7.3 Content for Stage 1

Consult

Mathematics • Stage 1

Number and Algebra

Whole Numbers 1

Outcomes

A student:

- describes mathematical situations and methods using everyday and some mathematical language, actions, materials, diagrams and symbols MA1-1WM
- uses objects, diagrams and technology to explore mathematical problems MA1-2WM
- supports conclusions by explaining or demonstrating how answers were obtained MA1-3WM
- counts, orders, reads and represents two- and three-digit numbers MA1-4NA

Students:

Count collections to 100 by partitioning numbers using place value (ACMNA014)

- count forwards or backwards by ones, from a given two-digit number
- identify the number before and after a given two-digit number
- read and use the ordinal names to at least 'thirty-first', eg when reading calendar dates [L]
- count and represent large sets of objects by systematically grouping in tens
- use and explain mental grouping to count and to assist with estimating the number of items in large groups [CCT]
- state the place value of digits in two-digit numbers, eg 'in the number 32, the "3" represents 30 or 3 tens' [L]

Recognise, model, read, write and order numbers to at least 100. Locate these numbers on a number line (ACMNA013)

- represent two-digit numbers using objects, pictures, words and numerals [L]
- apply an understanding of place value and the role of zero to read, write and order two-digit numbers [L]
- use a number line or hundreds chart to assist with counting and ordering
    - give reasons for placing a set of numbers in a particular order (Communicating, Reasoning) [CCT]
- use place value to partition two-digit numbers, eg 32 as three groups of 10 and two ones
- partition two-digit numbers in non-standard forms, eg 32 as 32 ones [CCT]
- round numbers to the nearest ten when estimating
- write and solve simple everyday problems with two-digit numbers [L, N, CCT]
    - choose an appropriate strategy to solve problems, including trial-and-error and drawing a diagram (Communicating, Problem Solving) [N, CCT]

Mathematics • Stage 1

Number and Algebra

Whole Numbers 1

Recognise, describe and order Australian coins according to their value (ACMNA017)

- identify, sort, order and count money using the appropriate language in everyday contexts, eg coins, notes, cents, dollars [L, N, WE]
- recognise that total amounts can be made using different denominations, eg 20 cents can be made using a single coin or two 10 cent coins [N]
- recognise the symbols for dollars ($) and cents (c)

Background information

The learning needs of students are to be considered when determining the appropriate range of two- and three-digit numbers.

By developing a variety of counting strategies and ways to combine quantities, students recognise that there are more efficient ways to count collections than counting by ones.

Language

Students should be able to communicate using the following language: ones/units, tens, digit, round to.

Students should be made aware that bus and telephone numbers are said differently from *ordinary* numbers. Ordinal names may be confused with fraction names, eg ‘the third’ relates to order but ‘a third’ is a fraction.

The word ‘round’ has different meanings in different contexts and some students may confuse it with the word ‘around’.

Mathematics • Stage 1

Number and Algebra

Whole Numbers 2

Outcomes

A student:

- describes mathematical situations and methods using everyday and some mathematical language, actions, materials, diagrams and symbols MA1-1WM
- uses objects, diagrams and technology to explore mathematical problems MA1-2WM
- supports conclusions by explaining or demonstrating how answers were obtained MA1-3WM
- counts, orders, reads and represents two- and three-digit numbers MA1-4NA

Students:

Recognise, model, represent and order numbers to at least 1000 (ACMNA027)

- represent three-digit numbers using objects, pictures, words and numerals [L]
- count forwards or backwards by ones, from a given three-digit number
- identify the number before and after a given three-digit number
- use number lines and number charts beyond 100 to assist with counting and ordering
    - give reasons for placing a set of numbers in a particular order (Communicating, Reasoning) [CCT]

Investigate number sequences, initially those increasing and decreasing by twos, threes, fives and tens from any starting point, then moving to other sequences (ACMNA026)

- use the terms ‘more than’ and ‘less than’ to compare numbers [L]
- count forwards and backwards by twos, threes, fives and tens
- count forwards and backwards by tens, on and off the decade, with two- and three-digit numbers, eg 40, 30, 20 … (on the decade) 427, 437, 447 … (off the decade)
- use a hundreds chart to identify number sequences

Group, partition and rearrange collections up to 1000 in hundreds, tens and ones to facilitate more efficient counting (ACMNA028)

- apply an understanding of place value and the role of zero to read, write and order three-digit numbers [L]
    - make the largest and smallest number from three given digits (Communicating) [CCT]
    - use an abacus to model and represent numbers (Communicating) [A]
- uses place value to partition three-digit numbers, eg 326 as three groups of 100, two groups of 10 and six ones
- partition three-digit numbers in non-standard forms, eg 326 can be 32 tens and six ones [CCT]
- count and represent large sets of objects by systematically grouping in tens and hundreds
    - use models such as linking blocks, place-value blocks and bundles of sticks to explain grouping (Communicating, Reasoning)
- use and explain mental grouping to count and to assist with estimating the number of items in large groups [N, CCT]
- round numbers to the nearest hundred when estimating

Mathematics • Stage 1

Number and Algebra

Whole Numbers 2

Count and order small collections of Australian coins and notes according to their value (ACMNA034)

- use the face value of notes and coins to sort, order and count money [WE]
  - compare Australian coins and notes with those from other countries, eg from students' cultural backgrounds (Communicating) [N, IU]
  - determine whether there is enough money to buy a particular item (Problem Solving, Reasoning) [N]
- recognise that there are: 100 cents in $1; 200 cents in $2, …

Background information

Students need to learn correct rounding of numbers based on the convention of rounding up if the last digit is five or more and leaving the number if the last digit is zero to four.

One-cent and two-cent coins were withdrawn by the Australian Government in 1990. Prices can still be expressed in one-cent increments but the final bill is rounded to the nearest five cents (except for electronic transactions),

eg $5.36, $5.37 round to $5.35
$5.38, $5.39, $5.41, $5.42 round to $5.40
$5.43, $5.44 round to $5.45

Language

Students should be able to communicate using the following language: more than, less than, hundreds.

The word 'and' is used when reading a number or writing it in words, eg five hundred and sixty-three.

Mathematics • Stage 1

Number and Algebra

Addition and Subtraction 1

Outcomes

A student:

- describes mathematical situations and methods using everyday and some mathematical language, actions, materials, diagrams and symbols MA1-1WM
- uses objects, diagrams and technology to explore mathematical problems MA1-2WM
- supports conclusions by explaining or demonstrating how answers were obtained MA1-3WM
- uses a range of mental strategies and informal recording methods for addition and subtraction involving one- and two-digit numbers MA1-5NA

Students:

Represent and solve simple addition and subtraction problems using a range of strategies including counting on, partitioning and rearranging parts (ACMNA015)

- use concrete materials to model addition and subtraction problems involving one- and two-digit numbers
- represent subtraction as the difference between two numbers
- use the terms ‘add’, ‘plus’, ‘equals’, ‘is equal to’, ‘take away’, ‘minus’ and ‘the difference between’ [L]
- recognise and use the symbols for ‘plus’ +, ‘minus’ − and ‘equals’ = [L]
- record number sentences in a variety of ways using drawings, words, numerals and mathematical symbols [L]
- build addition facts to at least 20, including by recognising patterns
  - model and record patterns for individual numbers by making all possible whole number combinations,
    eg $0+4=4$ (Communicating) [N]
    $1+3=4$
    $2+2=4$
    $3+1=4$
    $4+0=4$
  - find and make generalisations about number relationships, eg adding a number and zero does not change the number, eg $6+0=6$ (Communicating, Reasoning) [N, CCT]
  - use concrete materials to model the commutative property for addition and apply it to aid the recall of addition facts, eg $4+5=5+4$ (Communicating, Reasoning)
- relate addition and subtraction facts for numbers to at least 20, eg $5+3=8$; so $8-3=5$ and $8-5=3$
- use and record a range of mental strategies for addition and subtraction problems involving one- and two-digit numbers
  - counting on from the larger number to find the total of two numbers
  - counting back from a number to find the number remaining
  - counting on or back to find the difference between two numbers
  - using doubles and near doubles, eg 5 + 7; double 5 and add 2 more
  - combining numbers that add to 10, eg 4 + 7 + 8 + 6 + 3 + 5; group 4 and 6, 7 and 3 first
  - bridging to ten, eg 17 + 5; 17 and 3 is 20 and add 2 more
  - partitioning numbers to at least 20 using place value (eg 19 as 10 + 9) and non-standard forms (eg 19 as 11 + 8 or 12 + 7 etc) [N]
  - choose and apply efficient strategies for addition and subtraction (Problem Solving)

Mathematics • Stage 1

Number and Algebra

Addition and Subtraction 1

Language:

The following language is introduced for students' communication: counting on, counting back, combine, add, plus, sum, increase, addition, minus, the difference between, decrease, subtract, subtraction, equals, is equal to, is the same as, number sentence, number fact, empty number line, double, double and one more, double and one less, digit.

The word 'difference' has a specific meaning in this context, referring to the numeric value of the group. In everyday language it can refer to any attribute. Students need to understand that the need to carry out subtraction can be indicated by a variety of language structures. The language used in the 'comparison' type of subtraction is quite different to that used in the 'take away' type.

Students need to understand the different uses for the '=' symbol, eg 4 + 1 = 5 where the '=' symbol should be pronounced as 'equals', and 5 is the answer to 4 + 1; compared to a statement of equality such as 4 + 1 = 3 + 2 where the '=' symbol should be pronounced as 'is the same as' or 'is equal to'.

Mathematics • Stage 1

Number and Algebra

Addition and Subtraction 2

Outcomes

A student:

- describes mathematical situations and methods using everyday and some mathematical language, actions, materials, diagrams and symbols MA1-1WM
- uses objects, diagrams and technology to explore mathematical problems MA1-2WM
- supports conclusions by explaining or demonstrating how answers were obtained MA1-3WM
- uses a range of mental strategies and informal recording methods for addition and subtraction involving one- and two-digit numbers MA1-5NA

Students:

Explore the connection between addition and subtraction (ACMNA029)

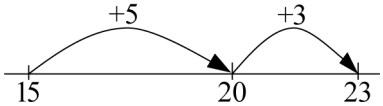
- use concrete materials to model how addition and subtraction are inverse operations
- use related addition and subtraction number facts to at least 20, eg 15 + 3 = 18, so 18 – 15 = 3

Solve simple addition and subtraction problems using a range of efficient mental and written strategies (ACMNA030)

- use concrete materials to model addition and subtraction problems
- use and record a range of strategies for addition and subtraction of one- and two-digit numbers, including the jump strategy and the split strategy,
  eg record how the answer to 37 − 12 was obtained using the split strategy

  $30-10=20$
  $7-2=5$
  So $37-12=25$

- select and use a variety of strategies to solve addition and subtraction problems involving one- and two-digit numbers [CCT, N]
  - perform simple calculations with money, eg buying items from a class shop and giving change (Problem Solving) [N, WE]
  - check solutions using a different strategy (Problem Solving) [CCT]
  - recognise which strategies are more efficient and explain why (Communicating, Reasoning) [CCT]
  - explain or demonstrate how an answer was obtained for addition and subtraction problems , eg show how the answer to 15 + 8 was obtained using a jump strategy on an empty number line (Communicating, Reasoning) [N]



Mathematics • Stage 1

Number and Algebra
Addition and Subtraction 2

Background information

It is appropriate for students at this stage to use concrete materials to model and solve problems, for exploration and for concept building. Concrete materials may also help in explanations of how solutions were arrived at.

Addition and subtraction should move from counting and combining perceptual objects, to using numbers as replacements for completed counts with mental strategies, to recordings that support mental strategies (such as jump or split, partitioning or compensation).

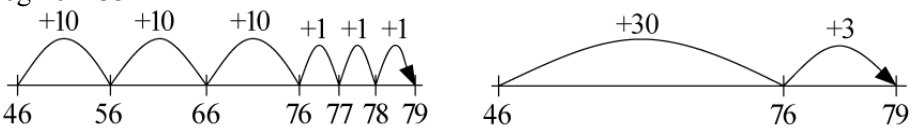
At this stage, students develop a range of strategies to aid quick recall of number facts and to solve addition and subtraction problems. Students should be encouraged to explain their strategies and invent ways of recording their actions. It is also important to discuss the merits of various strategies in terms of practicality and efficiency.

Subtraction covers two different situations: 'taking away' from a group, and 'comparison' (ie determining how many more (or less) when comparing two groups). In performing a subtraction, students could use 'counting on or back' from one number to find the difference. The 'counting on or back' type of subtraction is more difficult for students to grasp. Nevertheless, it is important to encourage students to use the 'counting on' strategy as a method of solving comparison problems after they are confident with the 'take away' type.

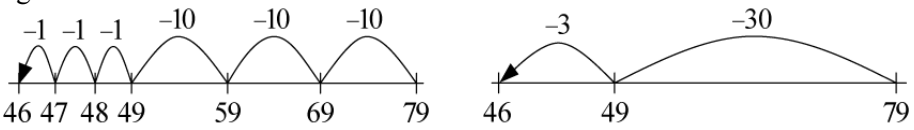
Jump strategy on a number line – an addition or subtraction strategy in which the student places the first number on an empty number line and then counts forward or backwards firstly by tens and then by ones to perform a calculation. (The number of jumps will reduce with increased understanding.)

Jump strategy method:

eg 46 + 33



eg 79 – 33



Split strategy – an addition or subtraction strategy in which the student separates the tens from the units and adds or subtracts each separately before combining to obtain the final answer.

Split strategy method:

$$\begin{aligned} 46 + 33 &= 40 + 6 + 30 + 3 \\ &= 40 + 30 + 6 + 3 \\ &= 70 + 9 \\ &= 79 \end{aligned}$$

An inverse operation is the operation that reverses the effect of the original operation. Addition and subtraction are inverse operations; multiplication and division are inverse operations.

Mathematics • Stage 1

Number and Algebra

Addition and Subtraction 2

Language

Students should be able to communicate using the following language: answer.

Some students may need assistance when two tenses are used within the one problem, eg ‘I had six beans and took away four. So, how many do I have now?’

The word ‘left’ can be ambiguous, eg ‘There were five children in the room. Three went to lunch. How many are left?’ Is the question asking how many children are remaining in the room or how many children went to lunch?

Mathematics • Stage 1

Number and Algebra

Multiplication and Division 1

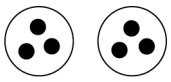
Outcomes

A student:

- describes mathematical situations and methods using everyday and some mathematical language, actions, materials, diagrams and symbols MA1-1WM
- uses a range of mental strategies and concrete materials for multiplication and division MA1-6NA

Students:

Develop confidence with number sequences to and from 100 by ones from any starting point. Skip count by twos, fives and tens starting from zero (ACMNA012)

- count by ones twos, fives and tens using rhythmic or skip counting from any starting point including zero
  - use patterns to assist counting by twos, fives or tens (Communicating)
- describe collections of objects as 'groups of' [L],
  eg 
  'two groups of three'
- find the total number of objects using skip counting

Background information

There are two forms of division:

Sharing (partitive) – How many in each group?
eg 'If twelve marbles are shared between three students, how many does each get?'

Grouping (quotitive) – How many groups are there?
eg 'If I have twelve marbles and each child is to get four, how many children will get marbles?' This form of division relates to repeated subtraction, eg $12 - 4 - 4 - 4 = 0$; so three children will get 4 marbles each.

After students have divided a quantity into equal groups (eg divide 12 into groups of 4), the process can be reversed by combining the groups, thus linking multiplication and division.

When sharing a collection of objects into two or four groups, students may describe the groups as being one-half or one-quarter of the whole collection.

An array is one of several different arrangements that can be used to model multiplicative situations involving whole numbers. An array is made by arranging a set of objects, such as counters, into columns and rows. Each column must contain the same number of objects as the other columns, and each row must contain the same number of objects as the other rows.

Mathematics • Stage 1

Number and Algebra
Multiplication and Division 1

Language

Students should be able to communicate using the following language: shared between, shared among, is the same as, number sentence, number fact, odd number, even number, empty number line, digit.

The term ‘lots of’ can be confusing to students because of its everyday use and should be avoided, eg ‘lots of fish in the sea’.

It is preferable that students use ‘groups of’, before progressing to ‘rows of’ and ‘columns of’.

To represent equality of groups, the terms ‘is the same as’ or ‘is equal to’ should be used. At this stage, the term ‘is the same as’ is emphasised as more appropriate for students’ level of conceptual understanding. Use of the word ‘equals’ may suggest that the right side of a number sentence contains ‘the answer’, rather than a value equivalent to that on the left.

Mathematics • Stage 1

Number and Algebra

Multiplication and Division 2

Outcomes

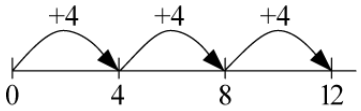
A student:

- describes mathematical situations and methods using everyday and some mathematical language, actions, materials, diagrams and symbols MA1-1WM
- uses objects, diagrams and technology to explore mathematical problems MA1-2WM
- supports conclusions by explaining or demonstrating how answers were obtained MA1-3WM
- uses a range of mental strategies and concrete materials for multiplication and division MA1-6NA

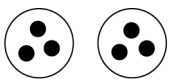
Students:

Recognise and represent multiplication as repeated addition, groups and arrays (ACMNA031)

- find the total number of objects using repeated addition, eg 3 groups of 4 is the same as $4 + 4 + 4$
  - use an empty number line or hundreds chart to model repeated addition (Communicating), eg



  - explore the use of repeated addition to count in practical situations, eg Aboriginal stockmen counting stock [AHC] (Problem Solving)
- recognise when items have been arranged into groups, eg 'I can see two groups of three pencils'
- use concrete materials to model multiplication as equal 'groups' or as an array of equal 'rows' or equal 'columns', eg



'two groups of three'

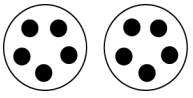
or

'two rows of three'
'three columns of two'

  - describe collections of objects as 'groups of', 'rows of' and 'columns of' (Communicating) [L]
  - recognise practical examples of arrays, such as seedling trays or vegetable gardens (Communicating) [CCT, SE]
- model the commutative property of multiplication, eg '3 groups of 2 is the same as 2 groups of 3'

Recognise and represent division as grouping into equal sets and solve simple problems using these representations (ACMNA032)

- recognise when there are equal numbers of items in groups, eg 'There are three pencils in each group'
- model division by sharing a collection of objects into equal groups or as equal rows in an array, eg ten objects shared between two



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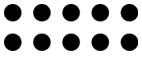


  - describe the part left over when a collection cannot be shared equally into groups (Communicating, Problem Solving, Reasoning) [N, CCT]
- use concrete materials to model division as repeated subtraction

Mathematics • Stage 1

Number and Algebra

Multiplication and Division 2

- solve multiplication and division problems using objects, diagrams, imagery, actions or trial-and-error [N, CCT]
  - pose and solve simple multiplication and division problems (Problem Solving) [N, CCT]
  - use estimation to check that the answers are reasonable (Problem Solving) [N, CCT]
  - support answers by demonstrating how the answer was obtained (Communicating) [N, CCT]
  - recognise which strategy worked and which did not work and explain why (Communicating, Reasoning) [N, CCT]
- record multiplication and division problems using drawings, words and numerals , eg ‘ two rows of five makes ten’ or ‘2 rows of 5 is 10’ [L, N]

Background information

Aboriginal people use repeated addition and grouping strategies to count in practical situations, such as when counting stock.

Refer also to background information in Multiplication and Division 1.

Language

Students should be able to communicate using the following language: array, rows of, columns of, horizontal, vertical, add, addition, subtract, subtraction, part left over, answer.

The term ‘rows of’ refers to horizontal groupings, and the term ‘columns of’ refers to vertical groupings.

Mathematics • Stage 1

Number and Algebra

Fractions and Decimals 1

Outcomes

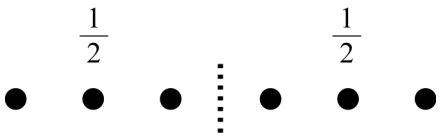
A student:

- describes mathematical situations and methods using everyday and some mathematical language, actions, materials, diagrams and symbols MA1-1WM
- represents and models halves, quarters and eighths MA1-7NA

Students:

Recognise and describe one-half as one of two equal parts of a whole (ACMNA016)

- describe parts of an object or collection of objects as 'about a half', 'more than a half ' or 'less than a half' [L]
- describe equal parts of a whole object or collection of objects, eg 'I folded my paper into 2 equal parts and now I have halves' [L]
- use concrete materials to model half of a whole object or share a collection of objects, eg seedling trays [N, SE]



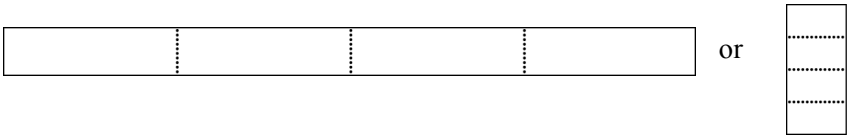
- use fraction notation for half $\left(\frac{1}{2}\right)$ [L]

Background information

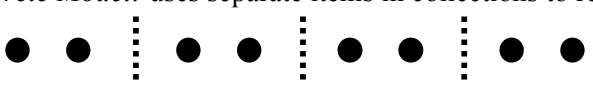
At this stage, fractions are used in two different ways: to describe equal parts of a whole, and to describe equal parts of a collection of objects. Fractions refer to the relationship of the equal parts to the whole unit. When using collections to model fractions it is important that students appreciate the collection as being a 'whole' and the resulting groups as 'parts of that whole'. It should be noted that the size of the resulting fraction will depend on the size of the original whole or collection of objects. It is not necessary for students to distinguish between the roles of the numerator and denominator at this stage. They may use the symbol '$\frac{1}{2}$' as an entity to mean 'one half' or 'a half', and similarly use '$\frac{1}{4}$' to mean 'one quarter' or 'a quarter'.

Three Models of Fractions

Linear Model: uses one-directional cuts or folds that compare fractional parts based on length; this model should be introduced first. Cuts or folds may be either vertical or horizontal.



Discrete Model: uses separate items in collections to represent parts of the whole group.

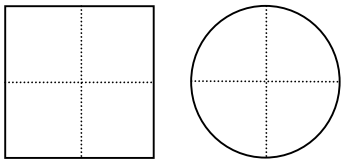


Mathematics • Stage 1

Number and Algebra

Fractions and Decimals 1

Area Model: uses multi-directional cuts or folds to compare fractional parts to the whole. This model should only be introduced once students have an understanding of the concept of area, which it should be introduced in Stage 2.



Language

Students should be able to communicate using the following language: about a half, more than a half, less than a half, share.

Some students may hear ‘whole’ in the phrase ‘part of a whole’ and confuse it with the term ‘hole’.

Mathematics • Stage 1

Number and Algebra

Fractions and Decimals 2

Outcomes

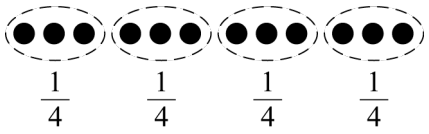
A student:

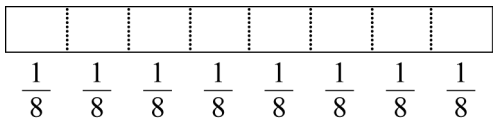
- describes mathematical situations and methods using everyday and some mathematical language, actions, materials, diagrams and symbols MA1-1WM
- supports conclusions by explaining or demonstrating how answers were obtained MA1-3WM
- represents and models halves, quarters and eighths MA1-7NA

Students:

Recognise and interpret common uses of halves, quarters and eighths of shapes and collections (ACMNA033)

- recognise that fractions refer to equal parts of a whole, eg all quarters of an object or collection are the same size, all eighths of an object or collection are the same size [N],

  eg 

  or 

- visualise fractions that are equal parts of a whole, eg 'Imagine where you would cut the rectangle before cutting it'
- use concrete materials to model and describe a half, a quarter or an eighth of a whole object
  - create quarters by halving one half, eg 'I halved my paper then halved again and now I have quarters' (Communicating, Problem Solving)

    
  - discuss why $\frac{1}{8}$ is less than $\frac{1}{4}$, eg if a cake is shared among eight people, the slices are smaller than if the cake is shared among four people (Communicating, Reasoning) [N, CCT]
- recognise when a collection of objects has been shared into halves, quarters or eighths [N]
- use fraction language in a variety of everyday contexts, eg the half-hour or one-quarter of the class [N]
- use fraction notation for half $\left(\frac{1}{2}\right)$, quarter $\left(\frac{1}{4}\right)$ and eighth $\left(\frac{1}{8}\right)$ to label parts of a whole on a diagram [L]

Background information

Refer to background information in Fractions and Decimals 1.

Mathematics • Stage 1

Number and Algebra
Fractions and Decimals 2

Language

Students should be able to communicate using the following language: more than, less than, halves, one-quarter, quarter, one-eighth, eighth, equal parts, shared among.

At this stage, the term ‘three-quarters’ may be used to name the remaining parts after one-quarter has been identified.

Mathematics • Stage 1

Number and Algebra

Patterns and Algebra 1

Outcomes

A student:

- describes mathematical situations and methods using everyday and some mathematical language, actions, materials, diagrams and symbols MA1-1WM
- uses objects, diagrams and technology to explore mathematical problems MA1-2WM
- creates, represents and continues a variety of patterns, and builds and completes number relationships MA1-8NA

Students:

Investigate and describe number patterns formed by skip counting and patterns with objects (ACMNA018)

- identify and describe patterns when counting forwards or backwards by ones, twos, fives, or tens
  - use objects to represent counting patterns (Communicating)
  - investigate and solve problems based on number patterns (Problem Solving) [N, CCT]
- continue, create and describe number patterns that increase or decrease
  - discuss how number patterns are made and how they can be copied or continued (Communicating, Problem Solving) [N, CCT]
  - record patterns created by using the process of repeatedly adding the same number (Communicating)
- represent number patterns on a number line or hundreds chart
- model and describe odd and even numbers using counters paired in two rows
  - describe the pattern created by modelling odd and even numbers (Communicating)

Background information

At this stage, students further explore number patterns that increase or decrease. Patterns could now include any patterns observed on a hundreds chart and these might go beyond patterns created by counting in ones, twos, fives or tens.

This links closely with the development of Whole Numbers and Multiplication and Division.

Language

Students should be able to communicate using the following language: increase, decrease.

Mathematics • Stage 1

Number and Algebra

Patterns and Algebra 2

Outcomes

A student:

- describes mathematical situations and methods using everyday and some mathematical language, actions, materials, diagrams and symbols MA1-1WM
- uses objects, diagrams and technology to explore mathematical problems MA1-2WM
- supports conclusions by explaining or demonstrating how answers were obtained MA1-3WM
- creates, represents and continues a variety of patterns, and builds and completes number relationships MA1-8NA

Students:

Describe patterns with numbers and identify missing elements (ACMNA035)

- describe a number pattern in words, eg 'It goes up by threes'
- determine a missing term in a number pattern, eg 3, 7, 11, __, 19, 23, 27 [CCT]
  - describe how the missing term in a number pattern was determined (Communicating) [N]
  - check solutions to missing terms in patterns by repeating the process (Reasoning) [N]

Solve problems by using number sentences for addition or subtraction (ACMNA036)

- complete number sentences involving one operation of addition or subtraction by calculating the missing value, eg find $\square$ so that $5+\square=13$ or $15-\square=9$
  - make connections between addition and related subtraction facts (Reasoning) [CCT]
  - describe how a missing value in a number sentence was calculated (Communicating, Reasoning) [CCT]
- solve problems involving addition or subtraction by using number sentences [N, L]
  - represent a word problem as a number sentence (Communicating, Problem Solving) [N, L]
  - pose a word problem to represent a number sentence (Communicating, Problem Solving) [N, L]

Background information

At this stage, describing number relationships and making generalisations should be encouraged when appropriate.

To represent equality of groups, the terms 'is the same as' or 'is equal to' should be used. At this stage, the term 'is the same as' is emphasised as more appropriate for students' level of understanding. Use of the word 'equals' may suggest that the right side of an equation contains 'the answer', rather than a value equivalent to that on the left.

Language

Students should be able to communicate using the following language: missing term, number sentence, value.

Mathematics • Stage 1

Measurement and Geometry

Length 1

Outcomes

A student:

- describes mathematical situations and methods using everyday and some mathematical language, actions, materials, diagrams and symbols MA1-1WM
- supports conclusions by explaining or demonstrating how answers were obtained MA1-3WM
- estimates, measures, compares and records lengths and distances using informal units, metres and centimetres MA1-9MG

Students:

Measure and compare the lengths and capacities of pairs of objects using uniform informal units (ACMMG019)

- select and use uniform informal units to measure lengths or distances, placing the units end-to-end without gaps or overlaps, eg paper clips, pop sticks, handspans, paces
  - measure the length of everyday objects, eg use handspans to measure the length of a table (Problem Solving)
  - explain the relationship between the size of a unit and the number of units needed, eg more paper clips than pop sticks will be needed to measure the length of the desk (Communicating, Reasoning) [N, CCT]
- record lengths or distances by referring to the number and type of uniform informal unit used
  - investigate different informal units of length used in various cultures, including those used in Aboriginal communities (Communicating) [AHC]
- estimate linear dimensions and curves using uniform informal units and then check by measuring
  - discuss strategies used to estimate length, eg visualising the repeated unit, using the process ‘make, mark and move’ (Communicating, Problem Solving) [N, CCT]
- compare the lengths of two or more objects using uniform informal units and check by placing the objects side-by-side and aligning the ends
  - describe why the length of an object remains constant when units are rearranged, eg ‘The book was seven paperclips long. When I moved the paperclips around and measured again, the book was still seven paperclips long’ (Communicating, Reasoning) [N, CCT]

Mathematics • Stage 1

Measurement and Geometry

Length 1

Background information

At this stage, measuring the length of objects using informal units enables students to develop some key understandings of measurement. These include:

- that units are repeatedly placed end to end without gaps or overlaps;
- that units must be equal in size;
- that identical units should be used to compare lengths;
- that some units are more appropriate for measuring particular objects;
- and that there is a relationship between the size of the chosen unit and the number of units needed.

Recognising that a length may be divided and recombined to form the same length is an important component of *conserving* length.

It is important that students have had some measurement experiences before being asked to estimate lengths and distances and that a variety of estimation strategies are taught.

Students should be given opportunities to apply their understandings of measurement, gained through experiences with informal units, to experiences with the centimetre and metre.

Students could make a measuring device using informal units before using a ruler. This would assist students in understanding that the distances between marks on a ruler represent unit lengths and that the marks indicate the end points of each of the units.

Using the terms ‘make’, ‘mark’ and ‘move’ assists students in understanding the concept of repeated units. By placing the unit on a flat surface, marking where it ends, moving the item along and continuing the process, students see that the unit of measurement is the space between the marks and not the marks themselves.

Students could make a measuring device from ten interlocking blocks and use it to measure objects. Counting by tens to measure objects may be easier for students than using a 30-centimetre ruler.

Students will have an informal understanding of measurement prior to school, although this may not align to Western concepts of measurement. In particular, Aboriginal students often have developed a sense of measurement based on their self and their environment.

Language

Students should be able to communicate using the following language: handspan, more, less, ‘make, mark and move’, compare.

Mathematics • Stage 1

Measurement and Geometry

Length 2

Outcomes

A student:

- describes mathematical situations and methods using everyday and some mathematical language, actions, materials, diagrams and symbols MA1-1WM
- supports conclusions by explaining or demonstrating how answers were obtained MA1-3WM
- estimates, measures, compares and records lengths and distances using informal units, metres and centimetres MA1-9MG

Students:

Compare and order several shapes and objects based on length, area, volume and capacity using appropriate uniform informal units (ACMMG037)

- select an appropriate uniform informal unit and use it to compare and order two or more shapes or objects according to their length
  - compare the lengths of two or more objects that cannot be moved or aligned (Reasoning) [CCT]
- make and use a tape measure calibrated in uniform informal units, eg calibrate a paper strip using footprints as a repeated unit
  - use computer software to draw a line and use a simple graphic as a uniform informal unit to measure its length (Communicating) [ICT]

Recognise and use formal units to measure lengths of objects

- recognise the need for a formal unit to measure lengths or distances
- use the metre as a unit to measure lengths or distances
  - explain and model using concrete materials that a metre length can be arranged in a variety of ways, eg straight line, curved line (Communicating, Reasoning)
- record lengths and distances using the abbreviation for metre (m) [L]
- measure lengths or distances to the nearest metre or half-metre
- recognise the need for a smaller unit than the metre
- recognise that 100 centimetres is equal to 1 metre
- use a 10 cm length, with 1 cm markings, as a device to measure lengths
- measure lengths and distances to the nearest centimetre
- record lengths and distances using the abbreviation for centimetre (cm) [L]

Background information

Refer to background information for Length 1.

Mathematics • Stage 1

Measurement and Geometry

Length 2

Language

Students should be able to communicate using the following language: order, metre, half-metre, centimetre, length, distance, metre rule, ruler.

Mathematics • Stage 1

Measurement and Geometry

Area 1

Outcomes

A student:

- describes mathematical situations and methods using everyday and some mathematical language, actions, materials, diagrams and symbols MA1-1WM
- estimates, measures, compares and records areas using informal units MA1-10MG

Students:

Estimate and measure the area of shapes using uniform informal units

- compare the areas of two surfaces that cannot be moved or superimposed, eg by cutting paper to cover one surface and superimposing the paper over the second surface
- estimate the larger of two similar shapes and compare areas by cutting and covering
- measure area by placing uniform informal units in rows or columns without gaps or overlaps
  - select and use appropriate uniform informal units to measure area (Reasoning)
  - use computer software to create a shape and use a simple graphic as an uniform informal unit to measure its area (Communicating) [ICT]
- estimate and count informal units to measure area and describe the part left over [N]

Background information

At this stage, measuring the area of objects using informal units enables students to develop some key understandings of measurement. These include repeatedly placing units so there are no gaps or overlaps and understanding that the units must be equal in size. Covering surfaces with a range of informal units should assist students in understanding that some units tessellate and are therefore more suitable for measuring area.

Students may have a prior understanding of area based upon the concept of boundaries and/or landmarks, such as those used by Aboriginal communities. It is important that students have had some measurement experiences before being asked to estimate, and that a variety of estimation strategies are taught.

When students understand why tessellating units are important, they should be encouraged to make, draw and describe the spatial structure (grid). Students should develop procedures for counting the tile or grid units so that no units are missed or counted twice.

Students should also be encouraged to identify and use efficient strategies for counting, eg using repeated addition or rhythmic counting.

Language

Students should be able to communicate using the following language: flat surface, curved surface, cutting, covering, measure, gap, overlap, part left over.

Area is the measure of the amount of surface. A surface may be flat or curved.

Mathematics • Stage 1

Measurement and Geometry

Area 2

Outcomes

A student:

- describes mathematical situations and methods using everyday and some mathematical language, actions, materials, diagrams and symbols MA1-1WM
- supports conclusions by explaining or demonstrating how answers were obtained MA1-3WM
- estimates, measures, compares and records areas using informal units MA1-10MG

Students:

Compare and order several shapes and objects based on length, area, volume and capacity using appropriate uniform informal units (ACMMG037)

- compare the areas of two surfaces that cannot be moved or superimposed by measuring in uniform informal units
- estimate the larger of two or more areas and then compare and order the areas by measuring using uniform informal units [N]
    - discuss strategies used to estimate area, eg visualising the repeated unit (Communicating, Problem Solving)
- draw the spatial structure (grid) of repeated units covering an area
    - explain the structure of the unit tessellation in terms of rows and columns (Communicating)
- describe why the area remains constant when units are rearranged [N, CCT]
- record area by referring to the number and type of units used, eg the area of this surface is 20 tiles [L]
    - explain the relationship between the size of a unit and the number of units needed to measure area, eg more tiles than workbooks will be needed to measure the area of the desktop (Communicating, Reasoning) [L, N, CCT]
    - explain why tessellating shapes are best for measuring area (Communicating, Reasoning) [N, CCT]

Background information

Refer to background information in Area 1.

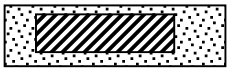
Mathematics • Stage 1

Measurement and Geometry
Area 2

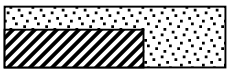
Language

Students should be able to communicate using the following language: order, tessellate, tessellating, estimate, rows, columns, grid.

Superimposing – the comparison of area by placing one area on top of another.



Superpositioning – the comparison of areas by aligning the edges (or corner) of one area when placed on top of another.



Mathematics • Stage 1

Measurement and Geometry

Volume and Capacity 1

Outcomes

A student:

- describes mathematical situations and methods using everyday and some mathematical language, actions, materials, diagrams and symbols MA1-1WM
- supports conclusions by explaining or demonstrating how answers were obtained MA1-3WM
- estimates, measures, compares and records capacities and volumes using informal units MA1-11MG

Students:

Measure and compare the lengths and capacities of pairs of objects using uniform informal units (ACMMG019)

- estimate volume or capacity using appropriate uniform informal units, eg blocks for volume, cups for capacity
  - explain a strategy used for estimating volume or capacity (Communicating, Problem Solving) [N, CCT]
- measure the capacity of a container by counting the number of times a smaller container can be filled and emptied into the container
  - select an appropriate informal unit to measure and compare the capacities of two containers, eg using cups rather than teaspoons to fill two different-sized buckets (Problem Solving) [N]
  - explain that if a smaller unit is used then more units are needed to measure, eg more cups than ice cream containers are needed to fill a bucket (Communicating, Reasoning) [N, CCT]
- establish and recognise that containers of different shapes may have the same capacity, eg a tall narrow container may hold the same as a short, wide container
- measure the volume of a container by filling the container with uniform informal units and counting the number of units used, eg the number of blocks a box can hold
  - explain that if there are gaps when packing or stacking, this may affect the accuracy of finding the volume (Communicating, Reasoning) [CCT]

Mathematics • Stage 1

Measurement and Geometry

Volume and Capacity 1

Background information

The order in which content related to capacity and volume appears in the content is not indicative of the order in which it should be taught.

Volume and capacity relate to the measurement of three-dimensional space, in the same way that area relates to the measurement of two-dimensional space.

The attribute of volume is the amount of space occupied by an object or substance and can be measured in cubic units, eg cubic centimetres (cm^3) and cubic metres (m^3).

Capacity refers to the amount a container can hold, and can be measured in millilitres (mL) and/or litres (L). Capacity is only used in relation to containers and generally refers to liquid measurement. The capacity of a closed container will be slightly less than its volume – capacity is based on the inside dimensions, while volume is determined by the outside dimensions of the container.

It is not necessary to refer to these definitions with students (capacity is not taught as a separate concept to volume until Stage 4).

Students need experience in filling containers with both continuous material (eg water) and with discrete objects (eg marbles). The use of continuous material leads to measurement using the units litre and millilitre in later stages.

The use of blocks leads to measurement using the units cubic metre and cubic centimetre.

Calibrating a container using informal units is a precursor to students using measuring cylinders calibrated in formal units (litres and millilitres) at a later stage.

An object displaces its own volume when totally submerged.

Language

Students should be able to communicate using the following language: measure, compare gap, pack, stack.

Mathematics • Stage 1

Measurement and Geometry

Volume and Capacity 2

Outcomes

A student:

- describes mathematical situations and methods using everyday and some mathematical language, actions, materials, diagrams and symbols MA1-1WM
- uses objects, diagrams and technology to explore mathematical problems MA1-2WM
- supports conclusions by explaining or demonstrating how answers were obtained MA1-3WM
- estimates, measures, compares and records capacities and volumes using informal units MA1-11MG

Students:

Compare and order several shapes and objects based on length, area, volume and capacity using appropriate uniform informal units (ACMMG037)

- record volume or capacity by referring to the number and type of uniform informal units used [L]
- compare and order the capacities of two or three containers by filling one container and pouring the contents into another, or pouring the contents of two of the containers into a third and marking each level
- calibrate a large container using uniform informal units, eg filling a bottle by adding cups of water and marking the new level as each cup is added
- pack cubic units (eg blocks) into rectangular containers so there are no gaps
    - recognise that cubes pack and stack better in rectangular containers than other shapes (Reasoning)
    - devise and explain strategies for packing and counting units to fill a box, eg packing in layers and ensuring there are no gaps between units (Communicating, Problem Solving) [N, CCT]
- estimate the larger volume of two or more containers and then compare and order the volumes by measuring using uniform informal units [N]
- estimate the volume of a pile of material and check by measuring, eg a pile of rice
- compare and order the volumes of two or more models by counting the number of blocks used in each model
    - recognise that models with different shapes may have the same volume, eg a model 4 blocks wide and 2 blocks high has the same volume as a model 2 blocks wide and 4 blocks high (Reasoning) [CCT]
- compare and order the volumes of two or more objects by marking the change in water level when each is submerged
    - recognise that changing the shape of an object does not change the amount of water it displaces (Reasoning) [CCT]

Background information

The order in which capacity and volume appear in the content is not indicative of the order in which they should be taught.

Refer also to background information in Volume and Capacity 1.

Mathematics • Stage 1

Measurement and Geometry
Volume and Capacity 2

Language

Students should be able to communicate using the following language: order.

Refer also to language in Volume and Capacity 1.

Mathematics • Stage 1

Measurement and Geometry

Mass 1

Outcomes

A student:

- describes mathematical situations and methods using everyday and some mathematical language, actions, materials, diagrams and symbols MA1-1WM
- estimates, measures, compares and records masses of objects using informal units MA1-12MG

Students:

Investigate mass using an equal arm balance

- sort objects on the basis of their mass
- identify materials that are light or heavy
- place two objects on either side of an equal arm balance to obtain a level balance
- use an equal arm balance to compare the masses of two objects
  - discuss the action of an equal arm balance when a heavy object is placed in one pan and a lighter object in the other pan (Communicating)
- use an equal arm balance to find two collections of objects that have the same mass, eg a collection of blocks and a collection of counters
- use drawings to record findings from using an equal arm balance

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Background information

Mass is an intrinsic property of an object, but its most common measure is in terms of weight. Weight is a force that changes with gravity, while mass remains constant.

At this stage, measuring mass using informal units enables students to develop some key understandings of measurement. These include: repeatedly using a unit as a measuring device; selecting an appropriate unit for a specific task; appreciating that a common informal unit is necessary for comparing the mass of objects; and understanding that some units are unsatisfactory because they are not uniform, eg pebbles.

Students should appreciate that the equal arm balance has two functions: comparing the mass of two objects and measuring the mass of an object by using a unit repeatedly as a measuring device.

Language

Students should be able to communicate using the following language: sort, equal arm balance, level balance, same mass.

As the terms ‘weigh’ and ‘weight’ are common in everyday usage, they can be accepted in student language should they arise. Weight is a force which changes with gravity, while mass remains constant.

Mathematics • Stage 1

Measurement and Geometry

Mass 2

Outcomes

A student:

- describes mathematical situations and methods using everyday and some mathematical language, actions, materials, diagrams and symbols MA1-1WM
- uses objects, diagrams and technology to explore mathematical problems MA1-2WM
- supports conclusions by explaining or demonstrating how answers were obtained MA1-3WM
- estimates, measures, compares and records masses of objects using informal units MA1-12MG

Students:

Compare masses of objects using balance scales (ACMMG038)

- compare and order the masses of two or more objects by hefting and then checking using an equal arm balance
- measure the mass of an object by counting the number of informal units needed to balance the object
  - select an appropriate informal unit to measure the mass of an object and justify the choice (Problem Solving) [N, CCT]
  - explain why some informal units are more appropriate in a given situation (Communicating, Reasoning) [CCT]
- estimate and record mass by referring to the number and type of informal units used
- compare and order the masses of two or more objects using informal units
- calculate differences in mass by measuring and comparing, eg 'The pencil has a mass equal to three blocks and a pair of plastic scissors has a mass of six blocks, so the scissors are three blocks heavier than the pencil'
  - predict whether the amount of units will be greater or smaller when a different unit is used, eg 'I will need more pop sticks than blocks as the pop sticks are lighter than the blocks' (Reasoning) [CCT]
  - solve problems involving mass (Problem Solving) [N, CCT]
- recognise that mass is conserved, eg the mass of a lump of plasticine remains constant regardless of shape [CCT]

Background information

When students realise that changing the shape of an object does not alter its mass they are said to *conserve* the property of mass.

'Hefting' is testing the weight of an object by lifting and balancing it. Where possible students can compare the weights of two objects by using their bodies to balance each object, eg holding one object in each hand or balancing an object on each arm or leg.

Mathematics • Stage 1

Measurement and Geometry

Mass 2

Language

Students should be able to communicate using the following language: estimate, order, compare.

Refer also to language in Mass 1.

Mathematics • Stage 1

Measurement and Geometry

Time 1

Outcomes

A student:

- describes mathematical situations and methods using everyday and some mathematical language, actions, materials, diagrams and symbols MA1-1WM
- uses objects, diagrams and technology to explore mathematical problems MA1-2WM
- describes, compares and orders durations of events, and reads half- and quarter-hour time MA1-13MG

Students:

Name and order months and seasons (ACMMG040)

- name and order the months of the year [L]
- recall the number of days that there are in each month
- name and order the seasons, and name the months for each season
    - describe the environmental characteristics of each season, eg 'Winter is cool and some trees lose their leaves' (Communicating) [SE]
    - recognise that in some cultures seasonal changes mark the passing of time, eg the flowering of plants and migration patterns of animals are used by many cultures including Aboriginal people (Reasoning) [AHC, SE]
    - recognise that in countries in the northern hemisphere, the season is the opposite to that being experienced in Australia at that time (Reasoning) [A]

Use a calendar to identify the date and determine the number of days in each month (ACMMG041)

- identify a day and date using a conventional calendar [N]
    - identify personally or culturally specific days (Communicating) [IU]
    - identify the different use of calendars in different communities (Communicating) [IU, AHC, A]

Tell time to the half-hour (ACMMG020)

- use the terms 'o'clock' and 'half-past' [L]
- describe the position of the hands on a clock for the half-hour [L]
    - explain why the hour hand on a clock is halfway between the two hour-markers when the minute hand shows the half-hour (Communicating, Reasoning) [CCT]
    - describe everyday events with particular hour and half-hour times, eg 'We start school at 9 o'clock' (Communicating) [N]
- read and record hour and half-hour time on digital and analog clocks

Mathematics • Stage 1

Measurement and Geometry

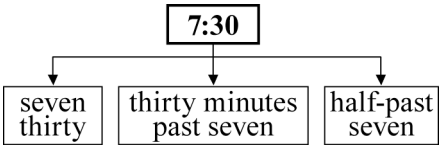
Time 1

Background information

'Timing' and 'telling time' are two different notions. The first relates to the duration of time and the second is 'dial reading'. Both, however, assist students in understanding the passage of time and its measurement.

Duration – It is important at this stage to have students develop a sense of one hour, one minute and one second through practical experiences rather than simply recalling that there are 60 minutes in an hour.

Telling time – At this stage, 'telling time' focuses on reading the half-hour on both analog and digital clocks. An important understanding is that when the minute hand shows the half-hour, the hour hand is always halfway between two hour-markers. Students need to be aware that there are three ways of expressing the time.



Note: When writing digital time, two dots should separate hours and minutes, eg 9:30.

In Aboriginal communities calendars may vary in accordance with local seasonal and environmental changes, such as flowering of plants and migration patterns of animals, or according to significant events in the local community. Consult with local communities regarding specific local perspectives.

Language

Students should be able to communicate using the following language: longer, shorter, calendar, month, season, year, minute, second, analog clock, digital clock, hour hand, minute hand, half past, halfway.

The terms 'hour hand' and 'minute hand' should be used rather than 'big hand' and 'little hand' to promote understanding of their respective functions.

Mathematics • Stage 1

Measurement and Geometry

Time 2

Outcomes

A student:

- describes mathematical situations and methods using everyday and some mathematical language, actions, materials, diagrams and symbols MA1-1WM
- uses objects, diagrams and technology to explore mathematical problems MA1-2WM
- supports conclusions by explaining or demonstrating how answers were obtained MA1-3WM
- describes, compares and orders durations of events, and reads half- and quarter-hour time MA1-13MG

Students:

Describe duration using months, weeks, days and hours (ACMMG021)

- use a calendar to calculate the number of months, weeks or days until an upcoming event
- estimate and measure the duration of an event using a repeated informal unit, eg the number of times you can clap your hands while the teacher writes your name [N]
    - solve simple everyday problems about time and duration (Problem Solving) [N, CCT]
    - recognise that other cultures use informal units of time, eg Aboriginal communities' use of tidal change (Reasoning) [N, CCT, AHC]
- compare and order the duration of events measured using a repeated informal unit, eg 'It takes me ten claps to write my name but only two claps to say my name'
- use the terms 'hour', 'minute' and 'second' [L]
- experience and recognise activities that have a duration of one hour, half an hour or quarter of an hour, one minute and a few seconds [L]
    - indicate when it is thought that an activity has gone on for one hour, one minute or one second (Reasoning)
    - compare and discuss the relationship between time units, eg an hour is a longer time than a minute (Communicating, Reasoning) [N]
    - make predictions about the duration of time remaining until a particular school activity starts or finishes, eg the length of time until lunch begins (Reasoning) [N]

Tell time to the quarter-hour, using the language of 'past' and 'to' (ACMMG039)

- use the terms 'past' and 'to', eg 'It is a quarter past three', 'It is a quarter to four' [L]
- describe the position of the hands on a clock for quarter past and quarter to [L]
    - recognise that the hands on a clock turn in a clockwise direction (Communicating)
- associate the numerals 3, 6 and 9 with 15, 30 and 45 minutes and use the terms 'quarter past' and 'quarter to' [L, N]
- identify which hour has just passed when the hour hand is not pointing to a numeral
- read and record quarter-past and quarter-to time on digital and analog clocks

Mathematics • Stage 1

Measurement and Geometry

Time 2

Background information

Refer to background information in Time 1.

Language

Students should be able to communicate using the following language: date, quarter past, quarter to, numeral, clockwise.

Refer also to language in Time 1.

Mathematics • Stage 1

Measurement and Geometry

Three-Dimensional Space 1

Outcomes

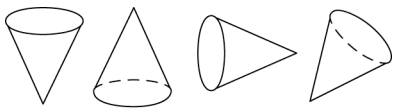
A student:

- describes mathematical situations and methods using everyday and some mathematical language, actions, materials, diagrams and symbols MA1-1WM
- sorts, describes, represents and recognises three-dimensional objects MA1-14MG

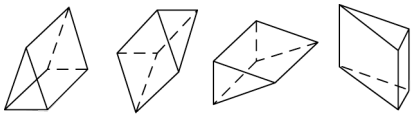
Students:

Recognise and classify familiar two-dimensional shapes and three-dimensional objects using obvious features (ACMMG022)

- manipulate and describe common three-dimensional objects, including cones, cubes, cylinders, spheres, prisms and pyramids [L]
- use the term 'faces' to describe the flat surfaces of three-dimensional objects [L]
- identify and name three-dimensional objects including cones, cubes, cylinders, spheres, prisms and pyramids from a collection of everyday objects [L]
  - select an object from a description of its features, eg find an object with six square faces (Reasoning)
- sort three-dimensional objects according to particular features, eg 'All these objects have curves'
- recognise that three-dimensional objects look different from different views
- identify cones, cubes, cylinders, prisms and pyramids presented in different orientations, eg



cones



triangular prisms

- recognise three-dimensional objects from pictures and photographs, and in the environment [N]

Background information

At this stage, students begin to explore objects in greater detail. They continue to describe the objects using their own language and are introduced to some formal language. Developing and retaining mental images of objects is an important skill for these students. Manipulation of a variety of real objects and shapes in the classroom, the playground and outside the school is crucial to the development of appropriate levels of language and representation.

Language

Students should be able to communicate using the following language: three-dimensional object, two-dimensional shape, face, cone, cube, cylinder, sphere, prism, pyramid, view.

The word 'face' has different meanings in different contexts. In mathematics the term 'face' refers to a flat surface, eg a cube has six faces.

Mathematics • Stage 1

Measurement and Geometry

Three-Dimensional Space 2

Outcomes

A student:

- describes mathematical situations and methods using everyday and some mathematical language, actions, materials, diagrams and symbols MA1-1WM
- sorts, describes, represents and recognises three-dimensional objects MA1-14MG

Students:

Describe the features of three-dimensional objects (ACMMG043)

- use the terms ‘faces’, ‘edges’ and ‘corners’ to describe three-dimensional objects [L]
  - describe the features of three-dimensional objects using materials, pictures and actions (Communicating) [L]
- identify two-dimensional shapes as faces of three-dimensional objects
- sort three-dimensional objects according to particular attributes, eg shape of faces
  - explain the attribute or multiple attributes used when sorting three-dimensional objects (Communicating, Reasoning)
- represent three-dimensional objects, including landmarks, by making simple models, drawing or painting [AHC]
  - choose a variety of materials to represent three-dimensional objects, including computer-drawing tools (Communicating) [N, ICT]
  - explain or demonstrate how a simple model was made (Communicating, Reasoning) [N]

Background information

Refer to background information in Three-Dimensional Space 1.

Language

Students should be able to communicate using the following language: edge, corner, base.

The mathematical term for a corner of a three-dimensional object is ‘vertex’. The plural is ‘vertices’. At this stage, students may use the everyday term ‘corner’.

Refer also to language in Three-Dimensional Space 1.

Mathematics • Stage 1

Measurement and Geometry

Two-Dimensional Space 1

Outcomes

A student:

- describes mathematical situations and methods using everyday and some mathematical language, actions, materials, diagrams and symbols MA1-1WM
- supports conclusions by explaining or demonstrating how answers were obtained MA1-3WM
- manipulates, sorts, represents, describes and explores two-dimensional shapes MA1-15MG

Students:

Recognise and classify familiar two-dimensional shapes and three-dimensional objects using obvious features (ACMMG022)

- identify and name vertical and horizontal lines in pictures and the environment [L]
- identify and name parallel lines in pictures and the environment [L]
  - give everyday examples of parallel lines, eg train tracks (Reasoning)
- manipulate, compare and describe features of two-dimensional shapes, including triangles, quadrilaterals, pentagons, hexagons and octagons [N]
  - describe features of two-dimensional shapes using the terms ‘sides’ and ‘corners’ (Communicating) [L, N]
- sort two-dimensional shapes by a given attribute, eg by number of sides or corners
  - explain the attribute used when sorting two-dimensional shapes (Communicating, Reasoning) [N]
- identify and name two-dimensional shapes presented in different orientations according to their number of sides using the terms ‘triangles’, ‘quadrilaterals’, ‘pentagons’, ‘hexagons’ and ‘octagons’ [L],

  eg

quadrilaterals hexagons

  - recognise that the name of a shape does not change when the shape changes its orientation in space, eg a square on its corner is still a square (Communicating, Reasoning)
  - select a shape from a description of its features (Reasoning) [L]
  - recognise that shapes with the same name may have sides of equal or different length (Reasoning)
- recognise that rectangles and squares are quadrilaterals
- identify and name shapes found in pictures and the environment, eg in Aboriginal art [AHC]
- join and separate an arrangement of shapes to form new shapes
  - identify shapes that are embedded in an arrangement of shapes or in a design (Problem Solving) [CCT]

Mathematics • Stage 1

Measurement and Geometry

Two-Dimensional Space 1

Background information

Manipulation of a variety of real objects and shapes is crucial to the development of appropriate levels of imagery, language and representation.

The skills of discussing, representing and visualising three-dimensional objects and two-dimensional shapes are developing at this stage and must be fostered through practical activities and communication. It is important for students to experience a broad range and variety of objects and shapes in order to develop flexible mental images and language.

Students need to be able to recognise shapes presented in different orientations. They need to develop an understanding that changing the orientation of the shape does not change its features or its name, eg a square on its point is still a square. In addition, they should have experiences identifying both regular and irregular shapes, although it is not expected that students understand or distinguish between regular and irregular shapes at this stage. Regular shapes have all sides and all angles equal.

Many shapes used in Aboriginal art are used with specific meanings. Local Aboriginal communities and education consultants can provide examples. Further exploration of such meanings could be incorporated in students' studies within the creative arts KLA.

Language

Students should be able to communicate using the following language: horizontal, vertical, parallel, quadrilateral, pentagon, hexagon, octagon, length, side, corner, equal, three-dimensional object, two-dimensional shape.

Shape: the term 'shape' refers to a two-dimensional figure.

Object: the term 'object' refers to a three-dimensional figure.

Mathematics • Stage 1

Measurement and Geometry

Two-Dimensional Space 2

Outcomes

A student:

- describes mathematical situations and methods using everyday and some mathematical language, actions, materials, diagrams and symbols MA1-1WM
- manipulates, sorts, represents, describes and explores two-dimensional shapes MA1-15MG

Students:

Describe and draw two-dimensional shapes, with and without digital technologies (ACMMG042)

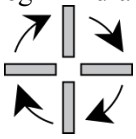
- make representations of two-dimensional shapes in different orientations, using drawings and a variety of materials including digital technologies [ICT]
- identify a line of symmetry on appropriate two-dimensional shapes
  - investigate and explain whether a given line through a shape is a line of symmetry (Communicating, Reasoning) [CCT]
  - use computer drawing tools to complete a design with one line of symmetry (Communicating) [ICT]
- make symmetrical designs using pattern blocks, drawings, paintings, origami and digital technology [ICT, A]

Investigate the effect of one-step slides and flips with and without digital technologies (ACMMG045)

- perform a one-step flip or slide on a single shape and describe the result, eg ‘When I flip the rectangle it creates a mirror image’
  - manipulate an image using computer functions ‘flip’ and ‘move’ (Communicating) [ICT]
  - recognise that flipping or sliding a shape does not change its size or features (Reasoning)
  - describe the movement of a shape as a single slide or flip (Communicating) [L]

Identify and describe half and quarter turns (ACMMG046)

- recognise whether a shape has been half or quarter turned
- describe, create and continue patterns with two-dimensional shapes using half and quarter turns, eg ‘If I draw a rectangle and quarter turn it three times, the pattern looks like a cross’



- make tessellating designs by flipping, sliding and/or turning a two-dimensional shape
  - create a tessellating design using computer functions ‘flip’, ‘move’ and ‘rotate’ (Communicating, Problem Solving) [ICT]
- identify shapes that do and do not tessellate [CCT]

Mathematics • Stage 1

Measurement and Geometry

Two-Dimensional Space 2

Background information

At this stage students will need to have experiences involving directions and turning. This is a precursor to understanding $360°$ as a full revolution. Discussions around what a 'full turn', 'half turn' and 'quarter turn' are will be necessary. Relating this information to students physically, for example, by playing games like 'Simon Says' using turns, may be helpful. Similarly, linking the vocabulary to students' experience with clocks may be of benefit.

A shape is said to have symmetry if both parts match when it is folded along a line of symmetry. Each part is the mirror image of the other.

Language

Students should be able to communicate using the following language: pattern blocks, line of symmetry, tessellate, flip, slide, move, turn, half turn, quarter turn, rotate.

Refer also to language in Two-Dimensional Space 1.

Mathematics • Stage 1

Measurement and Geometry

Position 1

Outcomes

A student:

- describes mathematical situations and methods using everyday and some mathematical language, actions, materials, diagrams and symbols MA1-1WM
- represents and describes the position of objects in everyday situations and on maps MA1-16MG

Students:

Give and follow directions to familiar locations (ACMMG023)

- give and follow directions to move between familiar locations, eg within the classroom or school
  - use amounts of turn (full and half) to describe direction (Communicating) [L]
- use the terms 'left' and 'right' to describe the position of objects in relation to themselves and in relation to a person facing in the opposite direction, eg 'The ball is on his/her left' [L]
- give or follow instructions to position objects in models and drawings, eg 'Draw the bird between the two trees' [L]
  - give or follow simple directions using a diagram or description (Communicating) [L]
- describe the path from one location to another on a drawing [L]
  - use a diagram to give simple directions (Communicating)
  - create a path from one location to another using computer software (Communicating) [ICT]

Background information

Being able to describe the relative position of objects in a picture or diagram requires interpretation of a two-dimensional representation.

Locations that are familiar to Aboriginal students may not be limited to their home environments but may also include other locations within the community, eg local landmarks and organisations.

Language

Students should be able to communicate using the following language: full turn, half turn, opposite, diagram, location.

Mathematics • Stage 1

Measurement and Geometry

Position 2

Outcomes

A student:

- describes mathematical situations and methods using everyday and some mathematical language, actions, materials, diagrams and symbols MA1-1WM
- represents and describes the position of objects in everyday situations and on maps MA1-16MG

Students:

Interpret simple maps of familiar locations and identify the relative positions of key features (ACMMG044)

- interpret simple maps by identifying objects in different locations, eg find a classroom on a school plan map [L, N]
- draw a sketch of a simple model
- describe the position of objects in models, photographs and drawings [L]
  - give reasons when answering questions about the positions of objects (Communicating, Reasoning) [CCT]
- make simple models from memory, photographs, drawings or descriptions, eg students make a model of their classroom
  - use knowledge of position in real world contexts to recreate models (Communicating)
- use drawings to represent the position of objects along a path [L]

Background information

Making models and drawing simple sketches of their models is the focus for students at this stage. Students usually concentrate on the relative position of objects in their sketches. The relationship of size between objects is difficult and will be refined over time, leading to the development of scale drawings in later stages. Accepting students' models and sketches is important.

Language

Students should be able to communicate using the following language: map, position, model.

Mathematics • Stage 1

Statistics and Probability

Data 1

A student:

- describes mathematical situations and methods using everyday and some mathematical language, actions, materials, diagrams and symbols MA1-1WM
- supports conclusions by explaining or demonstrating how answers were obtained MA1-3WM
- gathers and organises data, represents data in column and picture graphs, and interprets the results MA1-17SP

Students:

Choose simple questions and gather responses (ACMSP262)

- investigate an issue of interest by choosing suitable questions to obtain appropriate data [N]
- gather data and track what has been counted by using concrete materials, tally marks, words or symbols [L]

Represent data with objects and drawings where one object or drawing represents one data value. Describe the displays. (ACMSP263)

- display data using concrete materials and pictorial representations
- use objects or pictures as symbols to represent data, using one-to-one correspondence, eg using a block to represent each car [N]
- interpret and discuss information presented in data displays where one object or drawing represents one data value [N]
    - identify information presented in graphs using comparative language such as ‘more than’ and ‘less than’, eg ‘There were more silver cars than red cars’ (Communicating, Reasoning) [L]
    - develop ways to describe their findings from data, eg write simple sentences such as ‘The most popular fruit snack is an apple’ (Communicating) [L]

Background information

The notion of representing an object with a different object is abstract and is introduced at this stage.

It is important that each object in a three-dimensional graph represents one object except in the case where items are used in pairs, eg shoes. One object can also represent an idea, such as a person’s preference.

When collecting information to investigate a question, students can develop simple ways of recording. Some methods include placing blocks or counters in a line, colouring squares on grid paper, and using tally marks.

Language

Students should be able to communicate using the following language: data, represent, symbol, tally mark, more than, less than.

Statistics and Probability

Data 2

Outcomes

A student:

- describes mathematical situations and methods using everyday and some mathematical language, actions, materials, diagrams and symbols MA1-1WM
- uses objects, diagrams and technology to explore mathematical problems MA1-2WM
- supports conclusions by explaining or demonstrating how answers were obtained MA1-3WM
- gathers and organises data, represents data in column and picture graphs, and interprets the results MA1-17SP

Students:

Identify a question of interest based on one categorical variable. Gather data relevant to the question (ACMSP048)

- pose suitable questions that that will elicit categorical answers and gather the data, eg 'Which school sport is the most popular with our class members?', 'How did each student in our class get to school today?' [L, N]
  - predict the likely responses within data to be collected (Reasoning)
  - determine what data to gather in order to investigate a question of interest, eg colour, mode of transport, gender, type of animal, favourite sport (Problem Solving) [CCT]

Collect, check and classify data (ACMSP049)

- collect data on familiar topics through questioning, eg 'How many students are in our class each day this week?' (Communicating) [L]
  - use tally marks to assist with data collection (Communicating)
- identify categories of data and use them to sort data, eg sorting data collected on attendance by day of the week and into boys and girls present [L, N]

Create displays of data using lists, tables and picture graphs and interpret them (ACMSP050)

- use a baseline, equal spacing and same-sized symbols when representing data in a graph
  - identify misleading representations of data, eg on a picture graph where a particular symbol is used to represent one item but it is shown in different sizes (Reasoning) [N, CCT, EU]
- display data using lists, tables and picture graphs [L, N]
  - use displays to communicate information gathered in other learning areas, eg data gathered in a unit on families or local places (Communicating) [L, N, PSC, IU]
  - use graphics software to create picture graphs (Communicating) [ICT]
- interpret information presented in simple picture graphs [N]
  - describe data displayed in simple picture graphs found in books and made by other students (Communicating) [L, N]
- record observations based on tables and picture graphs developed from collected data [L]

Statistics and Probability

Data 2

Background information

Categorical variables can be separated into distinct groups or categories, eg the different colours of smarties in a box, or the types of favourite fruit of class members.

One-to-one correspondence in a picture graph means that one symbol is used to represent one response/item, eg ❀ = 1 flower.

Language

Students should be able to communicate using the following language: category, collect, picture graph, list.

Statistics and Probability

Chance 1

Outcomes

A student:

- describes mathematical situations and methods using everyday and some mathematical language, actions, materials, diagrams and symbols MA1-1WM
- supports conclusions by explaining or demonstrating how answers were obtained MA1-3WM
- recognises and describes the elements of chance in everyday events MA1-18SP

Students:

Identify outcomes of familiar events involving chance and describe them using everyday language such as 'will happen', 'won't happen' or 'might happen' (ACMSP024)

- use everyday language to describe chance events, eg might, certain, probably, likely, unlikely [L]
- recognise and describe the element of chance in familiar activities, eg 'I might play with my friend after school' [L, N]
    - predict what might occur during the next lesson or in the near future, eg 'How many people might come to your party?', 'How likely is it to rain if there are no clouds in the sky?' (Communicating, Reasoning) [CCT]

Background information

Students should be encouraged to recognise that, because of the element of chance, their predictions will not always be proven true.

Language

Students should be able to communicate using the following language: will happen, won't happen, might happen, probably, likely, unlikely.

When discussing certainty, there are two extremes: events that are certain to happen and those that are certain not to happen. Words such as 'might', 'may', 'possible' are used to describe events between these two extremes.

Statistics and Probability
Chance 2

Outcomes
A student:

- describes mathematical situations and methods using everyday and some mathematical language, actions, materials, diagrams and symbols MA1-1WM
- recognises and describes the elements of chance in everyday events MA1-18SP

Students:

Identify practical activities and everyday events that involve chance. Describe outcomes as 'likely' or 'unlikely' and identify some events as 'certain' or 'impossible' (ACMSP047)

- compare familiar activities and events and describe them as being more or less likely to happen [L]
- identify and distinguish between possible and impossible events
  - describe familiar events as being possible or impossible, eg 'It is possible that it will rain today', 'It is impossible to roll one six-sided dice and get a seven' (Communicating)
- identify and distinguish between certain and uncertain events
  - describe familiar situations as being certain or uncertain, eg 'It is uncertain what the weather will be like tomorrow', 'It is certain that tomorrow is Saturday' (Communicating)
- describe possible outcomes in everyday situations, eg discuss weather possibilities for the next day [L, CCT]

Background information

Refer to background information in Chance 1.

Language

Students should be able to communicate using the following language: certain, uncertain, possible, impossible.

The meaning of 'uncertain' is 'not certain' – it does not mean 'impossible'.