:

- The work is meaningful to the students.
- The work is both physically and intellectually challenging.
- The work is valued in the wider community, society and culture.
- The work has economic validity.

Occupations with these characteristics inspire students to engage in the work with integrity and passion, to develop their own interests and expertise, to gain recognition for their contribution and to experience a sense of ownership and accomplishment. In this way, through the occupations, adolescents have the opportunity to take on more mature roles within the community. These roles might include being the beekeeper, the bookkeeper or the photographer. The opportunity to take on different occupations and roles leads the adolescent towards maturity and a sense of their own value and usefulness. When the adolescent assumes a role in the community, the occupation has demonstrably engaged and transformed the student, provided the student with goals and validation, and adds impetus to the student's learning.

A central component of the rural blueprint for the adolescent community is the opportunity for adolescents in the farm community to work towards economic self-sufficiency. This aspect of the *Erdkinder* program is also applied to Montessori adolescent communities in urban settings. Economic independence, according to Dr Montessori (1976 [1948]: 104) is 'the general principle of social education in adolescents', giving them a sense of the 'wide social connotations of productiveness and earning power'. She continues: 'If the produce [produced by the students] can be used commercially, this brings in the fundamental mechanism of society, that of production and exchange, on which economic life is based' (1976 [1948]: 107).

Most importantly, from working within a small community, students gain an understanding of how work, and the roles people play in workplaces, are essential for the well-being of the whole community and how they function for the greater good of the community. By this means, the student begins to glimpse possibilities for their future role in the wider society and the contribution they can make to humanity in general.

Social outcomes for the early adolescent stage of life include:

- learning to live in domestic relations with others, and to work through human problems
- learning what it means to make a contribution to a community

- understanding the significance of interdependency and, therefore, the need to cooperate with adults and peers in relation to the rest of the world
- assuming work roles and experiencing their social implications, as well as the benefits for all of taking an active role in society
- adapting to a variety of work demands for the sake of others, as beginning of social consciousness
- understanding work as a product of commerce necessary to community life,
- experiencing the significance of economic independence and interdependence
- balancing individual initiatives in relation to community goals
- learning the meaning of rules and their importance to harmonious living

## The Moral, or Ethical, Dimension of the Environment

Dr Montessori (1976 [1948]: 101) recognised in adolescents a 'sensitive period when there should develop the most noble characteristics that would prepare a [human] to be social, that is to say, a sense of justice and a sense of personal dignity.' This sensitive period, which builds on the interest in morality that begins in the previous plane of development, is addressed through both work and study in the adolescent community.

The work, or occupations, in the adolescent community provide students with opportunities to take on a variety of roles in the community. All roles in the community provide an opportunity for communication and cooperation toward the greater good. These include ongoing companionship within the community and the building of relationships with neighbours and wider community. Through experience of different social roles, adolescents learn to understand the difference between right and wrong actions in relation to work, study, the environment and social responsibility. They also become aware that through their own effort, they can make a difference in the world. Because the occupations in the adolescent community are meaningful, the students feel valued and their contribution is tangible. When an individual student succeeds in a task through personal effort, the result is a sense of accomplishment, which can also be accompanied by an economic benefit.

The orientation of the study undertaken in the adolescent community also contributes to moral development. Through their study of history, for example, adolescents build their knowledge of the human past, and possible human futures in the context of sustainability and the well-being of planet Earth. Studying human history from an ethical point of view, especially the relationship of humans with the natural world, brings into focus current environmental questions. A study of how humans have, or have not, used water and land, plants and animals, air and energy sustainably in the past raises moral questions for humans in the present and into the future. In this way, adolescents learn that the study of history, how humans lived in the past, builds wisdom about how to live in the present and in the future. When the study of history intersects in this way with adolescents thinking about their future, and what it might hold, it can motivate and capture interest, build a sense of identity and vocation, as well as contribute to ethical and moral development.

Moral, or ethical, outcomes for the early adolescent stage of life, following Kahn and Stewart (2001: 561), include:

- learning to respect others and their roles
- learning that work is noble and involves taking on adult-like responsibilities
- the ability to engage with social and moral problems, for example, the ethical use of the natural environment and the ethics of science
- displaying individual initiative, including the ability to commit to freely chosen work
- learning to take pleasure in one's own progress, as well as the way one's own progress can contribute to others and enhance the progress of the whole group
- developing the concept of 'service' orientation, including service to the needs of a wider humanity
- posing big mora questions, including 'What makes for a virtuous life?'; 'How can we build a better world?'
- developing an ethical conscience exercised by community values and responsible dialogue with others

## The Cognitive, or Intellectual, Dimension of the Environment

The cognitive, intellectual dimension of the environment covers the study of the earth and human civilisation. It not only involves study of discipline knowledge, but also ways to apply this knowledge. In this way, students have the opportunity to expand understanding and skill, both through practical problem solving and intellectual reasoning, Cognitive, or intellectual, outcomes for the early adolescent stage of life include:

- learning to express oneself using a variety of modalities, including artistic, verbal, musical and other media, in ways that relate directly to the occupations and roles in the community
- addressing philosophical questions related to nature and the cosmos
- analysing scientific causality in the natural world and the cosmos
- building understanding of the mathematics directly connected to the practical needs of the community
- building understanding of the mathematics needed to represent in symbolic form data observed scientifically
- building knowledge and skill in a variety of languages and how to use language to engage with different cultures and to improve human understanding
- connecting the history of life on earth and its civilisations with one's own evolution as an individual and with the social evolution of a human community
- building a global view of the whole of history and the future destiny of humans while reflecting on the individual contribution one makes to the creative direction of the future
- understanding the nature of interdisciplinary studies, the relationship between the disciplines and the totality of the natural and human built worlds
- using available tools and technology to continue the inquiry into how knowledge can best be applied

## The Emotional, or Nurturing, Dimension of the Environment

Drawing attention to the insecurity of children after the Second World War, Montessori (1976 [1948]: 98) wrote: 'We have lost that security which we had in the past'. She was, of course, alluding to the shifting nature of modern conditions. In order to be prepared for a world that has an unsure future, Montessori writes that the adolescent's task is to construct an adult who has a 'strong character and quick wits as well as courage'. She continues:

> [The adult] must be strengthened … by moral training and … must also have practical ability in order to face the difficulties of life. Adaptability—this is the most essential quality; for the progress of the world is continually opening new careers, and at the same time closing or revolutionizing the traditional types of employment … there is a need for a more dynamic training of character and the development of a clearer consciousness of social reality.

Adaptability, suggests Mario Montessori (1966 [1957]: 1) is measured by an optimal state of happiness, as he describes in the following way:

> Dr Montessori explained what she meant by 'adaptation'. To her the word meant happiness, ease and the sort of inner equilibrium which gives a sense of security … It is based on the permanency of the spiritual, ethical and economical equilibrium of the group environment [the child] may grow up in. For adaptation, thus considered, 'stability' plays a great role, because it represents the basis from which to start towards the realization of the individual's aspirations. It is as the solid ground is under one's feet when walking.

Adaptation, understood as emotional balance of this kind, is understood in the context of the Montessori adolescent community as the basis of educational success. Emotional outcomes for the early adolescent stage of life include:

- understanding the connection between personal vocation, a person's life work or mission in life, and the vocation of humanity
- feeling self sufficient and confident, based on an ability to care for oneself and others
- developing inner harmony and happiness through a love of work, study and achievement, and participation in and contribution to the work of society
- feeling hope for future world progress
- experiencing the joy of relating one's own life to the history of human culture
- recognising the importance of being keepers of human culture

- experiencing freedom in the spontaneous collaboration with others in a harmonious connection with the natural world
- experiencing the value of human life and its role in the cosmos
- experiencing a sense of belonging to the world human community and to the Earth
- building a personal discipline, creativity, aesthetic and productivity through learning about hand crafted art and practical achievement
- gaining a sense of control over change, both internal and external, in one's personal and social evolution
- building a feeling of usefulness, and an understanding of one's 'many sided powers of adaptation'
- building a belief in the human capacity to solve problems and in the spiritual source of life to overcome adversity

# Erdkinder: A Curriculum for Adolescents Aged from Twelve to Fifteen/Sixteen

In 1948, when Dr Montessori first outlined her blueprint for an adolescent curriculum, it was common for adolescents to choose either manual training or an intellectual education, but not both, as they entered secondary school. The adolescent curriculum advocated by Dr Montessori, in contrast, integrates manual and intellectual work for all students of this age, each type of work complementing and enhancing the other. Both types of work are interwoven in the practical and engaging projects that are a feature of the Montessori adolescent curriculum, as advocated by Dr Montessori in the following way:

> Education [for adolescents] should … include the two forms of work, manual and intellectual, for the same person, and thus make it understood by practical experience that these two kinds complete each other and are equally essential to a civilized existence (Montessori1976 [1948]; 103).

# Curriculum Overview

Dr Montessori's blueprint for an adolescent community is not a straightforward inventory of school subjects. She describes knowledge as a means for 'opening up ways of expression', addressing the 'formative forces' in the evolution of the human soul and making the 'individual a part of … civilization' (1976 [1948] 115). Moreover, Dr Montessori envisioned the prepared environment for adolescents as a place in which adolescents develop, not only intellectually, but also physically and socially. (1976 [1948]: 97-109).

The Montessori adolescent curriculum is divided into three main domains. These are *intellectual development, creative expression* and *preparation for adult life*. These three domains are closely interwoven across the curriculum, with the *intellectual development* and *creative expression* domains having a particularly strong cross-curricular orientation.

### Intellectual Development

The domain of intellectual development is made up subjects that comprise the knowledge students need in order to make a contribution to society. This domain has a cross-curricular orientation, traversing all areas of the curriculum.

First, this domain covers an area of study, which in the Montessori context, is called *moral development*, and which focuses on the study of *civility*, *citizenship, civil society and community life*. This area of study includes opportunities for students to participate in, and contribute to, the immediate community. Through these activities, students have the chance to extend the domain of *grace and courtesy* into learning how to engage with members of their own and the wider community, in everyday interactions, financial interactions, problem-solving, debate and discussion with civility and a concern for the needs, dignity and well-being of all involved. Through their community participation students develop a social conscience and a sense of social responsibility, as well as opportunities to develop independence, leadership skills and skills related to making ethical and wise choices.

Second, in order to make a positive contribution to society, citizens must be numerate and literate. For this reason, studies in mathematics and English language are included in this domain. As part of their civic responsibility, students also are expected to become familiar with the content and standards of the mandated curriculum that all students in the state or country are required to study and achieve.

The subjects studied in this domain are:

- civility, citizenship, civics and community life (civil society and moral development)
- mathematics, including arithmetic, geometry, algebra and measurement
- language, English language, as well as at least one language other than English

In this domain *English* and *mathematics* are studied in discrete lessons, as a means of building and consolidating foundation knowledge and skills. These subjects are also embedded in all areas of the curriculum, wherever language and mathematical skills are needed to engage productively with curriculum content.

## Creative Expression

The domain of creative expression is made up of subjects oriented to personal expression, specifically linguistic, artistic and imaginative expression. This domain also has a cross-curricular orientation in the Montessori adolescent program, because creative expression of all kinds can become the means adolescents use to represent knowledge and skills gained in any area of the curriculum.

The three subjects in this domain of the curriculum are:
- language for creative expression
- music
- visual arts

As students study in the domain of creative expression, they are taught skills in all areas of the arts, including literature and creative writing, visual arts, crafts, music and performance. They are then given opportunities to use these skills to demonstrate and display knowledge and understanding gained in any area of the curriculum. For example, to display what they have learned while undertaking a research project on ancient Alexandria, a group of students might present a dramatic representation of the character of Socrates, another might create artworks relevant to the historical time in which Socrates lived, while another might perform a musical recital that relates to that time.

## Preparation for Adult Life and Contemporary Culture

The domain of the Montessori adolescent curriculum that prepares students for adult life and contemporary culture includes the subjects of *science* and *history*. It also includes the *occupations*, the work of the adolescent community.

In the Montessori adolescent community the Science curriculum is organised under two headings.

> ***The study of the physical universe, the Earth and living things***, incorporating studies in:
> **Earth and space sciences**: cosmology, including astronomy; geology and physical geography, including the geology and geography of prehistoric periods
> **Biological sciences**: biology, including studies in botany, zoology, ecology, physiology, comparative anatomy and health sciences (including nutrition and exercise science)
>
> ***The study of human progress and civilisation***, incorporating studies in:
> **Physical sciences**: physics and chemistry
> **Contemporary sciences**: mechanics and engineering, history of science and technology, including genetics

*The study of human progress* incorporates engagement with machines and instruments collected in the *museum of machinery*. In this museum students have the opportunity to explore and engage with a variety of machines, instruments and inventions that have made human civilisation possible (Montessori 1976 [1948]: Appendix B). These include manual, mechanical, electrical and electronic equipment, from the past and the present, including, for example, microscopes, radios, engines, computers, cars, televisions and mobile phones. In the museum, with the support of experts, students have the opportunity to explore the parts of machines, to discover how they work and to reassemble and modify the machines for specific purposes. Again, echoing the learning style of the child in the first plane of development, the ability of the adolescent to focus, to lengthen periods of concentration and to be concerned with accuracy and precision is enhanced if the activity they are engaged in requires exact and challenging work with the hands.

In the Montessori adolescent community, *history* is studied with the broader context of the *humanities*, which include *geography*, *anthropology*, *politics* and *economics*. This study is organised under two headings:
- The study of humanity
- The study of the building of human civilisation

Through the study of *history and the humanities* adolescents can understand how humans have progressed though time. For this reason, students study in depth the history of particular historical periods, and are given

the opportunity to immerse themselves in the culture, including an exploration through visual and dramatic arts, music, food, culture and daily life of these periods of time. In this way they engage with the knowledge both emotionally and cognitively. This area of study includes the following topics:

- geographical exploration
- relation of humans to the environment
- contact between different peoples
- war, religion and the love of one's country and culture
- a detailed study of an historical period
- a detailed study of one person's life
- a detailed study of the present day
- a detailed study of our nation
- law and government in our nation and other nations
- literature

The *occupations*, or work of the adolescent community includes:

- practical daily life tasks, including maintenance of the community environment
- working the land, including, for example, care of the natural environment, horticulture, agriculture and animal husbandry
- contributing to the micro-enterprises of the community

This work is undertaken collaboratively. From the Montessori point of view, work of this type does not hinder a student's study; instead, it enhances the quality of the study as students have the opportunity to apply their knowledge to solve problems and to contribute to the community. The *occupations* enable students to build independence, to the point where they experience what it means to be economically independent in society. They also learn that collaboration between humans is the 'results in … a happy social life that will facilitate individual progress' (Montessori 1976 [1948]: 113). While working collaboratively on occupations that contribute to the life of the community, students are also learning to discipline themselves, and to work towards shared goals.

The three areas of this domain of the curriculum together achieve the aim of fostering in adolescents an admiration, for and understanding of, the life and work of humanity.

In this domain students also study *English* and *mathematics* wherever these subjects intersect with the study of *science* and *history*, and with the *occupations*. In other words, students learn the English and mathematical skills needed to study productively in this domain.

## Curriculum Summary

Intellectual Development (cross-curricular):
- civility, citizenship, civics and community life (civil society and moral development)
- mathematics, including arithmetic, geometry, algebra and measurement
- language, English language, as well as at least one language other than English

Creative Expression (cross-curricular):
- language for creative expression
- music
- visual arts

Preparation for adult life and contemporary culture
Science curriculum
- *the study of the Earth and living things*, incorporating studies in:
- **Earth and space sciences**: cosmology, including astronomy; geology and physical geography, including the geology and geography of prehistoric periods
- **Biological sciences: biology**, including studies in botany, zoology, ecology, physiology, comparative anatomy and health sciences
- *the study of human progress and civilisation*, incorporating studies in:
- **Physical sciences**: physics and chemistry
- **Contemporary sciences**: mechanics and engineering, history of science and technology, including genetics

History and the humanities curriculum
- *the study of humanity*
- *the study of the building of human civilisation*

These studies incorporate studies in *geography*, *anthropology*, *politics* and *economics*.

Occupations
- *practical daily life tasks*, including maintenance of the community environment
- *working the land*, including care of the natural environment, horticulture, agriculture and animal husbandry
- *participating in the micro-enterprises of the adolescent community*

## Pedagogy

The themes that govern the approach to pedagogy implemented in the Montessori adolescent community are *synthesis* and *integration*. First, the characteristics of the adolescent student, in the third plane of development, are considered by Montessori educators to be a synthesis of the characteristics of both the first plane child and the second plane child. For this reason, Montessori adolescent pedagogy integrates concrete and active learning experiences with opportunities for reflective and contemplative study of increasingly abstract concepts and ideas. Second, the pedagogy integrates intellectual and ethical development, creative expression and the academic disciplines, giving students the opportunity to apply discipline knowledge, judgement and creative skills to problem solving in projects that require physical activity, ethical choices, self-expression and abstract application of interdisciplinary knowledge. The focus of the pedagogy is the adolescent's civic, ethical and social development as well as the adolescent's adaptation to the demands of the changing natural and human world.

To facilitate the interdisciplinary approach, teachers who work with the students in the adolescent community are qualified to teach across a group of related subjects, and are experts in these areas. The students also work with teachers who are experts in practical and specialised skills. These specialised teachers work on their own projects, giving the students opportunities to work alongside them to achieve practical and real world goals that are meaningful in the adult world. There are also teachers with expertise in Montessori education, as well as adults with expertise in adolescent physiology, health and psychology.

Learning experiences include opportunities to address individual learning needs through individual and small group tutoring, as well as opportunities for collaborative learning through group work, project-based learning, seminars, workshops, discussion groups, book groups, research tasks, practical projects and community work. In

summary, the pedagogy can be described as expansive. It combines both active and reflective approaches to learning through interdisciplinary studies in the context of collaborative projects in which adolescents work alongside specialists to achieve socially and economically meaningful goals.

The expansive nature of the curriculum, and the pedagogy used to implement the curriculum, ensures that the curriculum can be adjusted to accommodate knowledge, skills and understandings required by the Australian Curriculum and the demands of external examinations. Students become active participants with teachers in the task of identifying individual learning needs and, where needed, to design individualised learning programmes to meet these requirements and demands. The goal is to hand over to students increasing responsibility for planning and managing their own learning as one aspect of the overall aim of the Montessori learning environment prepared for adolescents: to prepare students for social and economic independence.

# English

## Introduction

Adolescents are strongly motivated to be social. They strive to belong to their peer group and seek recognition from others. They also look for ways they can forge links with the broader community so they can contribute to social life in a meaningful and increasingly adult way. In Australia the mode of communication through which adolescents can rehearse adult social roles in the wider community is English, alongside a variety of community languages, including the indigenous languages of Australia, in the form of spoken, written, visual and multimodal texts. The Montessori adolescent program is designed to connect students to their immediate community through activities such as community work, research and library visits, guest speakers, performance, enterprises such as market stalls and work experience. Through these activities students interact within a wide variety of social contexts, requiring them to use varieties of English, and perhaps a language other than English, as appropriate to each context.

Across all areas of the Montessori adolescent curriculum knowledge about the English language and its use is emphasised. Students build on the language study undertaken in the Montessori curriculum for six to twelve year olds. In workshops students review and consolidate their knowledge of::

- the functions of words and word groups
- the structure of clauses and sentences
- word study, spelling and punctuation
- the study of style.

This knowledge is used to enhance each student's skills in English comprehension and interpretation, expression and composition. The study of English permeates all three domains of the curriculum: *intellectual development, creative expression* and *preparation for adult life and contemporary culture*.

In all curriculum domains students read and interpret texts from a variety of sources related to each topic being studied. Students use their comprehension and interpretation skills to:

- recognise the audiences and purposes for which texts are constructed
- gather, analyse, evaluate and synthesise ideas and information
- establish the validity and credibility of sources
- explore the author's meaning, intent and point of view, providing evidence from the text to support claims
- analyse texts to identify different perspectives, points of view, beliefs, assumptions and values, both explicit and implicit, and how these relate to the target audience and the text's purpose
- evaluate and critique ideas and issues from a variety of sources and points of view

Students use their expression and composition skills to compose texts for a variety of purposes and audiences, using a range of media. Student texts are composed in response to the demands of each of the three curriculum domains.

Spoken language activities in the domains of *intellectual development* and *preparation for adult life and contemporary culture* might include seminars and workshops, presentations, debates, dramatic role-play and performance. Preparation for these activities also requires students to engage closely with written language. For example, to prepare for seminars, students read relevant texts closely, applying the skills of interpretive reading, analytical thinking and critical response to organise their ideas and findings for presentation to others. They then present their ideas and findings at the seminar to an audience who might include peers, teachers and an expert in the field. During the seminar they also need to apply their knowledge of the social conventions that support harmonious and productive group discussions. Following the seminar discussion, students might transform their presentation into a formal written text, published on paper or in digital form, to share with a wider audience, or to use for assessment purposes.

The desire of adolescents to contribute to social justice, and their tendency to introspection and strong emotional responses, underpins how important *creative expression* is for this age group. At this age students need a wide range of opportunities to express strong feelings and opinions, for example, by:

- providing personal, interpretive and critical responses to a variety of texts, including plays, poems, novels and other literary texts, as well as speeches, news and opinion in the media, information texts, biography and other non-fiction texts
- analysing, interpreting, evaluating and critiquing art works, including literature, visual arts, drama, film and music, that reflect a range of cultures, places and historical periods

In the domain of *creative expression* students read, interpret and critically respond to English literature, past and present, and the literature of other cultures and times. They prepare works of literature for performance, including poetry, prose and drama, both spoken and multimodal. They also write creatively and present their own creative works using a variety of media, including spoken and written language and multimodal presentations.

Studying the art works, and other cultural artefacts, of different cultures across time and space also enables students to reflect critically on the value systems of those cultures as part of studies in the *humanities* area of the curriculum. The works studied might include spoken, written, visual and multimodal texts. To present the findings of this type of study, students might create, a dramatic monologue to re-enact an event from the point of view of a particular historical figure, or they might conduct a debate based on contrasting perspectives on the same historical events or time period, for example, from the contrasting perspectives of English-speaking missionaries and indigenous people at different times in different parts of the world.

Language is an essential tool for successful participation in the *occupations* of the adolescent community and for later successful participation in work and community life. Within the adolescent community there are opportunities for students to engage interpersonally with their peers, to share their aspirations and worldviews, and to talk about social issues and challenges. To participate in the *occupations* of the community, students must listen and speak, as well as read and write effectively using a variety of communication channels and media. They might also use communication skills to incorporate creative expression, analytical academic research and evaluative responses into projects undertaken as part of this curriculum area. As students apply their language and literacy skills to complete practical and community projects, they learn that language use has to be crafted thoughtfully and respectfully to achieve their goals. For example, as students compose written texts to achieve practical and community goals, they learn, through practical experience, the value of the process used to compose effective written texts, a process that includes planning, drafting, revising and editing a text. They will also develop reading and composition skills related to the use of computer technology, including word processing, desktop publishing, webpage design, scriptwriting and multimodal authoring.

## The Aims of the Montessori English Curriculum for Adolescents from Twelve to Fifteen/Sixteen Years

The aims of the Montessori language curriculum for adolescents aged from twelve to fifteen/sixteen years include the following:

- to develop listening skills that enable students to comprehend, take notes, respond to and participate effectively in a range of spoken exchanges and presentations, including, for example, seminars and meetings
- to develop spoken language skills to interact with others effectively in a range of contexts using levels of formality and social conventions appropriate to each context
- to develop spoken and written English language knowledge and skills for effective personal expression, for example, to communicate thoughts, feelings and beliefs effectively, clearly, fluently and creatively
- to develop spoken and written English language knowledge and skills to persuade, debate, substantiate opinions and respond to a range of different viewpoints
- to foster appreciation of the personal expression of others in spoken, written, visual and multimodal texts
- to foster appreciation of reading as an essential life skill for gaining factual information, reflecting on others' points of view, connecting with and evaluating the ideas of others and for enjoyment
- to extend reading skills to enable students to apply these skills to all areas of the curriculum, including the critical interpretation of texts, an analytical approach to research and principled contribution to community activities

- to foster an appreciation of writing as a valuable and effective means of communication for personal and creative expression in literary texts, for sharing information and knowledge, for explaining and persuading and for practical tasks
- to extend writing skills to all areas of the curriculum, including personal expression, creative and literary writing, interpretive, analytical, evaluative and persuasive writing, and the presentation of information and research
- to develop a personal style in written work
- to use writing as an aspect of effective study skills
- to further refine the process of writing

## English Curriculum for Adolescents Aged Twelve to Fifteen/Sixteen Years

| Content Strand | Knowledge, Skills and Understandings | Activities and Resources |
|---|---|---|
| | *Typically students will:* | |
| Listening | Listen to others politely and respectfully<br><br>Listen effectively in meetings, seminars, discussion groups and collaborative tasks<br><br>Listen to provide constructive criticism to peer presentations<br><br>Identify key ideas and information, and take effective notes, from oral lectures, presentations and discussions | Activities and resources related to the pedagogy and *occupations* of the adolescent community |
| Speaking | Engage in spoken exchanges in a variety of contexts with peers, teachers, experts and community members<br><br>Participate effectively in seminars, discussion groups and collaborative tasks, formal debates and meetings<br><br>Read passages aloud in order to engage an audience<br><br>Deliver a range of spoken presentations effectively, including:<br>- reciting poetry and story-telling<br>- presenting information, ideas and points of view<br>- delivering a monologue, speech or a proposal<br><br>Research and interpret through performance the character of a person from another time and/or place<br><br>Participate in collaborative spoken performance, including dialogues and plays<br><br>Create multimedia performance pieces, for example, multimedia presentation, art work or light show | Activities and resources related to the pedagogy and *occupations* of the adolescent community<br><br>Resources include:<br>- microphone<br>- performance space, stage, podium or equivalent<br>- costumes<br>- projector |
| Reading | Understand the role reading plays in social life, and its applications in the life of the adolescent community and in the wider community<br><br>Understand the purpose for reading, and how to read different formats, including literary, factual and persuasive texts of different types in paper-based, digital or multimedia forms<br><br>Read, respond to and interpret a range of literary texts, including short stories, novels, plays, and poetry<br><br>Recognise and label the elements of a literary text, including:<br>- the setting, plot, characterization, dialogue, climax and *denouement* of a narrative<br>- the form, metre and rhyme scheme of a poem<br><br>Recognise literary technique and structures, including figures of speech such as:<br>- metaphor and simile<br>- personification<br>- hyperbole and irony | Activities include:<br>- evaluating the expression of comparable ideas across a variety of sources for a variety of audiences<br>- analysing how individual, groups, events and places are represented in literary, factual and persuasive texts in order to influence audience perception or opinion<br>- designing a checklist for evaluating the quality of information found in sources such as websites, magazines, advertisements, television and newspaper current affairs e.g. credibility, accuracy, reliability, fact distinguished from opinion<br>- using evidence from literary, |

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| | - pun<br>- alliteration<br><br>Participate in a book group to share and discuss ideas and interpretive questions collaboratively<br><br>Respond personally, analytically and critically to a variety of literary works by:<br>- interpreting, analysing and evaluating different perspectives on issues, events, situations, individuals or groups<br>- identifying and analysing implicit and explicit values, beliefs and assumptions<br><br>Read for enjoyment beyond assigned reading tasks<br><br>Appreciate the diversity of the literary tradition through reading works by authors from many racial, ethnic, and cultural groups | factual and persuasive texts to reveal how authors create emotional responses, influence and/or position an audience e.g. through comparison, contrast, exaggeration, juxtaposition, the changing of chronological order, or the expansion and compression of time<br>- analytical, interpretive and evaluative comprehension tasks related to intellectual development and creative expression<br><br>Resources include:<br>- classical and contemporary literature<br>- texts from popular culture<br>- interviews with authors<br>- literary criticism<br>- study guides<br>- library<br>- reference and research materials (paper-based, digital, web-based, multimedia) |
| | Read to build understanding of subject matter across the curriculum<br><br>Read closely, analytically and critically a range of non-fiction/factual texts, including information texts, biography, newspaper and journal articles by interpreting, analysing and evaluating different perspectives on issues, events, situations, individuals or groups<br><br>Read a range of persuasive texts, including speeches, media commentary, essays, journal articles and opinion pieces<br><br>Recognise and describe an author's intention and point of view<br><br>Use annotation and citation effectively when interpreting a text<br><br>Build and expand, through reading, an increasingly mature and sophisticated vocabulary relevant to range of contexts and language varieties | |
| **Reading for life** | Read for information across the curriculum and beyond (e.g. mass media and popular culture in community and *occupations* contexts)<br><br>Read to 'do' i.e. reading to learn how to complete practical tasks and how to use equipment and technology<br><br>Read for enjoyment and entertainment<br><br>Read as a study skill:<br>- applying reading strategies such as skimming, scanning, vocabulary building, text analysis and synthesis, summarising, paraphrasing, acknowledging sources and note-taking to achieve study goals<br>- establishing reading goals and priorities as part of larger research or other projects<br>- developing analytical, interpretive, evaluative and critical | Activities include:<br>- preparation for seminars, meetings, presentations and debates<br>- research, analytical, interpretive and evaluative comprehension tasks related to the undertaking of practical and community projects<br>- lunchtime book club<br>- reading out loud for an audience as performance e.g. story-telling, choral reading, and information sharing<br><br>Resources include:<br>- literary texts, reference and |

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| | reading skills | research materials (paper-based, digital, web-based, multimedia)<br>- DIY instructions and operating manuals (paper-based, digital, web-based, multimedia) |
| **Writing** | Introduce, consolidate and/or review knowledge about:<br>- written texts, their purposes and structure<br>- the structure of paragraphs<br>- the study of grammar: the function of words, groups and phrases, the analysis and composition of clauses and sentences<br>- the study of style<br>- word study, spelling and etymology<br>- punctuation<br>- handwriting and keyboarding | Activities include:<br>- modelled and guided writing activities in which students develop written composition skills<br>- composition of a range of written texts to achieve purposes across all curriculum domains<br>- writer's conferences<br>- engaging in real life tasks that demand written texts to achieve a range of purposes<br><br>Resources include:<br>- model texts<br>- purposeful writing contexts across the curriculum<br>- a range of writing media (paper-based, digital, web-based, multimedia) |
| **Writing as experience** | Uses the steps of the writing process as a means to composing texts:<br>- planning: generating ideas, selecting a topic/focus, gathering and collating details, building vocabulary, organising information<br>- seeking and responding to feedback<br>- editing to improve clarity and effectiveness<br>- proofreading for spelling and punctuation<br>- publishing (handwriting/word processing, illustrating, presenting)<br><br>Build a repertoire of text structures to achieve a range of purposes, including:<br>- describe, recount, narrate<br>- respond, interpret, critique<br>- instruct, explain, report<br>- persuade<br><br>Write for a range of audiences:<br>- from informal to formal<br>- from peers to an audience of higher or lower status in the context e.g. more or less expert, older or younger<br><br>Write for a range of media, including written text, spoken presentation or dialogue, digital media, and multimedia<br><br>Write in a range of forms, including notes and messages, letter, essay, article, short answer, prose, poetry<br><br>Write spontaneously for practical purposes and enjoyment<br><br>Develop a personal voice in writing<br><br>Share drafts with 'critical friends' (e.g. other students, teachers, parents) in order to gather ideas for revision and respond to suggestions<br><br>Develop criteria for evaluating own and others' texts<br><br>Improve awareness and mastery of the conventions of | |

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| | language (paragraphs, spelling, punctuation) and the effect of conventional usage on clarity<br><br>Develop a range of strategies for organising ideas and content prior to writing, including graphic organisers, concept mapping, note-taking, file system, bibliography<br><br>Draw from multiple sources and integrate into own work with correct citation and no plagiarism<br><br>Use word processing, graphics, and publishing as a medium of exchange<br><br>Evolve a personalised style sheet | |
| **Visual Literacy** | View and critique still and moving visual texts across a range of media (e.g. paper-based, digital, drama, animation and film/video), reflecting on techniques and style, purpose and audience, intention and point of view<br><br>Compare and contrast visual texts with written texts, for example, compare a literary text with a film or computer game adaptation of the text<br><br>Explore the way the meanings in images are combined with the meanings in written texts to repeat, add to, contradict and/or multiply those meanings<br><br>Prepare multimedia literary, factual and persuasive texts, using and experimenting with a range of equipment and techniques (e.g. paper-based, digital, drama, animation and film/video) and adapting style according to purpose, audience and medium<br><br>Analyse, interpret and evaluate own image-making, and the styles of other image-makers, using knowledge about the elements of images, including use of images to:<br>- represent characters' actions, reactions, interactions and circumstances in literary images<br>- represent, relate, combine and organise compositionally different types of content in factual images<br>- persuade and influence viewers<br><br>Use knowledge about the elements of images to compare different image styles in literary, factual and persuasive texts (e.g. picture books, illustrated texts, comics, graphic novels, animation/film etc) across a range of media (e.g. print, digital, drama, animation and film/video) and to analyse and interpret the effect of these styles on the way the viewer interprets the image and the text as a whole, including:<br>- the representation of ideas e.g. characters' actions, interactions, reactions, circumstances<br>- the way ideas represented in images are combined to influence viewer pathways from one image, or image element, to the next e.g. combining elements within images, sequences of images in linear texts, contrasted images, visual rhyme, the relation between images in hyperlinked digital texts<br>- the arrangement of elements in relation to each other (e.g. | Activities include:<br>- readers' theatre activities adapted to visual literacy<br>- evaluating the expression of comparable ideas across a variety of images used in a variety of genres and media (e.g. a well-known traditional story, presentation of the same content or issue in different publications or in different media such as photographic, film, drama, video or digital representation)<br>- evaluating comparable information across a variety of modes in multimodal texts (e.g. image, wording, sound)<br>- exercises in which students develop skills in visual composition, incorporating Visual Arts knowledge, skills and understandings<br>- composition of a range of visual texts to achieve purposes across all curriculum domains e.g. posters, photographs, journalism projects, diagrams, tables, data displays, flow charts, comic strips, graphic novels, video, animation<br>- critically evaluating the effect of images used in advertisements from print, television and online sources<br>- extending studies in art and art history, art across cultures and time, and the elements of photography and videography introduced in Visual Arts |

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| | part-whole, types of, sequence, time line, cause and effect) and the use of symbols<br>- the building of relations of more or less empathy, involvement, power, identification and/or reality between characters and readers e.g. use of gaze (direct, indirect), shot (long, medium, close-up) angle (high, low, eye-level, front on, oblique), colour and background<br>- the organisation, or composition, of the image e.g. placement, framing, how much elements stand out i.e. their salience (relative size, weight, sharpness, intensity, foregrounding/backgrounding)<br>- the use of images to influence or persuade viewers<br><br>Use Visual Arts curriculum to develop a language for talking about the style of images used across a range of media, including the elements and principles of design, composition and colour, and media tools and techniques | Resources include:<br>- model visual and multimedia texts of all types, literary, factual and persuasive e.g. picture books, graphic novels, visual art works, photography, film, news media, animation and advertising<br>- visual and video arts studio, equipment and materials<br>- multimedia software and equipment for making, editing and managing digital images, including digital camera and video recorder, multimedia authoring software, software for editing and managing images |

## English Across the Curriculum

As described above, English is embedded in all areas of the curriculum, wherever language skills are needed to engage productively with curriculum content. How English is embedded in specific curriculum areas is summarised in the table below.

### The Domain of Intellectual Development

| *Spoken language* | *Composing written and multimodal texts* | *Reading* |
|---|---|---|
| Citizenship, civics and community life | | |
| - use a range of media to communicate with the wider community (e.g. telephone, social networking, video conference, Skype)<br>- discuss ideas in conversation with others within and beyond the adolescent community<br>- participate in seminars and debating<br>- deliver presentations within and beyond the adolescent community<br>- participate in a council meeting, conflict resolution conference | - take notes<br>- summarise reading material<br>- present research, analysis and proposals for projects and change<br>- publish flyers, articles, opinion pieces, newsletters and newspapers<br>- incorporate text into charts, timelines, and power points | - read for pleasure<br>- read to know what surrounding community and society is reading and talking about, e.g. positions taken and the opinions expressed in the mass media and popular culture<br>- research primary and secondary sources<br>- read literary and philosophical works<br>- read non-fiction, including text books, reference books, newspapers, journals, websites<br>- review and respond to the writing of others |
| Mathematics | | |
| - demonstrate proofs/problems<br>- explain problem-solving strategies | - use the vocabulary of mathematics effectively<br>- record the analysis of mathematical problems and strategies used<br>- write word problems<br>- write text to accompany timelines, graphs, charts and multimedia presentations on mathematics topics<br>- prepare visual texts including graphs, diagrams, charts, timetables<br>- prepare historical accounts related to mathematical topics and biographies of mathematicians | - read story/word problems<br>- research mathematics through history, including the biographies of mathematicians<br>- read current texts on topics in mathematics |
| English and languages other than English | | |
| - read aloud for self or an audience<br>- recite poetry<br>- engage in story-telling to a variety of audiences<br>- participate in quizzes, discussions, book groups and debates | - take notes<br>- keep a journal/diary<br>- apply knowledge about grammar to the composition of sentences/clauses<br>- write effective paragraphs<br>- draft essays and articles<br>- compose poetry, fiction, scripts and other literary texts<br>- write to persuade<br>- revise, edits and proofread texts<br>- use spelling and punctuation | - solve puzzles and brainteasers<br>- apply knowledge about grammar to the analysis of sentences/clauses<br>- research primary and secondary sources<br>- read literary and philosophical works<br>- read non-fiction/factual texts, including text books, reference materials, newspapers, journals, current affairs |

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| | effectively<br>- present/publish written text effectively, including hand-written, typed, multimodal and digital text | - apply reading strategies e.g. reading for the main idea, skimming, scanning<br>- review and respond personally and critically to the writing of others<br>- prepare for assessment |

## The Domain of Creative Expression

| *Spoken language* | *Written language and multimedia* | *Reading* |
|---|---|---|
| English for creative expression | | |
| - follow and give instructions related to a range of techniques for creative expression<br>- read aloud as performance for a range of audiences<br>- participate in acting exercises and the reading of scripts<br>- perform in videoed stories, plays, *dramatis personae*<br>- perform poetry and songs<br>- discuss artworks with others in groups and seminars<br>- communicate with artists, specialists and others involved in creative industries in the community | - take notes on aspects of literary texts, including setting, character, plot, atmosphere, themes, motifs, symbols<br>- keep a journal/creative diary to record personal responses to artworks<br>- write creatively in a range of genres<br>- prepare story boards and scripts for plays and videos<br>- write poetry and song lyrics<br>- write captions and synopses for artworks and exhibitions<br>- write reviews, analysis, interpretation and criticism of artworks<br>- prepare projects related to creative expression, past and present | - read creative writing across a range of genres and media<br>- read scripts, poetry and other language for performance<br>- recognise aspects of literary texts, including themes, motifs, symbols, figurative language (analogy, metaphor, simile), characterisation, imagery, mood and atmosphere, point of view<br>- analyse the style of a literary or other art work<br>- read and evaluate responses of others to creative expression/artworks, including own creative work<br>- read reference works and criticism related to creative expression, past and present |

## The Domain of Preparation for Adult Life and Contemporary Culture

| Science | | |
|---|---|---|
| - follow and give instructions and demonstrations related to science experiments and projects<br>- participate in discussions and problem-solving exchanges<br>- present at seminars and at community events<br>- communicate with experts, specialists and others involved in science and technology in the community<br>- participate in debates and performances related to issues in science and technology<br>- participate in quizzes | - use the vocabulary of science effectively<br>- take notes from talks, lectures and reference material<br>- write summaries and outlines<br>- record data in journal/diary<br>- prepare laboratory and research reports<br>- write scientific explanations<br>- write analytical essays<br>- prepare multimodal and multimedia project presentations, that include, for example, maps, graphs, diagrams, charts, timelines | - consult a range of primary and secondary sources<br>- evaluate the credibility, reliability, and accuracy of sources<br>- read published reference and text books and articles as well as work produced by peers<br>- survey and evaluate a range of positions and opinions taken on issues in science and technology |
| History/Humanities | | |
| - participate in discussions and seminars | - take notes<br>- keep a journal/diary | - research a range of primary and secondary sources |

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| - deliver spoken presentations at seminars and community events<br>- communicate with experts, specialists and members of the wider community<br>- participate in debates and performances related to history topics<br>- participate in quizzes | - write essays, articles and proposals<br>- write to recount and account for historical events<br>- write to persuade<br>- present research/projects in written, multimodal and multimedia form | - evaluate the credibility, reliability, and accuracy of sources<br>- read literary and philosophical works related to the study of history<br>- read text books, reference books, newspapers, journals, websites<br>- review and respond critically to the historical writing of others<br>- survey and evaluate a range of positions and opinions taken by writers on issues in history and current affairs |
| Occupations | | |
| - use a range of media to communicate with others (e.g. telephone, social networking, video conference, Skype)<br>- discuss ideas in conversation with others within and beyond the adolescent community<br>- participate in problem-solving, seminars and debating<br>- deliver presentations within and beyond the adolescent community<br>- communicate with experts, specialists and members of the wider community | - draft business letters, business presentations and proposals<br>- design instruction manuals<br>- design marketing/advertising materials<br>- take notes and prepare summaries and outlines<br>- draft analytical essays<br>- prepare newsletters and reports | - research a range of primary and secondary sources<br>- evaluate the relevance, credibility, reliability, and accuracy of sources<br>- read literary and philosophical works related to the occupation<br>- read reports, text books, reference books, newspapers, journals, websites and manuals |

# Mathematics

## Introduction

In the Montessori adolescent curriculum the discipline of mathematics, incorporating *arithmetic*, *algebra*, *geometry* and *measurement*, combines both theoretical study, in other words, exploring relations between abstract concepts, and applying knowledge to solve problems in the context of the *occupations* of the adolescent community. Whether theoretical or applied, the study of mathematics involves working with patterns and relationships. For this reason, theoretical and applied studies in mathematics complement each other. For example, mathematics can be applied to the investigation of scientific problems, while the symbol systems of theoretical mathematics help scientists organise, display and interpret data. The study of mathematics also provides the structure that underpins the laws and formulae of science. In addition, it can be used to improve understanding of technology, while technology provides new opportunities for mathematical exploration.

Twenty-first century society and culture is more dependent than ever on mathematics, but the teaching of mathematics in schools does not always appeal to adolescents enough for them to engage with this study at the level demanded by contemporary society. The role of mathematics in contemporary society and the task of the school in this context are described by Montessori (1976 [1948] 116) in the following way:

> Mathematics are necessary because intelligence today is no longer natural but mathematical, and without development and education in mathematics it is impossible to understand or take any part in the special forms of progress characteristic of our times. A person without mathematical training today is like an illiterate in the times when everything depended on literary culture. But even in the natural state the human mind has a mathematical bent, tending to be exact, to take measurements and make comparisons, and to use its limited powers to discover the nature of the various 'effects' that nature presents to man while she conceals from him the world of causes. Because of this vital importance of mathematics the school must make use of special methods for teaching it and make clear and comprehensible its elements with the help of plenty of apparatus that demonstrates the 'materialized abstractions' of mathematics.

The Montessori mathematics curriculum is designed to renew the appeal of mathematics, and to make it accessible to students in a way that promotes both understanding and engagement. For this reason, the Montessori mathematics methodology is:

- activity-, inquiry- and project-based
- linked to the history of ideas
- applied to real life goals and problems
- based on the use of manipulative materials (*materialised abstractions*).

In the Montessori environment the study of mathematics is not organised according to year groups; instead students work through the curriculum at their own pace and their own level over a period the three to four years. When needed, assistance and/or extension activities are provided within individual or small group tutorial programs.

Students apply their mathematical knowledge to the *occupations*, which include the micro-enterprises the students are responsible for within the adolescent and wider community.

- While living and working in a Montessori rural community, students might use their knowledge of measurement, data and statistics to analyse the rate animals consume feed and the relation of livestock to the area of pasture and to create a variety of spreadsheets and graphs to plot and record productivity/profit and loss.
- For enterprises such as the guesthouse and market stall, students might apply their knowledge of mathematics to business and budget planning, inventory, bookkeeping and calculating interest, commission or discounts.
- Students in an urban adolescent program might apply their mathematical knowledge, skills and understanding to planning, purchasing, preparing, serving school lunches, as well as cleaning up after lunch. If the school has space for a garden on the grounds or rooftop, or in a greenhouse, students can also plan food cultivation, purchase and plant seeds, and maintain and harvest foods for school lunches.

Through these applied activities students both develop mathematical knowledge, understanding and skill, and learn to appreciate the value of this knowledge. Most importantly, they are not rushed through the topics of the curriculum, but have the opportunity to explore real life application in some depth.

## The Aims of the Montessori Mathematics Curriculum for Adolescents from Twelve to Fifteen/Sixteen Years

The aims of the Montessori mathematics curriculum for adolescents aged from twelve to fifteen/sixteen years include the following:

- to develop both theoretical and applied mathematical knowledge and skills
- to build connections between mathematical knowledge and scientific knowledge, and between mathematical knowledge and real life problem solving
- to apply mathematical knowledge, reasoning and skill to the occupations of the adolescent community
- to model phenomena in the real world using a variety of mathematical functions. including measurement, and the representation and interpretation of data

A framework for the *Montessori Mathematics Curriculum* has been developed that reveals to students how mathematical knowledge in the three components of the discipline, Arithmetic, Algebra and Geometry, has developed over time through the work of mathematicians from many times and places.

## Mathematics Curriculum for the Adolescent Aged Twelve to Fifteen/Sixteen Years

| *Content Strand* | *Knowledge, Skills and Understandings* | *Activities and Resources* |
|---|---|---|
| | *Typically students will:* | |
| Arithmetic | | |
| Whole numbers | Review memorisation, whole number operations, and the order of operations<br><br>Use a range of strategies to perform mental arithmetic<br><br>Demonstrate skills in estimating and rounding in all operations<br><br>Work with a range of number base systems (in addition to the *decimal system*), including number base systems used in other times and cultures<br><br>Solve word problems<br><br>Work with rational and irrational numbers | Resources include:<br>- word problem cards<br>- *bead frames* for a range of bases, with charts<br>- charts, card material and artefacts<br>- research and reference materials (paper-based, digital, web-based, multimedia)<br>- variety of relevant commercial resources |
| Fractions | Review and extend knowledge of fractions:<br>- equivalent fractions<br>- comparison of fractions<br>- simplifying fractions<br>- adding and subtracting fractions and mixed numbers<br>- multiplying and dividing fractions<br><br>Review and extend knowledge about decimals<br>- converting fractions to decimals<br>- comparison of decimals and rounding | Resources include:<br>- *metal fraction insets* (to tenths)<br>- box of manipulable cut-out fractions, and words and symbols on labels<br>- *insets of equivalence*<br>- *divided skittles* for division of fractions<br>- materials for graphing<br>- *yellow board of decimal hierarchies*, colour-coded beads, charts and |

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| | - multiplying and dividing decimals by multiples of 10<br><br>Apply knowledge about numbers between zero and one (fractions, decimals), ratios (comparison by division) and proportion (equal ratios) to *occupations* | colour-coded cards<br>- *decimal checkerboard*<br>- *constructive triangles*<br>- variety of relevant commercial resources |
| **Powers of numbers** | Review and extend knowledge of powers of numbers<br>- powers 1 to 10<br>- operations with numbers expressed as powers<br>- decomposition of numbers using exponential notation<br>- using exponential notation in science | Resources include:<br>- material for working with squares of numbers<br>- *wooden cubing material*<br>- *powers of two* cube<br>- calculators |
| **Percentages** | Review and extend knowledge of percentages:<br>- estimating percentages<br>- converting percentages to fractions and decimals<br>- converting fractions and decimals to percentages<br>- expressing an amount as a percentage of another amount<br>- complementary percentages<br>- calculating a whole number or fractional percentage of an amount<br>- using decimals to find a percentage of an amount<br><br>Use a calculator to find percentages<br><br>Apply knowledge of percentages to occupations e.g. banking and interest, use of credit cards | Resources include:<br>- *golden bead* material<br>- *centessimal circle inset*<br>- interest, time and principal command cards<br>- calculators<br>- variety of relevant commercial resources |
| **Number patterns** | Review and extend knowledge of prime numbers<br><br>Work with puzzles and patterns related to prime numbers e.g. Fibonacci numbers, *Goldbach's conjecture*<br><br>Introduce, consolidate and/or review knowledge of prime factors and factor trees<br><br>Introduce, consolidate and/or review knowledge of square numbers and square roots<br><br>Introduce and/or review knowledge of signed numbers and compare them<br><br>Work with number sequences, polynomials, substitution/evaluations | Resources include:<br>- 1cm wooden cubes<br>- graphing resources |
| **Squaring and cubing** | Review and extend knowledge of squaring and cubing<br><br>Review and extend knowledge of Pythagorean Theorem and its Euclidean demonstration<br><br>Review and extend knowledge of square root and cube root | Resources include:<br>- material for working with squares of numbers<br>- *insets of equivalence*<br>- *wooden cubing material*<br>- command cards<br>- calculators<br>- variety of relevant commercial resources |

| Algebra | | |
|---|---|---|
| **Algebraic rules** | Review and extend algebraic rules and their application:<br>- changing rules to formulae<br>- using pronumerals (adding, subtracting, multiplying, dividing)<br>- substituting values into formulae<br>- using number patterns to solve problems<br>- learning the language of algebra<br>- using the distributive law to expand brackets<br>- using algebra and algebraic formulae in problems | Resources include:<br>- *insets of equivalence* (Pythagoras; Euclidean)<br>- algebraic decanomial cards and envelopes<br>- variety of relevant commercial resources |
| **Linear Equations** | Work with number sentences and equations:<br>- using pronumerals in equations<br>- using a flowchart to build expressions<br>- using backtracking to solve equations<br>- using substitution to solve equations<br>- balancing equations<br>- identifying equivalent equations<br>- performing the same operation on both sides to solve equations<br>- solving equations involving two operations<br>- deriving an equation from a word problem to solve the problem | Resources include:<br>- charts<br>- word problem command cards<br>- bead material |
| **Sequences** | Work with different types of sequences:<br>- arithmetic<br>- geometric<br>- algebraic | |
| **Structure** | Work with different types of algebraic structure:<br>- operations and their order<br>- geometric and graphic models of operations<br>- laws of exponents<br>- rules for radicals<br>- distributive law: minus and parentheses<br>- identities<br>- multiplying, dividing, factoring<br>- inverses: opposites and reciprocals, inverse operations, inverse functions<br>- algebraic functions: equivalent fractions, lowest terms<br>- abstract algebra | Resources include:<br>- graphic calculators<br>- relevant computer software |
| **Equations and inequalities** | Work with equations in different ways:<br>- solving equations graphically<br>- solving equations by trial and error<br>- linear equations<br>- quadratic equations<br>- inequalities<br>- simultaneous equations<br>- finding the equations of a line | Resources include a variety of commercial resources, paper-based and digital |
| **Data, statistics, ratio and probability** | Develop knowledge and skills related to the collection, representation, comparison and interpretation of data and statistics by integrating the mathematical skills of:<br>- counting<br>- computation | Activities include:<br>- creating and interpreting visual displays of data (VDD) and statistical information to compare and predict, to explore and investigate effects (e.g. of one or |

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| | - the transfer of numerical values into graphical and/or geometric form<br><br>Review and extend knowledge of data collection, representation, comparison and interpretation covered in the curriculum for children from nine to twelve years, including vocabulary for talking about data and data representation: *set, average, mean-median-mode; quantity-category, continuous-discrete; cluster-outlier; sample-census, spreadsheet, database, distribution, frequency-range, variables-variability, probability, skewed-symmetric-bi modal, quartile, proportion*<br><br>Calculate *average*, *mean, median, mode* and *range* values for sets of data and use these calculations to explore variation e.g. of means and proportions in representative data<br><br>Construct, compare and interpret visual data displays to show values and their relations, including:<br>- graphs (bar, picture, circle/pie, coordinate plane)<br>- line, scatter. stem-and-leaf and box plots<br>- frequency distribution (scale, table, matrix)<br>- histograms<br>- scales used to represent categories and quantities<br><br>Construct, compare and interpret corresponding data displays in terms of relative size and/or shape (e.g. compare parallel box plots representing and summarising distribution of a particular population)<br><br>Study and apply knowledge of Cartesian graphs:<br>- Cartesian plane: first quadrant<br>- interpreting points on a graph (scatter and line graphs)<br>- using tables to plot relationships<br>- conversion graphs<br>- finding a rule for relationships<br><br>Explore, investigate, describe and interpret variation between comparable data sets e.g. bivariate numerical data where the independent variable is time<br><br>Make judgements about reliability and usefulness of data displays and statistical information in the context of specific projects, research tasks and *occupations*<br><br>Using knowledge of fractions and percentages to calculate the experimental and theoretical probability of multiple possible outcomes, considering:<br>- similarity and proportion | more changing variables) and to recognise uncertainty<br>- reading and evaluating data displays and statistical interpretation e.g. in the media, in advertising and in political campaigns<br>- selecting and/or designing the most effective data collection, representation, display and interpretation techniques to answer a research question or to solve a project-related problem<br>- using computer databases and spreadsheet programs<br>- interpreting and evaluating data represented in a variety of ways e.g. in the media, text books, reference materials<br>- guest speakers, including community members and/or specialists to talk about the use of data and statistics in their work or research, and to share techniques and insights relating to students' projects and *occupations*<br>- applying interpretation and evaluation of different representations of data across the curriculum; to predict probability; to *occupations*<br>- applying probability trials to outcomes of experiments and *occupations*<br><br>Resources include:<br>- text books and reference sources<br>- interactive white board<br>- string lines, tape measures<br>- materials for data collection and representation (paper-based and electronic)<br>- paper-based, digital, web-based and/or multimedia resources including graphing and survey resources |

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| | - direct variation<br>- gradient | |
| **Functions** | Study and apply knowledge of functions:<br>- input-output tables<br>- Cartesian graphs: intercepts, effects of parameters, rate of change, ordered pairs, equations<br>- linear functions: gradient-intercept form, standard form, constant sum, constant difference<br>- quadratic functions: intercept form, standard form, vertex form<br>- other functions: exponential functions, constant products, rational functions, step functions, absolute value functions, iterating linear functions<br>- definitions of function, domain, range | Resources include a variety of commercial resources. |
| Geometry | | |
| **Geometry I** | Review and extend knowledge of parts of triangles, quadrilaterals and polygons (height, base, surface, perimeter, vertices, diagonals, apothem, centre)<br><br>Explore diagonals and angles to find formulae<br><br>Explore rotation, reflection and enlargement | Resources include:<br>- geometry cabinet, constructive triangles, metal plates for squares and triangles<br>- Montessori material for measuring height of figures |
| **Geometry II** | Review and extend knowledge of angles:<br>- describing angles<br>- measuring angles<br>- relations between angles<br><br>Investigate angles in triangles, quadrilaterals and polygons (size and sum of angles) | Resources include:<br>- protractors 180° and 360°, set squares, compasses, rulers<br>- graphing resources<br>- nets of solids<br>- a variety of commercial resources. |
| **Patterns and design** | Investigate line designs in angles<br><br>Investigate patterns and designs involving plane figures and geometric solids<br><br>Visualise and draw 3D shapes<br><br>Investigate nets of solids and Euler's rule for polyhedra | Resources include materials for model making and technical drawing |

| | | |
|---|---|---|
| **Integrating geometry and algebra to solve problems** | Select appropriate operations to solve a variety of application problems using real numbers<br><br>Identify coordinates of a point in a plane or in space<br><br>Find the length and the midpoint of a segment in two or three dimensions to solve problems<br><br>Use definitions, properties and theorems of lines, angles and polygons to solve problems:<br><br>Recognize, identify and model regular and non-regular polyhedra and use coordinate geometry to confirm properties<br><br>Use formulae to solve problems related to:<br>- the perimeter of a geometric figure and circumference of a circle<br>- the area of a triangle, parallelogram, rhombus, trapezoid, square, rectangle, regular polygons, and circles<br>- arc lengths and the area of sectors of a circle<br>- the ratio of the perimeters, areas, and volumes of similar geometric figures<br>- the lateral area, surface area, and volume of a right prism, pyramid, right circular cylinder, cone, and sphere | |
| **Patterns, Relationships, and Functions** | Use gradients to determine if two lines are parallel or perpendicular<br><br>Write equation of a line parallel or perpendicular to a given line through a given point<br><br>Transform (translate, reflect, rotate, dilate) polygons in the coordinate plane, describing the transformation in simple algebraic terms | Resources include a variety of commercial resources, paper-based and digital |
| **Measurement** | | |
| **Units of Measurement** | Review prefixes and suffixes used to name units of the metric system<br><br>Review units of measurement | Resources include teacher made *metric system* charts, strip and card materials |
| **Time** | Review the base systems of time e.g. 24 hours/day, 60 sec/minute, 60 min/hr<br><br>Apply knowledge of time to reading timetables and working with time zones | Resources include:<br>- variety of clocks: analogue and digital<br>- variety of timetable formats<br>- *time zone* globe |
| **Length and Perimeter** | Review and extend techniques, rules, formulae, operations and word problems related to the measurement of length and calculation of perimeter | Resources include chalk, string, tape measures, rulers and graphing resources |
| **Study of Area** | Review and extend the study of area to abstract calculation of area | Resources include:<br>- *area of a circle* material<br>- *area of parts of circle* material |

| | | |
|---|---|---|
| | Investigate the calculation of area of a range of geometric shapes, including different types of triangles and quadrilaterals, and circles<br><br>Apply knowledge of area to tessellation<br><br>Build theorems for the calculation of the area of a range of shapes<br><br>Investigate and compare total and lateral surface area | |
| Study of Volume | Review and extend study of volume:<br>- solid geometry review<br>- from the solid to its volume<br><br>Investigate the volume of a range of solid shapes, including different types of prisms, pyramids and cylinders | Resources include:<br>- *hollow volume* material<br>- *volume of a sphere* material |
| Angles | Review and extend study of the measurement of angles<br><br>Apply knowledge about measuring angles to occupations | Resources include Montessori concrete materials, protractors and equipment for measuring angles in the field. |

## Mathematics Across the Curriculum

As with the study of English language in the Montessori adolescent curriculum, the study of mathematics is embedded in all areas of the curriculum, wherever mathematics skills are needed to engage productively with curriculum content. How mathematics is embedded in specific curriculum areas is summarised in the table below.

### The Domain of Intellectual Development

| Citizenship, civics and community life |
|---|
| - apply knowledge of mathematics to contribute to community projects, including fund-raising, surveys, managing food distribution with and beyond the adolescent community |
| **Language: English and LOTE** |
| - use knowledge of mathematics to assist with layout and presentation of texts in digital environments |

### The Domain of Creative Expression

| Language for creative expression, music and visual arts |
|---|
| Apply knowledge of mathematics to:<br>- preparation for theatrical performance e.g. production budget, working with sound and light, ticketing, calculating margins, fund-raising, costume, set and prop design, stage directions<br>- the study and making of music e.g. scale patterns, rhythm, tempo<br>- the study and making of visual art and craft e.g. geometry, measurement, perspective, budgets for materials and equipment<br>- the study of poetry e.g. rhythm and metrics |

## The Domain of Preparation for Adult Life and Contemporary Culture

| Science |
|---|
| Apply knowledge of mathematics to:<br>- collecting, collating, storing, comparing and interpreting data; tracking variability and effects<br>- identifying trends, patterns and cycles<br>- problem solving<br>- selecting and using mechanical and electronic equipment for measuring<br>- the study of physics e.g. exploring the laws of motion, inertia, mass and weight and calculating velocity and acceleration<br>- the study of energy e.g. to gauge efficiency of alternative energy sources such as solar or wind<br>- the study of astronomy, the solar system and the Earth e.g. measuring in light years, using the powers of numbers to measure large distances and sizes, measuring time over a day, seasons, time zones etc<br>- the study of geology and geography e.g. map-making, measuring comparative density, reading and making drawings to scale<br>- the study of water e.g. flow rate, use, conservation, measuring pollutants<br>- the study of health and physical education e.g. the relation between energy use and calorie expenditure, speed, distance and velocity, heart rate |
| History/Humanities |
| Apply knowledge of mathematics to:<br>- designing timelines<br>- reading and making maps<br>- studying the currencies, exchange rates, economies and time zones of different countries<br>- exploring number base systems used by ancient civilisations<br>- biographies of great mathematicians<br>- planning field trips e.g. preparing itineraries, reading public transport timetables, calculating costs, distances and times |
| Occupations |
| Apply knowledge of mathematics to:<br>- cooking projects e.g. shopping budgets, measuring ingredients, doubling and tripling proportions, exploring the ratio of protein, fat and carbohydrate<br>- construction projects e.g. estimating costs and calculating cost/unit measurement; calculating area or volume, drawing to scale, calculating angles of roof pitch<br>- projects involving animals e.g. budgets for housing, fencing, feed etc, administering supplements and medications, calculating productivity, monitoring prices, geometry of bee hives<br>- micro-enterprises e.g. preparing budgets, using money, marketing, bookkeeping, reporting |

# Science

## Introduction

In the Montessori view, adolescents learn by doing. Learning by doing is a feature of the Montessori Science curriculum. Much of the curriculum is aligned with the *occupations* of the Montessori adolescent community. *Occupations* are courses of study that arise out of needs of the adolescent community and local environment. They are projects that provide real, meaningful work that aims at developing a sense of worth in the students because their contributions to the community are real.

The pedagogy used to teach science in the Montessori adolescent community can be described as project-based. Students are engaged in projects related to four science disciplines:

- **Earth and space sciences**: cosmology, including astronomy; geology and physical geography, including the geology and geography of prehistoric periods
- **Biological sciences**: biology, including studies in botany, zoology, ecology, physiology, comparative anatomy and health sciences
- **Physical sciences**: physics and chemistry
- **Contemporary sciences**: mechanics and engineering, history of science and technology, including genetics

Each project is initiated by a problem that needs a solution. For example, if the class initiates a micro-enterprise based on keeping poultry, the need to learn about the biology and needs of poultry is real. This generates meaningful engagement in the process of scientific inquiry, in which students identify and investigate key questions and gather and collate evidence-based conclusions. While each project might be grounded in one area of the curriculum more than others, opportunities for interdisciplinary studies are also valued. While the main disciplinary focus of a project might be on science and mathematics, students might also engage with knowledge and skills related to language, art, history or geography. As the projects unfold, students have the opportunity to contact scientists working in relevant fields, as a source of expertise and as a model for how to conduct scientific enquiry.

While working on projects, students are able to explore particular topics in depth. Early in the project students participate in *main lessons* which outline the key science concepts needed to engage with the project productively. Students then work to develop their knowledge, skill and understanding to the level required to complete the project successfully. While engaged on a project, students are free to explore areas of science, and to develop scientific capabilities, that they find relevant and interesting. In addition, because the projects are undertaken in real life settings to meet real life challenges, the students also explore ethical issues relevant to the project. For example, if the students are working on a project that involves keeping poultry, they might apply their knowledge of poultry biology and behaviour to debate and explore issues relating to the relative merits of cage-laid, barn laid, free range and/or organic eggs.

As the project unfolds, students have the opportunity take on different roles. For example, students whose project involves keeping poultry might take on the roles relating to farming, using video to keep records or bookkeeping. In this way, students learn to cooperate to achieve goals shared with others, to experiment with different occupations and to demonstrate to themselves and others that they are able to contribute to meaningful and real life ventures. In addition, they learn to think about the ethics of science and progress and develop the ability to make informed decisions about issues that relate to the health and well-being of themselves, their community and their environment.

The project-based approach allows students to develop science understanding, and inquiry skills because, in order to complete each project, students must engage in research and experimentation. The project-based approach also enables students to understand science as human endeavour. For example, students are encouraged to explore the genesis of scientific knowledge and understandings by researching the biographies of great scientists, past and present, as well as the history of scientific concepts and ideas. As the projects unfold, students engage in seminars, debates and discussions about not only scientific knowledge, understandings and skills, but also the cultural and social issues that need to be taken into consideration when decisions and problem-solving involve science.

As part of the *Montessori Science Curriculum* for adolescents students take part in field trips to observe and collect data and to become familiar with the ecology of their region. They learn to identify local plants and animals, whether native, feral or domesticated, and study the ecological systems of the region, including relations between organic and inorganic elements. Students also review their knowledge of the systems for organising knowledge in science and make note of how the knowledge, and terms used are kept current. For example, they consolidate their knowledge of scientific taxonomies and their organising principles, as well as features, such as features of anatomy and physiology, which determine where organisms are placed in a classification system. Students also use their research skills to track how knowledge about evolution, and systems such as climate and ecology, is changing and expanding, and what this might mean for decision makers and humanity in general.

In summary, the 'learning by doing' project-based approach of the Montessori science curriculum is designed to reveal the relations between elements. This idea is elaborated by Montessori (1976 [1948] 93–94) in the following way:

> To present detached notions is to bring confusion. We need to determine the bonds that exist between them. When the correlation among the notions, by now linked one to the other has been established, the details may be found to tie together among themselves. The mind, then, is satisfied and the desire to go on with research is born. …
>
> Here is the essential principle of education: to teach details is to bring confusion; to establish the relationship between things is to bring knowledge.

## The Aims of the Montessori Science Curriculum for Adolescents from Twelve to Fifteen/Sixteen Years

The aims of the Montessori mathematics curriculum for adolescents aged from twelve to fifteen/sixteen years include the following:

### Science inquiry skills

- to work with scientific data (primary and secondary), including gathering, recording, storing, collating, interpreting, and repeating investigations
- to represent findings in a variety of forms, including graphs, tables and diagrams
- to seek elaboration and justification of data and ideas and reflect on alternative interpretation
- to use principles that will validate and demonstrate personal understanding of science
- to work collaboratively to undertake laboratory or field science around reality based activities
- to follow scientific and mathematical procedures to observe, hypothesise, predict and test in an area of scientific investigation of their own choice.
- to identify potential hazard and design an appropriate investigation to observe, collect data and present findings

### Earth and space sciences

- to create maps and drawings of land-based data (topographical maps).
- to collect, display and interpret data on the geologic and mineral content of the local soil and through chemical analysis, composition studies and testing, explaining the historical development of various components

### Biological sciences

- to explore and represent patterns and cycles in the natural world
- to create and read biological scale drawings
- to investigate the role of organisms within a variety of ecosystems
- to investigate the local flora and fauna that make up the natural local habitat
- to compare and contrast various ecosystems and their associated functions in the succession of habitats
- to collect data and track the trends and variability in behaviour of local and domesticated animals.

### Physical sciences

- to investigate physics in the total environment: the Universe, the earth, the forces that shape the earth, the structure of matter, the transformation of energy, the motion of things, the forces of nature

- to select and utilise various mechanical devices while testing the models and patterns of certain scientific laws e.g. conservation of energy

Contemporary sciences

- to design and use apparatus and tools appropriate to meet occupational challenges
- to maintain small common electrical and mechanical systems, identifying and eliminating possible causes of malfunctions
- to compare and contrast the design, functionality and structural integrity of self-designed structures and make appropriate recommendations for improvement

## Science Curriculum for the Adolescent Aged Twelve to Fifteen/Sixteen Years

| *Content Strand* | *Knowledge, Skills and Understandings* | *Activities and Resources* |
|---|---|---|
| | *Typically students will:* | |
| The study of Earth and living things | | |
| Earth and space sciences:<br>- cosmology<br>- astronomy<br>- geology and physical geography | Build knowledge of the stars, galaxies and the universe.<br>Study the history of the exploration of the universe through visual observation, telescopes, unmanned and manned space exploration<br><br>Study the structure of the Earth and geological history<br>- the composition of the Earth<br>- three states of matter<br>- different ways of combining<br>- attraction and gravity<br>- geology<br><br>Study plate tectonics and geological phenomena such as the formation of mountains<br><br>Study the Sun and the Earth<br>- rotation of the Earth and its consequences<br>- Earth as a sphere<br>- tilt of the axis<br>- seasons<br>- time zones<br><br>Study the Work of Air<br>- protection of the atmosphere<br>- rains<br>- winds<br>- land and sea breezes<br>- seasons and the winds<br>- ocean currents<br>- the wind as sculptor<br><br>Study the Work of Water<br>- the river<br>- rain<br>- ocean waves<br>- ice<br>- the water cycle<br>- water and vegetation<br><br>Study of Human Geography | Activities include:<br>- making models<br>- reading and making maps<br>- creating timelines of cosmological and geological eras<br>- conducting experiments<br>- interdisciplinary projects related to weather and climate e.g. projects that integrate scientific, statistical and historical knowledge<br><br>Resources include:<br>- globes<br>- telescope<br>- charts<br>- maps<br>- experiment supplies<br>- non-toxic supplies for experiments<br>- almanac<br>- reference and research materials (paper-based, digital, web-based, multimedia) |

| | | |
|---|---|---|
| | - zones on the Earth<br>- interdependencies<br>- economic geography | |
| **Biological sciences:**<br>- botany<br>- zoology<br>- physiology/ anatomy<br>- health sciences | Classify living things according to the Linnaean taxonomy<br><br>Study and use different classification systems in use today<br><br>Study and compare the *morphology*, or structural features of living things<br><br>Study the cell as the basic unit of life<br>- the structure of the cell<br>- cell respiration<br>- cell division/reproduction, meiosis<br>- photosynthesis<br>- biochemistry of the cell<br>- DNA/RNA, mitosis, protein synthesis<br><br>Introduce and extend knowledge of genetics:<br>- Mendel<br>- dominance/recessiveness<br>- probability<br>- aberration<br><br>Review and extend knowledge of natural cycles:<br>- water<br>- nitrogen<br>- carbon<br><br>Review and extend knowledge of the vital functions of living things plants and animals:<br>- body coverings<br>- circulation<br>- respiration<br>- digestion<br>- movement<br>- reproduction<br><br>Introduce and extend knowledge of biochemistry<br><br>Review and extend knowledge of human physiology, including body functions, hormones and nutrients<br><br>Explore the interdependency of life<br><br>Investigate ecosystems, including populations, interactions and biodiversity within ecosystems<br><br>Investigate the extinction of species<br><br>Investigate the development of genetic engineering<br><br>Investigate animal behaviour:<br>- reflex<br>- perception e.g. touch, taste, sight, smell, hearing | Activities will include:<br>- investigating the life forms in pond water and their relations<br>- identifying, recording and classifying activities in the school environment, including both domestic and natural species<br>- creating diagrams, charts, models, visual data displays and multimedia representations e.g. of cells, cell processes, DNA populations and relationships in ecosystems, genetic patterning, natural cycles, biological processes etc<br>- projects relating to inherited traits in families e.g. colour blindness<br>- creating timelines to illustrate evolutionary time<br>- dissection<br>- projects that enable students to apply knowledge of human physiology to own health and well-being<br><br>Resources will include:<br>- microscopes and other research equipment<br>- resources for record-keeping and displaying findings<br>- reference and research materials (paper-based, digital, web-based, multimedia) |

| The study of human progress and civilisation | | |
|---|---|---|
| **Physical sciences:**<br>- physics<br>- chemistry | Understand foundation concepts in physics related to forces and motion, including velocity, acceleration, inertia, force, mass and weight, friction, work, power, effort, Newtown's three Laws of Motion, energy transformation, mechanical advantage, efficiency<br><br>Investigate simple machines, including, lever, inclined plane, wheel and axle, pulleys, gears<br><br>Review and extend knowledge of electricity and magnetism<br><br>Investigate forms of energy and energy transfers<br><br>Investigate the nature of matter, including atoms and their structure, particle theory, molecular structure, ionisation<br><br>Review and extend knowledge of elements, compounds, chemical reactions, acids and bases, salts, oxidation, valences, the carbon compounds of organic chemistry<br><br>Identify and use of the periodic table<br><br>Compare and contrast metals and non-metals<br><br>Understand and describe the carbon, oxygen and nitrogen cycles<br><br>Undertake experiments under laboratory conditions<br><br>Extend and apply research skills<br><br>Reference sources effectively | Activities include:<br>- experiments, investigations, project work<br>- working with models<br><br>Resources include:<br>- science laboratory<br>- reference and research materials (paper-based, digital, web-based, multimedia) |
| **Contemporary sciences**<br>- mechanics<br>- engineering<br>- history of science and technology | Use and care for basic mechanics tools<br><br>Repair and maintain the systems of a combustion engine<br><br>Understand systems for cooling and heating<br><br>Understand electrical systems<br><br>Build knowledge of the mechanical and sub-atomic properties of machines that allow them to work | Resources include:<br>- *museum of machines*<br>- workshop<br>- tools and equipment |

## Synthesising and Integrating Scientific Knowledge and Understanding: *Systems of Interdependency*

Scientific understanding and knowledge is synthesised and integrated in the following 'learning by doing' studies of systems of interdependency.

| Systems of interdependency | | |
|---|---|---|
| *Content Strand* | *Knowledge, Skills and Understandings* | *Activities and Resources* |
| | *Typically students will:* | |
| **Soil**<br>Through a study of soil, students are introduced to both geological and biological studies. | Investigate the composition of soil<br><br>Relate soil chemistry to the study of animal and plant life<br><br>Apply knowledge of the carbon, oxygen and nitrogen cycles<br><br>Understand the role of soil in photosynthesis<br><br>Recognize soil types, their origins and their suitability for specific plants<br><br>Understand the geological impact of glaciers<br><br>Describe the causes and effects of erosion | Activities include testing, grading and mapping soil types<br><br>Resources include:<br>- soil test kit<br>- mineral sample kit<br>- range of soil types<br>- access to internet, e.g. Google Earth, GIS<br>- plants, fertilizers, potting mix, plant pots<br>- reference and research materials (paper-based, digital, web-based, multimedia) |
| **Water**<br>Water is integral to the origin of life and to the Earth's history. It is studied for its physical and chemical properties. | Appreciate the physical properties of water<br><br>Identify water forms on earth<br><br>Describe the role of water in photosynthesis<br><br>Identify water as the universal solvent<br><br>Recall the molecular structure of water<br><br>Understand water ionization<br><br>Understand the water cycle<br><br>Test water quality, by observing, measuring and comparing features such as:<br>- ph<br>- biological indicators<br>- turbidity<br><br>Comprehend the concept of watershed<br><br>Discuss the ethical implications of water use and management | Resources include:<br>- water test kit<br>- chemistry glassware for separation of soluble and insoluble substances.<br>- conductivity meter<br>- pH meter<br>- reference and research materials (paper-based, digital, web-based, multimedia) |
| **Air**<br>Air is studied for its role in earth's climate and in plant and animal life cycles | Investigate the chemistry of the air<br><br>Define meteorology<br><br>Comprehend the transfer of heat energy | Activities include testing and analysing air quality<br><br>Resources and equipment include:<br>- Bunsen burners |

| | | |
|---|---|---|
| | Relate movement of air to climatic patterns<br><br>Understand the role of convection in heating and cooling<br><br>Discuss the implications of degrading air quality and the relation between air quality and climate change | - access to Internet e.g. Bureau of Meteorology, *Seabreeze*<br>- *Airwatch*<br>- air monitor box<br>- reference and research materials (paper-based, digital, web-based, multimedia) |
| **Energy**<br>Energy is studied as a comprehensive force that originated with the Big Bang and has global implications as a universal human commodity and need. | Describe and explain and non renewable energy sources including solar power, fossil fuels, geothermal energy, nuclear energy<br><br>Understand energy uses, including work and machines<br><br>Appreciate the nature of energy<br><br>Explore alternative energy systems<br><br>Understand the role of technology in energy production and conservation<br><br>Discuss the ethical implications of energy use | Resources and equipment include:<br>- bicycles<br>- timing devices, e.g. video timers, light gates<br>- solar panels<br>- electronics kits<br>- reference and research materials (paper-based, digital, web-based, multimedia) |
| **Animals and Plants**<br>Animals and plants are studied in terms of their role in natural ecosystems and in agricultural science, as well as for their anatomical and vital function s. | Investigate the characteristics of living things<br><br>Understand animal and plant habitats and their distribution<br><br>Study photosynthesis<br><br>Harvest plant and animal products<br><br>Understand the process photosynthesis and its importance in ecosystems<br><br>Understand energy flow in food webs and chains<br><br>Understand the concept of genetics<br><br>Understand the role of biodiversity in an ecosystem<br><br>Study evolution and the diversity of living things<br>Describe the role of adaptation in evolution<br><br>Understand the concept of homeostasis. | Resources and equipment:<br>- microscope kit<br>- anatomical models<br>- live animals<br>- plants, fertilizers, potting mix, plant pots<br>- reference and research materials (paper-based, digital, web-based, multimedia) |
| **The Human Organism**<br>The human organism is studied in terms of the life cycle, and for its relation with the natural world | Research the origins of humans<br><br>Understand the role of humans in animal domestication<br><br>Explore the use of genetics for science, medicine and agriculture and debate the ethics behind this use<br><br>Explore the ethics of the uses of natural resources<br><br>Discuss the various systems for food procurement, processing and distribution. | Resources and equipment include:<br>- anatomical models<br>- medical meters, e.g. sphygmomanometer, stethoscope, thermometer<br>- reference and research materials (paper-based, digital, web-based, multimedia) |

Synthesis and integration of scientific knowledge can also be achieved through the research and study of topics such as those in the following list.

- Science in society, including researching the life and work of an Australian scientist, and science-related industries and professions
- Physics of machines, including everyday machines such as bicycles and wheelbarrows
- Sustainable technologies, including photovoltaic cells, water use and conservation, grey water use and solar model cars
- Organic farming, including worm farms, propagation, irrigation systems and companion planting

## Science Across the Curriculum

A cluster of curriculum areas converge in the study of science. Embedded in scientific enquiry are a range of interdisciplinary skills, especially numeracy and literacy skills. For example, in order to undertake scientific investigations, students need to be able to measure data, organise the results meaningfully and interpret and analyse the data using their knowledge about statistics and probability. In order to record their investigations and express their understanding of science, students must be proficient in all areas of literacy. Students need to deliver spoken presentations and prepare reports. Students also need to participate in seminars, debates and discussions about scientific issues and related cultural, social and ethical issues. These discussions also draw on the civics and citizenship area of the curriculum.

The history of science is another aspect of the project-based 'learning by doing' approach to the study of science. *Main lessons* and *key lessons* in some projects include stories about scientists, their discoveries, insights and their contributions to the scientific body of knowledge and our understanding of how the world works. These lives are described in the Montessori context as *Great Lives*, and include scientists of the past (e.g. Galileo, Darwin, Mendel, Curie) and more contemporary scientists (e.g. Watson and Crick, Marshall and Warren).

# History and the Humanities

## Introduction

Throughout the Montessori curriculum for students from the age of six, *history* is taught systematically and sequentially. In the Montessori adolescent curriculum, for students aged from twelve to sixteen, the study of history is embedded in the wider contexts of the humanities, incorporating geography, anthropology, politics and economics. Like the science curriculum, the pedagogy used to teach *history and the humanities* in the Montessori adolescent community is project-based. Students are engaged in projects related to two areas of historical study:

- *The study of the history of humanity*
- *The study of the building of human civilisation*

Humanities projects are studies of human groups in different places and times from ancient to modern. These projects inevitably include studies in *geography*, *anthropology*, *politics* and *economics*. These wide-ranging studies introduce students to a variety of human experiences, enabling them to see the world through the eyes of others, and enriching their appreciation of the nature of change. Strong emphasis is placed on the way human civilisations emerge and evolve over time and in different parts of the world. The projects might cover, for example:

- *early humans, ancient civilisations and traditional culture*, and early agriculture, including traditional pre-settlement Australian Indigenous and other First Nation cultures, the Incas, Aztecs and Mayans, the ancient peoples of the Indus Valley
- *classical civilisations*, including Ancient Greece and Rome, classical China and other ancient civilisations of Asia, Alexandria
- *societies in transition*, including the feudal Europe, Renaissance and the Enlightenment in Europe, the colonial and Federation periods in Australia
- *age of ideas and science*, including the scientific and industrial revolutions, global exploration, transport and mass migration including migration to Australia, space exploration

The aim of this area of study is to provide adolescents with an historical framework through which to study the story of humanity over time so they can understand our time, place and culture as part of the continuing story of humanity and its endeavours. In this way adolescents can understand where and how their own 'here and now' fits into the continuing story. The study of history, therefore, contributes to adolescents understanding themselves and the social context in which they find themselves, as described by Ewert-Krocker (2001: 411) in the following way:

> Our job as educators, if we are to adopt a Montessori perspective is not to teach history….our job is to help the adolescent see her role in history, to see that she has a role in history…

The pedagogy used to deliver the program encourages students to investigate the art of discussion over time and across cultures, and in this way to build their own discussion and debating skills. Students also use visual arts, drama and written expression to represent and display the knowledge they have gained and the philosophical values they have explored through the study of history. Timelines are used and created to establish chronologies. Each project follows the same pattern of delivery.

- First, students are presented with key lessons and key concepts.
- Second, students engage in individual and group research lessons, aligned with the literacy lessons needed to carry out the research effectively.
- Finally, students present the information they have gathered and organised during their research by means of written text, artistic expression, spoken presentation and/or dramatic performance.

## The Aims of the Montessori History and Humanities Curriculum for Adolescents from Twelve to Fifteen/Sixteen Years

The aims of the Montessori history and humanities curriculum for adolescents aged from twelve to fifteen/sixteen years include the following:

- to compare the development of cultures in the ways they have met their fundamental needs
- to group events by defined historical eras and timelines
- to consider cause and effect as well as multi-cultural perspectives, when studying human groups in different historical eras
- to investigate patterns of migration and settlement of peoples and their diversity
- to review geographic and climatic data for world regions in order to consider the impact of the environment on the cultures being studied
- to examine issues of war and peace in relation to the diffusion of people, ideas and products
- to compare and contrast Australian government and culture with other governments, including the following perspectives:
  - development of Australian government, the nature of Australian democracy and how it works in the context of social change
  - impact of large scale change on different groups of people in Australian society, including, for example, settlement, immigration, gold rush, exploration, industrialisation, the world wars, economic cycles
- to explain processes for developing public policy in Australia
- to identify and compare differing points of view and to recognise degrees of bias
- to understand how knowledge of history contributes to the present and anchors the future
- to read primary sources in philosophy and literature from a culture being studied in order to gain insight into the mind and spirit of a human society at point in time
- to write and present research papers drawing on multiple sources
- to apply knowledge and skills in creative expression (e.g. drama, art, music) to personalise studies in history and communicate them with others
- to link the needs and interdependencies of human communities across time with the daily life and challenges faced by the adolescents themselves and their community
- to investigate patterns of global economics (e.g. resource and food distribution) and their effects on contemporary societies

## History and Humanities Curriculum for the Adolescent Aged Twelve to Fifteen/Sixteen Years

| *Content Strand* | *Knowledge, Skills and Understandings* | *Activities and Resources* |
|---|---|---|
| | *Typically students will:* | |
| The study of the history of humanity | | |
| Inquiry | Inquire into what makes the people living in different groups human, as manifested in the art, literature, music, customs, philosophy, religion, government and economy of the group<br><br>Inquire into the relation between the natural world and the human built environment and culture<br><br>Create timelines of historical periods<br><br>Develop skills in mapping and map reading<br><br>Develop interest in and understanding of diversity<br><br>Apply historical understanding to the investigation, | Activities include:<br>- research drawing on a variety of primary and secondary sources<br>- plan and organise learning opportunities, including visiting experts, excursions and field trips to museums, art galleries, archaeological sites etc<br>- note taking from lectures, presentations and reference material<br>- conducting interviews<br>- spoken and written summaries of key ideas<br>- spoken presentations, |

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| | analysis and resolution of problems | performances and debates<br>- researching, drafting and publishing historical recounts, accounts, analytical and persuasive texts using referencing conventions effectively<br>- dramatisation of historical events and characters<br>- creating models, timelines, charts, artworks<br><br>Resources include:<br>- timeline of civilizations<br>- the *whole of history* chart<br>- artefacts<br>- maps<br>- research and reference materials (paper-based, digital, web-based, multimedia) |
| **The study of cultures from ancient to modern** | Compare up to five representative cultures, spanning eras from ancient to modern, in terms of:<br>- natural environment: geography, climate, flora, fauna<br>- how the culture meets the fundamental human needs: cultural (artistic expression, religion, or belief system, adornment) and physical (clothing, food, shelter, transport, defence)<br>- -trade routes, migration and settlement (cause and effect)<br>- government<br><br>Appreciate and respect the values, religions and beliefs of other cultures<br><br>Understand that civilisations and cultures emerge and evolve through a sequence of events over time<br><br>Appreciate that past events can shape the present and future<br><br>Understand the different social, cultural and intellectual contexts that shaped people's lives and actions in the past<br><br>Understand the development of trade and economies in different civilizations.<br><br>Understand the development of spoken and written language throughout time<br><br>Understand the role and development of food, housing, transport, clothing, medicine, defence, and communication of other cultures | |
| **Detailed studies: examples** | Conduct a detailed study of:<br>- a place over time<br>- an historical figure<br>- the nation over time<br><br>Conduct a detailed study of historical transitions, for example:<br>- from imperial to republic to communist rule in China<br>- from imperial to western-style democracy in Japan<br>- from tsarist state to communism to democracy in Russia<br><br>Conduct a study of the *great* historical conversations, for example, between Socrates and Plato<br><br>Conduct a study of the transition from tribe to village to city, and a study of great cities across time (e.g. Baghdad, Athens) combining historical, geographical, anthropological, economic and psychological perspectives<br><br>Conduct a study of the original inhabitants of any land | |

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| | throughout history<br>- how they met their fundamental needs<br>- how their technology developed<br>- history of the arrivals of people from other cultures<br>- positive and negative effects of the arrival of people from other cultures<br>- attempts at integration of the cultures and their results<br>- present day conditions | |
| The study of the building of human civilisation | | |
| Inquiry | Inquire into the evolving role of science and technology in the building of human civilisation | Activities and resources as above |
| Detailed studies: examples | Conduct a detailed study of:<br>- a philosophy, concept, phenomenon, reform or idea from any period in history, and any part of the world, and related factors and consequences<br>- a scientific and/or technological innovation from any period of history and any part of the world<br>- the impact of technology on one or more human societies | |

## History and the Humanities across the Curriculum

In order to undertake projects within the discipline of history effectively, students must apply literacy skills to a high standard. Necessary literacy skills include the ability to read primary and secondary sources to understand the gist, to locate specific information and to interpret and evaluate information from a variety of sources. To present their knowledge and understanding of history, students need to write a variety of texts, including analytical and persuasive texts. Student presentations might also draw on skills developed in the creative expression area of the curriculum as well as skills in information and communications technology (ICT).

When students work with timelines, time zones and maps in the study of history, they apply numeracy skills. The study of *geography* is also embedded in history when students investigate how geographical location, climate and the environment affect human societies. In addition the study of history focuses attention on *citizen ship, civics and ethics* when students investigate how the nature of governments and civil society influence the capacity of a civilisation to flourish or decline. This knowledge equips students to make informed and ethical decisions in their own contribution to human society.

When students study the origins of any of the other disciplines that are part of the adolescent curriculum they employ the techniques they have used in the study of history.

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# Appendix

## *Occupations*: Sample Projects

The sample projects below exemplify how all areas of the curriculum might be synthesised and integrated in the *occupations* of the Montessori adolescent community.

### Science Project: Poultry Farming

The project is initiated by a group of students with an adult guide, and the input of other specialists as needed.

**Goals**

| | |
|---|---|
| Engagement | - Students apply scientific knowledge and skills to situations outside of the classroom.<br>- Students show interest in new or unusual situations. |
| Key Concepts/ Mastery | - Students understand their biology and that of other living things, and recognise the interdependence of life.<br>- Students understand the structure and function of organisms, from the organisational level of cells to systems.<br>- Students understand the need for reproduction in maintaining a species and a community. |
| Skills | - Students plan adequate control of variables in a simple experiment.<br>- Students design a simple controlled experiment to test the effects of one variable.<br>- Students form inferences based on observation.<br>- Students interpret data in a graphical form.<br>- Students use correct procedure for handling apparatus. |
| Work Management | - Students follow procedures.<br>- Students work cooperatively in a group.<br>- Students make neat and accurate observations. |

#### Methodology

The methodology used to support project-based learning is derived from the three-period lesson, a lesson structure that is applied at all levels of Montessori education, from early childhood to teacher education.

#### First Period of the Project

In this period students participate in *introductory* activities that open up the topic and *key concept* lessons.

The first period of the *poultry farming* project might include introductory activities such as the following:

- a story that demonstrates the interdependence of humans and domesticated animals and plants
- a reading from the section on 'domesticates' from Guns, Germs and Steel by Jarrad Diamond
- the story of the pavlova
- In 1935, the chef of the Hotel Esplanade in Perth, Western Australia, Herbert Sachse, created the pavlova to celebrate the visit of the great Russian ballerina, Anna Pavlova. The dish is based on meringue made from egg whites. Whilst it has been suggested this dessert was created in New Zealand, it has become recognized as a popular Australian dish.
- a cooking lesson: how to make pavlova
- a 'how to' dissection lesson: dissecting an animal heart
- a 'how to' lesson: using a microscope
- an art lesson: painting microscope observation

Students then pose one or more *key questions*. The key question for the *poultry farming* project might be:

*What do we need to know to successfully operate a chicken egg farm?*

The answer to this question determines the key concept lessons to follow. Below are a series of key concept lessons that might be presented in the first period of the *poultry farming* project. These lessons focus on students understanding of:

- their own biology and that of other living things
- the interdependence of life
- the structure and function of organisms, from the organisational level of cells to systems
- need for reproduction in maintaining a species and a community.

| *Lesson* | *Title* |
|---|---|
| **Lesson 1** | Classification of animal kingdom, and the classes of vertebrate |
| **Lesson 2** | Food chains and decomposers |
| **Lesson 3** | Circulatory system |
| **Lesson 4** | Respiratory system |
| **Lesson 5** | Digestive system |
| **Lesson 6** | Structure of egg |

Students might also participate in a seminar in which the following question is researched and discussed:
*How do our actions on a farm affect the balance of nature?*

Students will be provided with a range of resources to explore the key concepts and the discussion question further. These will include a range of reference and research materials (paper-based, digital, web-based, multimedia).

During the first period of the project students build a shared specialised vocabulary to talk about the topic. This vocabulary might include:

- Kingdom, Phylum, Class, Order, Family, Genus, Species
- autotroph, heterotroph, producer, consumer, decomposer
- poultry, fowl, hen, rooster, chicken, hatchlings
- free range, battery
- mould, fungus, bacteria, compost
- food chain, food web
- reproduction system: egg, sperm, mitosis, penis, vagina
- circulatory system: heart, blood, artery, vein
- respiratory system: lungs, diaphragm, intercostal muscles, bronchi, bronchioles, alveoli
- digestive system: mouth, oesophagus, stomach, small intestine, large intestine, anus

## Second Period of the Project

The second period of the project begins with whole group lessons and activities. In the context of the *poultry farming* project these lessons and activities might focus on the students developing the following knowledge, skills and understandings;

- Plan adequate control of variables in a simple experiment
- Design a simple controlled experiment to test the effects of one variable.
- Follow a procedure.
- Work cooperatively in a group.
- Make neat and accurate observations.
- Use correct procedure for handling apparatus.
- Understand the structure and function of organisms, from the organisational level of cells to systems.

Whole group lessons and activities might include the following:

| *Lesson* | *Title* |
|---|---|
| **Lesson 1** | Investigating the needs of poultry |
| **Lesson 2** | Making a chicken coop |
| **Lesson 3** | Setting up a bread mould experiment |
| **Lesson 4** | Setting up a compost decomposition experiment. |
| **Lesson 5** | Creating photo identification cards of school plants and animals. |
| **Lesson 6** | Conducting a heart dissection |
| **Lesson 7** | Conducting step test for fitness. |
| **Lesson 8** | Calculating lung volume |
| **Lesson 9** | Creating art work based on microscope observations of tissues. |

The students then undertake individual research tasks related to the project. In the context of the *poultry farming* project these might include the following:

- growth of poultry
- business policy and guidelines for poultry farming.
- ethical rearing of poultry
- avian diseases
- uses of poultry products: meat, eggs, feathers
- history of poultry and poultry farming

### Third Period of the Project

In the third period of the project students complete a variety of tasks for assessment, including spoken and written presentations and creative expression. A spoken presentation might be used to present results of observations and experiments and a written assignment or report might be used to present research findings. Students might also be quizzed or tested on the knowledge, skills and understandings they have gained. Students would also present creative work, such as illustrations based on microscope observations.

Note: A similar process could be employed by adolescent programs in urban areas for such projects as a market garden, or even the raising of sprouts if there is no space available for a garden. The products could be sold locally or could be used in a school lunch program.

## Humanities Project: Early Agriculture – The Incas

Note: This project is appropriate for both rural and urban adolescent programs involving students aged from twelve to sixteen years.

The project is initiated by a group of students with an adult guide, and the input of other specialists as needed. The project would span one school term.

### Goals

| | |
|---|---|
| Engagement | to inspire wonder in a past civilization and the relics it leaves behind today |
| Key Concepts/ Mastery | - to experience the Incan culture as an early agricultural, complex social structure<br>- to understand that the ways in which early agricultural societies developed was affected by the natural environment and their understanding of their place within the environment<br>- to understand that the Incan people made use of limited resources in enterprising ways in order to meet their fundamental human needs |
| Skills | - take notes from lectures and presentations |

| | |
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| | - make oral summaries of key ideas for the group<br>- develop public speaking and presentation techniques<br>- develop dramatic performance skills<br>- write summaries of key ideas from readings<br>- take notes for research using a variety of frameworks<br>- prepare and draft a research paper<br>- choose relevant readings from a variety of texts, including multimodal texts<br>- use referencing conventions and prepare bibliographies effectively<br>- develop skills in public speaking |
| **Work Management** | - use work time effectively without disturbing others<br>- manage paperwork effectively |

### First Period of the Project

In this period students participate in *introductory* activities that open up the topic and *key concept* lessons. The first period of the *poultry farming* project might include introductory activities such as the following:

- introducing to concepts
- building vocabulary
- initiating the challenge
- eliciting students' areas of interest and ideas for problem solving
- connecting the project to a micro-enterprise in the adolescent community
- telling an Inca creation story
- watching a DVD: *Lost Civilisations: Macchu Picchu*

Students then pose one or more *key questions*. The key questions for the *Inca* project might be:

*What was it like to be an everyday Incan?*
*How was such a large empire so quickly overrun?*
*What were the similarities and differences between colonisation of South America and colonisation of Australia?*

The answer to these questions determines the key concept lessons to follow. Below are a series of key concept lessons that might be presented in the first period of the *Incan* project.

| *Lesson* | *Title* | *Description* |
|---|---|---|
| **Lesson 1** | Orientation in space and time: South American | Students design a timeline of the Incan story and create a map to show boundaries of Incan empire |
| **Lesson 2** | Incan Government & Social Structures | Students discuss the running of a large empire, - its necessary structures, its difficulties - and compare with the running of modern nations. |
| **Lesson 3** | Quipu recording system | Students discuss the lack of alphabet and the use of different systems of recording and remembering. |
| **Lesson 4** | Incan Agriculture | Students explore the methods of farming and the types of domesticated plants and animals of South America. |
| **Lesson 5** | Pizarro and the conquest of the Incas. | Students read accounts of the conquest and present a seminar to discuss the topic. |

Further activities might include:

- making connections with the adolescent community, its land and micro-enterprises, for example, the growing of vegetables originating from South America such as corn, potatoes and tomatoes
- cooking using ingredients originating from South America e.g. Quinoa salad, chocolate

Students will be provided with a range of resources to explore the key concepts and the discussion question further. These will include a range of reference and research materials (paper-based, digital, web-based, multimedia).
During the first period of the project students build a shared specialised vocabulary to talk about the topic. This vocabulary might include:

- Inca, Coya, Amerindians, Sapa Inca
- Quipu, Curaca
- Francisco Pizarro, Atahuallpa, civil war
- Macchu Picchu, Camayoc, Tahuantinsunyu
- llama, alpaca, Quecha, Cuzco

### Second Period of the Project

The second period of the project begins with whole group lessons and activities. In the context of the *Inca* project these lessons and activities might focus on the students engaging in enquiry, research, dialogue with experts, experimentation, field trips and practical activities. Whole group lessons and activities might include the following:

| *Activity* | *Title* | *Description* |
|---|---|---|
| Activity 1 | Map of South America | Students create a 2D or 3D map of South America, showing topography, current political borders and extent of Incan empire |
| Activity 2 | Incan time measurement; Incan number base system | Students measure time taken to boil a potato and use their results to recreate their daily timetable in the Incan number base system. They discuss use of different base systems in different periods of history. |
| Activity 3 | Artefact creation | Students create artefacts using clay, based on the type of artefacts found in Inca ruins. |
| Activity 4 | Cooking | Students create a salad using corn, quinoa and hot chocolate. They discuss traditional foods. |
| Activity 5 | Drama | Students are given small scenes to recreate using the information they have gleaned through research and concept lessons. |

The students then undertake individual research tasks related to the project.

### Third Period of the Project

During the third period of the project students demonstrate their knowledge and mastery of the topic through tasks such as the following:

Spoken language

- prepare a monologue delivered by Pizzarro, Sapa Inca or an Incan layman
- perform a play or mime recreating the story of the conquest
- perform a play recreating 'day in the life of' an Incan
- perform an interview between Pizarro and Sapa Inca

Written language

- end of unit quiz
- providing definitions
- research project on how the Incas met their fundamental needs (e.g. food, architecture, medicine)
- compose a narrative based on Incan legends and information about Incan culture
- recreate the journal of a Spanish conquistador or of a vanquished Incan

Creative expression

- create an archaeological ancient artefact, or musical instrument or artwork
- prepare a dramatic production of conquest or daily life of Incans.

Montessori Australia Foundation
3 Myoora Road Terrey Hills NSW 2084
Ph: 02 9986 2282 Fax: 02 9986 2281
Email: info@montessori.org.au
Web: montessori.org.au
ABN: 46 104 887 309