R–7 Mathematics
Teaching Resource

Available in Word format and PDF on the SACSA website: www.sacsa.sa.edu/companion
FOREWORD

The R–7 Mathematics teaching resource and the R–7 English teaching resource are the first two documents in the SACSA Companion Documents series. Underlying the development of this series is the need to promote consistency of curriculum within and across schools in South Australia.

These resources are designed to support teachers to further engage with the SACSA Framework and work towards maximising students’ achievement. They arise from the need expressed by many teachers for the requirements of the SACSA Framework to be made more explicit for each year level.

The documents are written by practising teachers in close collaboration with curriculum officers, members of professional associations and other committed educators.

I commend this resource to you as a valuable support for teachers working to best meet the diverse needs of learners in the range of settings across South Australia.

Steve Marshall
CHIEF EXECUTIVE
ACKNOWLEDGMENTS

The following people and groups are acknowledged for their valuable contribution to the development of this resource.

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INTRODUCTION

This *R–7 Mathematics teaching resource* is one in a series of companion documents to the South Australian Curriculum, Standards and Accountability (SACSA) Framework.

Extensive consultation on the draft mathematics and English teaching resources distributed in January 2003 provided the feedback that has guided the revision of these documents.

These resources have been written and reviewed by junior primary, primary and secondary teachers who worked with the support of, and in collaboration with, curriculum officers and site leaders.

**Linking with the SACSA Framework**

The purpose of this document is to provide a sample range of learning descriptors relating to the Key Ideas and Outcomes in mathematics R–7. These descriptors, in dot point format:

- make explicit the knowledge, skills and understandings reflected in the Key Ideas and Outcomes
- make consistent the expectations for learning at specific year levels within and across sites
- support teachers in planning, programming and assessing using the SACSA Framework.

The descriptors are not prescriptive, as learning does not develop in a linear fashion. The dot points describe the possible growth points of learners as they progress towards demonstrating Outcomes to reach a Standard. Teachers will continue to use their professional knowledge, skills and judgments to provide the rich array of learning experiences that cater for the learners in their classrooms.

**Planning for teaching and learning**

When using this resource for planning, teaching and learning, teachers will also need to engage with the following core principles:

- The Essential Learnings (including associated literacy, numeracy and use of ICTs), Equity Cross-curriculum Perspectives, Enterprise and Vocational Education (including Key Competencies) and a consideration of all the Learning Areas are vital components of program planning and learning development.
- Learning involves building on prior knowledge with learners active in constructing their own learning as they progress through cycles of growth.
- In the Early Years, when planning for teaching, learning and assessing children’s progress, it is important that teachers refer to the Developmental Learning Outcomes. *The Overview of Key Ideas and Developmental Learning Outcomes* chart has been included at the beginning of the Early Years section, particularly for use by those teachers of Reception and Year 1 children.
Format of this resource
The format of this document has been developed:

- with consideration to the organisation of the SACSA Framework
- in response to the feedback on the draft document
- to ensure consistency across Curriculum Bands
- for practical use by teachers.

To suit these purposes the document:

- is organised in Curriculum Bands for the following year levels: Early Years (R–2), Primary Years (3–5), Middle Years (6–8)
- is structured into the strands with sub-headings to provide clarity within these strands
- contains concept maps that precede two of the five strands in each Learning Band, providing teachers with a visual representation of the Key Ideas and Outcomes. Teachers may use the concept maps to support them further in their work or they may prefer to develop their own
- includes cross-referencing to allow navigation between Bands within modes and strands
- contains a small number of ‘assessment and reflective questions’ (A&RQ). The intent of these is to stimulate reflection and ideas about assessment as teachers undertake their planning of teaching, learning and assessing programs.

To further assist in planning, programming and assessing, a copy of this document in Word format is available on the SACSA website. This format allows teachers to cut, paste and modify the document to suit their needs. Go to <http://www.sacsa.sa.edu.au/companion>. 
## Overview of Key Ideas and Developmental Learning Outcomes: BIRTH to AGE 5

<table>
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<th>KEY IDEAS</th>
<th>DEVELOPMENTAL LEARNING OUTCOMES</th>
<th>LEARNING AREAS</th>
<th>KEY IDEAS</th>
<th>DEVELOPMENTAL LEARNING OUTCOMES</th>
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<tbody>
<tr>
<td>The psycho-social self</td>
<td>In partnership with educators in respectful and caring environments: Children form secure attachments developing close bonds with one and then more educators. Id • In • KC4 Children begin to develop trust in themselves and others and their environments. F • Id • In • KC4 Children construct a secure sense of self and a confident personal and group identity within their family, their communities and their out-of-home care. Id • In • KC4 Children develop self-awareness and a sense of being connected with others within the context of their environments. These connections foster increasing appreciation of caring relations and a basis for shared understandings. F • In • KC4 Children develop autonomy and a sense of agency, as well as dispositions and skills for self-regulation, decision-making and an understanding of their interdependence with others. F • Id • In • T • KC4 • KC6 Children explore and develop emotional wellbeing. F • In • KC1 Children begin to explore and develop understandings and strategies to effectively manage change. F • KC1 • KC6</td>
<td>The Developmental Learning Outcomes are deliberately broad long-term accomplishments. They reflect the integration of learning and development through the Essential Learnings and all Learning Areas and allow for different developmental pathways. Children develop trust and confidence. F • Id Children develop a positive sense of self and a confident personal and group identity. Id • In • KC6 Children contribute in a variety of ways as members of groups. Id • In • KC4</td>
<td>Self and social development</td>
<td>Children extend their sense of personal and group identity. Id • In Children develop autonomy and a sense of agency. Id • In • KC4 • KC6 Children contribute in a variety of ways as members of groups. Id • In • KC4</td>
<td>Arts and creativity</td>
</tr>
</tbody>
</table>
CONCEPT MAP
Early Years: Exploring, analysing and modelling data

Developmental Learning Outcomes
Children develop trust and confidence
Children develop a positive sense of self and a confident personal and group identity
Children develop a sense of being connected with others and their worlds
Children are intellectually inquisitive
Children develop a range of thinking
Children are effective communicators
Children develop a sense of physical well-being
Children develop a range of physical competencies

This concept map provides a visual representation of the Key Ideas and Outcomes below. Educators may prefer to develop their own.

Key Ideas
Children generate data about the world around them. They develop strategies, including using technology, to collect, organise and represent data, and use it to describe situations and to make decisions and personal plans.

Children explore ways of using comparative language and number to describe and represent data and to communicate responses about their questions. They make predictions about similar situations based upon the conclusions drawn from data they collect and digitalise.

Children construct an understanding of chance and randomness through exploring the variety of possibilities presented both by their daily activities and phenomena in their environment.

Outcomes
1.1 Generates and organises data and uses it to make personal and collective plans.

1.2 Uses everyday comparative language and number to describe the data they have generated in parts and as a whole and describe how the data assists them to answer their own questions.

1.3 Recognises situations whose outcomes are certain, impossible or unpredictable; states possible outcomes for particular events and uses everyday language to describe the likelihood of the outcomes occurring.

Educators’ questions
How can the generation and analysis of data help children plan for action?

How can the analysis of collected data help children identify with a group?

How do data generating and reporting methods help children collaborate and negotiate?

Through a range of indoor and outdoor games, how can children explore the concepts of bias and chance events?

How can children use data to communicate different points of view and interests?

Learners’ questions
What data do I need to collect?

Are there any patterns in the data I have collected?

How can I organise and present my data?

Can others understand the way I represented my data?

How likely is it that I’ll get the same results again?
### KEY IDEAS

Children generate data about the world around them. They develop strategies, including using technology, to collect, organise and represent data, and use it to describe situations and to make decisions and personal plans.

<table>
<thead>
<tr>
<th>RELATING TO OUTCOME</th>
<th>KC1</th>
<th>KC3</th>
<th>KC6</th>
<th>KC7</th>
</tr>
</thead>
<tbody>
<tr>
<td>1.1</td>
<td></td>
<td></td>
<td></td>
<td></td>
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<tr>
<td>1.2</td>
<td></td>
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<td></td>
</tr>
</tbody>
</table>

Children explore ways of using comparative language and number to describe and represent data and to communicate responses about their questions. They make predictions about similar situations based upon the conclusions drawn from data they collect and digitalise.

<table>
<thead>
<tr>
<th>RELATING TO OUTCOME</th>
<th>KC2</th>
<th>KC6</th>
<th>KC7</th>
</tr>
</thead>
<tbody>
<tr>
<td>1.2</td>
<td></td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

### OUTCOMES

#### Reception Towards Standard 1
- Sorts collections of objects using familiar criteria (eg using junk materials).
- Compares and describes objects according to similarities and differences (eg colour, shape, size, function).
- Talks about data collection (eg responds to ‘What information do we want to collect; how, why and from where?’).
- Organises concrete materials into graph/table form.

#### Year 1 Towards Standard 1
- Sorts, compares and analyses collections of objects.
- Talks about data collection (eg responds to ‘What information do we want to collect; how, why and from where?’).
- Discusses a variety of ways to organise the data.
- Represents data in a variety of ways (eg using concrete objects or pictures, picture graphs, lists, numbers, symbols, tallies).
- Generates picture/column graphs using software such as Kidpix/Max Count.

#### Year 2 Standard 1
- Sorts and organises objects/information using more than one criterion (eg using popular and peer group artefacts).
- Gathers, organises, represents and interprets data to find answers to student-generated questions.
- Practises using a formal tally system (eg $$1+1$$).
- Investigates a variety of ways to collect and organise data.
- Compares ways of collecting and organising data.
- Uses picture, column and bar graphs and simple spreadsheets to represent data including electronic resources such as Kidpix, Max Count and websites.
- Understands need for 1:1 correspondence and common baseline data when making comparisons.
- Reads and interprets data from a variety of sources (eg timetables, rosters, charts).
Children generate data about the world around them. They develop strategies, including using technology, to collect, organise and represent data, and use it to describe situations and to make decisions and personal plans.

A&RQ: Have I provided opportunities for my learners to share their knowledge and experiences?

A. Looks for and describes patterns in data to draw conclusions.
B. Communicates data to others and explains its purpose (eg explaining who would use it and why).
C. Recognises key features of representations (eg labels, titles).

Children explore ways of using comparative language and number to describe and represent data and to communicate responses about their questions. They make predictions about similar situations based upon the conclusions drawn from data they collect and digitalise.

1.1 Generates and organises data and uses it to make personal and collective plans.

1.2 Uses everyday comparative language and number to describe the data they have generated in parts and as a whole and describe how the data assists them to answer their own questions.

C. KC2
### Learning Area: Mathematics

**Strand: Exploring, analysing and modelling data**  
**Band: Early Years**  
**Standard: 1**

<table>
<thead>
<tr>
<th>KEY IDEAS</th>
<th>Chance, data and probability</th>
<th>OUTCOMES</th>
</tr>
</thead>
<tbody>
<tr>
<td>Children construct an understanding of chance and randomness through exploring the variety of possibilities presented both by their daily activities and the phenomena in their environments. F T C KC 6 relating to outcome 1.3</td>
<td>Recognises situations where chance is a factor and begins to predict/record likely outcomes.</td>
<td>Recognises situations whose outcomes are certain, impossible or unpredictable; states possible outcomes for particular events and uses everyday language to describe the likelihood of the outcomes occurring. F T C KC 2</td>
</tr>
</tbody>
</table>

#### Reception Towards Standard 1
- Recognises situations in their familiar environment where chance is a factor (eg after rain: ‘We might see a rainbow’).
- Recognises that there is an element of uncertainty about some events (eg cautiously places blocks on top of a tower to see if they will fall).
- Constructs an understanding of chance through the playing of simple games/activities where chance is involved (eg using dice, tossing a coin, adventure computer games).
- Explores the everyday usage of expressions of chance (eg being lucky, fair).
- Explores language of chance relating to everyday events (eg maybe/may not, will/won’t, never/always).

#### Year 1 Towards Standard 1
- Recognises situations where chance is a factor and begins to predict/record likely outcomes.
- Recognises that repetitions of the same event can produce different results (eg ‘Last time I rolled a 3 but next time I could roll something else’).
- Refines understanding of chance through the playing of games/activities where chance is involved (eg using dice, tossing a coin, adventure computer games).
- Orders outcomes for familiar events/experiments from those least likely to occur to those most likely to happen.
- Explores the language of chance (eg certain, uncertain, likely, unlikely, possible, impossible, less/more likely, maybe).

#### Year 2 Standard 1
- Uses prior knowledge to predict likely outcomes (eg ‘When I roll the dice I might get a 5 or 6 or . . .’).
- Lists possible outcomes for a chance event and investigates these outcomes using materials available (eg tossing a coin).
- Understands that the possible outcomes for a chance event can change if the event is modified (biased).
- Draws conclusions from data collected and compares conclusions to make predictions for what might happen next.
- Uses the language of chance (eg certain, uncertain, likely, unlikely, possible, impossible, less/more likely, maybe).

A&RQ: Do I allow time for my learners to reflect on their discoveries?
<table>
<thead>
<tr>
<th>KEY IDEAS</th>
<th>Length, perimeter and area</th>
<th>OUTCOMES</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>Reception</strong> Towards Standard 1</td>
<td><strong>Year 1</strong> Towards Standard 1</td>
<td><strong>Year 2</strong> Standard 1</td>
</tr>
<tr>
<td>Children construct concepts of size and measurable attributes by comparing a wide variety of familiar figures, objects and events drawn from the world around them.</td>
<td>• Sorts, orders and compares objects according to their length/area.</td>
<td>• Estimates and uses arbitrary units to accurately measure length/area/perimeter (eg ‘This is four-and-a-half straws long’, ‘I can cover this paper with 24 flip tiles’).</td>
</tr>
<tr>
<td>Id T C KC1 relating to outcome 1.4</td>
<td>• Uses estimation and direct comparison to match, sort and order objects with increasingly less difference in length/area/perimeter.</td>
<td>• Recognises that the unit of measure influences the outcomes of the measure (eg it takes more toothpicks and less pop sticks because pop sticks are longer than toothpicks).</td>
</tr>
<tr>
<td>Children develop strategies that directly compare and quantify measurable attributes of a wide variety of figures, objects and events drawn from the world around them. T C KC6 relating to outcome 1.5</td>
<td>• Uses everyday language to describe length (eg short/long).</td>
<td>• Begins to understand and use mathematical terms (eg centimetre, metre).</td>
</tr>
<tr>
<td>• Uses increasingly graduated comparative language of measurement (eg shorter than, taller than, same length).</td>
<td>• Uses arbitrary units to accurately match/measure length/area/perimeter.</td>
<td>• Discusses what needs measuring, chooses the appropriate unit, and considers the size of the object in comparison to the size of the measuring unit.</td>
</tr>
<tr>
<td>• Demonstrates an understanding of what it means to ‘match’ lengths/area (eg placing the measuring units with no gaps/overlapping).</td>
<td>• Demonstrates an understanding of the need to use consistent units when measuring.</td>
<td>• Begins to use standard units with increasing accuracy when measuring.</td>
</tr>
<tr>
<td>• Compares lengths/areas directly by placing objects side by side, and aligning the ends or on top of each other.</td>
<td>• Identifies the need for a baseline when accurately comparing lengths.</td>
<td>• Discusses what needs measuring, chooses the appropriate unit, and considers the size of the object in comparison to the size of the measuring unit.</td>
</tr>
</tbody>
</table>

1.4 Compares and orders the measurable attributes of distance, surface, space, mass, turn/angle and time to describe the size of a wide range of familiar figures, objects and events. T C KC1

1.5 Chooses and uses a variety of strategies to measure the size of a wide variety of figures, objects and events drawn from the world around them. T C KC6
Learning Area: Mathematics
Strand: Measurement
Band: Early Years
Standard: 1

KEY IDEAS
(refer p 8 for DLO overview)

Volume, capacity and mass
(refer p 34 & p 35 for Primary Years)

<table>
<thead>
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<th>Year 1</th>
<th>Year 2</th>
</tr>
</thead>
<tbody>
<tr>
<td>Towards Standard 1</td>
<td>Towards Standard 1</td>
<td>Standard 1</td>
</tr>
</tbody>
</table>

OUTCOMES

1.4 Compares and orders the measurable attributes of distance, surface, space, mass, turn/angle and time to describe the size of a wide range of familiar figures, objects and events.

1.5 Chooses and uses a variety of strategies to measure the size of a wide variety of figures, objects and events drawn from the world around them.

Children construct concepts of size and measurable attributes by comparing a wide variety of familiar figures, objects and events drawn from the world around them.

Id T C KC1
relating to outcome 1.4

Children develop strategies that directly compare and quantify measurable attributes of a wide variety of figures, objects and events drawn from the world around them.

T C KC6
relating to outcome 1.5

- Sorts, orders and compares objects according to their capacity, mass and volume.
- Uses everyday language to describe capacity, mass and volume (eg full, heavy, light).
- Demonstrates an understanding of what it means to ‘match’ capacity, mass and volume.
- Compares capacity, mass and volume directly (eg pouring water from one container into another).
- Uses estimation and direct comparison to match, sort and order objects with increasingly less difference in capacity, mass and volume.
- Uses increasingly graduated comparative language of measurement (eg heavier than, lighter than, holds more).
- Uses arbitrary units to accurately match/measure capacity, mass and volume.
- Demonstrates an understanding of the need to use consistent units when measuring.
- Identifies the need for a baseline when accurately comparing capacity, mass and volume (eg making sure the containers are empty before filling).
- Estimates and uses arbitrary units to measure capacity, mass and volume accurately (eg “This jug holds 4 cups”, “3 blocks balance with this pencil”).
- Recognises that the unit of measure influences the outcomes of the measure (eg “It takes more teaspoons and fewer cups because teaspoons hold less”).
- Continues to use comparative language (eg heavier, lighter).
- Begins to understand and use mathematical terms (eg litres, millilitres, grams, kilograms).
- Discusses what it is that needs measuring, chooses the appropriate unit, and considers the size of the object in comparison to the size of the measuring unit.
- Begins to use standard units with increasing accuracy when measuring.
## Learning Area: Mathematics

### Strand: Measurement

#### Band: Early Years

#### Standard: 1

<table>
<thead>
<tr>
<th>KEY IDEAS</th>
<th>Time and temperature</th>
<th>OUTCOMES</th>
</tr>
</thead>
<tbody>
<tr>
<td>Children construct concepts of size and measurable attributes by comparing a wide variety of familiar figures, objects and events drawn from the world around them. Id T C KC1 relating to outcome 1.4</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Children develop strategies that directly compare and quantify measurable attributes of a wide variety of figures, objects and events drawn from the world around them. T C KC6 relating to outcome 1.5</td>
<td></td>
<td></td>
</tr>
<tr>
<td><strong>Reception Towards Standard 1</strong></td>
<td><strong>Year 1 Towards Standard 1</strong></td>
<td><strong>Year 2 Standard 1</strong></td>
</tr>
<tr>
<td>• Describes familiar events and routines/periods of time in everyday language (eg ‘three more sleeps to my birthday/name day’, ‘library day is Monday’).</td>
<td>• Responds to and uses everyday comparative and descriptive language of time (eg before, after, now, longer, sooner, day, night, summer).</td>
<td>• Understands and uses terms appropriately (eg minutes, seconds, hours, o’clock, half past).</td>
</tr>
<tr>
<td>• Associates events/routines in their lives with particular times (eg cultural celebrations, religious holidays).</td>
<td>• Explores the sequence of events in familiar situations (eg getting ready for school, daily timetable).</td>
<td>• Sorts/orders days of week/months of year/seasons.</td>
</tr>
<tr>
<td>• Compares lengths of time (eg ‘It takes me longer to get home from school than you’, ‘I ate my lunch faster than you’).</td>
<td>• Sorts, orders and compares events within their day, week, month, year.</td>
<td>• Measures the passing of time with tools such as a calendar, stopwatch and digital/analogue clock.</td>
</tr>
<tr>
<td>• Understands that clocks can be used to show the passing of time.</td>
<td>• Investigates measurement of time, seasons, days of week and months of the year.</td>
<td>• Compares and orders standard measurements of time (eg minutes are longer than seconds).</td>
</tr>
<tr>
<td>• Describes temperature using everyday language (eg ‘This feels cold’).</td>
<td>• Investigates features and purposes of a variety of clocks (eg digital, stopwatch, analogue, timers).</td>
<td>• Makes, draws and uses digital/analogue clocks to explore minutes, 5 minute intervals etc.</td>
</tr>
<tr>
<td></td>
<td>• Makes and uses digital/analogue clocks to explore o’clock/half past.</td>
<td>• Constructs devices to measure passing of time (eg calendars, sand clocks).</td>
</tr>
<tr>
<td></td>
<td>• Describes and compares temperature using everyday language (eg ‘Today it feels hotter than yesterday’).</td>
<td>• Explores devices that measure temperature.</td>
</tr>
</tbody>
</table>
## Learning Area: Mathematics
### Strand: Number

<table>
<thead>
<tr>
<th>KEY IDEAS</th>
<th>Whole numbers, ordinals and fractions</th>
<th>OUTCOMES</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>(refer p 8 for DLO overview)</strong></td>
<td><strong>(refer p 39 &amp; p 40 for Primary Years)</strong></td>
<td><strong>Standard: 1</strong></td>
</tr>
<tr>
<td><strong>Reception Towards Standard 1</strong></td>
<td><strong>Year 1 Towards Standard 1</strong></td>
<td><strong>Year 2 Standard 1</strong></td>
</tr>
</tbody>
</table>

- **Children construct their concepts of counting numbers, simple fractions and the base 10 number system using symbols and collections from everyday life.**
  - **In T C KC1 relating to outcome 1.6**
  - In their daily activities children construct meaning from operations with numbers. They explore ways of deconstructing and combining numbers that represent collections of objects, units of comparison and amounts of money.
  - **In T C KC1 relating to outcome 1.7**

- **Children generate and explore a variety of computational strategies to use numbers in daily activities when they need to estimate and quantify.**
  - **Id T C KC1 KC6 relating to outcome 1.8**

<table>
<thead>
<tr>
<th>Reception Towards Standard 1</th>
<th>Year 1 Towards Standard 1</th>
<th>Year 2 Standard 1</th>
</tr>
</thead>
<tbody>
<tr>
<td>• Recognises, records and uses numerals to 10 (eg matches numerals to small groups of objects).</td>
<td>• Recognises, records, and uses numerals to at least 30 (eg to record quantity).</td>
<td>• Recognises, records and uses numerals to at least 100.</td>
</tr>
<tr>
<td>• Orders and describes groups according to quantity (eg most, lots, not many, more).</td>
<td>• Orders groups according to the number in the group (eg sorting, counting and ordering groups of marbles to find the largest group).</td>
<td></td>
</tr>
<tr>
<td>• Recites number names up to at least 10 (forwards and backwards) accurately (eg counting rhymes).</td>
<td>• Counts groups of objects beyond 30 orally.</td>
<td>• Uses the base 10 number system and fractions to represent numbers when working with their peers, collections of objects, measurements and data. In T C KC4</td>
</tr>
<tr>
<td>• Counts groups of objects to at least 10, using one-to-one correspondence, but may need to recount if arrangement or starting point for the count changes.</td>
<td>• Counts on, orally, from different starting points (eg ‘8, 9, 10 …’, ‘30, 31 …’).</td>
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<td>• Ascribes a number to a small group of 2 or 3 objects without counting (eg fingers on a hand).</td>
<td>• Ascribes a number by recognising the arrangement (eg dots on a die, dots in a line).</td>
<td>• Describes, represents and uses a variety of counting strategies and the four number operations to estimate and quantify collections of objects, units of comparison and amounts of money. In T C KC2</td>
</tr>
<tr>
<td>• Estimates the number of objects (real, digital or pictorial) in a group or needed for a task, with developing accuracy to 10.</td>
<td>• Estimates the number of objects (real, digital or pictorial) in a group with reasonable accuracy to 20.</td>
<td>• Uses counting strategies to answer questions about situations that involve number operations, use of a calculator, and informal and standard algorithms. Id T C KC7</td>
</tr>
<tr>
<td>• Recognises, records, and uses numerals to at least 30 (eg to record quantity).</td>
<td></td>
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<td>• Orders groups according to the number in the group (eg sorting, counting and ordering groups of marbles to find the largest group).</td>
<td>• Recognises, records and uses numerals to at least 100.</td>
</tr>
<tr>
<td>• Orders and describes groups according to quantity (eg most, lots, not many, more).</td>
<td>• Orders groups according to the number in the group (eg sorting, counting and ordering groups of marbles to find the largest group).</td>
<td></td>
</tr>
<tr>
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<td>• Estimates the number of objects (real, digital or pictorial) in a group or needed for a task, with developing accuracy to 10.</td>
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<td>• Uses counting strategies to answer questions about situations that involve number operations, use of a calculator, and informal and standard algorithms. Id T C KC7</td>
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</table>

- **1.6** Uses the base 10 number system and fractions to represent numbers when working with their peers, collections of objects, measurements and data. In T C KC4
- **1.7** Describes, represents and uses a variety of counting strategies and the four number operations to estimate and quantify collections of objects, units of comparison and amounts of money. In T C KC2
- **1.8** Uses counting strategies to answer questions about situations that involve number operations, use of a calculator, and informal and standard algorithms. Id T C KC7
Children construct their concepts of counting numbers, simple fractions and the base 10 number system using symbols and collections from everyday life.

**In TC KC1 relating to outcome 1.6**

In their daily activities children construct meaning from operations with numbers. They explore ways of deconstructing and combining numbers that represent collections of objects, units of comparison and amounts of money.

**In TC KC1 relating to outcome 1.7**

Children generate and explore a variety of computational strategies to use numbers in daily activities when they need to estimate and quantify.

**Id TC KC1 KC6 relating to outcome 1.8**

- Describes outcomes and events using ordinals: first, second, third (eg 'I’m first, Yousef’s second, Jing’s third').
- Engages in free play with fractions and begins to use their own language to describe fractions (eg ‘I want the biggest bit’, ‘I’ve eaten half my sandwich’).
- Explores base 10 using concrete materials and number grids.
- Begins to use ordinal numbers to 31 (eg linked to calendar).
- Recognises that fractions are part of a whole.
- Uses the structure of the base 10 number system to arrange and rearrange numbers (eg ‘27 is 27 ones or 1 ten and 17 ones or 2 tens and 7 ones’).
- Identifies odd and even numbers.
- Uses the terms ‘half’ and ‘quarter’ with increasing precision (eg to describe something cut into two: ‘Let’s have half each’).
- Uses simple fractions accurately to describe parts of a whole or quantity (eg folds the paper into quarters; ‘We go home in ½ an hour’, ‘3 is half of 6’).
- Compares reads and writes simple fractions (eg ½, ¼).

**A&RQ: Do I give my learners the opportunity to talk about their own learning?**

**In TC KC4**

Uses the base 10 number system and fractions to represent numbers when working with their peers, collections of objects, measurements and data.

**In TC KC2**

Describes, represents and uses a variety of counting strategies and the four number operations to estimate and quantify collections of objects, units of comparison and amounts of money.

**Id TC KC7**

Uses counting strategies to answer questions about situations that involve number operations, use of a calculator, and informal and standard algorithms.
## Learning Area: Mathematics
### Strand: Number
#### Band: Early Years
##### Standard: 1

<table>
<thead>
<tr>
<th>KEY IDEAS</th>
<th>(refer p 8 for DLO overview)</th>
<th>Addition and subtraction</th>
<th>(refer p 40 for Primary Years)</th>
<th>OUTCOMES</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>Reception</strong></td>
<td><strong>Towards Standard 1</strong></td>
<td><strong>Year 1</strong></td>
<td><strong>Towards Standard 1</strong></td>
<td><strong>Year 2</strong></td>
</tr>
<tr>
<td>Children construct their concepts of counting numbers, simple fractions and the base 10 number system using symbols and collections from everyday life.</td>
<td><strong>In T C KC1 relating to outcome 1.6</strong>&lt;br&gt;Children generate and explore a variety of computational strategies to use numbers in daily activities when they need to estimate and quantify.</td>
<td><strong>Id T C KC1 KC6 relating to outcome 1.8</strong>&lt;br&gt;Identifies and describes equality/inequality in quantity using terms like ‘same as’ and ‘more’ (eg ‘She’s got the same as me’, ‘They’ve got more than us’).</td>
<td><strong>1.6</strong>&lt;br&gt;Uses the base 10 number system and fractions to represent numbers when working with their peers, collections of objects, measurements and data.</td>
<td><strong>1.6</strong>&lt;br&gt;Solves problems relating to equality/inequality by using counting and ordering strategies.</td>
</tr>
<tr>
<td>Estimates how many objects are needed to complete a task (eg ‘I think I need 3 more’).</td>
<td><strong>In T C KC1 relating to outcome 1.7</strong>&lt;br&gt;Describes, represents and uses a variety of counting strategies and the four number operations to estimate and quantify collections of objects, units of comparison and amounts of money.</td>
<td><strong>Id T C KC1 KC6 relating to outcome 1.8</strong>&lt;br&gt;Recognises which operation to use for a particular situation.</td>
<td><strong>1.7</strong>&lt;br&gt;Uses knowledge of number, number relationships and operations to construct statements of equality/inequality (eg ‘6 is more than 4’, ‘2+5 = 5+2’).</td>
<td><strong>1.7</strong>&lt;br&gt;Uses counting strategies to answer questions about situations that involve number operations, use of a calculator, and informal and standard algorithms.</td>
</tr>
<tr>
<td>Understands that groups can be put together and taken apart (eg join 2 groups with 5 or fewer objects in each, estimate total).</td>
<td><strong>1.8</strong>&lt;br&gt;Uses counting strategies to answer questions about situations that involve number operations, use of a calculator, and informal and standard algorithms.</td>
<td><strong>Id T C KC7</strong>&lt;br&gt;Uses materials to compose and decompose numbers when adding and subtracting two-digit numbers (eg 23–8 is the same as 10 and 13–8).</td>
<td><strong>1.8</strong>&lt;br&gt;Uses counting strategies to answer questions about situations that involve number operations, use of a calculator, and informal and standard algorithms.</td>
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Children construct their concepts of counting numbers, simple fractions and the base 10 number system using symbols and collections from everyday life.

**In T C KC1**

relating to outcome 1.6

In their daily activities children construct meaning from operations with numbers. They explore ways of deconstructing and combining numbers that represent collections of objects, units of comparison and amounts of money.

**In T C KC1**

relating to outcome 1.7

Children generate and explore a variety of computational strategies to use numbers in daily activities when they need to estimate and quantify.

**Id T C KC1 KC6**

relating to outcome 1.8

- Develops mental computation strategies of number facts to 10 (eg using doubles and adjusting up or down, $5+5 = 10$, so $4+6 = 10$).
- Develops mental computation strategies of number facts to 20 (eg using doubles and adjusting up or down, $5+5 = 10$ so $5+6 = 11$).
- Begins to apply place value knowledge to compute mentally beyond 20 (eg $6+7 = 13$ so $16+7 = 23$).
- Uses a calculator to represent and explore number.
- Uses a calculator and software programs to explore simple number operations.
- Uses a calculator and a range of software to compute addition and subtraction.
- Uses a calculator to represent and explore number.
- Develops mental computation strategies of number facts to 10 (eg using doubles and adjusting up or down, $5+5 = 10$, so $4+6 = 10$).
- Develops mental computation strategies of number facts to 20 (eg using doubles and adjusting up or down, $5+5 = 10$ so $5+6 = 11$).
- Begins to apply place value knowledge to compute mentally beyond 20 (eg $6+7 = 13$ so $16+7 = 23$).
- Uses a calculator and software programs to explore simple number operations.
- Uses a calculator and a range of software to compute addition and subtraction.

**A&RQ: Have I provided learners and their families the opportunity to work together and learn?**
Learning Area: Mathematics  
Strand: Number  
Band: Early Years  
Standard: 1

<table>
<thead>
<tr>
<th>KEY IDEAS</th>
<th>(refer p 8 for DLO overview)</th>
<th>Multiplication and division</th>
<th>(refer p 40 for Primary Years)</th>
<th>OUTCOMES</th>
</tr>
</thead>
<tbody>
<tr>
<td>Children construct their concepts of counting numbers, simple fractions and the base 10 number system using symbols and collections from everyday life.</td>
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<td><strong>In T C KC1 relating to outcome 1.6</strong></td>
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<td>In their daily activities children construct meaning from operations with numbers. They explore ways of deconstructing and combining numbers that represent collections of objects, units of comparison and amounts of money.</td>
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<td><strong>In T C KC1 relating to outcome 1.7</strong></td>
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<td>Children generate and explore a variety of computational strategies to use numbers in daily activities when they need to estimate and quantify.</td>
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<td><strong>Id T C KC1 KC6 relating to outcome 1.8</strong></td>
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</table>

<table>
<thead>
<tr>
<th>Reception Towards Standard 1</th>
<th>Year 1 Towards Standard 1</th>
<th>Year 2 Standard 1</th>
</tr>
</thead>
<tbody>
<tr>
<td>• Recognises and makes groups that are of the same number.</td>
<td>• Groups and shares collections of objects equally.</td>
<td>• Makes and records repeated groups of the same number.</td>
</tr>
<tr>
<td>• Records the grouping and sharing informally.</td>
<td>• Relates addition of equal groups to interval counting and begins to explore multiplication (eg 'There are 10 people, therefore there are 20 shoes').</td>
<td>• Relates subtraction of equal groups to interval counting and begins to explore division (eg divides collections into equal groups for sharing).</td>
</tr>
<tr>
<td>• Recognises multiplication as repeated addition or grouping, and division as repeated subtraction or sharing.</td>
<td>• Experiments with multiplication symbol in relation to ‘groups of’.</td>
<td></td>
</tr>
</tbody>
</table>

1.6 Uses the base 10 number system and fractions to represent numbers when working with their peers, collections of objects, measurements and data.  
**In T C KC4**

1.7 Describes, represents and uses a variety of counting strategies and the four number operations to estimate and quantify collections of objects, units of comparison and amounts of money.  
**In T C KC2**

1.8 Uses counting strategies to answer questions about situations that involve number operations, use of a calculator, and informal and standard algorithms.  
**Id T C KC7**
Learning Area: Mathematics

Strand: Number       Band: Early Years       Standard: 1

<table>
<thead>
<tr>
<th>KEY IDEAS</th>
<th>(refer p 8 for DLO overview)</th>
<th>Money</th>
<th>(refer p 42 for Primary Years)</th>
<th>OUTCOMES</th>
</tr>
</thead>
<tbody>
<tr>
<td>Reception</td>
<td>Towards Standard 1</td>
<td>Year 1</td>
<td>Towards Standard 1</td>
<td>Year 2</td>
</tr>
<tr>
<td>- Sorts and compares coins and uses the language of money (eg cents, dollars, change, coin, notes).</td>
<td>- Sorts, compares, orders and names all coins.</td>
<td>- Recognises all coins and some notes and their value by sorting, comparing and ordering them.</td>
<td>- Uses concrete materials to explore the value of coins (eg 10c is 10).</td>
<td>- Understands values of money (eg recognises that $1 is equal to 100c).</td>
</tr>
<tr>
<td>- Recognises $ and c symbols.</td>
<td>- Makes up and records amounts of money using 5c, 10c and 20c.</td>
<td>- Reads, makes up and records amounts of money to $1, and experiments with amounts greater than $1.</td>
<td>- Begins to understand purchasing value of coins (eg in the school canteen) and that sometimes you may need change.</td>
<td>- Makes up and records amounts of money by counting on or using patterns (eg counting by 5s, 10s, 20s, 50s).</td>
</tr>
</tbody>
</table>

Children construct their concepts of counting numbers, simple fractions and the base 10 number system using symbols and collections from everyday life. **In T C KC1 relating to outcome 1.6**

In their daily activities children construct meaning from operations with numbers. They explore ways of deconstructing and combining numbers that represent collections of objects, units of comparison and amounts of money. **In T C KC1 relating to outcome 1.7**

Children generate and explore a variety of computational strategies to use numbers in daily activities when they need to estimate and quantify. **In T C KC1 KC6 relating to outcome 1.8**

| 1.6 | Uses the base 10 number system and fractions to represent numbers when working with their peers, collections of objects, measurements and data. |
| **In T C KC4** |
| 1.7 | Describes, represents and uses a variety of counting strategies and the four number operations to estimate and quantify collections of objects, units of comparison and amounts of money. |
| **In T C KC2** |
| 1.8 | Uses counting strategies to answer questions about situations that involve number operations, use of a calculator, and informal and standard algorithms. |
| **In T C KC7** |
**Early Years: Pattern and algebraic reasoning**

**Key Ideas**
- Children recognise, describe, predict, represent and communicate patterns.
- Children make predictions and informal generalisations about their daily activities, aspects of their natural world and environments using patterns they generate or identify.
- Children use mathematics to explore and describe change based on their personal experiences and interactions with their environments. They use these predictions to make connections between the past, present and future.

**Developmental Learning Outcomes**
- Children develop trust and confidence
- Children develop a positive sense of self and a confident personal and group identity
- Children develop a sense of being connected with others and their worlds
- Children are intellectually inquisitive
- Children develop a range of thinking skills
- Children are effective communicators
- Children develop a sense of physical well-being
- Children develop a range of physical competencies

**Outcomes**
1.9 Recognises and constructs spatial and numerical patterns with concrete materials, continues these patterns and predicts what comes next.
1.10 Represents and communicates spatial and numerical patterns.
1.11 Describes and represents situations from personal and family experiences and interaction with the environment where there is change over time.

**Edurers’ questions**
- How can understandings about patterns and connections help children make predictions about preferred and non-preferred future events?
- How does investigating patterns and change help children understand advantage and disadvantage?
- How can children co-construct understandings and participate as team members through the constructing and predicting of patterns?
- How can the use of spatial patterns and transformations generated with multimedia, popular culture and graphic images help children explore the effects of stereotyping?
- How do you ensure that the learning environment enables all children to confidently develop and share their understanding in a range of ways?

**Learners’ questions**
- How can I record my pattern to share with others?
- What is the repeating pattern and what comes next?
- How can I use numbers to describe my pattern?
### Learning Area: Mathematics
#### Strand: Pattern and algebraic reasoning

**Band: Early Years**

**Standard: 1**

<table>
<thead>
<tr>
<th>KEY IDEAS</th>
<th>Reception Towards Standard 1</th>
<th>Year 1 Towards Standard 1</th>
<th>Year 2 Standard 1</th>
<th>OUTCOMES</th>
</tr>
</thead>
<tbody>
<tr>
<td>Children recognise, describe, predict, represent and communicate patterns. <strong>F T C KC1 KC2 KC6 relating to outcome 1.9</strong></td>
<td><strong>1.9</strong> Recognises and constructs spatial and numerical patterns with concrete materials, continues these patterns and predicts what comes next. <strong>F T C KC1</strong></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Children make predictions and informal generalisations about their daily activities, aspects of the natural world and environments, using patterns they generate or identify. <strong>F C KC6 relating to outcome 1.10</strong></td>
<td><strong>1.10</strong> Represents and communicates spatial and numerical patterns. <strong>F C KC2</strong></td>
<td></td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

**OUTCOMES**

- **Reception Towards Standard 1**
  - Sorts and describes a collection of objects.
  - Recognises that repetition is what makes a pattern.
  - Joins in with and follows movement patterns as a part of games, songs and rhymes.
  - Copies and continues a simple pattern.
  - Constructs and records simple patterns in a variety of ways, including the use of a range of software programs (eg big, little, big; gumnut, gumnut, block) and describes them using everyday language.
  - Recognises patterns in design, works of art/symbols from other cultures, and the environment.

- **Year 1 Towards Standard 1**
  - Sorts and classifies by more than one criterion.
  - Identifies the repetitive unit in a number pattern.
  - Joins in with and follows movement patterns as a part of games, songs and rhymes.
  - Constructs, continues, records and describes patterns (eg 6 red, 2 blue, 6 red …).
  - Identifies similarities and differences in patterns (eg ‘Your pattern goes 2, 3; mine goes 4, 1 but they’re both patterns of 5’).
  - Recognises and represents the same pattern in different forms (eg 1, 1, 2 is the same pattern unit as red, red, blue).
  - Produces patterns in artworks.
  - Recognises and describes patterns in design, works of art/symbols from other cultures, and the environment.

- **Year 2 Standard 1**
  - Sorts and classifies by a variety of criteria.
  - Identifies, continues and constructs spatial and number patterns.
  - Continues and represents what comes next in a given numerical pattern (eg 1, 3, 5, 7, …; 5, 10, 15, …).
  - Joins in with and follows movement patterns as a part of games, songs and rhymes.
  - Continues and represents what comes next in a given numerical pattern (eg 1, 3, 5, 7, …; 5, 10, 15, …).
  - Joins in with and follows movement patterns as a part of games, songs and rhymes.
  - Begins to use their understanding of equality and patterns in addition and subtraction facts to make further predictions (eg ‘If 1+9 = 10 and 2+8 = 10, then 3+7 must equal 10’).
  - Investigates multiplication through the use of patterns.
  - Describes and explains patterns on a 100 chart.

- **A&RQ: Have I been explicit to learners about the purpose of the activity?**

  - Produces patterns in artworks.
  - Recognises and talks about patterns and design, works of art/symbols from other cultures, and the environment.
**Learning Area: Mathematics**

**Strand: Pattern and algebraic reasoning**

**Band: Early Years**

**Standard: 1**

<table>
<thead>
<tr>
<th>KEY IDEAS</th>
<th>(refer p 8 for DLO overview)</th>
<th>Change</th>
<th>(refer p 46 for Primary Years)</th>
<th>OUTCOMES</th>
</tr>
</thead>
<tbody>
<tr>
<td>Reception Towards Standard 1</td>
<td>Year 1 Towards Standard 1</td>
<td>Year 2 Standard 1</td>
<td></td>
<td></td>
</tr>
<tr>
<td>- Recognises and describes change over time using everyday language or simple sketches (e.g. compares old photo with a current one).</td>
<td>- Describes and represents change over time using sketches, photos, graphics and verbal descriptions (e.g. can talk about life cycles or construct diagrams of life cycles).</td>
<td>- Describes and represents change over time using sketches, photos, animations, graphics, verbal and written descriptions and graphs (e.g. life cycles, personal experiences, the changes within a year).</td>
<td></td>
<td></td>
</tr>
<tr>
<td>- Describes repetitive familiar events using everyday language (e.g. “We go to Japanese every Wednesday”).</td>
<td>- Begins to recognise and describe patterns significant to their everyday lives (e.g. days of the week, seasons).</td>
<td>- Identifies patterns on a calendar, on an analogue clock, and in problem-solving games and programs.</td>
<td></td>
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</table>

**Children use mathematics to explore and describe change based on their personal experiences and interactions with their environments. They use these predictions to make connections between the past, present and future.**

**F Id In C KC1 KC2 KC6 relating to outcome 1.11**

**A&RQ:** Have I provided learners and their families with opportunities to share their personal stories and experiences in relation to the activities?
### Learning Area: Mathematics

#### Strand: Spatial sense and geometric reasoning

#### Band: Early Years

#### Standard: 1

<table>
<thead>
<tr>
<th>KEY IDEAS</th>
<th>2-D and 3-D objects</th>
<th>OUTCOMES</th>
</tr>
</thead>
<tbody>
<tr>
<td>Reception Towards Standard 1</td>
<td>Year 1 Towards Standard 1</td>
<td>Year 2 Standard 1</td>
</tr>
</tbody>
</table>

- **Children explore their social and natural environments, identifying and mathematically describing key features of shapes and objects around them. In the process they learn more about themselves and their integral relationship with the environments.**

<table>
<thead>
<tr>
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<th>Year 1 Towards Standard 1</th>
<th>Year 2 Standard 1</th>
</tr>
</thead>
<tbody>
<tr>
<td>- Manipulates, sorts and describes 2-D shapes.</td>
<td>- Identifies and names a variety of 2-D shapes in pictures and in the environment.</td>
<td>- Investigates, identifies and describes 2-D shapes (eg pentagon, trapezium, octagon, hexagon, rhombus) using drawing tools including software.</td>
</tr>
<tr>
<td>- Records/represents 2-D shapes using drawing tools.</td>
<td>- Identifies 3-D objects in the environment (eg ‘A can is a cylinder’).</td>
<td>- Explores and describes regular and irregular 2-D shapes using a variety of materials.</td>
</tr>
<tr>
<td>- Identifies and names circles, squares, triangles and rectangles in pictures and in the environment.</td>
<td>- Describes features of 3-D objects using everyday language.</td>
<td>- Investigates, identifies and describes 3-D objects (eg ‘It has 6 square faces and 12 edges—it’s a cube’).</td>
</tr>
<tr>
<td>- Manipulates and sorts 3-D objects.</td>
<td>- Manipulates and sorts 3-D objects.</td>
<td>- Explores and represents views of 3-D objects: top view, side view, cross-sections using materials such as play dough and a range of drawing programs.</td>
</tr>
<tr>
<td>- Uses informal language to describe objects (eg round, flat, like a ball).</td>
<td>- Begins to use mathematical language to describe and label 3-D objects (eg edges, faces, cube).</td>
<td>- Explores, designs and constructs nets of 3-D objects.</td>
</tr>
<tr>
<td>- Uses objects for particular purposes (eg when constructing chooses a toothpaste box for a chimney, uses cylinder to roll).</td>
<td>- Uses knowledge of spatial properties when selecting objects to construct a model (eg chooses a cylinder for a neck).</td>
<td>- Uses language to differentiate 2-D shapes from 3-D objects.</td>
</tr>
<tr>
<td>- Uses knowledge of spatial properties when selecting objects to construct a model (eg chooses a cylinder for a neck).</td>
<td></td>
<td>- Uses knowledge of spatial properties when selecting objects to construct a model (eg chooses a cylinder for a neck).</td>
</tr>
</tbody>
</table>

(refer p 8 for DLO overview) (refer p 47 for Primary Years)

**Id In C KC1 KC2 KC6 relating to outcome 1.12**
<table>
<thead>
<tr>
<th>KEY IDEAS</th>
<th>Transformation and symmetry</th>
<th>OUTCOMES</th>
</tr>
</thead>
<tbody>
<tr>
<td>Children explore and experiment with simple transformations to predict and change the orientation and position of figures and objects in their daily activities. In C KC6 relating to outcome 1.13</td>
<td></td>
<td>A&amp;RQ: Have my learners been given the opportunity to celebrate their learning?</td>
</tr>
<tr>
<td><strong>KEY IDEAS</strong></td>
<td><strong>Transformation and symmetry</strong></td>
<td><strong>OUTCOMES</strong></td>
</tr>
<tr>
<td>Reception Towards Standard 1</td>
<td>Year 1 Towards Standard 1</td>
<td>Year 2 Standard 1</td>
</tr>
<tr>
<td>- Explores and experiments with arrangements of shapes by turning, flipping and sliding.</td>
<td>- Explores, makes and describes simple arrangements of shapes by flipping, sliding and turning.</td>
<td>- Explores, makes and describes arrangements of shapes by flipping, sliding and turning.</td>
</tr>
<tr>
<td>- Matches shapes one-to-one by flipping, sliding and rotating.</td>
<td>- Makes and describes patterns with figures and objects that tessellate.</td>
<td>- Sorts and identifies figures that tessellate.</td>
</tr>
<tr>
<td>- Experiments with linear and rotational symmetry using a few shapes.</td>
<td>- Creates designs with linear and rotational symmetry (eg designing with pattern blocks).</td>
<td>- Constructs symmetrical pictures in a variety of ways (eg using cut-out shapes) by flipping, turning and using templates and drawing software.</td>
</tr>
<tr>
<td>- Completes 7–8 piece puzzle with interlocking pieces by rotating, fitting and matching.</td>
<td>- Completes complex jigsaws, rotating, fitting, matching and flipping puzzle pieces to fit.</td>
<td>- Completes complex jigsaws (eg 3-D puzzles, computer puzzles/simulation software, tangrams).</td>
</tr>
<tr>
<td>- Uses everyday language to describe the movement of shapes.</td>
<td>- Describes simple transformations, tessellations and symmetry in the environment using everyday language.</td>
<td>- Explores mathematical language to describe transformations, orientation and position (eg reflection, translation, rotation, symmetrical).</td>
</tr>
</tbody>
</table>

1.13 Uses simple transformations to orientate and move familiar objects and themselves when they are constructing, arranging and locating. Id C
Learning Area: Mathematics  
Strand: Spatial sense and geometric reasoning  
Band: Early Years  
Standard: 1

### KEY IDEAS

- Children explain ways of representing themselves and familiar locations in spatial terms, and begin to think in geometric ways.  
  **Id T C KC2 relating to outcome 1.14**

### Location and position

#### Reception
- **Towards Standard 1**
  - Locates objects and places related to themselves (eg ‘Put it in my bag’).
  - Locates relevant objects and places within their class unit and around the school (eg meets carer by the swings, finds way to the toilet).
  - Makes and explores different pathways (eg in the sandpit, making roadways/train tracks with Lego/blocks).
  - Gives and follows simple directions (eg ‘Put it under the table’).
  - Uses everyday language to describe position (eg on, off, in, out, near, far, in front, next to, behind, above, below, away from, through).

#### Year 1
- **Towards Standard 1**
  - Locates objects and places within their own experience (eg ‘Our house is next to the shops’).
  - Uses pictures to describe location (eg ‘The dog is behind the tree’).
  - Describes and records locations and pathways (eg makes simple models, draws simple maps, including the use of a range of software).
  - Records simple maps/pathways with increasing attention to accurate position and orientation.
  - Explores the visual concept of a ‘bird’s-eye view’.
  - Explores pathways through mazes.
  - Gives and follows directions both in oral and written form.
  - Understands and uses spatial terminology such as right, left, back, forward, around and past.

#### Year 2
- **Standard 1**
  - Finds and explains paths between particular points (eg ‘To get to the library from the canteen go …’).
  - Constructs, explains and follows pathways. (eg draws path from school to home, draws plan of desk top).
  - Begins to interpret simple maps (eg zoo, student made maps).
  - Discusses and experiments with using key features of maps (eg legends/keys/coordinates).
  - Records maps/pathways using ‘bird’s-eye view’.
  - Creates paths on squared paper/digitally (eg following directions: forward 3, turn right, forward 7).
  - Understands and uses spatial terminology such as between, third from the left, clockwise/anti-clockwise and half turn.

### OUTCOMES

**1.14** Uses everyday and positional language and makes informal maps to represent their location and familiar places.  
**In T C**
TERMINOLOGY AND SYMBOLS

Strand: Exploring, analysing and modelling data

Data, Question, Ask, Survey, Collect, Find, Organise, Sort, Group, Collate, Represent, Record, Tally, Graph, Table, Compare, Predict, Pattern, Equal, Same, Different, More than, Less than, Pictogram, Column graph, Bar graph, Line graph, Pie graph, Spreadsheet, Database, Axis, x axis, y axis, Base line, Title, Labels, Everyday chance language (eg likely, will, perhaps).

Strand: Measurement

Everyday language (eg big, small, heavy), Measure, Estimate, Approximate, Accurate, Attributes, Length, Height, Perimeter, Distance, Metre, Centimetre, Area, Covers, Space, Temperature, Capacity, Fill, Full, Empty, Litres, Millilitre, Volume, Angle, Turn, Wide, Narrow, Mass, Kilograms, Grams, Time, Weekend, Months, Days, Minutes, Seconds, Hours, Weeks, Seasons, Before/after, In-between, Nearly, Half, Abbreviations (eg mm, cm, kg).

Strand: Number

More, Less, As many, Same, Equal, Not equal, Greater, Less, Estimate, Sort, Order, Compare, Add, Plus, Sum, Total, Counting on, Counting back, Forwards, Backwards, Subtract, Take away, Minus, Difference, Group, Multiply, Divide, Share, Hundreds, Tens, Ones, Digits, Number, Numeral, Fraction, Part, Piece, Half, Third etc, Whole, Double, Record, Patterns, Symbols (eg + - x > <= ).

Strand: Pattern and algebraic reasoning

Pattern, Repeat, Repetition, Dance, Rhythm, Predict, Next, Before/after, Design, Explore, Record, Represent, Describe, Explain, Rule, Count, Number, Groups, Multiply, Add, Odd/even.

Strand: Spatial sense and geometric reasoning

Geometric, Shape, Object, Plane, Figure, Solid, 2-D, 3-D, Closed, Open, Boundary, Polygon, Quadrilateral, Pentagon, Hexagon, Octagon, Square, Triangle, Rectangle, Rhombus, Trapezium, Circle, Oval, Ellipse, Curved, Straight, Symmetry, Transformation, Translate/Slide, Rotate/Turn, Reflect/Flip, Tessellate, Tessellation, Cube, Cone, Sphere, Prism, Pyramid, Properties, Attributes, Side, Corner, Surface, Edge, Face, Vertices, Vertex, Angle, Degrees, Amount, Count, Number, Line, Label, Arrange, Rearrange, Vertical, Horizontal, Oblique, Right, Left, Clockwise, Anti-clockwise, Map, Net, Cross-section, Scale, Bird’s-eye View, Coordinates, Direction, Model, Pack and stack, Function, Use.
## Equipment

**Exploring, analysing and modelling data**
- Dice (six-sided, multi-sided, coloured)
- Spinners
- Coins
- Flip blocks
- Grid chart
- Grid paper
- Electronic media (e.g., Kidpix, website lists)
- Newspapers
- Maths dictionary (electronic and print)

**Measurement**
- Maths dictionary (electronic and print)
- Clocks: analogue, digital
- Timers: sand, egg, digital, stopwatches, tocker timers, candles, sundials, water, shadow, kitchen
- Calendars, timetables
- Rulers, tape measures, trundle wheels, height chart
- Rotagrams
- Scales: bathroom, balance, kitchen
- Spring balances
- Weights
- Thermometer
- Containers: digital, uniform, non-uniform, standard measure
- Junk materials
- Straws, sticks, lids
- Blocks
- Computers

**Number**
- Maths dictionary (electronic and print)
- Arbitrary counting units/blocks
- MAB, popsticks, rubber bands, base 10 boards
- Grids (blank and numbered)
- Dice, spinners, flip blocks, variety of counters/blocks
- Johnson lines
- Cards: playing, dot, number
- Dominoes
- Number charts (different languages and structures)
- Number lines
- Number games (e.g., matching, ordering)
- Electronic media (e.g., calculators, websites)
- Grids

**Pattern and algebraic reasoning**
- Grid paper
- Number charts
- Junk materials (e.g., keys, buttons, gumnuts, seeds, fabric, wrapping paper, works of art)
- Blocks and counters
- Regular and irregular figures and objects
- Calendars, timetables, diaries
- Weather charts
- Electronic media (e.g., Kidpix, calculator)
- Musical instruments, tape recorder, music
- Pattern making materials: stamps, paints, coloured paper shapes/cut-outs, paper shape punchers
- Maths dictionary (electronic and print)

**Spatial sense and geometric reasoning**
- Maths dictionary (electronic and print)
- Junk materials (e.g., cardboard, boxes, cylinders)
- Blocks (e.g., pattern, wooden cubes)
- 2-D and 3-D shapes
- Grids, grid paper, dot paper
- Electronic media: drawing and design programs ‘Lego’, websites
- Commercial maps, mazes, street directories, school maps
- Play dough, plasticine, clay
- Geoboards
- Construction sets: polydrons, geoshapes

**Spatial sense and geometric reasoning**
- Maths dictionary (electronic and print)
- Junk materials (e.g., cardboard, boxes, cylinders)
- Blocks (e.g., pattern, wooden cubes)
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- Grids, grid paper, dot paper
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- Play dough, plasticine, clay
- Geoboards
- Construction sets: polydrons, geoshapes
BIBLIOGRAPHY


Key Ideas

Students generate and analyse data from a diverse range of sources (including online) and perspectives to investigate situations drawn from their personal lives and the world around them. They use this data to explore patterns and relationships, and to inform their choices and actions.

Students draw conclusions from data they collect from diverse sources and perspectives, using descriptions of the spread of data and of relationships within it. They make predictions and informal inferences for larger populations or similar situations, and communicate their conclusions and predictions to a variety of audiences.

Students refine their understanding of chance and randomness by using data from their daily activities to describe possible outcomes and their likelihood. They analyse trends and relationships and make predictions about possibilities in the future.

Outcomes

3.1 Poses questions, determines a sample, collects and records data including related data, represents sample data in order to investigate the world around them.

2.1 Poses questions, explores patterns, and collects relevant data. They record and represent the data and also use data presented by others.

2.2 Describes key features of data and draws conclusions from similar data from different groups. They make general predictions based on results.

2.3 Describes situations where chance plays a role; collects, organises and represents data to identify possible outcomes; and uses comparative language to describe the likelihood of each outcome.

3.2 Summarises, recognises bias, draws conclusions and makes conjectures about data. Understands how different organisation and representations influence data interpretation.

3.3 Analyses data to search for patterns in events where the range of outcomes is generated by situations where chance plays a role.

This concept map provides a visual representation of the Key Ideas and Outcomes below. Educators may prefer to develop their own.

Essential Learnings Equity Cross-curriculum Perspectives and Enterprise and Vocational Education embedded in the SACSA Framework’s Key Ideas and Outcomes, can be developed through critical questions such as:

- How can data help learners to better understand the needs and interests of themselves, groups and other people?
- How can data help young people to understand and address issues relevant to their lives and affecting human and community well-being?
- How can learners use data to develop enterprising and creative solutions to issues of personal, social and cultural significance?
- How do different ways of communicating data serve different purposes and interests?
- What and whose interests (e.g. personal, social, political and economic) are reflected in, and served by, this data?
Learning Area: Mathematics

Strand: Exploring, analysing and modelling data

Band: Primary Years

Standards: 2 & 3

### KEY IDEAS

Students generate and analyse data from a diverse range of sources (including online) and perspectives to investigate situations drawn from their personal lives and the world around them. They use this data to explore patterns and relationships, and to inform their choices and actions.

Id T C KC1

relating to outcome 2.1

Students engage with data by formulating and answering questions, and collecting, organising and representing data in order to investigate and understand the work around them.

In T C KC1 KC6

relating to outcome 3.1

### OUTCOMES

<table>
<thead>
<tr>
<th>Year 3</th>
<th>Year 4</th>
<th>Year 5</th>
</tr>
</thead>
<tbody>
<tr>
<td>Towards Standard 2</td>
<td>Standard 2</td>
<td>Towards Standard 3</td>
</tr>
</tbody>
</table>

#### Year 3 Towards Standard 2

- Develops questions to collect data.
- Uses tallying to collect data (eg $\begin{array}{c}1 \\ 1 \\ 1 \\ 1 \end{array}$).
- Constructs bar, column and picture graphs from collected data.
- Recognises, interprets and constructs scaled picture graphs (eg 1 car = 5 cars).
- Collects, organises, represents, analyses and saves data electronically (eg draws up a table and chooses a pictorial representation).
- Recognises and begins to use graph labels, titles, and x and y axes.

#### Year 4 Standard 2

- Clarifies questions to decide what data to collect.
- Prepares questionnaires to enable data collection.
- Collects and organises data (eg uses tables, charts, tallies).
- Constructs bar and column graphs using a scale and labelled axes including using graphing software.
- Collects, organises, analyses and saves data electronically.
- Recognises and uses graph labels, titles, and x and y axes.

#### Year 5 Towards Standard 3

- Prepares questionnaires and surveys to enable data collection.
- Collects, organises, analyses, displays and saves data on paper and using a range of software (eg spreadsheets).
- Constructs and interprets line, bar, column and composite graphs using a scale.
- Recognises pie graphs.
- Uses graph labels, titles, and x and y axes confidently.

A&RQ: Have I provided to my learners opportunities for further learning in meaningful ways?

**2.1**

Poses questions, explores patterns, and collects relevant data. They record and represent the data, and also use data presented by others.

**3.1**

Poses questions, determines a sample, collects and records data including related data, represents sample data in order to investigate the world around them.

In T C KC1 KC6
# Learning Area: Mathematics

## Strand: Exploring, analysing and modelling data

### Band: Primary Years

#### Standards: 2 & 3

### KEY IDEAS

Students draw conclusions from data they collect from diverse sources and perspectives, using descriptions of the spread of the data and of relationships within it. They make predictions and informal inferences for larger populations or similar situations, and communicate their conclusions and predictions to a variety of audiences.

**F Id T C** KC1 KC2 KC6 relating to outcome 2.2

Students use statistical methods to reduce, analyse and interpret data, while critically evaluating the cultural and social inclusivity of the samples used.

**In T** KC1 relating to outcome 3.2

### OUTCOMES

#### Year 3

Towards Standard 2

- Recognises and interprets bar, column and picture graphs.
- Explores how data can be used to present a particular point of view (eg in advertising).
- Discusses future plans based on data collected.

#### Year 4

Standard 2

- Interprets information from tables, and bar, column and picture graphs.
- Continues to explores how data can be used to present a particular point of view (eg in advertising).
- Discusses and makes plans based on data collected.

#### Year 5

Towards Standard 3

- Reads and interprets graphs from real-life applications (eg graphs and tables found in newspapers).
- Analyses and makes judgments based on statistical information and makes predictions and generalisations.
- Understands how data can be used to present a particular point of view (eg in advertising).

**A&RQ:** Have I provided to my learners opportunities for further learning in meaningful ways?

---

2.2 Describes key features of data and draws conclusions from similar data from different groups. They make general predictions based on results. **F T C** KC1 KC2 KC6

3.2 Summarises, recognises bias, draws conclusions and makes conjectures about data. Understands how different organisation and representations influence data interpretation. **In T** KC1
# Learning Area: Mathematics

## Strand: Exploring, analysing and modelling data

### Band: Primary Years

#### Standards: 2 & 3

<table>
<thead>
<tr>
<th>KEY IDEAS</th>
<th>Chance, data and probability</th>
<th>OUTCOMES</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>Year 3</strong></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Towards Standard 2</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Students refine their understanding of chance and randomness by using data from their daily activities to describe possible outcomes and their likelihood. They analyse trends and relationships and make predictions about possibilities in the future.</td>
<td>Identifies events/activities which have an element of chance (eg likely or unlikely, possible or impossible).</td>
<td>2.3 Describes situations where chance plays a role; collects, organises and represents data to identify possible outcomes; and uses comparative language to describe the likelihood of each outcome.</td>
</tr>
<tr>
<td></td>
<td>Predicts and records outcomes of simple chance events (eg tossing coins or flip tiles).</td>
<td>Predicts possible results of experiments (eg more likely/less likely).</td>
</tr>
<tr>
<td></td>
<td>Uses tallying to record events.</td>
<td>Records outcomes of chance experiments (eg coin toss, dice roll).</td>
</tr>
<tr>
<td></td>
<td>Appreciates that actions can bias the likelihood of outcomes (eg survey of boys’ favourite TV programs or sports).</td>
<td>Uses whole numbers and fractions to describe the likelihood of outcomes (eg 50:50 chance, ½ a chance).</td>
</tr>
<tr>
<td></td>
<td>Discusses future plans and actions based upon their understanding of a familiar chance situation.</td>
<td>Collects, organises, analyses and saves data electronically.</td>
</tr>
<tr>
<td><strong>Year 4</strong></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Standard 2</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Students engage with data to understand, analyse and apply notions of chance and probability in the social and natural worlds.</td>
<td>Identifies events/activities which have an element of chance.</td>
<td>3.3 Analyses data to search for patterns in events where the range of outcomes is generated by situations where chance plays a role.</td>
</tr>
<tr>
<td></td>
<td>Predicts possible results of experiments (eg more likely/less likely).</td>
<td>Uses whole numbers and fractions to describe the likelihood of outcomes (eg 1 in 6 chance of drawing a 4).</td>
</tr>
<tr>
<td></td>
<td>Records outcomes of chance experiments (eg coin toss, dice roll).</td>
<td>Uses common percentages to describe likelihood of outcomes (eg 50%, 25%, 75%, 100% chance).</td>
</tr>
<tr>
<td><strong>Year 5</strong></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Towards Standard 3</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Identifies events/activities in everyday situations which have an element of chance.</td>
<td>Identifies events/activities in everyday situations which have an element of chance.</td>
<td></td>
</tr>
<tr>
<td>Predicts possible events from least likely to most likely and identifies trends.</td>
<td>Predicts possible events from least likely to most likely and identifies trends.</td>
<td></td>
</tr>
<tr>
<td>Conducts experiments, records and organises the data and compares results to make predictions.</td>
<td>Conducts experiments, records and organises the data and compares results to make predictions.</td>
<td></td>
</tr>
<tr>
<td>Collects, organises, analyses and saves data electronically using a range of software (eg Excel, Claris Works, Kidpix).</td>
<td>Collects, organises, analyses and saves data electronically using a range of software (eg Excel, Claris Works, Kidpix).</td>
<td></td>
</tr>
<tr>
<td></td>
<td>Uses common percentages to describe likelihood of outcomes (eg 50%, 25%, 75%, 100% chance).</td>
<td></td>
</tr>
</tbody>
</table>
### Learning Area: Mathematics

#### Strand: Measurement

#### Band: Primary Years

<table>
<thead>
<tr>
<th>KEY IDEAS</th>
<th>Year 3 Towards Standard 2</th>
<th>Year 4 Standard 2</th>
<th>Year 5 Towards Standard 3</th>
</tr>
</thead>
<tbody>
<tr>
<td>Students refine their concepts of measurable attributes and units of comparison. They choose the most appropriate attributes and units to quantify 2-D figures, 3-D solids and time for a wide variety of purposes, and are able to justify their choices to others.</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>T C KC2 relating to outcome 2.4 Students use direct measurement strategies and relationships between particular attributes to quantify the size of 2-D figures, 3-D solids and time. They identify, plan and act to address measurement problems.</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>T C KC3 relating to outcome 2.5 Students understand attributes, units and systems of measurement. They research and report on how measurement is used in the home, community and paid workforce, and recognise transferability between these and other contexts.</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>In T C KC1 KC2 KC6 relating to outcome 3.4 Students recognise and develop and report on connections between mathematical ideas and representations. They employ logical strategies to solve problems in measurement situations, and reflect on the reasonableness of their answers.</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>T KC1 KC2 KC6 relating to outcome 3.5</td>
<td></td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th>Length, perimeter and area</th>
<th>(refer p 12 for Early Years)</th>
<th>(refer p 57 for Middle Years)</th>
</tr>
</thead>
<tbody>
<tr>
<td>Year 3 Towards Standard 2</td>
<td>Year 4 Standard 2</td>
<td>Year 5 Towards Standard 3</td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>- Sorts, classifies, orders, describes and compares objects by length using non-standard and standard units.</td>
<td>- Recognises and uses standard metric units (mm, cm, m, km).</td>
<td>- Uses a range of estimation and measuring strategies to refine accuracy in measuring length.</td>
</tr>
<tr>
<td>- Chooses appropriate metric units (mm, cm, m) for measuring and understands these abbreviations.</td>
<td>- Uses a variety of length measuring tools (eg rulers, trundle wheels, tape measures, own measuring devices).</td>
<td>- Recognises the relationship between units of length and writes them in decimal form (eg 156cm = 1.56m).</td>
</tr>
<tr>
<td>- Uses a variety of length measuring tools (eg rulers, trundle wheels, tape measures).</td>
<td>- Understands the meanings of prefixes such as milli and centi.</td>
<td>- Converts measurements (eg m to cm, m to km).</td>
</tr>
<tr>
<td>- Practises measuring metres and centimetres.</td>
<td>- Understands and recalls length measurements (eg 100cm = 1m).</td>
<td>- Estimates, measures, compares and records the perimeter of regular shapes.</td>
</tr>
</tbody>
</table>
| - Develops a range of estimating strategies. | | - Estimates, measures, compares and records the area of regular shapes in cm².
| - Understands and recalls length measurement (eg 100cm = 1m). | | - Understands that the area of a square or rectangle can be found by using the formula A = (LxB) or A = (LxW). |
| - Calculates perimeter of regular shapes. | | |
| - Investigates area in cm² using concrete materials. | | |

#### OUTCOMES

- 2.4 Chooses, estimates and uses metric units to measure attributes of figures and objects; orders events or cycles of events; estimates the duration and time of events; constructs and uses measuring tools, and explains that all measurement is approximate and that some tools increase precision. T KC2
- 2.5 Uses direct measuring strategies to represent, communicate and record measurements graphically in symbols with correct units and performs simple operations on measures. T C KC2
- 3.4 Selects appropriate attributes and systems to measure for a variety of purposes and reports on how measurement is used in social practice. In T C KC1 KC2
- 3.5 Uses a range of standard tools to measure relationships between distances and other measurable attributes to calculate size. T
## Learning Area: Mathematics
### Strand: Measurement
#### Band: Primary Years

<table>
<thead>
<tr>
<th>KEY IDEAS</th>
<th>Volume and capacity</th>
<th>OUTCOMES</th>
</tr>
</thead>
<tbody>
<tr>
<td>Students refine their concepts of measurable attributes and units of comparison. They choose the most appropriate attributes and units to quantify 2-D figures, 3-D solids and time for a wide variety of purposes, and are able to justify their choices to others.</td>
<td>Students estimates, measures, compares and records capacity using litres and millilitres.</td>
<td>Year 3 Towards Standard 2</td>
</tr>
<tr>
<td><strong>(refer p 13 for Early Years)</strong></td>
<td>Year 4 Standard 2</td>
<td>Year 4 Towards Standard 3</td>
</tr>
<tr>
<td>Year 5 Towards Standard 3</td>
<td><strong>Volume and capacity</strong> (refer p 59 for Middle Years)</td>
<td><strong>OUTCOMES</strong></td>
</tr>
<tr>
<td>Students choose, estimates and uses metric units to measure attributes of figures and objects; orders events or cycles of events; estimates the duration and time of events; constructs and uses measuring tools, and explains that all measurement is approximate and that some tools increase precision. <strong>T KC2</strong></td>
<td>Students estimates, measures, compares and records volume and capacity using litres, millilitres and cubic centimetres.</td>
<td><strong>2.4</strong></td>
</tr>
<tr>
<td>Students estimate and selects appropriate attributes and systems to measure for a variety of purposes and reports on how measurement is used in social practice. <strong>In T KC1 KC2 KC6</strong></td>
<td>Students writes common capacity measurements in decimal form (eg 1.25L).</td>
<td><strong>2.5</strong></td>
</tr>
<tr>
<td>Students recognises and develop and report on connections between mathematical ideas and representations. They employ logical strategies to solve problems in measurement situations, and reflect on the reasonableness of their answers. <strong>T KC1 KC2 KC6</strong></td>
<td>Students converts mL to L, L to mL.</td>
<td><strong>3.4</strong></td>
</tr>
<tr>
<td>Students estimates, measures, compares and records volume using cubic centimetres.</td>
<td>Students constructs 3-D objects using standard cubic units and online resources.</td>
<td><strong>3.5</strong></td>
</tr>
<tr>
<td>Students memorises and recalls 1000mL = 1L.</td>
<td>Students measures the volume of shapes by counting the number of cm cubes.</td>
<td><strong>In T KC1 KC2</strong></td>
</tr>
<tr>
<td>Students estimates, measures, compares and records capacity using litres and millilitres.</td>
<td>Students recognises that 1cm³ = 1mL.</td>
<td><strong>3.5</strong></td>
</tr>
<tr>
<td>Students compares simple fractional amounts (eg ½L = 500mL).</td>
<td>Students memorises and recalls 1000mL = 1L).</td>
<td><strong>Uses a range of standard tools to measure relationships between distances and other measurable attributes to calculate size.</strong></td>
</tr>
<tr>
<td>Students writes common capacity measurements in decimal form (eg 1.25L).</td>
<td></td>
<td><strong>T</strong></td>
</tr>
</tbody>
</table>
**Learning Area: Mathematics**

**Strand: Measurement**  
**Band: Primary Years**  
**Standards: 2 & 3**

<table>
<thead>
<tr>
<th>KEY IDEAS</th>
<th>(refer p 13 for Early Years)</th>
<th>Mass</th>
<th>(refer p 60 for Middle Years)</th>
<th>OUTCOMES</th>
</tr>
</thead>
<tbody>
<tr>
<td>Students refine their concepts of measurable attributes and units of comparison. They choose the most appropriate attributes and units to quantify 2-D figures, 3-D solids and time for a wide variety of purposes, and are able to justify their choices to others.</td>
<td>Year 3</td>
<td>Year 4</td>
<td>Year 5</td>
<td>2.4 Chooses, estimates and uses metric units to measure attributes of figures and objects; orders events or cycles of events; estimates the duration and time of events; constructs and uses measuring tools, explains that all measurement is approximate and that some tools increase precision.</td>
</tr>
<tr>
<td>T C KC2 relating to outcome 2.4</td>
<td>Towards Standard 2</td>
<td>Standard 2</td>
<td>Towards Standard 3</td>
<td>T C2</td>
</tr>
<tr>
<td>Students use direct measurement strategies and relationships between particular attributes to quantify the size of 2-D figures, 3-D solids and time. They identify, plan and act to address measurement problems.</td>
<td></td>
<td></td>
<td></td>
<td>2.5 Uses direct measuring strategies to represent, communicate and record measurements graphically in symbols with correct units and performs simple operations on measures.</td>
</tr>
<tr>
<td>T C KC3 relating to outcome 2.5</td>
<td></td>
<td></td>
<td></td>
<td>T C2</td>
</tr>
<tr>
<td>Students understand attributes, units and systems of measurement. They research and report on how measurement is used in the home, community and paid workforce, and recognise transferability between these and other contexts.</td>
<td></td>
<td></td>
<td></td>
<td>3.4 Selects appropriate attributes and systems to measure for a variety of purposes and reports on how measurement is used in social practice.</td>
</tr>
<tr>
<td>In T C KC1 KC2 KC6 relating to outcome 3.4</td>
<td></td>
<td></td>
<td></td>
<td>In T C KC1 KC2</td>
</tr>
<tr>
<td>Students recognise and develop and report on connections between mathematical ideas and representations. They employ logical strategies to solve problems in measurement situations, and reflect on the reasonableness of their answers.</td>
<td></td>
<td></td>
<td></td>
<td>3.5 Uses a range of standard tools to measure relationships between distances and other measurable attributes to calculate size.</td>
</tr>
<tr>
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<td></td>
<td></td>
<td></td>
<td>T</td>
</tr>
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</table>
### KEY IDEAS

Students refine their concepts of measurable attributes and units of comparison. They choose the most appropriate attributes and units to quantify 2-D figures, 3-D solids and time for a wide variety of purposes, and are able to justify their choices to others.

**T** C **KC2**

relating to outcome

2.4

### OUTCOMES

2.4 Chooses, estimates and uses metric units to measure attributes of figures and objects; orders events or cycles of events; estimates the duration and time of events; constructs and uses measuring tools, explains that all measurement is approximate and that some tools increase precision.

**T** C **KC2**

2.5 Uses direct measuring strategies to represent, communicate and record measurements graphically in symbols with correct units and performs simple operations on measures.

**T** C **KC2**

### Time

#### Year 3
Towards Standard 2
- Draws and makes clocks (eg analogue and digital).
- Reads and writes the time in hours and minutes on digital clocks.
- Uses ‘to’ and ‘past’ terms.
- Applies timeframes (eg 24 hours in a day, 60 minutes in an hour, 60 seconds in a minute, 7 days in a week, 12 months in a year, 365 days in a year, 366 days in a leap year).
- Records times as am or pm.
- Reads and writes the time in hours and half hours on analogue clocks.
- Converts digital time to ‘past’ the hour or ‘to’ the hour.
- Reads and interprets a year calendar.
- Estimates length of time in seconds and minutes to 2 minutes.
- Develops a timeline of daily events.

#### Year 4
Standard 2
- Reads and writes clock time in quarter hour and 5 minute intervals in analogue and digital time.
- Uses ‘to’ and ‘past’ terms.
- Understands and recalls 24 hours in a day, 60 minutes in an hour, 60 seconds in a minute, 7 days in a week, 12 months in a year, 365 days in a year, 366 days in a leap year, 10 years in a decade, and 100 years in a century.
- Records times as am or pm.
- Converts analogue to digital time in 5 and 1 minute intervals.
- Reads and interprets calendars from different times and cultures, and timetables (eg class timetable).
- Estimates length of time in seconds and minutes to 5 minutes.
- Develops, creates and uses timelines (eg birth to Year 4).

#### Year 5
Towards Standard 3
- Reads and writes clock time in 1-minute intervals in analogue and digital forms.
- Understands and recalls 24 hours in a day, 60 minutes in an hour, 60 seconds in a minute, 7 days in a week, 12 months in a year, 365 days in a year, 366 days in a leap year, 10 years in a decade, and 100 years in a century.
- Reads and interprets calendars from different times and cultures, and timetables (eg bus, train, TV guide), and uses online resources to access timetables and world times.
- Uses software to create calendars.
- Estimates length of time in seconds and minutes to 10 minutes.

### Learning Area: Mathematics

**Strand: Measurement**

**Band: Primary Years**

**Standards: 2 & 3**

#### Year 3
Towards Standard 2

#### Year 4
Standard 2

#### Year 5
Towards Standard 3

---

### Standards

- **2 & 3**

---

### Table

<table>
<thead>
<tr>
<th>KEY IDEAS</th>
<th>(refer p 14 for Early Years)</th>
<th>Time</th>
<th>(refer p 61 for Middle Years)</th>
<th>OUTCOMES</th>
</tr>
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| Students refine their concepts of measurable attributes and units of comparison. They choose the most appropriate attributes and units to quantify 2-D figures, 3-D solids and time for a wide variety of purposes, and are able to justify their choices to others. | | | 2.4 Chooses, estimates and uses metric units to measure attributes of figures and objects; orders events or cycles of events; estimates the duration and time of events; constructs and uses measuring tools, explains that all measurement is approximate and that some tools increase precision. | T C **KC2**
| Students use direct measurement strategies and relationships between particular attributes to quantify the size of 2-D figures, 3-D solids and time. They identify, plan and act to address measurement problems. | | | **2.5** Uses direct measuring strategies to represent, communicate and record measurements graphically in symbols with correct units and performs simple operations on measures. | **T** C **KC2**
| **T** C **KC3**
relating to outcome **2.5** | | | **3.4** Selects appropriate attributes and systems to measure for a variety of purposes and reports on how measurement is used in social practice. | In **T** C **KC1** **KC2**
| | | **3.5** Uses a range of standard tools to measure relationships between distances and other measurable attributes to calculate size. | T |
Students refine their concepts of measurable attributes and units of comparison. They choose the most appropriate attributes and units to quantify 2-D figures, 3-D solids and time for a wide variety of purposes, and are able to justify their choices to others.

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<thead>
<tr>
<th>KC2 relating to outcome</th>
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<tbody>
<tr>
<td>Students use direct measurement strategies and relationships between particular attributes to quantify the size of 2-D figures, 3-D solids and time. They identify, plan and act to address measurement problems.</td>
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<td>Students understand attributes, units and systems of measurement. They research and report on how measurement is used in the home, community and paid workforce, and recognise transferability between these and other contexts.</td>
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<tr>
<td>Uses a stopwatch and/or digital watch to time events accurately.</td>
<td></td>
</tr>
<tr>
<td>Converts 24 hour clock time to analogue time.</td>
<td></td>
</tr>
<tr>
<td>Calculates differences in time (eg time between 11.17am and 12.49pm).</td>
<td></td>
</tr>
<tr>
<td>Converts hours to minutes.</td>
<td></td>
</tr>
<tr>
<td>Problem solves using time (eg How many minutes in 3½ hours?).</td>
<td></td>
</tr>
<tr>
<td>Develops, creates and uses timelines (eg important social and cultural dates of the 20th Century).</td>
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</table>

- Investigates and interprets Roman numerals I–XII.
- Interprets patterns of numbers (eg Roman numerals such as C, M, L).
- Uses a stopwatch and/or digital watch to time events accurately.
- Converts 24 hour clock time to analogue time.
- Calculates differences in time (eg time between 11.17am and 12.49pm).
- Converts hours to minutes.
- Problem solves using time (eg How many minutes in 3½ hours?).
- Develops, creates and uses timelines (eg important social and cultural dates of the 20th Century).

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<tbody>
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<td>Uses a range of standard tools to measure relationships between distances and other measurable attributes to calculate size.</td>
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</tbody>
</table>
### KEY IDEAS

Students refine their concepts of measurable attributes and units of comparison. They choose the most appropriate attributes and units to quantify 2-D figures, 3-D solids and time for a wide variety of purposes, and are able to justify their choices to others.

**T C KC2**  
**relating to outcome 2.4**  
Students use direct measurement strategies and relationships between particular attributes to quantify the size of 2-D figures, 3-D solids and time. They identify, plan and act to address measurement problems.

**T C KC3**  
**relating to outcome 2.5**  
Students understand attributes, units and systems of measurement. They research and report on how measurement is used in the home, community and paid workforce, and recognise transferability between these and other contexts.

**In T C KC1 KC2 KC6**  
**relating to outcome 3.4**  
Students recognise and develop and report on connections between mathematical ideas and representations. They employ logical strategies to solve problems in measurement situations, and reflect on the reasonableness of their answers.

**T KC1 KC2 KC6**  
**relating to outcome 3.5**

### OUTCOMES

<table>
<thead>
<tr>
<th>Year 3</th>
<th>Year 4</th>
<th>Year 5</th>
</tr>
</thead>
<tbody>
<tr>
<td>Towards Standard 2</td>
<td>Standard 2</td>
<td>Towards Standard 3</td>
</tr>
</tbody>
</table>

#### Year 3
- Practises using a thermometer.
- Reads the temperature scale on a thermometer.
- Understands the terms maximum and minimum temperature.
- Estimates, measures, records and orders temperatures in degrees Celsius.

#### Year 4
- Looks at and measures temperatures in degrees Celsius using a thermometer.
- Knows and understands temperatures at boiling and freezing points.
- Uses and records maximum and minimum temperatures.
- Records and graphs temperature readings (eg using graphing software).

#### Year 5
- Estimates and then measures accurately and records temperatures in degrees Celsius using a thermometer.
- Demonstrates understanding of minus degrees Celsius (e.g., –10°C).
- Records and graphs temperature readings (eg maximum and minimum temperatures over a day, a week) and uses online resources to compare world temperatures.
- Compares temperatures of localities (eg Darwin and Hobart, and other places in the world).
- Understands that some countries use the imperial system.
- Demonstrates awareness of higher temperatures (eg oven temperatures for cooking).

---

**2.4** Chooses, estimates and uses metric units to measure attributes of figures and objects; orders events or cycles of events; estimates the duration and time of events; constructs and uses measuring tools, and explains that all measurement is approximate and that some tools increase precision.

**2.5** Uses direct measuring strategies to represent, communicate and record measurements graphically in symbols with correct units and performs simple operations on measures.

**3.4** Selects appropriate attributes and systems to measure for a variety of purposes and reports on how measurement is used in social practice.

**3.5** Uses a range of standard tools to measure relationships between distances and other measurable attributes to calculate size.
### Learning Area: Mathematics

**Strand: Number**

**Band: Primary Years**

**Standards: 2 & 3**

<table>
<thead>
<tr>
<th>KEY IDEAS</th>
<th>(refer p 15 for Early Years)</th>
<th>Fractions and decimals</th>
<th>(refer p 65 for Middle Years)</th>
<th>OUTCOMES</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>Year 3</strong></td>
<td><strong>Towards Standard 2</strong></td>
<td><strong>Year 4</strong></td>
<td><strong>Standard 2</strong></td>
<td><strong>Year 5</strong></td>
</tr>
<tr>
<td>Students develop their number sense through exploring and analysing how numbers are used and represented in their daily activities, their communities and their experiences in other Learning Areas. They continue to refine their understanding of relationships between numbers, place value and proportion.</td>
<td><strong>Id In T C KC1 KC6</strong> relating to outcome 2.6</td>
<td>Students recognise relationships within different number concepts in order to make sense of, and represent numerically, a range of community activities and social processes encountered in their lives.</td>
<td><strong>In T C KC1</strong> relating to outcome 3.6</td>
<td><strong>2.6</strong> Represents and compares rational numbers in a variety of ways, describing relationships among them.</td>
</tr>
<tr>
<td><strong>Fractions and decimals</strong></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>• Understands the value of 1 = whole.</td>
<td>• Understands that 0 is a place holder (eg value of 0 in 207 and $3.05).</td>
<td>• Sequences and orders fractions (eg ( \frac{1}{4}, \frac{1}{2}, \frac{3}{4} )).</td>
<td></td>
<td><strong>4.1</strong> Represents and compares rational numbers in a variety of ways, describing relationships among them. <strong>In T KC2</strong></td>
</tr>
<tr>
<td>• Understands and uses commonly used fractions (eg ( \frac{1}{2}, \frac{1}{4}, \frac{1}{10} )).</td>
<td>• Models, compares and represents commonly used fractions such as ( \frac{1}{2}, \frac{1}{3}, \frac{1}{4}, \frac{1}{5}, \frac{1}{6}, \frac{1}{10} ) and ( \frac{1}{100} ).</td>
<td>• Finds equivalence between halves, quarters and eighths; fifths and tenths; tenths and hundredths (eg ( \frac{1}{2} = \frac{2}{4} )).</td>
<td></td>
<td><strong>In T KC1 KC2</strong> <strong>5.6</strong> Represents and analyses relationships amongst number concepts and uses these to make sense of, and represent the world. <strong>In T KC1 KC2</strong></td>
</tr>
<tr>
<td>• Models simple equivalent fractions using concrete objects (eg ( \frac{1}{2} = \frac{2}{4} )).</td>
<td>• Sequences simple fractions (eg ( \frac{1}{4}, \frac{1}{2}, \frac{3}{4} )).</td>
<td>• Finds fractions of quantities (eg ( \frac{1}{2} ) of 36).</td>
<td></td>
<td><strong>In T KC1 KC2</strong> <strong>6.6</strong> Represents and analyses relationships amongst number concepts and uses these to make sense of, and represent the world. <strong>In T KC1 KC2</strong></td>
</tr>
<tr>
<td>• Uses the terms equivalent, numerator and denominator.</td>
<td>• Understands and uses the term decimal.</td>
<td>• Converts simple mixed numbers to improper fractions (eg ( 1\frac{1}{4} = \frac{5}{4} )).</td>
<td></td>
<td><strong>In T KC1 KC2</strong> <strong>7.6</strong> Represents and analyses relationships amongst number concepts and uses these to make sense of, and represent the world. <strong>In T KC1 KC2</strong></td>
</tr>
<tr>
<td>• Understands and uses mixed numbers to 10 (eg ( 4\frac{1}{2} )).</td>
<td>• Understands, orders and uses decimals to 2 decimal places.</td>
<td>• Converts fractions to lowest terms (eg ( \frac{6}{10} = \frac{3}{5} )).</td>
<td></td>
<td><strong>In T KC1 KC2</strong> <strong>8.6</strong> Represents and analyses relationships amongst number concepts and uses these to make sense of, and represent the world. <strong>In T KC1 KC2</strong></td>
</tr>
<tr>
<td>• Counts and orders fractions to 100 (eg ( \frac{11}{22}, 1\frac{1}{4}, 2\frac{1}{2} )).</td>
<td>• Reads and writes decimal numbers as tenths.</td>
<td>• Adds and subtracts fractions with like denominators (eg ( \frac{2}{5} + \frac{3}{5} )).</td>
<td></td>
<td><strong>In T KC1 KC2</strong> <strong>9.6</strong> Represents and analyses relationships amongst number concepts and uses these to make sense of, and represent the world. <strong>In T KC1 KC2</strong></td>
</tr>
<tr>
<td>• Uses drawing programs (eg Kidpix) to show fractional amounts.</td>
<td>• Adds and subtracts decimals to 2 decimal places.</td>
<td>• Recognises, understands and uses simple percentages (eg 50%, 25%)</td>
<td></td>
<td><strong>In T KC1 KC2</strong> <strong>10.6</strong> Represents and analyses relationships amongst number concepts and uses these to make sense of, and represent the world. <strong>In T KC1 KC2</strong></td>
</tr>
</tbody>
</table>
Learning Area: Mathematics  
Strand: Number  
Band: Primary Years  
Standards: 2 & 3

<table>
<thead>
<tr>
<th>KEY IDEAS</th>
<th>Whole number + – x ÷</th>
<th>OUTCOMES</th>
</tr>
</thead>
</table>
| Students develop their understanding of the four operations (+ - x ÷) and the relationships between them. They use mathematical terminology, symbols and conventions to communicate their understanding to others. | **Year 3** Towards Standard 2 | 2.7 Describes, represents and applies operations with whole numbers.  
*T C KC2*  
relating to outcome 2.7 | **Year 4** Standard 2 | 2.8 Uses a variety of estimating and calculating strategies, including memorising addition and subtraction facts with whole numbers, and with money represented as decimals.  
*Id In T*  
2.8 Uses a variety of estimating and calculating strategies with whole numbers, including memorising multiplication and division facts, fractions and decimals.  
*T KC6*  
relating to outcome 3.8 | **Year 5** Towards Standard 3 |          |

**Students** develop their understanding by learning the key ideas:

- Practises, understands and recalls basic addition and subtraction and number facts to 20.
- Understands that the order of numbers in addition does not change the result.
- Demonstrates that addition and subtraction are inverse operations (e.g., if 14 + 3 = 17 and 17 - 3 = 14, subtracting 3 is the inverse of adding 3 and so 3 - 3 = 0).
- Understands the place value of digits up to 1000.
- Consolidates number concepts using online resources and software.
- Adds 2 and 3 digit numbers with and without exchanging.
- Subtracts 2 and 3 digit numbers with and without exchanging.
- Recognises and uses the multiplication symbol.
- Explains relationship between multiplication and addition.
- Explains relationship between subtraction and division.
- Practises, understands and recalls basic addition and subtraction number facts to 50.
- Writes, orders and expands 2, 3 and 4 digit numbers.
- Reads and records numbers to 1000 using numerals and words.
- Adds up to 4 digit numbers with and without exchanging.
- Subtracts up to 4 digit numbers with and without exchanging.
- Memorises, practises and recalls times tables up to 10x.
- Determines prime, composite and square numbers.
- Counts, orders, reads and records 2, 3, 4 and 5 digit numbers (place value, expanding numbers).
- Reads, writes and records 5 and 6 digit numbers using numerals and words.
- Write numbers in expanded form to 100 000.
- Rounds off to the nearest thousand.
- Estimates, approximates and performs mental computations to 4 numbers.
- Practises, understands and recalls basic addition and subtraction number facts to 100.
- Adds, with exchanging, up to 5 and 6 digit numbers.
- Subtracts, with exchanging, up to 5 and 6 digit numbers.

**Students** develop their understanding by learning the key ideas:

- Practises, understands and recalls basic addition and subtraction and number facts to 20.
- Understands that the order of numbers in addition does not change the result.
- Demonstrates that addition and subtraction are inverse operations (e.g., if 14 + 3 = 17 and 17 - 3 = 14, subtracting 3 is the inverse of adding 3 and so 3 - 3 = 0).
- Understands the place value of digits up to 1000.
- Consolidates number concepts using online resources and software.
- Adds 2 and 3 digit numbers with and without exchanging.
- Subtracts 2 and 3 digit numbers with and without exchanging.
- Recognises and uses the multiplication symbol.
- Explains relationship between multiplication and addition.
- Explains relationship between subtraction and division.
- Practises, understands and recalls basic addition and subtraction number facts to 50.
- Writes, orders and expands 2, 3 and 4 digit numbers.
- Reads and records numbers to 1000 using numerals and words.
- Adds up to 4 digit numbers with and without exchanging.
- Subtracts up to 4 digit numbers with and without exchanging.
- Memorises, practises and recalls times tables up to 10x.
- Determines prime, composite and square numbers.
- Counts, orders, reads and records 2, 3, 4 and 5 digit numbers (place value, expanding numbers).
- Reads, writes and records 5 and 6 digit numbers using numerals and words.
- Write numbers in expanded form to 100 000.
- Rounds off to the nearest thousand.
- Estimates, approximates and performs mental computations to 4 numbers.
- Practises, understands and recalls basic addition and subtraction number facts to 100.
- Adds, with exchanging, up to 5 and 6 digit numbers.
- Subtracts, with exchanging, up to 5 and 6 digit numbers.

**Students** develop their understanding by learning the key ideas:

- Practises, understands and recalls basic addition and subtraction and number facts to 20.
- Understands that the order of numbers in addition does not change the result.
- Demonstrates that addition and subtraction are inverse operations (e.g., if 14 + 3 = 17 and 17 - 3 = 14, subtracting 3 is the inverse of adding 3 and so 3 - 3 = 0).
- Understands the place value of digits up to 1000.
- Consolidates number concepts using online resources and software.
- Adds 2 and 3 digit numbers with and without exchanging.
- Subtracts 2 and 3 digit numbers with and without exchanging.
- Recognises and uses the multiplication symbol.
- Explains relationship between multiplication and addition.
- Explains relationship between subtraction and division.
- Practises, understands and recalls basic addition and subtraction number facts to 50.
- Writes, orders and expands 2, 3 and 4 digit numbers.
- Reads and records numbers to 1000 using numerals and words.
- Adds up to 4 digit numbers with and without exchanging.
- Subtracts up to 4 digit numbers with and without exchanging.
- Memorises, practises and recalls times tables up to 10x.
- Determines prime, composite and square numbers.
- Counts, orders, reads and records 2, 3, 4 and 5 digit numbers (place value, expanding numbers).
- Reads, writes and records 5 and 6 digit numbers using numerals and words.
- Write numbers in expanded form to 100 000.
- Rounds off to the nearest thousand.
- Estimates, approximates and performs mental computations to 4 numbers.
- Practises, understands and recalls basic addition and subtraction number facts to 100.
- Adds, with exchanging, up to 5 and 6 digit numbers.
- Subtracts, with exchanging, up to 5 and 6 digit numbers.
Students develop their understanding of the four operations (+, -, x, ÷) and the relationships between them. They use mathematical terminology, symbols and conventions to communicate their understanding to others.

KC2 relating to outcome 2.7

Students use their number sense to refine their ability to estimate, calculate and present using spreadsheets, measurements and amounts of money in their personal, family and community activities, and in their experiences in other Learning Areas.

Id T C KC7 relating to outcome 2.8

Students understand the meaning of operations and how they relate to each other, and can communicate these through a range of media, including information and communication technologies.

In T C KC2 KC7 relating to outcome 3.7

Students use computational tools and strategies, and understand and represent the thinking processes employed in solving problems involving proportions.

KC6 relating to outcome 3.8

- Explores relationships between table facts (eg multiples of 2, 4).
- Builds up understanding and knowledge of table facts (eg 10 to 100, 5 to 50, 2 to 20, 4 to 40, 3 to 30).
- Multiplies 2 digit numbers by 1 digit.
- Estimates, approximates and performs mental computations to 2 digits.
- Understands that the order of numbers in multiplication does not change the result (eg 6x3 = 3x6).
- Divides 2 and 3 digit numbers by 1 digit numbers with and without remainders (eg 11÷2 = 5r1).
- Understands and describes the term remainder.
- Recognises and uses odd and even numbers.
- Rounds off to the nearest 10.
- Uses calculators and electronic media to compute +, -, x and ÷.
- Understands and uses factors and multiples of numbers.
- Multiplies by 10 and by 100.
- Multiplies 2 and 3 digit numbers by 1 digit.
- Divides 3 digits by 1 digit with and without remainders (eg 2345÷5 = 469).
- Divides by 10 and by 100.
- Demonstrates that multiplication and division are reverse operations (eg 3x6 = 18 and 18+6 = 3).
- Determines prime, composite and square numbers.
- Estimates, approximates and performs mental computations to 3 digits.
- Rounds off to the nearest 10 and 100.
- Uses calculators and electronic media to compute +, -, x and ÷.
- Understands and recalls times tables up to 10x.
- Multiplies 2, 3 and 4 digit numbers by 1 digit.
- Multiplies 2 digit numbers by 2 digit numbers up to 12.
- Understands and uses factors and multiples of numbers up to 100.
- Divides 4 digit numbers with divisors up to 10, with and without remainders.
- Understands the term percentage.
- Uses symbols <, > and =.

A&RQ: Have I enabled my learners to engage with self-assessment?
**Learning Area: Mathematics**

**Strand: Number**

**Band: Primary Years**

**Standards: 2 & 3**

### KEY IDEAS

(Refer p 20 for Early Years)

<table>
<thead>
<tr>
<th>Money</th>
<th>Year 3</th>
<th>Year 4</th>
<th>Year 5</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>Towards Standard 2</strong></td>
<td><strong>Standard 2</strong></td>
<td><strong>Towards Standard 3</strong></td>
<td></td>
</tr>
<tr>
<td>Students use their number sense to refine their ability to estimate, calculate and present using spreadsheets, measurements and amounts of money in their personal, family and community activities, and in their experiences in other Learning Areas.</td>
<td><strong>Id T C KC7</strong> relating to outcome 2.8</td>
<td><strong>Id In T KC6</strong> relating to outcome 3.8</td>
<td></td>
</tr>
<tr>
<td><strong>Recognises and names coins and notes to $100.</strong></td>
<td><strong>Reads and writes amounts in numerals and words up to $100.</strong></td>
<td><strong>Reads and writes amounts in numerals and words up to $1000.</strong></td>
<td></td>
</tr>
<tr>
<td><strong>Counts coins in multiples of 5c, 10c, 20c, 50c, $1, $2.</strong></td>
<td><strong>Tenders amounts using coins and notes up to $100.</strong></td>
<td><strong>Adds up amounts up to $500.</strong></td>
<td></td>
</tr>
<tr>
<td><strong>Reads and writes amounts in words and numerals up to $20.</strong></td>
<td><strong>Adds and subtracts money amounts up to $100.</strong></td>
<td><strong>Calculates change from $50.</strong></td>
<td></td>
</tr>
<tr>
<td><strong>Understands value of money (eg ‘What can you buy for $1, $10, $100?”).</strong></td>
<td><strong>Calculates change from $50.</strong></td>
<td><strong>Multiplies and divides money amounts up to $500.</strong></td>
<td></td>
</tr>
<tr>
<td><strong>Tenders amounts up to $10.</strong></td>
<td><strong>Multiplies and divides amounts by 1 digit up to $100.</strong></td>
<td><strong>Multiplies using the symbol @ (eg 5 @ 35c = $1.75).</strong></td>
<td></td>
</tr>
<tr>
<td><strong>Adds and subtracts money up to $10.</strong></td>
<td><strong>Uses the least number of coins needed to make money amounts.</strong></td>
<td><strong>Estimates total costs by rounding (eg when shopping).</strong></td>
<td></td>
</tr>
<tr>
<td><strong>Calculates change from amounts to $5.</strong></td>
<td><strong>Rounds off to the nearest 5c.</strong></td>
<td><strong>Creates personal and household budgets up to $500.</strong></td>
<td></td>
</tr>
<tr>
<td><strong>Investigates rounding off amounts of money to nearest 5c.</strong></td>
<td><strong>Creates personal budgets up to $100.</strong></td>
<td><strong>Problem solves using at least 2 combinations of processes (eg ‘Find the total cost, then work out the change’).</strong></td>
<td></td>
</tr>
<tr>
<td><strong>Uses a calculator to solve money problems up to $20.</strong></td>
<td><strong>Uses a calculator to solve money problems (eg using +, −, %, ÷ functions).</strong></td>
<td><strong>Uses a calculator to solve money problems (eg using +, −, %, ÷ functions).</strong></td>
<td></td>
</tr>
<tr>
<td><strong>Use online shopping programs.</strong></td>
<td></td>
<td></td>
<td></td>
</tr>
</tbody>
</table>
CONCEPT MAP
Primary Years: Pattern and algebraic reasoning

KEY IDEAS
Students identify, describe, construct, represent and predict patterns and relationships when working with data, measuring and calculating. They relate these patterns and relationships to their everyday lives.

Students employ everyday language and mathematical symbols to represent and communicate their generalisations about mathematical situations and structures.

Students collect and analyse information in understanding that the social and physical world is constantly changing, and that such change can be represented in symbols and mathematical models.

OUTCOMES
2.9 Searches for, represents and analyses different forms of spatial and numerical patterns, and relates these to everyday life.

2.10 Represents and communicates patterns with everyday and mathematical language, including symbols, sketches, materials, number lines and graphs.

2.11 Uses materials, data and informal graphs to represent change.

OUTCOMES
3.9 Describes and generalises relationships between measurable attributes as patterns and explains the impact of varying one aspect of the relationship.

3.10 Analyses, creates and generalises numerical and spatial patterns and solves problems with such patterns.

3.11 Uses mathematical representations to make connections and analyse change.

Outcomes
Pattern and algebraic reasoning

This concept map provides a visual representation of the Key Ideas and Outcomes below. Educators may prefer to develop their own.
## Learning Area: Mathematics

### Strand: Pattern and algebraic reasoning

<table>
<thead>
<tr>
<th>YEAR</th>
<th>PATTERNS</th>
</tr>
</thead>
</table>
| **Year 3** Towards Standard 2 | - Describes and uses interval counting to show patterns (eg 2, 5, 8, 11).  
- Recognises and uses number patterns.  
- Recognises odd and even numbers.  
- Counts forwards and backwards to 100 by 1, 5 and 10.  
- Recognises, describes and discusses patterns in a 100s number chart.  
- Investigates shape and measurement patterns (eg \(\triangle \triangle \nabla \nabla \triangle\)).  
- Uses drawing programs to create simple patterns. |
| **Year 4** Standard 2 | - Describes and uses interval counting (eg 23, 26, 29 …).  
- Investigates number patterns.  
- Recognises patterns in a multiplication chart.  
- Investigates shape and measurement patterns (eg using computer-generated shapes including tessellations). |
| **Year 5** Towards Standard 3 | - Describes and uses interval counting (eg 345, 350, 355 …).  
- Understands and continues number, letter and shape patterns.  
- Recognises patterns in a multiplication chart.  
- Records patterns in the local environment (eg uses digital camera).  
- Uses drawing programs to create more complex patterns. |

### KEY IDEAS

- Students identify, describe, construct, represent and predict patterns and relationships when working with data, measuring and calculating. They relate these patterns and relationships to their everyday lives.
- Students demonstrate, record and report on logical and critical thought processes by searching for and abstracting generational algebraic representations from patterns drawn from current social situations.

### OUTCOMES

- **2.9** Searches for, represents and analyses different forms of spatial and numerical patterns, and relates these to everyday life.
- **3.9** Describes and generalises relationships between measurable attributes as patterns and explains the impact of varying one aspect of the relationship.

### Standards: 2 & 3
Learning Area: Mathematics  
Strand: Pattern and algebraic reasoning  
Band: Primary Years  
 Standards: 2 & 3

<table>
<thead>
<tr>
<th>KEY IDEAS</th>
<th>(refer p 22 for Early Years)</th>
<th>Algebra</th>
<th>(refer p 68 for Middle Years)</th>
<th>OUTCOMES</th>
</tr>
</thead>
<tbody>
<tr>
<td>Students employ everyday language and mathematical symbols to represent and communicate their generalisations about mathematical situations and structures.</td>
<td>2.10</td>
<td>Completes simple number sentences by calculating the value of a missing number (eg (2+\ldots=8)).</td>
<td>2.10</td>
<td>Represents and communicates patterns with everyday and mathematical language, including symbols, sketches, materials, number lines and graphs. C KC2</td>
</tr>
<tr>
<td>Students use mathematical models to make connections and analyse how things might change in both real and abstract contexts. They extract information from tables of data and graphs, making comparisons between varying rates of change, and predicting future events.</td>
<td>3.10</td>
<td>Constructs and uses number lines to investigate patterns of numbers (eg 20, 30, 40, …).</td>
<td>3.10</td>
<td>Analyses, creates and generalises numerical and spatial patterns and solves problems with such patterns. T C KC6</td>
</tr>
<tr>
<td></td>
<td></td>
<td>Creates a variety of symbols and graphics using drawing software to make algebraic number sentences (eg (\square+8=10)).</td>
<td></td>
<td></td>
</tr>
<tr>
<td></td>
<td></td>
<td>Uses factor trees to find factors.</td>
<td></td>
<td></td>
</tr>
<tr>
<td></td>
<td></td>
<td>Determines number patterns of square and triangular numbers.</td>
<td></td>
<td></td>
</tr>
<tr>
<td></td>
<td></td>
<td>Constructs and uses number lines (eg counting decimals and fractions).</td>
<td></td>
<td></td>
</tr>
<tr>
<td></td>
<td></td>
<td>Calculates the value of symbols in a number sentence (eg (\bigvee + \bigvee + \bigvee = 18)).</td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

A&RQ: Have my learners engaged in peer assessment?
<table>
<thead>
<tr>
<th>KEY IDEAS</th>
<th>Change</th>
<th>OUTCOMES</th>
</tr>
</thead>
</table>
| Students collect and analyse information in understanding that the social and physical world is constantly changing, and that such change can be represented in symbols and mathematical models.  
**F In C** KC1 relating to outcome  
**2.11** | Investigates data.  
Sketches graphs to represent change over time (eg birth to adult).  
Illustrates change over time (eg seasons, butterfly life cycle, dance steps, musical rotation).  
Discusses factors that may influence change over time, and identifies which of these they can manipulate and which they cannot (eg different conditions for growth of plants). | Investigates and analyses data about change.  
Makes charts and graphs to represent change over time (eg measures length of shadows over a time period).  
Uses a range of appropriate software (eg *Inspiration*) to present information. |
| Students analyse mathematical structures and use algebraic formulae to represent situations. They further develop the capacity to express themselves, and to solve problems involving linear relationships.  
**T C** KC1 KC6 relating to outcome  
**3.11** | | |

*(refer p 23 for Early Years)*
### Learning Area: Mathematics

**Strand: Spatial sense and geometric reasoning**

**Band: Primary Years**

**Standards: 2 & 3**

<table>
<thead>
<tr>
<th>KEY IDEAS</th>
<th>(refer p 24 for Early Years)</th>
<th>2-D and 3-D objects</th>
<th>(refer p 72 for Middle Years)</th>
<th>OUTCOMES</th>
</tr>
</thead>
<tbody>
<tr>
<td>Students understand and appreciate the extent to which shape and structure help them to make sense of their world.</td>
<td><strong>Year 3</strong> Towards Standard 2</td>
<td><strong>Year 4</strong> Standard 2</td>
<td><strong>Year 5</strong> Towards Standard 3</td>
<td>2.12 Compares and analyses relationships between and within 2-D and 3-D shapes and objects to represent their world. F T KC1 KC2</td>
</tr>
<tr>
<td>Students explore and analyse features in their immediate and extended environment in geometric terms. They compare perspectives of spatial sense and geometric reasoning in order to understand different human interactions with their environment.</td>
<td><strong>F Id T</strong> relating to outcome 2.12</td>
<td><strong>Id In T</strong> KC1 relating to outcome 3.12</td>
<td><strong>Id In T</strong> KC2</td>
<td>3.12 Describes and generalises spatial relationships within and between groups of 2-D and 3-D shapes and objects and appreciates their application in a range of cultural contexts.</td>
</tr>
<tr>
<td>• Recognises parallel, horizontal, vertical, oblique, diagonal and intersecting lines.</td>
<td><strong>Year 3</strong> Towards Standard 2</td>
<td><strong>Year 4</strong> Standard 2</td>
<td><strong>Year 5</strong> Towards Standard 3</td>
<td>2.12 Compares and analyses relationships between and within 2-D and 3-D shapes and objects to represent their world. F T KC1 KC2</td>
</tr>
<tr>
<td>• Identifies, recognises in the environment and names 2-D common shapes (eg square, rectangle, circle, oval, triangle, pentagon, octagon).</td>
<td><strong>Year 4</strong> Standard 2</td>
<td><strong>Year 5</strong> Towards Standard 3</td>
<td><strong>Id In T</strong> KC2</td>
<td>3.12 Describes and generalises spatial relationships within and between groups of 2-D and 3-D shapes and objects and appreciates their application in a range of cultural contexts.</td>
</tr>
<tr>
<td>• Draws and constructs 2-D shapes with and without a ruler.</td>
<td><strong>Year 4</strong> Standard 2</td>
<td><strong>Year 5</strong> Towards Standard 3</td>
<td><strong>Id In T</strong> KC2</td>
<td>3.12 Describes and generalises spatial relationships within and between groups of 2-D and 3-D shapes and objects and appreciates their application in a range of cultural contexts.</td>
</tr>
<tr>
<td>• Describes and compares the properties of different quadrilaterals (eg square, rectangle, kite).</td>
<td><strong>Year 4</strong> Standard 2</td>
<td><strong>Year 5</strong> Towards Standard 3</td>
<td><strong>Id In T</strong> KC2</td>
<td>3.12 Describes and generalises spatial relationships within and between groups of 2-D and 3-D shapes and objects and appreciates their application in a range of cultural contexts.</td>
</tr>
<tr>
<td>• Describes irregular polygons.</td>
<td><strong>Year 4</strong> Standard 2</td>
<td><strong>Year 5</strong> Towards Standard 3</td>
<td><strong>Id In T</strong> KC2</td>
<td>3.12 Describes and generalises spatial relationships within and between groups of 2-D and 3-D shapes and objects and appreciates their application in a range of cultural contexts.</td>
</tr>
<tr>
<td>• Recognises, sorts and names familiar 3-D objects (eg cylinder, cone, sphere, cube, prism).</td>
<td><strong>Year 4</strong> Standard 2</td>
<td><strong>Year 5</strong> Towards Standard 3</td>
<td><strong>Id In T</strong> KC2</td>
<td>3.12 Describes and generalises spatial relationships within and between groups of 2-D and 3-D shapes and objects and appreciates their application in a range of cultural contexts.</td>
</tr>
<tr>
<td>• Draws top, (bird’s-eye), side and front views of 3-D shapes.</td>
<td><strong>Year 4</strong> Standard 2</td>
<td><strong>Year 5</strong> Towards Standard 3</td>
<td><strong>Id In T</strong> KC2</td>
<td>3.12 Describes and generalises spatial relationships within and between groups of 2-D and 3-D shapes and objects and appreciates their application in a range of cultural contexts.</td>
</tr>
<tr>
<td>• Describes 2-D and 3-D shapes using terms such as base, surface, edge, face and vertex.</td>
<td><strong>Year 4</strong> Standard 2</td>
<td><strong>Year 5</strong> Towards Standard 3</td>
<td><strong>Id In T</strong> KC2</td>
<td>3.12 Describes and generalises spatial relationships within and between groups of 2-D and 3-D shapes and objects and appreciates their application in a range of cultural contexts.</td>
</tr>
<tr>
<td>• Constructs 3-D shapes from nets.</td>
<td><strong>Year 4</strong> Standard 2</td>
<td><strong>Year 5</strong> Towards Standard 3</td>
<td><strong>Id In T</strong> KC2</td>
<td>3.12 Describes and generalises spatial relationships within and between groups of 2-D and 3-D shapes and objects and appreciates their application in a range of cultural contexts.</td>
</tr>
<tr>
<td>• Experiments with 7 piece tangram puzzles.</td>
<td><strong>Year 4</strong> Standard 2</td>
<td><strong>Year 5</strong> Towards Standard 3</td>
<td><strong>Id In T</strong> KC2</td>
<td>3.12 Describes and generalises spatial relationships within and between groups of 2-D and 3-D shapes and objects and appreciates their application in a range of cultural contexts.</td>
</tr>
<tr>
<td>• Draws parallel, horizontal, vertical, oblique, diagonal and intersecting lines.</td>
<td><strong>Year 4</strong> Standard 2</td>
<td><strong>Year 5</strong> Towards Standard 3</td>
<td><strong>Id In T</strong> KC2</td>
<td>3.12 Describes and generalises spatial relationships within and between groups of 2-D and 3-D shapes and objects and appreciates their application in a range of cultural contexts.</td>
</tr>
<tr>
<td>• Describes and compares properties of polygons, prisms and pyramids (eg faces, bases, edges and vertices).</td>
<td><strong>Year 4</strong> Standard 2</td>
<td><strong>Year 5</strong> Towards Standard 3</td>
<td><strong>Id In T</strong> KC2</td>
<td>3.12 Describes and generalises spatial relationships within and between groups of 2-D and 3-D shapes and objects and appreciates their application in a range of cultural contexts.</td>
</tr>
<tr>
<td>• Describes the properties of circles, regular polygons and solids.</td>
<td><strong>Year 4</strong> Standard 2</td>
<td><strong>Year 5</strong> Towards Standard 3</td>
<td><strong>Id In T</strong> KC2</td>
<td>3.12 Describes and generalises spatial relationships within and between groups of 2-D and 3-D shapes and objects and appreciates their application in a range of cultural contexts.</td>
</tr>
<tr>
<td>• Recognises and names regular and irregular polygons (eg triangle, quadrilateral, pentagon, hexagon, octagon).</td>
<td><strong>Year 4</strong> Standard 2</td>
<td><strong>Year 5</strong> Towards Standard 3</td>
<td><strong>Id In T</strong> KC2</td>
<td>3.12 Describes and generalises spatial relationships within and between groups of 2-D and 3-D shapes and objects and appreciates their application in a range of cultural contexts.</td>
</tr>
<tr>
<td>• Draws top, side, front and cross-sections of 3-D shapes.</td>
<td><strong>Year 4</strong> Standard 2</td>
<td><strong>Year 5</strong> Towards Standard 3</td>
<td><strong>Id In T</strong> KC2</td>
<td>3.12 Describes and generalises spatial relationships within and between groups of 2-D and 3-D shapes and objects and appreciates their application in a range of cultural contexts.</td>
</tr>
<tr>
<td>• Constructs 3-D shapes from nets.</td>
<td><strong>Year 4</strong> Standard 2</td>
<td><strong>Year 5</strong> Towards Standard 3</td>
<td><strong>Id In T</strong> KC2</td>
<td>3.12 Describes and generalises spatial relationships within and between groups of 2-D and 3-D shapes and objects and appreciates their application in a range of cultural contexts.</td>
</tr>
<tr>
<td>• Interprets, recognises and names 3-D objects and shapes (eg cubes, prisms and pyramids).</td>
<td><strong>Year 4</strong> Standard 2</td>
<td><strong>Year 5</strong> Towards Standard 3</td>
<td><strong>Id In T</strong> KC2</td>
<td>3.12 Describes and generalises spatial relationships within and between groups of 2-D and 3-D shapes and objects and appreciates their application in a range of cultural contexts.</td>
</tr>
<tr>
<td>• Solves 7 piece tangram puzzles.</td>
<td><strong>Year 4</strong> Standard 2</td>
<td><strong>Year 5</strong> Towards Standard 3</td>
<td><strong>Id In T</strong> KC2</td>
<td>3.12 Describes and generalises spatial relationships within and between groups of 2-D and 3-D shapes and objects and appreciates their application in a range of cultural contexts.</td>
</tr>
</tbody>
</table>
Students understand and appreciate the extent to which shape and structure help them to make sense of their world.  

**FIdT**

**relating to outcome 2.12**

Students explore and analyse features in their immediate and extended environment in geometric terms. They compare perspectives of spatial sense and geometric reasoning in order to understand different human interactions with their environment.

**Id In** **KC1**

**relating to outcome 3.12**

- Recognises and draws lines of symmetry in nature, the human body and drawn shapes.
- Works with shapes to find the lines of symmetry.
- Explores symmetrical patterns using grid paper, geoboards and drawing programs.
- Uses drawing programs to draw symmetrical shapes.
- Recognises right angles in everyday objects.
- Understands and uses the terms smaller than a right angle and larger than a right angle.
- Makes and draws acute and obtuse angles.
- Uses drawing programs to draw symmetrical shapes.
- Recognises angles in the environment (eg takes digital photos).
- Constructs and compares a variety of angles (eg acute, square, straight, reflex, and obtuse).
- Uses a set square and protractor to measure and draw angles accurately (eg right angles, 30°, 45°, 60°).
- Understands that an angle is an amount of turn and can be measured in degrees.
- Draws symmetrical shapes and patterns.
- Identifies angles in everyday objects.
- Knows, uses and recognises obtuse, reflex, right and acute angles.
- Uses a range of drawing software (eg drawing tools) to construct angles.
- Uses a set square and protractor to measure and draw angles accurately (eg right angles, 30°, 45°, 60°).
- Understands and recalls 90° in a right angle, and 180° in a straight angle.

**A&RQ: Do I use learner achievement data to support and plan for future learning?**

**2.12**

Compares and analyses relationships between and within 2-D and 3-D shapes and objects to represent their world.  

**F T** **KC1** **KC2**

**3.12**

Describes and generalises spatial relationships within and between groups of 2-D and 3-D shapes and objects and appreciates their application in a range of cultural contexts.  

**Id In** **KC2**
### Learning Area: Mathematics

#### Strand: Spatial sense and geometric reasoning  
#### Band: Primary Years  
#### Standards: 2 & 3

<table>
<thead>
<tr>
<th>KEY IDEAS</th>
<th>Transformation and symmetry</th>
<th>OUTCOMES</th>
</tr>
</thead>
<tbody>
<tr>
<td>Students explore and communicate the ideas and language of geometric change and transformation. They use combinations of mathematical transformations. <strong>T C KC2 relating to outcome 2.13</strong></td>
<td>Students analyse and understand the uses and purposes of flips (reflection), slides (translation), rotations and dilations to explore geometric relationships and alternative preferred possibilities in the physical world. <strong>F T KC1 KC6 relating to outcomes 3.13</strong></td>
<td><strong>OUTCOMES</strong></td>
</tr>
<tr>
<td><strong>Year 3</strong> Towards Standard 2</td>
<td><strong>Year 4</strong> Standard 2</td>
<td><strong>Year 5</strong> Towards Standard 3</td>
</tr>
<tr>
<td>- Uses and understands the terms flip, slide and rotate and begins to use mathematical language (e.g., reflection for flip).</td>
<td>- Understands the terms flip (as reflection), slide (as translation) and turn (as rotation).</td>
<td>- Understands the term transformation.</td>
</tr>
<tr>
<td>- Creates patterns and tessellations with regular polygons.</td>
<td>- Creates and draws repeated patterns with translations, rotations and reflections.</td>
<td>- Uses the terms reflect, translate and rotate to describe movement.</td>
</tr>
<tr>
<td>- Makes shape patterns electronically, using concrete materials and on paper.</td>
<td>- Uses the terms reflect, translate and rotate to describe movement.</td>
<td>- Creates and draws repeated patterns with translations, rotations and reflections.</td>
</tr>
</tbody>
</table>

A&RQ: Have I provided feedback that is constructive and informs the direction for future learning during this activity?

2.13 Predicts, describes and represents the result of using combinations of reflections (flips), translations (slides) and rotations when arranging shapes, searching for patterns and describing pathways. **T C KC1 KC2 KC6**

3.13 Analyses the result of a series of flips, slides, rotations and reflections and translations and uses scales to undertake enlargements and reductions of figures and objects. **T C KC1**
Learning Area: Mathematics  
Strand: Spatial sense and geometric reasoning  
Band: Primary Years  
Standards: 2 & 3

### KEY IDEAS

<table>
<thead>
<tr>
<th>Year 3 Towards Standard 2</th>
<th>Year 4 Standard 2</th>
<th>Year 5 Towards Standard 3</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>Location and position</strong></td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

- Locates features when interpreting maps of familiar locations (eg using legends/keys).
- Draws views of a model (eg bird's-eye and side view).
- Describes a route around the school and marks it on a simple plan.
- Follows directions and walks a route marked on a simple plan or given orally (eg obstacle course, treasure hunt).
- Gives and follows directions through a simple maze.

- Draws different views of a model (ie top, left, right and back view).
- Gives and follows directions to locate objects in familiar settings and on maps (eg using paces, direction).
- Begins to construct site maps for school/class websites.

- Gives and follows directions to locate objects in familiar settings (eg ¼ turn, ½ turn, cardinal compass points, grid coordinates, orienteering).
- Constructs own coordinate points for a selected simple picture.
- Uses street directories and/or local maps.
- Produces simple plans demonstrating appreciation of scale (eg bedroom, classroom).
- Draws and describes a path or route using coordinates on a simple map or plan.
- Constructs own coordinate points for a selected simple picture.

---

**OUTCOMES**

- **2.14** Uses positional language and measurements to formally map location and arrangements.  
  T C KC2

- **3.14** Produces, uses and critiques scaled maps and plans and envisages alternative possibilities.  
  F T KC3

---

<number>52</number>
**TERMINOLOGY AND SYMBOLS**

**Strand: Exploring, analysing and modelling data**

<table>
<thead>
<tr>
<th>Graphing</th>
<th>Chance, data and probability</th>
</tr>
</thead>
<tbody>
<tr>
<td>Certain, Possible, Very likely, Equally likely, Always, Impossible, Data, Graph, Axis, Scale, Tally, Survey, Statistic, Composite.</td>
<td>Least likely, Possible, Chance, Certain, Random, Never, Possibility, Analyse, Predict, Order, Probability, Tally, Experiment, Outcome, Probable, Event, Trial.</td>
</tr>
</tbody>
</table>

**Strand: Measurement**

<table>
<thead>
<tr>
<th>Mass</th>
<th>Volume and capacity</th>
<th>Length, perimeter, area</th>
</tr>
</thead>
<tbody>
<tr>
<td>Light, Lightest, Heavy, Heaviest, Grams, Kilograms, Tonnes.</td>
<td>Full, Millilitres, Empty, Different, Same, Amount, Level, Litres, Capacity, Volume, Measure, Liquid, Cubic measure, Displacement.</td>
<td>Millimetre, Centimetre, Metre, Kilometre, Perimeter, Area, Wide, Long, Straight, Metric, Width, Length, Height, Depth, Formula, Diameter, Boundary, Circumference, Trundle wheel.</td>
</tr>
<tr>
<td>Symbols g kg t</td>
<td>Symbols L mL cm³</td>
<td>Symbols mm cm m km cm² m²</td>
</tr>
<tr>
<td>Temperature</td>
<td>Time</td>
<td></td>
</tr>
<tr>
<td>Degree, Hot, Cold, Freezing, Boiling, Thermometer, Rising, Falling, Celsius, Fahrenheit, Maximum, Minimum, Minus.</td>
<td>Noon, Midday, Midnight, Afternoon, Calendar, Season, Week, Annual, Month, Decade, Century, Leap year, Timetable, Arrive, Depart, Stopwatch, Time zone, Digital, Analogue, O’clock, Past, To, Second, Minute, Hour, Day, Duration, Elapse, Timeline.</td>
<td></td>
</tr>
<tr>
<td>Symbols °C °F</td>
<td>Symbols am pm AD BC</td>
<td></td>
</tr>
<tr>
<td></td>
<td>I = 1 V = 5 X = 10 L = 50 C = 100 D = 500 M = 1000</td>
<td></td>
</tr>
<tr>
<td></td>
<td>Symbols</td>
<td></td>
</tr>
<tr>
<td></td>
<td>Symbols mm cm m km cm² m²</td>
<td></td>
</tr>
</tbody>
</table>

**Strand: Number**

<table>
<thead>
<tr>
<th>Fractions and decimals</th>
<th>Whole number</th>
<th>Money</th>
</tr>
</thead>
<tbody>
<tr>
<td>Unit, Whole, Denominator, Tenth, Numerator, Equivalent, Fraction, Decimal, Mixed fraction, Sequence, Hundredth, Percentage, Factor, Improper fraction, Divisor, Multiples, Square number, Prime number.</td>
<td>+ − × ÷ Subtraction, Add, Minus, Plus, Take away, Total, Difference, Sum of, Remainder, Product, Times, Share, Multiply, Divide, Exchanging, Group, Numeral, Figure.</td>
<td>Cheapest, Profit, Expensive, Loss, Change, Budget, Tender, Change, Currency, Amount, Rounding off, Least, Ascending, Most, Descending.</td>
</tr>
<tr>
<td>Symbols + − × ÷ %</td>
<td>Symbols # ≠ / ( )</td>
<td>Symbols @ $. c</td>
</tr>
</tbody>
</table>
### Strand: Pattern and algebraic reasoning

<table>
<thead>
<tr>
<th><strong>Patterns</strong></th>
<th><strong>Algebra</strong></th>
<th><strong>Data representation</strong></th>
</tr>
</thead>
<tbody>
<tr>
<td>Interval, Pattern, Odd, Even,</td>
<td>Symbol, Factor trees, Square number,</td>
<td>Data, Change, Prediction, Logical.</td>
</tr>
<tr>
<td>Dimension, Forward, Backward, Scale,</td>
<td>Triangular number.</td>
<td></td>
</tr>
<tr>
<td>Factors, Symbol, Number line, Increase, Decrease, Repetition.</td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

### Strand: Spatial sense and geometric reasoning

<table>
<thead>
<tr>
<th><strong>2-D and 3-D objects</strong></th>
<th><strong>Transformation</strong></th>
<th><strong>Position</strong></th>
</tr>
</thead>
<tbody>
<tr>
<td>Rectangle, Circle, Square, Hexagon,</td>
<td>Transformation, Reflection, Rotation,</td>
<td>North, South, East, West, Compass</td>
</tr>
<tr>
<td>Triangle, Pentagon, Semicircle, Angle,</td>
<td>Translation, Flip, Slide, Turn,</td>
<td>points, Cardinal points, Under,</td>
</tr>
<tr>
<td>Vertex, Right angle, Obtuse, Reflex,</td>
<td>Tessellation, Congruent, Enlargement,</td>
<td>Above, Below, Behind, Around, Beside,</td>
</tr>
<tr>
<td>Net, Symmetry, Congruence, Prism, Pyramid, Solid, Cylinder, Dimensional, Sphere, Cone, Pentagon, Heptagon.</td>
<td>Reduction, Polygon.</td>
<td>Between, Centre, Further, Left, Right, Through, Chart, Path, Route, Direction, Location, Position, Grid, Coordinates, Plot, Map, Model, Row, Column.</td>
</tr>
</tbody>
</table>

### Symbols

```
\[ \begin{array}{c}
\text{N} \\
\text{W} \\
\text{E} \\
\text{S}
\end{array} \]
```
BIBLIOGRAPHY

Middle Years: Exploring, analysing and modelling data

Key Ideas

Students engage with data by formulating and answering questions, and collecting, organising and representing data in order to investigate and understand the world around them.

Students use statistical methods to reduce, analyse and interpret data, while critically evaluating the cultural and social inclusivity of the samples used.

Students engage with data to understand, analyse and apply notions of chance and probability in the social and natural worlds.

Outcomes

3.1 Poses questions, determines a sample, collects and records data including related data, represents sample data in order to investigate the world around them.

3.2 Summarises, recognises bias, draws conclusions and makes conjectures about data. Understands how different organisation and representations influence data interpretation.

3.3 Analyses data to search for patterns in events where the range of outcomes is generated by situations where chance plays a role.

Outcomes

4.1 Poses questions, appropriately designs a survey, collects data and classifies, sequences, collapses, tabulates and represents the data with and without ICTs.

4.2 Reads and describes information in given tables, diagrams, line and bar graphs. Makes predictions based on the information, understanding the limitations of data interpretation and the possible social consequences of these limitations.

4.3 Interprets data and makes numerical statements about probability, models situations, using data to validate their theories about the fairness of everyday situations including hypothetical situations.

This concept map provides a visual representation of the Key Ideas and Outcomes below. Educators may prefer to develop their own.

How does working with data support middle years learners to

- explore issues of personal and social significance?
- develop perspectives to critically reflect on who they are, where they belong, what they value and what their preferred future would look like?
- negotiate, plan and act to enhance their lives and the lives of others?
- develop greater independence and connectedness with their peers, other people and systems (local, national and global)?
- connect their learning across the curriculum?
- produce, create, perform and present?
Learning Area: Mathematics
Strand: Exploring, analysing and modelling data
Band: Middle Years
Standards: 3 & 4

<table>
<thead>
<tr>
<th>KEY IDEAS (refer p 31 for Primary Years)</th>
<th>Data collection and representation</th>
<th>OUTCOMES</th>
</tr>
</thead>
<tbody>
<tr>
<td>Students engage with data by formulating and answering questions, and collecting, organising and representing data in order to investigate and understand the world around them. In T C KC2 KC6 relating to outcomes 3.1, 4.1</td>
<td>Students use statistical methods to reduce, analyse and interpret data, while critically evaluating the cultural and social inclusivity of the samples used. In T KC1 relating to outcomes 3.2, 4.2</td>
<td></td>
</tr>
<tr>
<td>Students engage with data by formulating and answering questions, and collecting, organising and representing data in order to investigate and understand the world around them. In T C KC2 KC6 relating to outcomes 3.1, 4.1</td>
<td>Students use statistical methods to reduce, analyse and interpret data, while critically evaluating the cultural and social inclusivity of the samples used. In T KC1 relating to outcomes 3.2, 4.2</td>
<td></td>
</tr>
<tr>
<td>Conducts surveys to collect data.</td>
<td>Year 6 Standard 3</td>
<td>Year 7 Towards Standard 4</td>
</tr>
<tr>
<td>Utilises tally system.</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Presents data graphically (eg frequency table).</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Constructs graphs on grid paper (eg pictographs, bar graphs, composite bar graphs, column graphs, line graphs).</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Constructs tables and graphs using graphing software.</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Labels graphs with titles, axes, key and scales.</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Interprets graphs, including pie graphs, from various sources.</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Calculates the mean (average) of a set of data.</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Interprets information from data, graphs and tables.</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Explores a process for statistical enquiry by:</td>
<td></td>
<td></td>
</tr>
<tr>
<td>- formulating key questions to explore (eg social and environmental issues)</td>
<td></td>
<td></td>
</tr>
<tr>
<td>- collecting data</td>
<td></td>
<td></td>
</tr>
<tr>
<td>- classifying data as categorical or quantitative (discrete or continuous)</td>
<td></td>
<td></td>
</tr>
<tr>
<td>- organising and displaying data in table and graph form</td>
<td></td>
<td></td>
</tr>
<tr>
<td>- analysing data and making general comments on its distribution</td>
<td></td>
<td></td>
</tr>
<tr>
<td>- presenting results of surveys; describing initial questions, data collection processes and conclusions; and commenting on how they might be improved.</td>
<td></td>
<td></td>
</tr>
<tr>
<td>A&amp;RQ: Have I made clear at the beginning the criteria for success?</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Interprets information from data, graphs and tables.</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Interprets information from data, graphs and tables.</td>
<td></td>
<td></td>
</tr>
<tr>
<td>A&amp;RQ: Have I made clear at the beginning the criteria for success?</td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

3.1 Poses questions, determines a sample, collects and records data including related data, represents sample data in order to investigate the world around them. In T C KC1 KC6

3.2 Summarises, recognises bias, draws conclusions and makes conjectures about data. Understands how different organisation and representations influence data interpretation. In T KC1

4.1 Poses questions, appropriately designs a survey, collects data and classifies sequence, collapses, tabulates and represents the data with and without ICTs. In T C KC1 KC2 KC7

4.2 Reads and describes information in given tables, diagrams, line and bar graphs. Makes predictions based on the information, understanding the limitations of data interpretation and the possible social consequences of these limitations. In T KC1 KC6
Learning Area: Mathematics

Strand: Exploring, analysing and modelling data

Band: Middle Years

Standards: 3 & 4

<table>
<thead>
<tr>
<th>KEY IDEAS</th>
<th>Chance and probability</th>
<th>OUTCOMES</th>
</tr>
</thead>
</table>
| Students engage with data to understand, analyse and apply notions of chance and probability in the social and natural worlds. F In T KC1 relating to outcomes 3.3, 4.3 | - Describes the likelihood of events in everyday situations using appropriate everyday language (eg likely, unlikely, possible, probable, certain, impossible).  
  - Orders the terms from impossible to certain.  
  - Describes the likelihood of events in everyday situations using appropriate mathematical terminology (eg 50:50 chance, 1 in 4 chance, no chance, equal chance).  
  - Utilises graphic organisers (eg tree diagrams) to develop lists of possible outcomes.  
  - Predicts and records possible outcomes of an event.  
  - Uses data to order chance events from least likely to most likely (eg roll 2 dice 20 times and record the total each time, then order the results from the least likely result to the most likely).  
  - Explains the differences between predicted results and actual results of an experiment (eg coin tossing).  
  - Identifies risks and consequences of taking chances.  
  - Demonstrates an understanding of what constitutes gambling (eg lotto, raffles, poker machines).  
  - Identifies some of the social consequences of gambling (eg implications for families adversely affected by problem gambling).  
  - Assigns numbers and percentages to chance (ie if it has no chance of occurring it is assigned 0 or 0%; if it is certain to occur it is assigned 1 or 100%).  
  - Makes their own probability generator (eg a spinner to show P [red] = \( \frac{2}{5} \)).  
  - Assigns probabilities for given situations (eg ‘Five discs are placed in a bag, two are blue and three are black. What is the probability of drawing a blue disc?’).  
  - Tests predictions (eg coin tossing).  
  - Lists possible outcomes for an event (eg uses tree diagrams, matrix diagrams).  
  - Investigates experimental and theoretical probabilities.  
  - Writes formulae to determine probability (eg P = \( \frac{\text{number of outcomes in event}}{\text{total number of possible outcomes}} \)).  
  - Analyses data to search for patterns in events where the range of outcomes is generated by situations where chance plays a role. F In T KC1  
  - Interprets data and makes numerical statements about probability, models situations, using data to validate their theories about the fairness of everyday situations including hypothetical situations. F In T KC1 |
Students engage with data to understand, analyse and apply notions of chance and probability in the social and natural worlds.

**F In T KC1**

- Uses samples to make predictions about a larger population from which the sample comes (e.g., using coin tossing, predict the result from a sample of 100 tosses).

**F In T KC1**

- Analyses data to search for patterns in events where the range of outcomes is generated by situations where chance plays a role.

**F In T KC1**

- Interprets data and makes numerical statements about probability, models situations, using data to validate their theories about the fairness of everyday situations including hypothetical situations.
<table>
<thead>
<tr>
<th>KEY IDEAS</th>
<th>(refer p 33 for Primary Years)</th>
<th>Length, perimeter and area</th>
<th>Year 6</th>
<th>Year 7</th>
<th>Year 8</th>
<th>Standards: 3 &amp; 4</th>
</tr>
</thead>
<tbody>
<tr>
<td>Students understand attributes, units and systems of measurement. They research and report on how measurement is used in the home, community and paid workforce, and recognise transferability between these and other contexts. In T C KC1 KC2 KC6 relating to outcomes 3.4, 4.4</td>
<td>Students recognise and develop and report on connections between mathematical ideas and representations. They employ logical strategies to solve problems in measurement situations, and reflect on the reasonableness of their answers. T KC1 KC2 KC6 relating to outcomes 3.5, 4.5</td>
<td>Students understands attributes, units and systems of measurement. They research and report on how measurement is used in the home, community and paid workforce, and recognise transferability between these and other contexts. In T C KC1 KC2 KC6 relating to outcomes 3.4, 4.4</td>
<td>Year 6 Standard 3</td>
<td>Year 7 Towards Standard 4</td>
<td>Year 8 Standard 4</td>
<td>OUTCOMES</td>
</tr>
<tr>
<td>• Selects and uses the appropriate device and unit to measure lengths or distance. • Measures and records lengths or distances, including kilometres. • Converts between units of length (eg mm to cm, cm to m, m to km). • Calculates lengths or distances using decimals to three decimal places. • Estimates length and perimeter with a reasonable degree of accuracy and confirms by measuring them accurately. • Compares perimeters of different shapes (eg P = 16 can be 4x4 shape or 8x2 shape). • Constructs a square metre using a variety of lengths and widths. • Understands and shows that the perimeter of shapes can be the same regardless of the length of sides. • Estimates and records areas in square metres. • Uses the abbreviations for square metres (m²) and square centimetres (cm²).</td>
<td>• Selects and uses the appropriate device and unit to measure lengths or distance. • Measures and records lengths or distances, including kilometres. • Converts between units of length (eg mm to cm, cm to m, m to km). • Calculates lengths or distances using decimals to three decimal places. • Estimates length and perimeter with a reasonable degree of accuracy and confirms by measuring them accurately. • Compares perimeters of different shapes (eg P = 16 can be 4x4 shape or 8x2 shape). • Constructs a square metre using a variety of lengths and widths. • Understands and shows that the perimeter of shapes can be the same regardless of the length of sides. • Estimates and records areas in square metres. • Uses the abbreviations for square metres (m²) and square centimetres (cm²).</td>
<td>• Converts between millimetres, centimetres, metres and kilometres (eg 25mm = 0.025m). • Uses the formula Distance = Speed x Time to solve problems. • Develops and uses the formula for the area of a triangle (eg A = ½ (BxH) or LxW/2). • Uses the appropriate units of measurement (eg km², cm², m², mm², ha). • Uses appropriate strategies and devices to estimate and accurately measure the area of a shape (eg using an overlay grid). • Calculates the area of irregular shapes by separating them into simple parts (eg rectangles and triangles as below).</td>
<td>• Converts between units of area (eg cm² to mm², m² to km², mm² to cm², cm² to m², m² to km², m² to ha). • Estabishes π as the ratio of the circumference to the diameter of a circle by practical means. • Calculates the perimeter of polygons and circles using appropriate formulae. • Estimates area of objects with a reasonable degree of accuracy using various strategies. • Calculates the area of polygons using appropriate formulae (eg rectangles, triangles, parallelograms, trapezia). • Uses different methods to approximate the area of a circle. • Calculates the area of a circle using A = πr². • Calculates the area of irregular shapes that include circles, as shown below.</td>
<td></td>
<td></td>
<td></td>
</tr>
</tbody>
</table>
Students understand attributes, units and systems of measurement. They research and report on how measurement is used in the home, community and paid workforce, and recognise transferability between these and other contexts.

### 3.4
Selects appropriate attributes and systems to measure for a variety of purposes and reports on how measurement is used in social practice.

### 3.5
Uses a range of standard tools to measure relationships between distances and other measurable attributes to calculate size.

### 4.4
Selects appropriate measurement units and scale to conduct collaborative research into issues associated with the social or physical world.

### 4.5
Applies a variety of techniques and tools, and uses a range of measurement formulae to solve problems.

---

A&RQ: Do I provide ongoing feedback so that learning can be reviewed and responsive to suggestions?

---

- Explains that the area of squares and rectangles can be found by multiplying the length by the breadth: \( A = L \times W \) or \( A = L \times B \).
- Calculates the area of irregular shapes composed of square and rectangular sections.
- Applies knowledge of length, perimeter and area through practical problem-solving activities.
- Demonstrates understanding of the relationship between perimeter and area through practical problem-solving activities (e.g., investigating floor plans of the classroom or sports fields).
- Uses scale in ratio form to calculate either original size or drawing size.
- Applies knowledge of perimeter, circumference and area through practical problem-solving activities.

---

Students recognise and develop connections between mathematical ideas and representations. They employ logical strategies to solve problems in measurement situations, and reflect on the reasonableness of their answers.

### 3.4
Selects appropriate attributes and systems to measure for a variety of purposes and reports on how measurement is used in social practice.

### 3.5
Uses a range of standard tools to measure relationships between distances and other measurable attributes to calculate size.

### 4.4
Selects appropriate measurement units and scale to conduct collaborative research into issues associated with the social or physical world.

### 4.5
Applies a variety of techniques and tools, and uses a range of measurement formulae to solve problems.
Learning Area: Mathematics
Strand: Measurement
Band: Middle Years
Standards: 3 & 4

<table>
<thead>
<tr>
<th>KEY IDEAS</th>
<th>(refer p 34 for Primary Years)</th>
<th>Volume and capacity</th>
<th>Year 6 Standard 3</th>
<th>Year 7 Towards Standard 4</th>
<th>Year 8 Standard 4</th>
<th>OUTCOMES</th>
</tr>
</thead>
<tbody>
<tr>
<td>Students understand attributes, units and systems of measurement. They research and report on how measurement is used in the home, community and paid workforce, and recognise transferability between these and other contexts. In T C KC1 KC2 KC6 relating to outcomes 3.4, 4.4</td>
<td>• Understands the concept of kilolitre (ie 1000 litres = 1 kilolitre). • Uses the abbreviations for millilitres (mL), litres (L) and kilolitres (kL). • Constructs 3-D objects using cubic centimetre blocks and measures volume by counting the number of blocks. • Uses the abbreviations for cubic centimetres (cm³) and cubic metres (m³). • Estimates the volume of rectangular prisms using cubic centimetres. • Explains that the volume of rectangular prisms can be found by multiplying the length by the width by the height: ( V = \text{LxWxH} ). • Selects and uses the appropriate device and unit to measure capacity. • Calculates capacity using millilitres and litres to 3 decimal places.</td>
<td>• Converts mL to L and L to kL and vice versa. • Uses the symbols cm³, m³, mL, L and kL. • Demonstrates understanding of volume through practical problem-solving activities. • Develops and uses formula for volume of rectangular prisms: ( V = \text{LxWxH} ) or ( V = \text{LxBxH} ). • Demonstrates awareness that capacity is related to volume (eg through displacement activities where 1mL = 1cm³).</td>
<td>• Converts between mL, L, kL and ML. • Converts between units of capacity and units of volume (ie 1cm³ = 1mL, 1000cm³ = 1L, 1m³ = 1kL).</td>
<td>• Calculates the volume of prisms using ( \text{Volume = area of base x height} ), and uses appropriate units (eg mm³, cm³ and m³). • Applies knowledge of volume through practical problem-solving activities.</td>
<td>3.4 Selects appropriate attributes and systems to measure for a variety of purposes and reports on how measurement is used in social practice. In T C KC1 KC2 3.5 Uses a range of standard tools to measure relationships between distances and other measurable attributes to calculate size. 4.4 Selects appropriate measurement units and scale to conduct collaborative research into issues associated with the social or physical world. In T C KC1 KC4 4.5 Applies a variety of techniques and tools, and uses a range of measurement formulae to solve problems. In T KC6</td>
<td></td>
</tr>
</tbody>
</table>
### Learning Area: Mathematics

#### Strand: Measurement

**Band: Middle Years**

**Standards: 3 & 4**

#### KEY IDEAS

(Refer p 35 for Primary Years)

#### Mass

<table>
<thead>
<tr>
<th>Year 6</th>
<th>Year 7</th>
<th>Year 8</th>
</tr>
</thead>
<tbody>
<tr>
<td>Standard 3</td>
<td>Towards Standard 4</td>
<td>Standard 4</td>
</tr>
</tbody>
</table>

- Estimates the mass of familiar objects.
- Selects and uses the appropriate device and unit to measure mass.
- Compares the mass of different objects.
- Uses the abbreviations for milligrams (mg), grams (g), tonnes (t) and kilograms (kg).
- Converts between milligrams, kilograms, grams and tonnes to 3 decimal places.
- Applies the knowledge of mass to practical problem-solving situations.
- Chooses the appropriate units and tools to measure weight of a variety of objects.
- Identifies the relationships between milligrams, grams, kilograms and tonnes (eg 1kg = 1000g, 1t = 1000kg, 1g = 1000mg).
- Applies the knowledge of mass to practical problem-solving situations (eg mass of 1 litre of water to 1 kilogram).
- Converts between units of mass.
- Recognises that the units for volume are related as follows: 1000cm³ or 1L of pure water has a mass of 1kg.
- Solves problems involving capacity, mass and volume.

#### OUTCOMES

- **3.4** Selects appropriate attributes and systems to measure for a variety of purposes and reports on how measurement is used in social practice.

- **3.5** Uses a range of standard tools to measure relationships between distances and other measurable attributes to calculate size.

- **4.4** Selects appropriate measurement units and scale to conduct collaborative research into issues associated with the social or physical world.

- **4.5** Applies a variety of techniques and tools, and uses a range of measurement formulae to solve problems.
<table>
<thead>
<tr>
<th>KEY IDEAS</th>
<th>Time</th>
<th>OUTCOMES</th>
</tr>
</thead>
<tbody>
<tr>
<td>Students understand attributes, units and systems of measurement. They research and report on how measurement is used in the home, community and paid workforce, and recognise transferability between these and other contexts. <strong>In T C KC1 KC2 KC6 relating to outcomes 3.4, 4.4</strong></td>
<td>Year 6 - Standard 3&lt;br&gt;• Uses a stopwatch to time events accurately to hundredths of seconds.&lt;br&gt;• Tells the time using analogue, 24 hour and digital clocks.&lt;br&gt;• Converts between analogue, 24 hour and digital time.&lt;br&gt;• Converts from one time unit to another (eg ‘How many seconds are there in 1 hour?’).&lt;br&gt;• Calculates the duration of an event using starting and finishing times.&lt;br&gt;• Uses a calendar as a planning tool.&lt;br&gt;• Reads a simple timetable.&lt;br&gt;• Understands terminology such as AD, BC, CE, BCE (eg 400 BC).&lt;br&gt;• Reads and constructs a timeline, including AD and BC. Year 7 - Towards Standard 4&lt;br&gt;• Makes comparisons between time zones in Australia and calculates changes incorporating daylight saving.&lt;br&gt;• Reads and uses a variety of timetables.&lt;br&gt;• Constructs and interprets timelines using appropriate scales.&lt;br&gt;• Explains ways in which time is measured in other cultures (eg calendars which are calculated by moon cycles).&lt;br&gt;• Uses Speed = Distance/Time to answer problems. Year 8 - Standard 4&lt;br&gt;• Uses a standard time zone map to answer questions related to time differences.&lt;br&gt;• Uses bus, train and plane timetables to plan a journey, calculating departure and arrival time, and the time taken for sections of the journey.&lt;br&gt;• Problem solves using the relationship of Speed = Distance/Time.</td>
<td>3.4 Selects appropriate attributes and systems to measure for a variety of purposes and reports on how measurement is used in social practice. <strong>In T C KC1 KC2</strong> 3.5 Uses a range of standard tools to measure relationships between distances and other measurable attributes to calculate size. <strong>T</strong> 4.4 Selects appropriate measurement units and scale to conduct collaborative research into issues associated with the social or physical world. <strong>In T C KC1 KC4</strong> 4.5 Applies a variety of techniques and tools, and uses a range of measurement formulae to solve problems. <strong>T KC6</strong></td>
</tr>
</tbody>
</table>
### KEY IDEAS
(Refer p 38 for Primary Years)

#### Temperature

<table>
<thead>
<tr>
<th>Year 6</th>
<th>Year 7</th>
<th>Year 8</th>
</tr>
</thead>
<tbody>
<tr>
<td>Standard 3</td>
<td>Towards Standard 4</td>
<td>Standard 4</td>
</tr>
</tbody>
</table>

- Determines and records temperature variations.
- Estimates and reads maximum and minimum temperatures in centigrade.
- Calculates and interprets average temperature.
- Demonstrates awareness of the Fahrenheit temperature scale (°F).
- Uses online resources to compare current temperatures in different parts of the world.

#### OUTCOMES

3.4 Selects appropriate attributes and systems to measure for a variety of purposes and reports on how measurement is used in social practice.

3.5 Uses a range of standard tools to measure relationships between distances and other measurable attributes to calculate size.

4.4 Selects appropriate measurement units and scale to conduct collaborative research into issues associated with the social or physical world.

4.5 Applies a variety of techniques and tools, and uses a range of measurement formulae to solve problems.
### KEY IDEAS

*(refer p 40 for Primary Years)*

<table>
<thead>
<tr>
<th>Whole numbers</th>
<th>Year 6 Standard 3</th>
<th>Year 7 Towards Standard 4</th>
<th>Year 8 Standard 4</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>Students recognise relationships within different number concepts in order to make sense of, and represent numerically, a range of community activities and social processes encountered in their lives.</strong></td>
<td><strong>Develops an understanding of number systems across time and place (eg Mayan, Chinese).</strong></td>
<td><strong>Researches a different culture’s number system, past and present, and compares it to the Hindu–Arabic system used today.</strong></td>
<td><strong>Year 8</strong> <strong>Standard 4</strong></td>
</tr>
<tr>
<td><strong>Recognises the existence of different number systems (eg Greek, Roman, Hindu–Arabic).</strong></td>
<td><strong>Recognises, uses and writes in words, numbers beyond 1 000 000.</strong></td>
<td><strong>Year 8</strong> <strong>Standard 4</strong></td>
<td></td>
</tr>
<tr>
<td><strong>Provides examples of the use of number in everyday life.</strong></td>
<td><strong>Identifies place value of numbers over 1 000 000.</strong></td>
<td><strong>Year 8</strong> <strong>Standard 4</strong></td>
<td></td>
</tr>
<tr>
<td><strong>Reads, writes and records numbers to one million, using numerals and words.</strong></td>
<td><strong>Compares numbers and uses symbols (eg ≠, ≤ and ≥).</strong></td>
<td><strong>Year 8</strong> <strong>Standard 4</strong></td>
<td></td>
</tr>
<tr>
<td><strong>Explains place value of digits in numbers to 1 000 000.</strong></td>
<td><strong>Write numbers up to 1 000 000 in expanded form (eg using powers of 10).</strong></td>
<td><strong>Year 8</strong> <strong>Standard 4</strong></td>
<td></td>
</tr>
<tr>
<td><strong>Writes numbers to 1 000 000 in expanded form.</strong></td>
<td><strong>Uses power or index (exponents) notation.</strong></td>
<td><strong>Year 8</strong> <strong>Standard 4</strong></td>
<td></td>
</tr>
<tr>
<td><strong>Rounds to the nearest 10, 100, 1000, 10 000 and 100 000.</strong></td>
<td><strong>Writes numbers over 100 000 in ascending and descending order.</strong></td>
<td><strong>Year 8</strong> <strong>Standard 4</strong></td>
<td></td>
</tr>
<tr>
<td><strong>Places numbers in descending and ascending order.</strong></td>
<td><strong>Identifies large numbers in everyday use (eg comparing populations).</strong></td>
<td><strong>Year 8</strong> <strong>Standard 4</strong></td>
<td></td>
</tr>
<tr>
<td><strong>Compares numbers and uses symbols (eg =, ≠, &lt; and &gt;).</strong></td>
<td><strong>Identifies factors, common factors, prime factors, highest common factor and lowest common multiple.</strong></td>
<td><strong>Year 8</strong> <strong>Standard 4</strong></td>
<td></td>
</tr>
<tr>
<td><strong>Explains mental strategies used to solve addition and subtraction problems.</strong></td>
<td><strong>Uses arrays and divisibility rules.</strong></td>
<td><strong>Year 8</strong> <strong>Standard 4</strong></td>
<td></td>
</tr>
<tr>
<td><strong>Chooses appropriately between mental, written and calculator methods for addition and subtraction problems.</strong></td>
<td><strong>Identifies triangular and cubic numbers.</strong></td>
<td><strong>Year 8</strong> <strong>Standard 4</strong></td>
<td></td>
</tr>
<tr>
<td><strong>Applies square root to square numbers and uses the symbol ( \sqrt{\text{.}} ).</strong></td>
<td><strong>Year 8</strong> <strong>Standard 4</strong></td>
<td><strong>Year 8</strong> <strong>Standard 4</strong></td>
<td></td>
</tr>
</tbody>
</table>

### OUTCOMES

**3.6** Represents and analyses relationships amongst number concepts and uses these to make sense of, and represent the world.

**In T KC1 KC2**

**3.7** Describes, represents and analyses operations with rational numbers and relationships between them.

**In T C KC1 KC2**

**3.8** Uses a variety of estimating and calculating strategies with whole numbers, including memorising multiplication and division facts, fractions and decimals.

**T KC**

**4.6** Represents and analyses relationships amongst integers and rational numbers and commonly encountered irrational numbers.

**In T KC1**

**4.7** Communicates understanding of the meaning of operations with integers and rational numbers, and how they relate to each other.

**In T C KC2**

**4.8** Applies appropriate computational tools and strategies to proportional situations involving integers, and rational numbers.

**T KC6 KC7**
Students recognise relationships within different number concepts in order to make sense of, and represent numerically, a range of community activities and social processes encountered in their lives.

In T KC1

Students understand the meaning of operations and how they relate to each other, and can communicate these through a range of media, including information and communication technologies.

In T KC2 KC7

Students use computational tools and strategies, and understand and represent the thinking processes employed in solving problems involving proportions.

A&RQ: Do I encourage my learners to demonstrate their learning in a range of ways?

Students solve a given 2 step number or word problem (eg “A school has a total of 854 students—102 boys and 84 girls leave. How many students are left at the school?”).

Multiplying a 3 digit number by a 2 digit number using the extended form (long multiplication).

Divides a number with 3 or more digits by multiples of 10 (including remainders).

Understands the order of operations using BEDMAS (Brackets, Exponents, Division, Multiplication, Addition, Subtraction).

Uses and explains appropriate strategies in problem solving (eg trial and error, working backwards, looking for patterns).

Uses a calculator, when more appropriate, to solve problems (eg 7243 ÷ 64).

Identifies the operations required to solve more complex problems within their experiences (eg deposits and withdrawals in banking, other everyday use).

Recognises the existence of negative numbers (eg profit and loss).

Understands and uses rules for multiplying and dividing directed numbers.

Combines operations with directed numbers using order of operations (BEDMAS).

Uses the calculator to combine operations with directed numbers.

3.6 Represents and analyses relationships amongst number concepts and uses these to make sense of, and represent the world.

In T KC1 KC2

3.7 Describes, represents and analyses operations with rational numbers and relationships between them.

In T KC 1 KC2

3.8 Uses a variety of estimating and calculating strategies with whole numbers, including memorising multiplication and division facts, fractions and decimals.

T KC

4.6 Represents and analyses relationships amongst integers and rational numbers and commonly encountered irrational numbers.

In T KC1

4.7 Communicates understanding of the meaning of operations with integers and rational numbers, and how they relate to each other.

In T KC2

4.8 Applies appropriate computational tools and strategies to proportional situations involving integers, and rational numbers.

T KC6 KC7
<table>
<thead>
<tr>
<th>KEY IDEAS</th>
<th>Fractions, decimals, percentages, ratios and rates</th>
<th>OUTCOMES</th>
</tr>
</thead>
<tbody>
<tr>
<td>Students recognise relationships within different number concepts in order to make sense of, and represent numerically, a range of community activities and social processes encountered in their lives.</td>
<td></td>
<td>3.6 Represents and analyses relationships amongst number concepts and uses these to make sense of, and represent the world.</td>
</tr>
<tr>
<td><strong>Year 6 Standard 3</strong></td>
<td><strong>Year 7 Towards Standard 4</strong></td>
<td><strong>Year 8 Standard 4</strong></td>
</tr>
<tr>
<td><strong>Year 6 Standard 3</strong></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Provides examples of the use of decimals in everyday life.</td>
<td>Rounds off decimals to 3 places.</td>
<td>Rounds numbers correctly to a given number of decimal places including when using a calculator.</td>
</tr>
<tr>
<td>Explains the place value of tenths, hundredths and thousandths.</td>
<td>Divides decimals by a whole number.</td>
<td>Adds, subtracts, multiplies and divides decimal numbers.</td>
</tr>
<tr>
<td>Reads and writes decimals to thousandths, in both numerals and words.</td>
<td>Uses notation for recurring decimals such as 0.3.</td>
<td>Uses decimals in problem solving.</td>
</tr>
<tr>
<td>Writes decimals in expanded form (eg 1.25 = 1 unit +2tenths +5hundredths or 1+0.2+0.05).</td>
<td>Multiplies decimal numbers by decimal numbers (eg 0.2×0.3 = 0.06).</td>
<td>Adds and subtracts mixed numbers.</td>
</tr>
<tr>
<td>Rounds to the nearest whole number, tenth or hundredth.</td>
<td>Divides decimals using calculators (eg calculating averages).</td>
<td>Multiplies and divides fractions.</td>
</tr>
<tr>
<td>Compares and orders decimals (descending and ascending).</td>
<td>Converts decimals to fractions (eg 4.258 = 4258/1000).</td>
<td>Finds the reciprocals of numbers.</td>
</tr>
<tr>
<td>Uses symbols (eg =, ≠, &lt; and &gt;) to compare decimals.</td>
<td>Uses decimals in problem solving.</td>
<td>Uses the calculator to perform operations on fractions.</td>
</tr>
<tr>
<td>Adds or subtracts decimal numbers that have a different number of decimal places.</td>
<td>Compares the size of fractions (eg ‘Which is larger: 7/8 or 1/2?’).</td>
<td>Solves real-life problems involving fractions.</td>
</tr>
<tr>
<td>Students understand the meaning of operations and how they relate to each other, and can communicate these through a range of media, including information and communication technologies.</td>
<td>Compares and orders fractions in ascending or descending order (eg 1/3, 2/5, 7/8).</td>
<td>Determines sets of equivalent fractions.</td>
</tr>
<tr>
<td>Students use computational tools and strategies, and understand and represent the thinking processes employed in solving problems involving proportions.</td>
<td>Adds and subtracts fractions with different denominators, including improper fractions and whole numbers.</td>
<td>Expresses information as a ratio.</td>
</tr>
<tr>
<td></td>
<td></td>
<td>Simplifies ratios.</td>
</tr>
<tr>
<td></td>
<td></td>
<td>Finds equal ratios.</td>
</tr>
<tr>
<td></td>
<td></td>
<td>Uses equal ratios (proportion) to solve real-life problems.</td>
</tr>
<tr>
<td>T KC6 relating to outcomes 3.8, 4.8</td>
<td></td>
<td>Uses ratios to divide quantities (eg divide $120 in the ratio 2:3).</td>
</tr>
<tr>
<td></td>
<td></td>
<td>Applies ratios to scale diagrams.</td>
</tr>
</tbody>
</table>
Students recognise relationships within different number concepts in order to make sense of, and represent numerically, a range of community activities and social processes encountered in their lives.

In T KC1 relating to outcomes 3.6, 4.6

Students understand the meaning of operations and how they relate to each other, and can communicate these through a range of media, including information and communication technologies.

In T KC1 KC2 relating to outcomes 3.7, 4.7

Students use computational tools and strategies, and understand and represent the thinking processes employed in solving problems involving proportions.

T KC6 relating to outcomes 3.8, 4.8

- Multiplies and divides tenths, hundredths and thousandths by a single digit to terminating numbers.
- Multiplies and divides decimal numbers, including money, by 10, 100 and 1000.
- Multiplies and divides decimal numbers, including money, by single digit numbers in everyday contexts (eg cost of 3 computer games at $29.95 each, cost of 1 iceblock if a pack of 8 costs $3.90).
- Continues, creates and describes patterns involving fractions (eg ¼, ½, ¾, 1).
- Converts fractions to lowest terms.
- Converts improper fractions to mixed numbers by division.
- Converts mixed numbers to improper fractions.
- Adds and subtracts simple fractions by changing one denominator (eg 7/3 + 1/6).
- Demonstrates understanding of addition and subtraction of fractions through everyday problem solving (eg ‘I ate half a pie and my friend ate two-thirds of a pie. How many pies did we need? How much pie is left over?’).
- Multiplies fractions including whole numbers and mixed numbers.
- Converts fractions to frequently used decimals and percentages (eg 2/5, 5/6, 2/3).
- Converts percentages to fractions and decimals.
- Converts fractions and decimals to percentages.
- Expresses fractions of quantities as percentages (eg 20 out of 25 is ¾ is 80%).
- Finds simple percentages of quantities (eg 20% of $80) using both pen and paper and calculator.
- Solves practical problems involving percentage (eg simple interest, banking problems).
- Expresses information as a rate (eg a runner sprints 100 metres in 12 seconds: expressed as a rate = 8.3m/s).
- Uses rates to solve real-life problems.
- Expresses one quantity as a percentage of another.
- Finds percentages of quantities (eg 18% of $72).
- Finds a percentage of a quantity when given another (eg find 80% of a quantity if 15% is 30).
- Calculates percentage change.
- Uses percentages to calculate profit and loss.
- Calculates the GST on various items.

In T KC1 KC2

3.6 Represents and analyses relationships amongst number concepts and uses these to make sense of, and represent the world.

3.7 Describes, represents and analyses operations with rational numbers and relationships between them.

3.8 Uses a variety of estimating and calculating strategies with whole numbers, including memorising multiplication and division facts, fractions and decimals.

T KC6

4.6 Represents and analyses relationships amongst integers and rational numbers and commonly encountered irrational numbers.

In T KC1

4.7 Communicates understanding of the meaning of operations with integers and rational numbers, and how they relate to each other.

In T KC2

4.8 Applies appropriate computational tools and strategies to proportional situations involving integers, and rational numbers.

T KC6 KC7
Students recognise relationships within different number concepts in order to make sense of, and represent numerically, a range of community activities and social processes encountered in their lives.

**In T KC1 relating to outcomes 3.6, 4.6**

Students understand the meaning of operations and how they relate to each other, and can communicate these through a range of media, including information and communication technologies.

**In T C KC2 KC7 relating to outcomes 3.7, 4.7**

Students use computational tools and strategies, and understand and represent the thinking processes employed in solving problems involving proportions.

**In T KC6 relating to outcomes 3.8, 4.8**

- Converts simple decimals to fractions (eg 0.125 = $\frac{125}{1000} = \frac{1}{8}$, 0.25 = $\frac{25}{100} = \frac{1}{4}$).
- Converts fractions to decimals (eg $\frac{3}{4} = \frac{75}{100} = 0.75$).
- Explains the use of percentages in everyday life.
- Expresses simple fractions and decimals as percentages (eg 50% = $\frac{50}{100} = \frac{1}{2}$).
- Expresses everyday percentages as fractions and decimals (eg 10%, 20%, 25%, 50%, 75%, 100%).
- Compares quantities using ratios.
Middle Years: Pattern and algebraic reasoning

KEY IDEAS
Students demonstrate, record and report on logical and critical thought processes by searching for and abstracting generational algebraic representations from patterns drawn from current social situations.

Students analyse mathematical structures and use algebraic formulae to represent situations. They further develop the capacity to express themselves, and to solve problems involving linear relationships.

Students use mathematical models to make connections and analyse how things might change in both real and abstract contexts. They extract information from tables of data and graphs, making comparisons between varying rates of change, and predicting future events.

OUTCOMES
3.9 Describes and generalises relationships between measurable attributes as patterns and explains the impact of varying one aspect of the relationship.

3.10 Analyses, creates and generalises numerical and spatial patterns and solves problems with such patterns.

3.11 Uses mathematical representations to make connections and analyse change.

OUTCOMES
4.9 Analyses, creates and generalises numeric and visual patterns to solve problems in a range of situations.

4.10 Uses symbolic algebra to represent situations and manipulate the symbolic representations to solve problems involving linear equations and inequations; gives simple algebraic proofs.

4.11 Models contextualised situation, making connections and analysing change.

This concept map provides a visual representation of the Key Ideas and Outcomes below. Educators may prefer to develop their own.
Learning Area: Mathematics

Strand: Pattern and algebraic reasoning

Band: Middle Years

Standards: 3 & 4

KEY IDEAS

Students demonstrate, record and report on logical and critical thought processes by searching for and abstracting generational algebraic representations from patterns drawn from current social situations.

**In T** K C2 relating to outcomes 3.9, 4.9

Students use mathematical models to make connections and analyse how things might change in both real and abstract contexts. They extract information from tables of data and graphs, making comparisons between varying rates of change, and predicting future events.

**F T** K C1 K C6 relating to outcomes 3.10, 4.10

Students analyse mathematical structures and use algebraic formulae to represent situations. They further develop the capacity to express themselves, and to solve problems involving linear relationships.

**T C** K C1 K C6 relating to outcomes 3.11, 4.11

<table>
<thead>
<tr>
<th>Year 6</th>
<th>Year 7</th>
<th>Year 8</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>Standard 3</strong></td>
<td><strong>Towards Standard 4</strong></td>
<td><strong>Standard 4</strong></td>
</tr>
<tr>
<td><strong>Algebra</strong></td>
<td><strong>Algebra</strong></td>
<td><strong>Algebra</strong></td>
</tr>
<tr>
<td>Builds a simple numerical or geometric pattern using materials (eg matchstick patterns).</td>
<td>Extends and describes the rule for numeric and geometric patterns (eg ‘7, 36, 181, 906 is previous number times 5 plus 1’).</td>
<td>EXPRESSIONS</td>
</tr>
<tr>
<td>Completes the pattern for a numerical or geometric series (eg 2, 4, 8, 16).</td>
<td>Investigates pattern rules in solving problems (eg rates charged by tradespeople 1 hr—$35, 2 hrs—$60, 3hrs—$95 = nx35+10 for various hours worked).</td>
<td>Describes patterns and relationships in society (eg time of year and demand for electricity).</td>
</tr>
<tr>
<td>Calculates the value of a missing number in a series of values.</td>
<td>Investigates and analyses graphs showing the relationship between variables (eg analysing winter rainfall patterns and making comparisons and predicting future trends).</td>
<td>Describes geometric patterns in words and adds to the pattern (simple linear expressions).</td>
</tr>
<tr>
<td>Explains how the answers in a series of values are determined.</td>
<td>Predicts future trends from linear graphs.</td>
<td>Constructs a table of values for a pattern.</td>
</tr>
<tr>
<td>Determines and records a rule, in words, to describe the pattern presented in a table.</td>
<td>Constructs a number sentence to match a problem that is presented in words and that requires finding an unknown.</td>
<td>Writes a rule to describe a pattern and uses pronumerals (eg 4n+3, 2x+1).</td>
</tr>
<tr>
<td>Applies a rule to a table to calculate the missing values.</td>
<td>Uses inverse operations to solve a number sentence (eg 2x = 8, x = 8+2).</td>
<td>Uses spreadsheets to make a number machine to look at rules for linear expressions.</td>
</tr>
<tr>
<td>Calculates the value of a missing number in a number sentence (eg 7xΔ = 42. What is the value of Δ?).</td>
<td>Uses patterns to solve a problem (eg ‘Look at the construction of taxi fares: fare = flag fall + rate/kilometre’).</td>
<td>Evaluates an algebraic expression by substituting numbers for the unknowns.</td>
</tr>
<tr>
<td>Describes and generalises relationships between measurable attributes as patterns and explains the impact of varying one aspect of the relationship.</td>
<td>Defines and gives examples of a pronumeral, term, like terms, constant term and coefficient, expression and equation.</td>
<td>Uses patterns to solve a problem (eg ‘Look at the construction of taxi fares: fare = flag fall + rate/kilometre’).</td>
</tr>
</tbody>
</table>

3.9 Describes and generalises relationships between measurable attributes as patterns and explains the impact of varying one aspect of the relationship.

3.10 Analyses, creates and generalises numerical and spatial patterns and solves problems with such patterns.

3.11 Uses mathematical representations to make connections and analyse change.

4.9 Analyses, creates and generalises numeric and visual patterns to solve problems in a range of applications.

4.10 Uses symbolic algebra to represent situations and manipulate the symbolic representations to solve problems involving linear equations and inequation; gives simple algebraic proofs.

4.11 Models contextualised situation, making connections and analysing change.
Students demonstrate, record and report on logical and critical thought processes by searching for and abstracting generational algebraic representations from patterns drawn from current social situations.

In T KC2 relating to outcomes 3.9, 4.9

Students use mathematical models to make connections and analyse how things might change in both real and abstract contexts. They extract information from tables of data and graphs, making comparisons between varying rates of change, and predicting future events.

F T KC1 KC6 relating to outcomes 3.10, 4.10

Students analyse mathematical structures and use algebraic formulae to represent situations. They further develop the capacity to express themselves, and to solve problems involving linear relationships.

T C KC1 KC6 relating to outcomes 3.11, 4.11

- Collects like terms in expressions with 1 and 2 pronumerals.
- Uses index notation to collect like items (eg $3a^2b^3x^4 = 3a^2b^3$).
- Uses the distributive law to expand brackets and simplify (eg $3(2x+y) = 6x+3y$).

**EQUATIONS**

- Solves simple linear equations by inspection or trial and error.
- Undoes algebraic expressions using inverse operations.
- Solves linear equations containing 2 or more operations.
- Solves worded problems by constructing equations and solving them.
- Plots and describes points in the four quadrants of the Cartesian plane.
- Graphs the values from a given table or a grid.
- Describes the pattern formed when a graph is drawn from a table of values (ie writes the rule).
- Describes and models a situation, makes connections and analyses it (eg looks at a fun run fundraiser in relation to sponsorship rates, model the different rates, graph and analyse).

A&RQ: Do I provide opportunities for my learners to support their peers through collaborative reflection about their learning?

3.9 Describes and generalises relationships between measurable attributes as patterns and explains the impact of varying one aspect of the relationship.

F T KC1 KC2

3.10 Analyses, creates and generalises numerical and spatial patterns and solves problems with such patterns.

T C KC6

3.11 Uses mathematical representations to make connections and analyse change.

In T

4.9 Analyses, creates and generalises numeric and visual patterns to solve problems in a range of applications.

F T KC1 KC6

4.10 Uses symbolic algebra to represent situations and manipulate the symbolic representations to solve problems involving linear equations and inequation; gives simple algebraic proofs.

T C KC6

4.11 Models contextualised situation, making connections and analysing change.

In T
Learning Area: Mathematics
Strand: Spatial sense and geometric reasoning
Band: Middle Years
Standards: 3 & 4

<table>
<thead>
<tr>
<th>KEY IDEAS</th>
<th>Lines and angles</th>
<th>OUTCOMES</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>Year 6</strong> Standard 3</td>
<td><strong>Year 7</strong> Towards Standard 4</td>
<td><strong>Year 8</strong> Standard 4</td>
</tr>
<tr>
<td>Students explore and analyse features in their immediate and extended environment in geometric terms. They compare perspectives of spatial sense and geometric reasoning in order to understand different human interactions with their environment.</td>
<td>- Uses symbols for ‘is parallel to’ (∥) and ‘is perpendicular to’ (⊥).&lt;br&gt;- Identifies and draws perpendicular lines.&lt;br&gt;- Names and labels lines, rays and line segments (eg AB, AB, AB).&lt;br&gt;- Uses common conventions to indicate right angles, equal angles and parallel lines, as shown below.&lt;br&gt;- Classifies and identifies angles as right, acute, obtuse, reflex, straight or a revolution.&lt;br&gt;- Constructs, labels and names angles using ( \angle ABC ).&lt;br&gt;- Estimates and measures angles in degrees using protractor and geometry software.&lt;br&gt;- Constructs an angle of a given size using a protractor.&lt;br&gt;- Applies understanding of angles to spatial sense and geometric reasoning activities (eg movement of the hands of a clock).&lt;br&gt;- Proves and uses the fact that the sum of the interior angles of a triangle is 180°.</td>
<td>- Determines angle properties relating to straight lines, intersecting lines, parallel lines and a transversal by using geometry software.&lt;br&gt;- Uses the terms lines, points, rays, segments, intersections, parallel and perpendicular when constructing diagrams (eg using drawing software to design a moving analogue clock).&lt;br&gt;- Bisects angles using a compass.&lt;br&gt;- Constructs triangles when only the lengths of sides are given.&lt;br&gt;- Uses understanding of angles to determine compass bearings and true bearings.&lt;br&gt;- Draws a 2-D shape given a description of its side and angle properties, using geometric software or a ruler, protractor and set square.&lt;br&gt;- Identifies the terminology of a circle: radius, diameter, circumference.</td>
</tr>
</tbody>
</table>

**OUTCOMES**

- **3.12** Describes and generalises spatial relationships within and between groups of 2-D and 3-D shapes and objects and appreciates their application in a range of cultural contexts.

- **4.12** Identifies characteristics and properties of 2-D and 3-D shapes and understands how these have influenced the built environment.
Students explore and analyse features in their immediate and extended environment in geometric terms. They compare perspectives of spatial sense and geometric reasoning in order to understand different human interactions with their environment.

**Id In T KC1**

relating to outcomes 3.12, 4.12

- Proves and uses the fact that the sum of the interior angles of a quadrilateral is $360^\circ$.
- Understands the meaning of the term congruence.
- Recognises congruence in lines, shapes and solids.
- Applies understanding of angles to spatial sense and geometric reasoning activities (eg movement of the hands of a clock).

3.12

Describes and generalises spatial relationships within and between groups of 2-D and 3-D shapes and objects and appreciates their application in a range of cultural contexts.

**Id In KC2**

4.12

Identifies characteristics and properties of 2-D and 3-D shapes and understands how these have influenced the built environment.

In KC1
# Learning Area: Mathematics

**Strand: Spatial sense and geometric reasoning**

**Band: Middle Years**

**Standards: 3 & 4**

### KEY IDEAS

Students explore and analyse features in their immediate and extended environment in geometric terms. They compare perspectives of spatial sense and geometric reasoning in order to understand different human interactions with their environment.

**Id In T KC1**

**relating to outcomes**

3.12, 4.12

### OUTCOMES

<table>
<thead>
<tr>
<th>Year 6</th>
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</thead>
<tbody>
<tr>
<td>Standard 3</td>
<td>Towards Standard 4</td>
<td>Standard 4</td>
</tr>
</tbody>
</table>

- **Constructs a model of a simple 3-D shape from drawings of different views.**
- **Uses the appropriate terminology in describing 3-D objects, including base, edge, surface, vertex and face.**
- **Visualises and sketches simple solids from different views.**
- **Constructs a model of a simple solid from an isometric drawing.**
- **Identifies and names the properties of rectangular prisms and triangular prisms.**
- **Identify and name the properties of square based and triangular based pyramids.**
- **Uses the formal names for prisms and identifies pyramids.**
- **Names the properties of square based and triangular based pyramids.**
- **Compares and describes the side and angle properties of isosceles, equilateral and scalene triangles.**
- **Identifies isosceles, scalene and equilateral triangles.**
- **Identifies 2-D shapes within patterns across cultures and in nature (eg an investigation of Islamic design).**
- **Classifies solids in terms of their geometric properties (ie faces, edges, vertices and cross-sections).**
- **Draws 3-D solids.**
- **Identifies and names properties of polyhedra (eg tetrahedron, pentagonal prism, hexagonal prism).**
- **Constructs complex solids from nets (eg hexagonal based pyramid).**
- **Draws oblique and isometric projections of cubes using paper or drawing software.**
- **Recognises the properties of quadrilaterals.**
- **Constructs, names and classifies scalene, isosceles and equilateral triangles.**
- **Determines unknown angles in quadrilaterals and triangles.**
- **Identifies faces, vertices and edges of polyhedra and looks at relationships (eg Euler’s formula).**
- **Develops nets to construct complex 3-D objects (eg soccer ball).**
- **Uses ICTs to investigate nets of more complex objects (eg crystals, soccer ball).**
- **Critiques the use of 2-D and 3-D objects in common applications (eg Packaging: ‘Why are milk cartons square in cross-section?’, Architecture: ‘How are triangles used for strength in building?’).**
- **Uses isometric graph paper to draw 3-D constructions.**

**A&RQ: Do I use learner achievement data to support and plan for future learning?**

3.12 Describes and generalises spatial relationships within and between groups of 2-D and 3-D shapes and objects and appreciates their application in a range of cultural contexts.

**Id In KC2**

4.12 Identifies characteristics and properties of 2-D and 3-D shapes and understands how these have influenced the built environment.

**In KC1**
Learning Area: Mathematics  
Strand: Spatial sense and geometric reasoning  
Band: Middle Years  
Standards: 3 & 4

<table>
<thead>
<tr>
<th>KEY IDEAS</th>
<th>Transformation</th>
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</table>
| Students analyse and understand the uses and purposes of flips (reflection), slides (translation), rotations and dilations to explore geometric relationships and alternative preferred possibilities in the physical world. F T KC1 KC6 relating to outcomes 3.13, 4.13 | Year 6 Standard 3  
- Rotate shapes clockwise and anticlockwise.  
- Identifies and names shapes that have rotational symmetry.  
- Uses both pen and paper and geometry software to construct a shape that has rotational symmetry.  
- Recognises tessellations in the everyday environment (eg weaving).  
- Makes enlargements and reductions of 2-D shapes, pictures and maps using pen and paper or using geometry software.  
- Discusses similarities and differences of the same object or scene represented in different sizes (eg drawings enlarged on a photocopier, drawings or pictures using geometry software).  
Year 7 Towards Standard 4  
- Rotates a shape about a point (eg rotates 90º clockwise).  
- Reflects a complex shape or design on a line.  
- Translates shapes over a given distance (eg translates the shape 5 squares horizontally to the left on grid paper).  
- Enlarges and reduces shapes using a scale.  
- Creates tessellation using rotation, translation and reflection (eg using drawing software).  
Year 8 Standard 4  
- Identifies rotational symmetry.  
- Constructs a mirror image of designs using a line of symmetry.  
- Uses line and rotational symmetry to classify polygons and polyhedra.  
- Creates a complex tessellating shape by using translation, rotation or reflection to modify a simple shape.  
- Identifies functional and aesthetic uses of tessellation in social contexts (eg paving, the works of M C Escher, patterns).  
- Performs 2 step geometrical transformations using grid paper or drawing software.  
- Describes various transformations.  

OUTCOMES  
3.13 Analyses the result of a series of flips, slides, rotations and reflections and translations and uses scales to undertake enlargements and reductions of figures and objects. T C KC1  
4.13 Identifies, represents and justifies one and two step geometrical transformations. T C KC1
Learning Area: Mathematics  
Strand: Spatial sense and geometric reasoning  
Band: Middle Years  
Standards: 3 & 4

<table>
<thead>
<tr>
<th>KEY IDEAS</th>
<th>(refer p 50 for Primary Years)</th>
<th>Location and position</th>
<th>OUTCOMES</th>
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<td>Year 6</td>
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<td>Towards Standard 4</td>
<td></td>
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<tr>
<td>Standard 3</td>
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<td>Year 7</td>
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<tr>
<td>Standard 4</td>
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</tbody>
</table>

**Year 6 Standard 3**
- Uses a coordinate grid to make simple 2-D shapes (eg "At what coordinates would the vertices of a square be placed?").
- Draws environmental and geometric objects from different perspectives.
- Recognises and uses the cardinal and intermediate points on a magnetic compass.
- Uses a coordinate grid to make more complex 2-D shapes (eg making a picture).

**Year 7 Towards Standard 4**
- Reads and interprets maps, plans, scale drawings and diagrams which have been drawn to scale.
- Reads and writes scales in words and through diagrams (eg 1 cm represents 5 km; 1:500,000).
- Draws 3-D objects using solid lines for visible edges and dotted lines for invisible edges.
- Recognises that a location can be represented on maps or plans using different scales.
- Uses a scale to calculate the distance between two points on a map.
- Produces scaled plans (eg classroom, bedroom).

**Year 8 Standard 4**
- Identifies and records familiar routes, locations and objects in their environment.
- Describes and draws what is seen and not seen from different views of 3-D shapes (eg pyramids, prisms).
- Recognises that a location can be represented on maps or plans using different scales.
- Evaluates maps and plans in terms of appropriateness of scale, use of symbols, appropriateness for task, clarity of purpose, accuracy etc.
- Uses coordinate grids to make more complex 2-D shapes (eg making a picture).
- Uses a Cartesian grid to plot points and lines and develop a relationship to describe the lines.
- Uses bearings and distance to describe a position.
- Identifies and records familiar routes, locations and objects in their environment.
- Uses a coordinate grid to make simple 2-D shapes (eg "At what coordinates would the vertices of a square be placed?").
- Draws environmental and geometric objects from different perspectives.
- Recognises and uses the cardinal and intermediate points on a magnetic compass.
- Uses a magnetic compass to find north and hence the direction associated with the other three major compass points.
- Identifies and records familiar routes, locations and objects in their environment.

Their capacity to solve problems in multi-layered and abstract ways in order to produce accurate maps, graphs and models.

T C KC6 relating to outcomes 3.14, 4.14

3.14 Produces, uses and critiques scaled maps and plans and envisages alternative possibilities.

F T KC3

4.14 Represents and uses location maps, pathways diagrams and network diagrams to describe current and possible future characteristics of the physical world. F T KC1 KC6
Students develop and extend their capacity to solve problems in multi-layered and abstract ways in order to produce accurate maps, graphs and models.

**TC KC6**

**relating to outcomes 3.14, 4.14**

- Explains a pathway to a location on a model, map or plan using distance, direction, angle multiples of 45°, compass points and coordinates.
- Finds alternative routes using a scale (eg to find the shortest route between two points).
- Follows simple directions to move from point to point on a given path, using maps, a magnetic compass and written and oral instructions.
- Develops a simple orienteering course.

**3.14**

Produces, uses and critiques scaled maps and plans and envisions alternative possibilities.

**FT KC3**

**4.14**

Represents and uses location maps, pathways diagrams and network diagrams to describe current and possible future characteristics of the physical world.

**FT KC1 KC6**
**TERMINOLOGY**

**Strand: Exploring, analysing and modelling data**

<table>
<thead>
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<th>Data collection and representation</th>
<th>Chance and probability</th>
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<tbody>
<tr>
<td>Scatterplot, Stemplot, Cartesian plane, Collinear, Dependent variable, Gradient, Independent variable, Linear graph, No-linear graph, Ordered pair, Point of intersection, Quadrant, Simultaneous solution, Substitute, Intercept, Biased, Bimodal, Box and whisker plot, Categorical, Conjecture, Skewed, Outlier, Quartile, Distributive, Bar graph, Column graph, Pictograph, Histogram, Composite bar graph, Pie graph, Line graph, Tally, Data, Mean, Mode, Median, Sample, Table, Categorical, Quantitative, Survey sample, Statistics, Percentage, Title, Axis.</td>
<td>Compound events, Dependent, Simultaneous, Expectation, Occurrence, Random, Relative frequency, Simulation, Theoretical probability, Possible, Probable, Likelihood, Predict, Relationship, Impossible, Possibility, Experiment, Tree diagram, Gamble, Certain, Event, Trial, Consequence, Likely, Unlikely, Sample, Population, Variable.</td>
</tr>
</tbody>
</table>

**Strand: Measurement**

**Length, perimeter and area; Volume and capacity; Mass; Time; Angles; Temperature**


**Strand: Number**

**Whole numbers; Fractions, decimals, percentages, ratios and rates**

Decimal, Numerator, Denominator, Rational, Irrational, Percentage, Reciprocal, Equivalent, Mixed number, Improper fraction, Fraction, Quantity, Number system, Thousandths, Divisor, Spreadsheet, Prime, Composite, Digit, Divisibility, Test, Exponent, Infinite, Integer, Proportion, Ratio, Scientific rotation, Compound, Interest, Invest, Principal, Unitary method, Rate, Quadratic, Depreciation, Appreciation, Commission, Deduction, Discount, Exchange rate, Gross, Inflation, Piece work, Retainer, Superannuation.
**Strand: Pattern and algebraic reasoning**

**Patterns**

Pronumerals, Variables, Equations, Formula, Number sentence, Pattern, Linear graphs, Predict, Substitute, Numerical, Geometric, Abstract relationship, Structure, Model, Inequation, Coefficient, Elimination, Induction, Interchange, Inverse, Linear equation, Binomial, Consecutive, Distributive, Identity, Quadratic, Direct variation, Negative reciprocal, Proportionality constant, Rectangular hyperbola, Asymptote, Exponential decay/growth.

**Strand: Spatial sense and geometric reasoning**

**2-D and 3-D objects**

Isometric, Bisect, Perspective, Base, Edge, Surface, Vertex, Face, Cross-section, Isosceles, Scalene, Equilateral, Oblique, Polyhedra, Acute, Obtuse, Reflex, Points, Rays, Segments, Intersections, Parallel, Perpendicular, Centre, Radius, Diameter, Circumference, Quadrilateral, Interior, Exterior, Euler, Arc, Segment, tangent, ellipse, Net, Curved surface, Parallelogram, Plane face, Prism, Pyramid, Sphere, Surface area. Trapezium, Adjacent, Alternate, Apex, Co-interior, Allied, Complementary, Concurrent, Congruence, Converse, Corresponding, Deductive.

**Transformation**

Tessellation, Rotate, Symmetry, Enlarge, Reduce, 2 dimensional/2-D, 3 dimensional/3-D, Reflect, Translate, Transform, Clockwise, Anti-clockwise, Adjacent, Axis of symmetry, Cosine, Equiangular, Perpendicular bisector, Proportion, Rotational symmetry, Sine, Trigonometric ratio, Tangent, Trigonometry.

**Location and position**

Magnetic compass, Scale drawings, Map, Plan, Ratio, Cardinal, Diagram, Orienteering, Intermediate points, Coordinate grid, Models, Pathways, Location, Vertices, Routes.
BIBLIOGRAPHY