

Maths Progressions - Geometry and Measurement

This document was created by Clevedon School staff using the NZC, Maths Standards and Numeracy Framework, with support from Cognition Education consultants. It is indicative of the maths knowledge and strategies required to meet the curriculum and national standards at different year levels. A differentiated programme will be needed to ensure all students are scaffolded to progress in their learning. The learning intentions listed in this document are not in linear order and are not intended to be used as such. The needs of the learners, as identified through formal and informal data gathering, drives learning at all times at Clevedon School. The maths progressions for [number & algebra](#) and [statistics](#) should be used in conjunction with these progressions.

At Clevedon School maths programmes are characterised by the following:

- A problem solving approach, rather than a 'number crunching' one
- Differentiated practices, based on needs, as ascertained by current and reliable data
- Integration of the various strands of maths as much as possible and integration of the numeracy domains
- Integration of maths in other subjects and in real life settings
- Teachers and students using the correct vocabulary as set out in this document to ensure students experience the same language of learning from class to class
- The development of assessment capable learners who understand and can articulate the following:
 - Where am I going? What are my goals?
 - How am I going? What progress is being made towards the goal?
 - Where to next? What activities need to be undertaken next to ensure progress?
- [Effective pedagogy in mathematics](#) - The International Academy of Education's research on improving student achievement in mathematics, based on Best Evidence Synthesis is used to inform classroom practice. This [short guide](#) with questions to consider when reflecting on classroom practice may be helpful.
- A strategic approach is used for teaching 'mathematical behaviours' as set out in this document. Learning intentions for mathematical behaviours must be a part of each lesson.
- Classroom discourse on mathematics is strategically developed. Use this [document](#) to support the establishment of a discourse based classroom.

How to use this document:

- These progressions are not a checklist to be worked through. They can form the basis of the maths programme and should be used to inform planning. Students may be working at multiple stages in different areas of their learning.
- Data analysis, identifying of goals and any other planning will start with the maths progressions but other resources can also be drawn on.
- Progressions can be used to plan and teach a specific group and sometimes for 'clinics' i.e. students across the class with the same identified learning need.
- Share the progressions with students (age appropriate), so they know where they are, where they are going and what their next learning step is.
- All lessons must include learning intentions from the 'mathematical behaviours' section. These should be specifically planned for, taught and monitored.

Other relevant school based documents:

- [Maths assessment timeline and guidelines](#)
- [Assessment capable learners at Clevedon School](#)
- [Literacy and numeracy achievement map](#)
- Talk moves [version 1](#), [version 2](#)

Other relevant documents:

- [The New Zealand Curriculum - mathematics and statistics achievement objectives](#)
- [The Mathematics Standards](#)
- [Best Evidence Synthesis - Mathematics](#)

Maths Progressions - Geometry and Measurement

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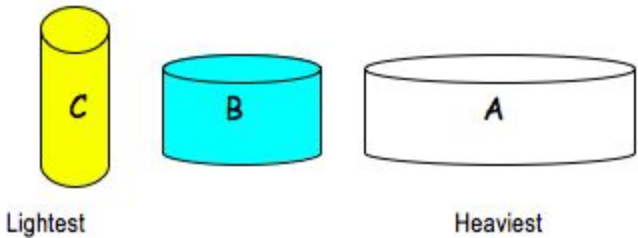
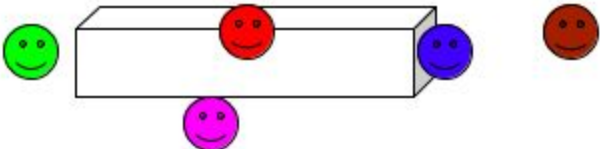

Level 1

After 1 year at school




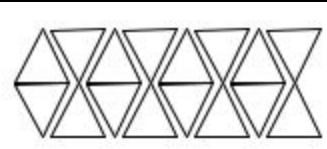
In a range of meaningful contexts students should be able to do the following:

Mathematical Behaviours (what mathematicians do)	
I am learning to...	
Explain my mathematical thinking	Explain others' strategies by repeating or re-voicing what they have said
Use the most efficient strategy to solve a problem e.g. I know that counting on from the largest number is more efficient than counting from 1.	Agree or disagree with someone else's strategy or answer, and explain why I think this
Listen actively	Say what I am good at in maths and what I need to work on
Identify maths in the world around me	Use mathematical vocabulary
Pose problems and conduct mathematical investigations	
Compare	
I am learning to...	
<p>Compare by direct comparison</p> <ul style="list-style-type: none"> ● Two lengths ● Two areas ● Two capacities ● Temperatures ● Two weights ● Time taken ● Values of coins ● Two shapes <p>Note:</p> <p>Where possible, reinforce number and algebra learning:</p> <ul style="list-style-type: none"> ● Doubles to 10 (using money) ● When counting number of blocks to measure an object, use skip counting 	<p>The vocabulary listed below are there to provide an example and are, not the full range of vocabulary that should be learned</p> <ul style="list-style-type: none"> ● Longer, taller, shorter e.g. A is longer than B ● Smaller, bigger e.g. The white oblong is smaller than the blue oblong ● Full, empty, enough, too much e.g. A can hold more water than B ● Hot, cold, freezing, boiling, warm e.g. The water is warmer than the ice ● Heavier, lighter e.g. The ball is heavier than the paper ● Long time, early, late e.g. Morning tea was a shorter time than lunch time ● 10 cents, 20 cents, \$1 etc. e.g. \$1 is more than 50c ● Square, circle, triangle e.g. The square and rectangle both have 4 sides
Order	
I am learning to...	

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<p>Order by direct comparison</p> <ul style="list-style-type: none"> ● Lengths ● Areas ● Capacities ● Temperatures ● Weights ● Days of the week 	<p>Three objects from lightest to heaviest</p>  <p>Example of language Long, longer, longest Light, lighter, lightest</p>
<p align="center">Sort</p> <p>I am learning to...</p>	
<p>Sort objects by their appearance (2D and 3D)</p>	<p>Examples</p> <ul style="list-style-type: none"> ● All of the round things go together ● All of the red shapes go together ● These are all long boxes ● These can all roll
<p>Sort a variety of object using everyday language</p> <p>Note: Sorting is an important skill, that need to be reinforced in a variety of contexts and subjects.</p>	<p>Examples</p> <ul style="list-style-type: none"> ● These objects are all yellow ● These are all things that can be recycled ● These are things that make a good friend ● These are all animals that can be pets
<p align="center">Position, orientation and transformation</p> <p>I am learning to...</p>	
<p>Describe positions of objects (relative to a person or another object)</p>	<p>The position of objects relative to a person or object: On, over, beside, inside, behind, outside, in, under, in front of, underneath, above, middle, next to, on top, before, between, after</p> 
<p>Give and follow instructions for movement that involve distances, directions and turns</p> <p>Note: Reinforce this learning during fractions and vice versa</p>	<p>Instructions for movement that involve distances, directions and turns: forwards, backwards, sideways, away from, towards, whole turn, half turn, quarter turn, near, far.</p> 

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	<p>Half and quarter turns in movement: Take two steps forward, make a quarter turn, slide over, make a half turn to face your next partner, etc.</p>
Create and talk about the result of slides, flips and turns on plane shapes	<p>The results of slides, flips, and turns on plane shapes</p>  <p>Slide Turn Flip</p>
<p>Represent reflections and translations by creating patterns</p> <p>Note: Reinforce the learning of patterns from the number and algebra strand</p> <ul style="list-style-type: none"> ● Continue sequential patterns ● Identify what the unit of repeat is in a pattern 	
<p>Find lines of symmetry in everyday objects</p> <p>Note: Folding or cutting regions in half is also a part of fraction learning. Reinforce during fractions unit and vice versa.</p>	
<p>Fit shapes together to form a tessellation (no spaces or overlaps)</p>	
<p>Knowledge</p> <p>I am learning to...</p>	
Recognise basic 2D shapes by sight and name	Circle, square, triangle, rectangle, hexagon
Know the days of the week in order	Monday is before Tuesday Yesterday was Wednesday, so tomorrow will be Friday
Read analogue times	O'clock Half past Quarter past Quarter to
Identify coins and notes	All coins All notes (5, 10, 20, 100)

Maths Progressions - Geometry and Measurement

Level 1

After 2 years at school

In a range of meaningful contexts students should be able to do the following:

Mathematical Behaviours (what mathematicians do)	
I am learning to...	
Explain my mathematical thinking	Explain others' strategies by repeating or re-voicing what they have said
Use the most efficient strategy to solve a problem e.g. I know that counting on from the largest number is more efficient than counting from 1.	Agree or disagree with someone else's strategy or answer, and explain why I think this
Listen actively	Say what I am good at in maths and what I need to work on
Identify maths in the world around me	Use mathematical vocabulary
Pose problems and conduct mathematical investigations	
Compare	
I am learning to...	
<p>Compare by estimation and direct comparison</p> <ul style="list-style-type: none"> ● More than two lengths ● More than two areas ● More than two capacities ● Temperatures ● More than two weights ● Duration of events ● Values of coins ● More than two shapes <p>Note:</p> <p>Where possible, reinforce number and algebra learning:</p> <ul style="list-style-type: none"> ● 50c is half of \$1 ● When counting number of blocks to measure an object, use skip counting <p>Note:</p> <p>Students must be able to make <i>sensible estimates</i> in the above as well as <i>measure accurately</i>. Making sensible estimates should be taught and assessed.</p>	<p>The vocabulary listed below are there to provide an example and are, not the full range of vocabulary that should be learned</p> <ul style="list-style-type: none"> ● Longer, taller, shorter e.g. A is longer than B ● Smaller, bigger e.g. The white oblong is smaller than the blue and yellow oblongs ● Full, empty, enough, too much e.g. A can hold more water than B, C and D ● The longest object is the book because it's 3 blocks longer than the pencil case ● Hot, cold, freezing, boiling, warm e.g. The soup is the warmest out of the ice, the juice and water ● Heavier, lighter e.g. The ball is heavier than the paper and the book ● Long time, early, late e.g. Morning tea was a shorter time than lunch time. It takes me longer to walk to the dairy than it does to the office ● 10 cents, 20 cents, \$1 etc. e.g. \$1 is more than 50c ● Square, circle, triangle e.g. The square and rectangle both have 4 sides but the triangle has 3

Maths Progressions - Geometry and Measurement

Compare by using a third object

- See above for list

Two lengths by using a third object



A is taller than B
C is taller than A
So C must be taller than B

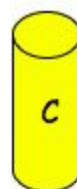
Order

I am learning to...

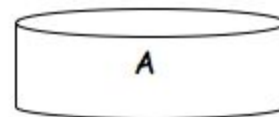
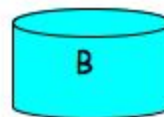
Order by direct comparison

- Lengths
- Areas
- Capacities
- Temperatures
- Weights
- Values of coins
- Days of the week

Three objects from lightest to heaviest



Lightest



Heaviest

Example of language:

Long, longer, longest

Light, lighter, lightest

Sort

I am learning to...

Sort objects by their appearance (2D and 3D)

Note:

Students should be introduced to 3D shapes during sorting activities, but they do not need to be able to name them at this level.

Examples

- All of the round things go together
- All of the shapes with three sides go together
- These are all long boxes
- These can all roll
- All of these shapes have the same number of corners
- These shapes have 6 faces

Sort a variety of objects using various mathematical language

Note:

Sorting is an important skill, that need to be reinforced in a variety of contexts and subjects.

Examples

- These objects all have 4 sides and 4 corners
- I've put all these objects together because they are 3D shapes and they have 6 sides.
- The all go together because they have the longest sides
- These are all things that can be recycled and reused
- These are things that make a good friend
- These are all animals that can be pets

Measure

I am learning to...

Maths Progressions - Geometry and Measurement

Measure using non-standard units

- Lengths
- Capacity and volume
- Weight
- Area

Note:

Where possible, reinforce number and algebra learning:

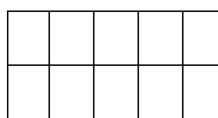
- The red pencil is half as many blocks long as the blue pencil
- When counting number of blocks to measure an object, use skip counting

Capacity using non-standard units:

3 cups fill the bowl



An area using tiles:



10 square tiles cover the floor

4 little triangles fill the big triangle

How much longer is the orange pencil than the blue pencil?



Students use non standard measure to answer e.g the orange pencil is 2 red blocks longer.

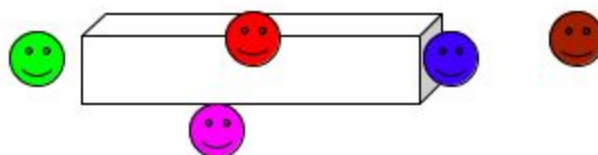
Position, orientation and transformation

I am learning to...


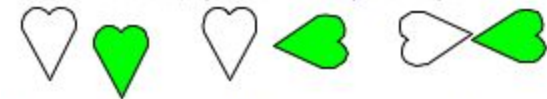



Describe positions of objects (relative to a person or another object)

The position of objects relative to a person or object:

On, over, beside, inside, behind, outside, in, under, in front of, underneath, above, middle, next to, on top, before, between, after, on the right hand side, on the left hand side etc.



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<p>Give and follow instructions for movement that involve distances, directions and turns</p> <p>Note: Reinforce this learning during fractions and vice versa</p>	<p>Instructions for movement that involve distances, directions and turns: forwards, backwards, sideways, away from, towards, whole turn, half turn, quarter turn, near, far.</p>  <p>Half and quarter turns in movement: Two steps forward, quarter turn to the left, slide to the right, make a half turn to face your next partner, etc.</p> <p>Turns when orienteering, using mazes and map reading: Turn right to get the treasure</p>
<p>Create and talk about the result of slides, flips and turns on plane shapes</p>	<p>The results of slides, flips, and turns on plane shapes</p>  <p>Slide Turn Flip</p>
<p>Create patterns using shapes (reflections and translations) and describe the pattern they have made</p> <p>Note: Reinforce the learning of patterns from the number and algebra strand</p> <ul style="list-style-type: none"> ● Create and continue sequential patterns ● Identify what the unit of repeat is in a pattern 	 <p>My pattern starts with an orange arrow pointing upwards, a blue arrow rotated a quarter turn clockwise, a green arrow rotated a quarter turn anticlockwise, a red arrow rotated a quarter turn clockwise...</p>
<p>Find lines of symmetry in everyday objects</p> <p>Note: Folding or cutting regions in half is also a part of fraction learning. Reinforce this during fractions unit and vice versa.</p>	
<p>Fit shapes together to form a tessellation (no spaces or overlaps)</p>	
<p>Knowledge</p> <p>I am learning to...</p>	
<p>Recognise basic 2D shapes by sight and name</p>	<p>Circle, square, triangle, rectangle, hexagon</p>
<p>Know the days of the week in order</p>	<p>Monday is before Tuesday Yesterday was Wednesday, so tomorrow will be Friday</p>

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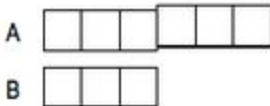
Read analogue times	O'clock Half past Quarter past Quarter to
Know and use time and calendar vocabulary	Minute, hour, second, morning, night, afternoon, midday, evening, midnight Months of the year, seasons
Identify coins and notes	All coins All notes (5, 10, 20, 100)
Count coins and notes in 2s, 5s and 10s	2, 4, 6, 8, 10 ... I have \$10

Maths Progressions - Geometry and Measurement

Level 2
Year 4 - At level 2

Year 3 - Early level 2

In a range of meaningful contexts students should be able to do the following:

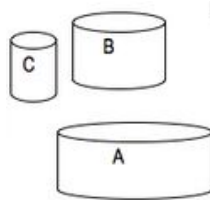
Mathematical Behaviours (what mathematicians do)	
I am learning to...	
Explain my mathematical thinking orally, visually or in writing	Engage in mathematical discussions with others
Explain others' strategies by repeating or re-voicing what they have said	Use the most efficient strategy to solve a problem e.g. I know that for this problem using a place value strategy is more efficient than counting on.
Agree or disagree with someone else's strategy or answer, and explain why I think this	Listen actively
I know what I am good at in maths, what my gaps are and my next steps	Use mathematical vocabulary
Pose problems and conduct mathematical investigations	Make connections with what I am learning in maths to other curriculum areas and the world around me
Compare	
I am learning to...	
Compare by estimating and measuring <ul style="list-style-type: none"> ● Lengths (including perimeter) ● Capacity and volume ● Area ● Mass ● Temperature ● Time <p>Note: Students must be able to make <i>sensible estimates</i> in the above as well as <i>measure accurately</i>. Making sensible estimates should be taught and assessed.</p>	Lengths by comparing the units used to measure them, and describe the comparison using measuring language <div>  <p>A = 6 cm and B = 3cm so A is 3cm more than B and B is half of A</p> </div> <p>Faster, slower, fastest, slowest</p> <p>How many times can you bounce a ball in a minute.</p> <p>Today is a hot day, because it is 22°C</p> <p>This water is boiling hot, because it is 100°C</p>
Estimate the size of various measures in everyday contexts	<ul style="list-style-type: none"> ● The size of 1L, 2L, 1mL, 5mL, 500mL ● The length of a km, m, cm, mm ● The size of a gram, kg ● The size of m², cm²
Order	
I am learning to...	

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Order by comparing metric units

- Lengths
- Areas
- Capacities
- Temperatures
- Weights
- Values of coins
- Days of the week

Weights by comparing metric units:



B= 1 cup of flour=20g

A= 2 cups of flour=40g

C= ½ cup of flour=10g

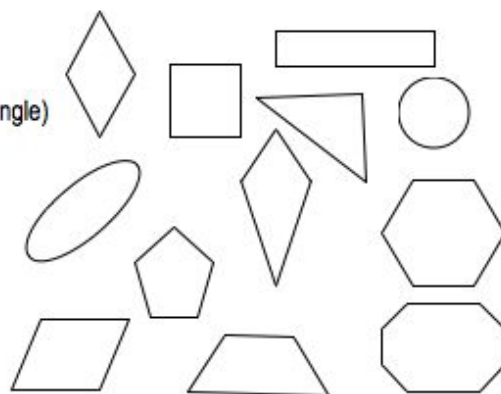
A is twice as heavy as B, and C is half the weight of B

Sort

I am learning to...

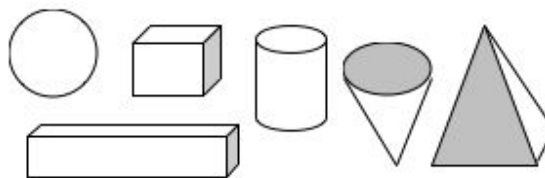
Sort, identify, describe and compare 2D and 3D shapes

Circle
Triangle
Square
Oblong (Rectangle)
Diamond
Oval
Ellipse
Hexagon
Pentagon
Octagon
Rhombus
Kite
Trapezium



Using their spatial features (corners, sides)

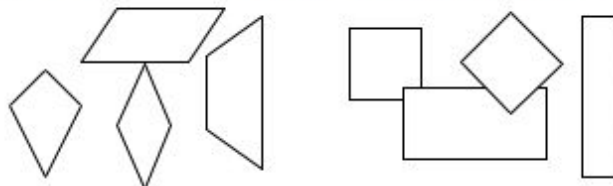
Sphere
Cube
Cylinder
Cone
Prism
Pyramid



Using their spatial features (faces, edges, corners)

Justify differences and similarities when sorting, using spatial features

Differences and similarities when sorting using spatial features



Measure

I am learning to...

Measure using appropriate metric units (with no gaps or overlaps)

Practical measurement of lengths using appropriate repeated metric units with no gaps and no overlaps

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- Length
- Area
- Weight (mass)
- Time
- Temperature
- Volume and capacity

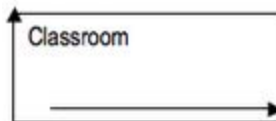
Note:

Students should learn how to choose and use appropriate devices to measure e.g. scales to measure weight

By the end of year 4, students should also be able to provide an accurate measurement for the length of an object which is longer than the measuring tool itself e.g. using a 1 metre ruler to measure the length of a room.

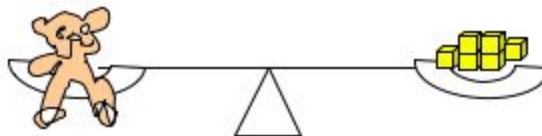


A is 7cm long and B is 5 cm long using 1 cm white rods



The classroom is 10 m long and 1 m wide using metre rulers

The weight of an object by using metric units



The bear weights 6 of the 10 g blocks = 60 g

Position, orientation and transformation

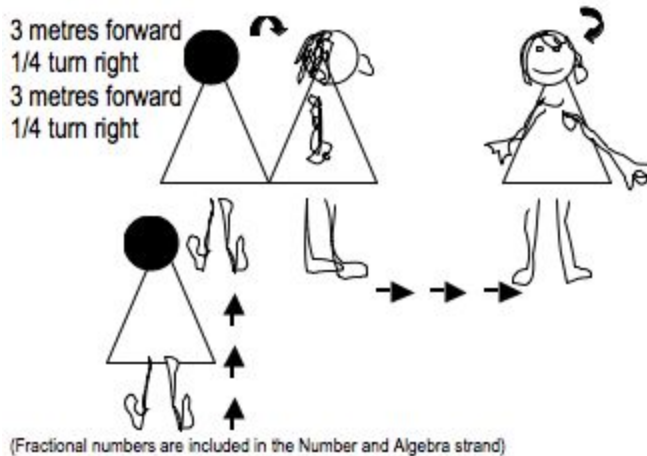
I am learning to...

Follow and give direction using quarter, half and three quarter turns, clockwise or anti clockwise, left and right and metric units such as metres

Note:

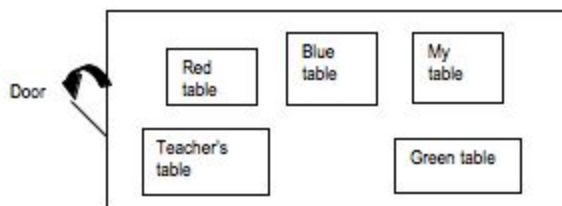
Reinforce - fractions knowledge, estimation skills and analogue times (e.g. quarter past)

Using quarter, half and three quarter turns clockwise or anticlockwise, left and right and metric units such as metres.



Create and use simple maps and plans

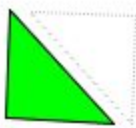


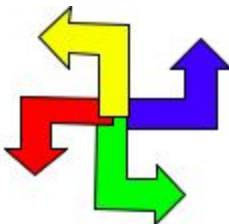

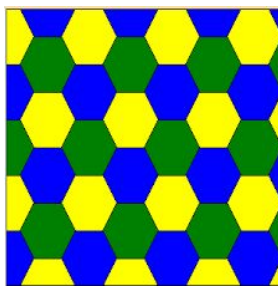
E.g. classroom, bedroom, home



Describe views and pathways from locations on a map

- Start at school
- Turn right and walk along Park Street. You can see the church at the end of the road straight ahead
- Turn right into Julie Drive. You can see the shops on your right

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	<ul style="list-style-type: none"> ● Cross the road at the shops and go left into Grove Road ● Third house on the right is mine. It is opposite the walkway to the park.
Predict and describe reflective symmetry (flips) and draw lines of symmetry in everyday objects e.g body parts, letters, insects etc.	 
Predict and describe patterns using translation (slides) of the same element or shape	
Predict and describe patterns by rotating (turning) objects or shapes	
Predict and describe the results of enlargements on plane shapes Note: Emphasise the learning of double and halves	 (Doubles and halves are included in the Number and Algebra strand)
Fit shapes together to form a tessellation	
Predict and check whether a particular shape will tessellate because they have straight sides	There is an opportunity for students to investigate here
<i>The transdisciplinary skills of prediction and description are key learning here</i>	
Problem solving I am learning to...	
Solve measurement problems by estimating and using addition and subtraction strategies Note:	Examples of this could be: Capacity using repeated non-standard units and metric units: 3 cups fill the bowl 3 cups = 1 Litre 1 teaspoon = 5 mL

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Refer to number and algebra progressions for strategies appropriate to each student's learning.



If 3 cups fill the 1L container. How many mL is the cup?
How many teaspoons would it take to fill the cup?

Area problems by a combination of part-whole, skip counting and repeating addition strategies:

$8 \times 5 = 40$ because $5 = 5 = 10$ and $4 \times 10 = 40$

$8 \times 6 = 48$ because $6 = 5 + 1$ so $8 \times 5 = 40$ and $8 \times 1 = 8$, $40 + 8 = 48$

Measurement problems involving weights by joining and separating them:

$5g + 3g = 8g$

Double the recipe: 5g sugar \rightarrow 10g sugar

Measurement problems involving area, in context by estimating and counting non-standard usings and metric units

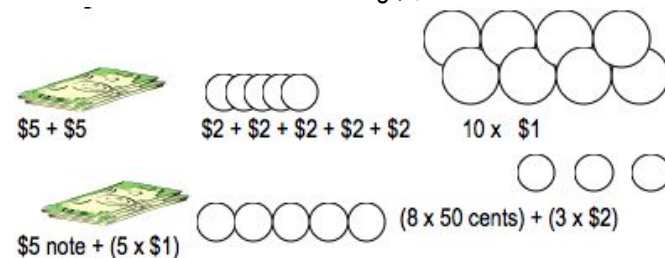


8 square metre tiles cover the floor

That's 4 squares + 4 squares

Or $2 + 2 + 2 + 2$ or 4×2 or 2×4

Represent a sum of money by two or more different combinations of note and coins e.g., \$10



Knowledge

I am learning to...


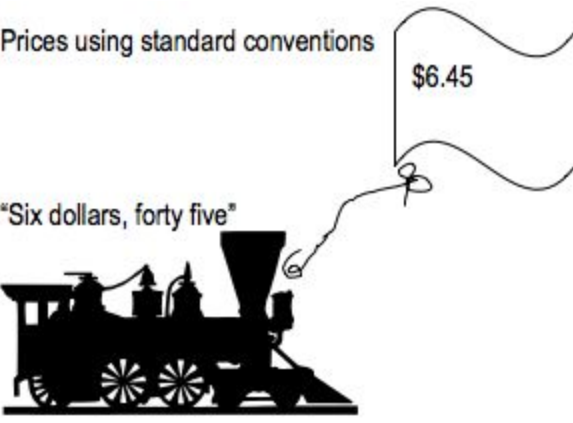
Recognise 2D shapes by sight and name

*Introduce 3D shapes

Circle, triangle, oblong (rectangle), square, diamond, oval, ellipse, hexagon, pentagon, octagon, rhombus, kite, trapezium

Sphere, cube, cylinder, cone, prism, pyramid

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<p>Read the conventions and appropriate symbols for units of:</p> <ul style="list-style-type: none"> ● Length ● Area ● Weight (mass) ● Time ● Temperature ● Volume and capacity 	<ul style="list-style-type: none"> ● cm, m, km, mm ● cm^2, m^2, km^2, mm^2 ● kg, g ● Minute, hour, second, morning, night, afternoon, midday, evening, midnight, months of the year, seasons, o'clock, quarter past/to, half past/to ● Write the date correctly 20-03-2015 ● degrees, celsius e.g. 20°C ● mL, L, kL
<p>Know and use the language of shape and measurement</p>	<p>See above and...</p> <ul style="list-style-type: none"> ● Analogue, digital ● Ordinal numbers (first day of the week, second month of the year) ● 3D/2D - dimensions ● Vertices, edges, faces, base, angles,
<p>Read and draw times in hours, half hours and quarter hours</p>	<p>Time in hours, half hours, and quarter hours (o'clock, half past, quarter past, quarter to)</p> <div data-bbox="834 848 1338 974">  <p>3 o'clock half past 4 7 o'clock half past 10</p> </div> <p>Draw the missing hands on the clock</p>
<p>Use a calendar to name the month of the year and use ordinal numbers for dates and months</p>	<p>First of the month is...</p> <p>First month of the year is..</p> <p>04-07-16 (short date)</p>
<p>Read class timetables using digital times</p>	<p>School starts at 9:00am 10:30am is fitness</p> <p>1:00pm is lunch</p>
<p>Read and write prices using standard conventions</p>	<p>Prices using standard conventions</p> <div data-bbox="834 1373 1403 1793">  <p>"Six dollars, forty five"</p> </div>

Maths Progressions - Geometry and Measurement

In year 5 and 6

Year 5 - Early level 3
Year 6 - At level 3

In a range of meaningful contexts students should be able to do the following:

Mathematical Behaviours (what mathematicians do)	
I am learning to...	
Explain my mathematical thinking orally, visually, in writing or using digital tools	Select and apply the appropriate representations to solve problems e.g. graphs, diagrams, tables, numbers etc.
Apply the most efficient strategy to solve a problem e.g. I know that for this problem a part-whole place value strategy is more efficient than compensating from tidy numbers.	Engage in mathematical discussions with others
Take or defend a position or point of view about a strategy/answer and justify with evidence e.g recognising relationships, or using counter examples	Explain others' strategies by repeating or re-voicing what they have said
Listen actively	I know where I am going, how I am going and where to next in maths
Use mathematical vocabulary	Make connections with what I am learning in maths to other curriculum areas and daily life
Pose problems and conduct mathematical investigations	Make generalisations
Measure	
I am learning to...	
<p>Estimate and measure using a range of units as appropriate</p> <ul style="list-style-type: none"> ● Length (including perimeter) ● Area ● Weight (mass) ● Time ● Temperature ● Volume and capacity ● Angles <p>Note: For volume measurements equipment may be used e.g. how many place value cubes fill a toothpaste box. They are not expected to know the formula for volume at this level.</p> <p>Note: Students must be able to make <i>sensible estimates</i> in the above as well as <i>measure accurately</i>. Making sensible estimates should be</p>	<p>Students must be able to choose and use appropriate devices to measure e.g. using a tape measure vs. a ruler, we use protractors to measure angles etc.</p> <p>Students should also be able to provide an accurate measurement for the length of an object which is longer than the measuring tool itself e.g. using a 1 metre ruler to measure the length of a room.</p> <p>Units to be used:</p> <ul style="list-style-type: none"> ● cm, m, km, mm ● cm², m², km², mm² ● kg, g, tonne ● Minute, hour, second, morning, night, afternoon, midday, evening, midnight, months of the year, seasons, o'clock, quarter past/to, half past/to ● 90°, 36° etc. ● Degrees celsius

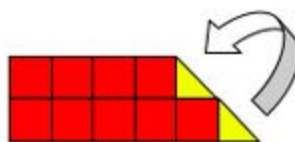
Maths Progressions - Geometry and Measurement

taught and assessed.

Note:

At this level students need to be able to measure decimals (e.g. understand that the measure is 1.3cm not just 1cm), but not problem solve with decimals

10 square metre tiles cover the floor



Capacity using marked measuring containers

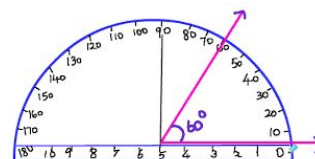
1 cup = 500mL



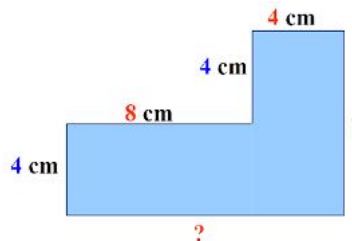
50g sugar on scales



Angles using a protractor



Find the perimeter of various shapes using efficient strategies



Describe the relative size of a kilometre, metre, centimetre and millimetre in everyday contexts

E.g. building, travelling, dressmaking
The length of these trousers is twice the length of the shorts
The junior cross country is approximately 1km, which is about the third of the distance of the senior cross country

Shape and space

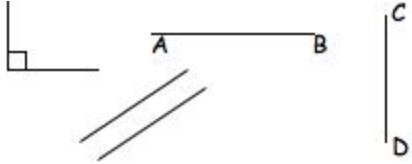
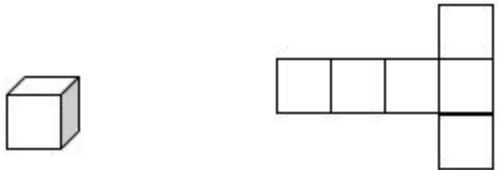
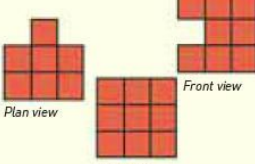
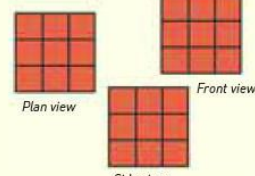
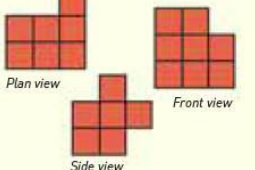


I am learning to...

Define, name, describe and draw 2D (plane shapes) and 3D shapes (prisms) by their spatial features

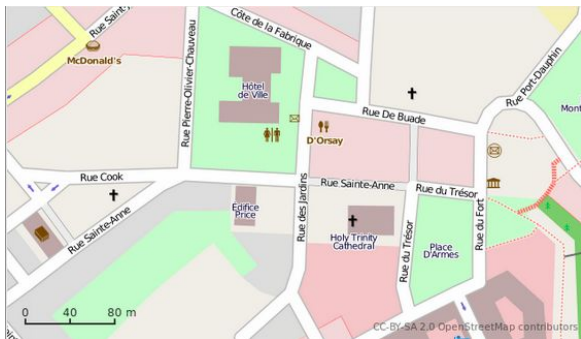
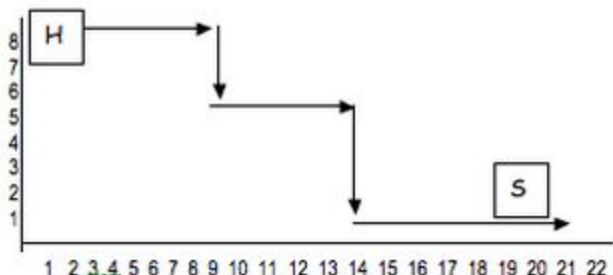
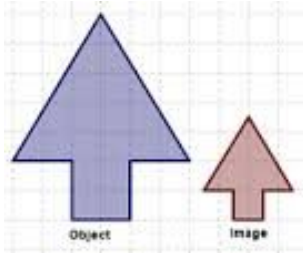
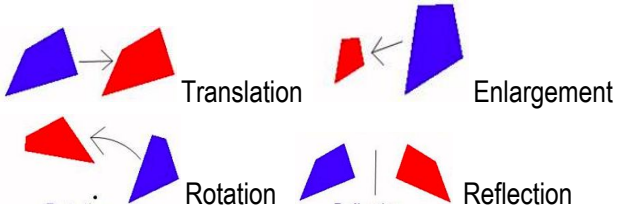
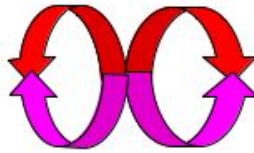
2D shapes/plane shapes:

- Sides
- Corners

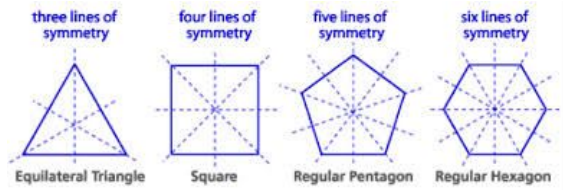
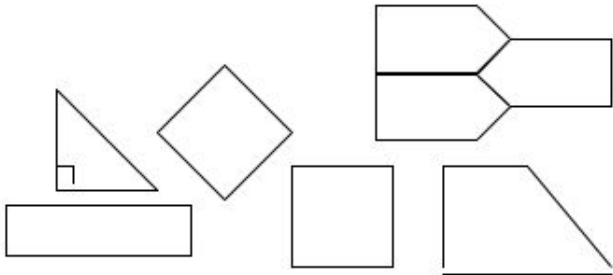
Maths Progressions - Geometry and Measurement

	<ul style="list-style-type: none"> ● Angles ● Diagonals ● Perimetre ● Centre <p>3D shapes/prisms:</p> <ul style="list-style-type: none"> ● Faces ● Edges ● Corners ● Angles ● Vertices (vertex) ● Surfaces
<p>Identify right angles, horizontal lines, vertical lines, parallel lines</p>	
<p>Draw nets for simple 3D shapes and make models (with equipment and paper) using the nets</p> <p>Note: By the end of year 6 students must be able to identify whether or not a net will fold to make a given cuboid model, e.g. which one of these nets will make a cuboid?</p>	
<p>Use projections (2D drawings) to interpret a isometric models made from cubes; and create a model from someone else's plan views</p> <p>Note: Students should engage in activities using cubes to build and investigate isometric models and their projections</p>	<p>Match the projections with the isometric views for 2 of the buildings.</p> <div data-bbox="922 1108 1206 1333"> <p><i>Projections for building A</i></p>  </div> <div data-bbox="922 1354 1206 1591"> <p><i>Projections for building B</i></p>  </div> <div data-bbox="922 1612 1206 1837"> <p><i>Projections for building C</i></p>  </div> <div data-bbox="1214 1255 1393 1434"> <p><i>Isometric view 1</i></p>  </div> <div data-bbox="1214 1507 1393 1707"> <p><i>Isometric view 2</i></p>  </div>
<p style="text-align: center;">Position, orientation and transformation</p> <p>I am learning to...</p>	

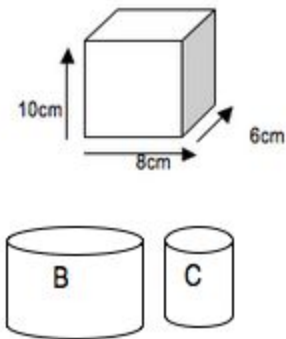

Maths Progressions - Geometry and Measurement

<p>Follow and give instructions involving distances in metres and compass directions including N, S, E, W, NE, NW, SE, SW</p>	<p>E.g. go 2m N, 3m SW, 4m N and 3m E.</p>
<p>Interpret scale maps of the local area and New Zealand</p>	
<p>Create and use coordinate systems to specify locations and describe paths</p>	<p>Home = 1, 8 School = 21, 1 Turn right at 9, 8. Turn left at 9, 5. Turn right at 15, 5. Turn left at 15, 1.</p> 
<p>Enlarge (on grid paper), simple shapes to a specified scale e.g. twice the size, three times the size</p>	
<p>Describe the transformations of an object (e.g. reflection, rotation, translation, enlargement)</p>	
<p>Design and make patterns that involve translation, reflection and rotation</p>	

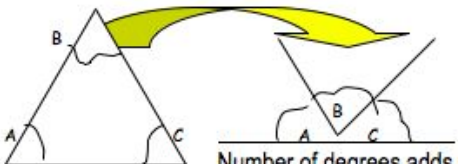

Maths Progressions - Geometry and Measurement

<p>Find all lines of reflective symmetry for a given shape or object</p>	 <p>three lines of symmetry four lines of symmetry five lines of symmetry six lines of symmetry</p> <p>Equilateral Triangle Square Regular Pentagon Regular Hexagon</p>
<p>Predict and check whether a particular shape will tessellate because it has a right angle and straight lines</p> <p>Note: There are many opportunities for students engaging in investigations here.</p>	
<p style="text-align: center;">Problem Solving</p> <p>I am learning to...</p>	
<p>Solve measurement problems by using a range of calculation strategies</p> <p>(Refer to number and algebra progressions for strategies appropriate to each student's learning)</p>	<p>It is 81 km from my house to school. I have travelled 33 km so I still have 48 more km to go. $33 = ? = 81$ or $81 - 33 = ?$ or $88 - 40 = ?$</p> <p>The perimeter of the classroom is $10\text{m} + 10\text{m} + 7\text{m} + 7\text{m} = 34\text{m}$ or $2 \times 10 + 2 \times 7 = 20 + 14 = 34$</p> <p>Area problems by using equipment e.g. place value blocks and calculating length x width using a range of additive and multiplicative strategies. 3×18 as $(3 \times 10) + (3 \times 8)$ or 9×6</p> <p>Temperature: use a range of additive and multiplicative strategies and negative numbers (integers)</p> <p>The highest temperature today was 25° and the lowest temperature was 8°. What was the difference? $25 - 8 = ?$</p> <p>In the Antarctic it was 23° below zero. The day warmed up by 7°. What is the temperature now? $-25 + +7 = -16^\circ$ In the Antarctic it was 23° below zero. The day got colder by 3°. What is the temperature now? $-25 + -3 = -26^\circ$</p> <p>Volume problems:</p> <p>$8 \times 6 = 48$ and $10 \times 48 = 480 \text{ cm}^3$ $8 \times 6 \times 10 = 480 \text{ cm}^3$</p>

Maths Progressions - Geometry and Measurement

	<p>$(10 \times 8) \times 3 \times 2$</p>  <p>B = 864g C = 16g How many C weigh the same as B? $864 \div 16$ as $432 \div 8$ as $216 \div 4$ as $108 \div 2 = 54$ or $16 \times 10 = 1600$ so $16 \times 5 = 800$ $800 + 16 = 816$ and $816 + 16 = 832$ $832 + 16 = 848$ and $848 + 16 = 864$</p>
<p>Carry out investigations involving geometry and measurement</p>	<p>This is one example:</p> <p>Investigation: To find a person's maximum heart rate in beats per minute, take their age away from 220. A 10-year old should have a maximum pulse rate of $220 - 10 = 210$. When you're exercising, your heart should be beating 60-75 percent of its maximum rate. Find out what kind of exercise increases your heart rate to 60-75 percent of its maximum rate.</p>
<p style="text-align: center;">Knowledge</p> <p>I am learning to...</p>	
<p>Read angles using a protractor</p>	
<p>Know and describe 360°, 180°, 90°, 45° angles</p>	

Maths Progressions - Geometry and Measurement

<p>Know the interior sum of any triangle</p>	 <p>Number of degrees adds up to a straight line $A + B + C = 180^\circ$</p>
<p>Know basic units and their equivalents in length, volume, weight</p> <p>Note: Emphasise the learning of place value, decimals and fractions (refer to number and algebra progressions for the appropriate level of learning for each student)</p>	<p>1 km = 1000m 1m = 100cm 1cm = 10mm</p> <p>1L = 1000mL 1/2 L = 500mL 1.5 L = 1, 500mL</p> <p>1kg = 1, 000g 1/2 kg = 500g</p>
<p>Read a variety of timetables in order to gain information</p>	<p>E.g. train and bus timetables, class timetables</p> <p>If I take the 6:42 train, I will arrive ten minutes later than I need to, to my destination.</p>
<p>Convert analogue time to digital time and vice versa</p> <p>Note: Students need to recognise that digital time works on a base of sixty and should be able to confidently read both analogue and digital times</p>	

Maths Progressions - Geometry and Measurement

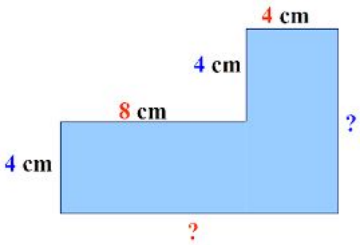
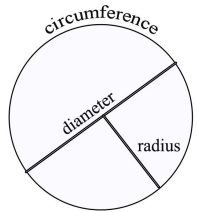
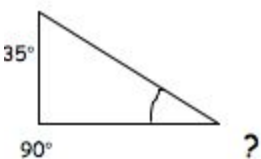
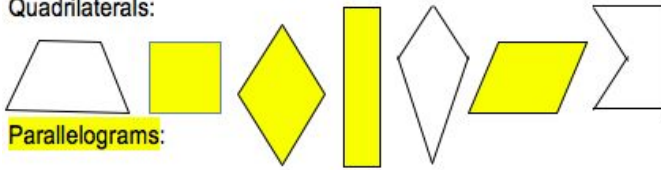

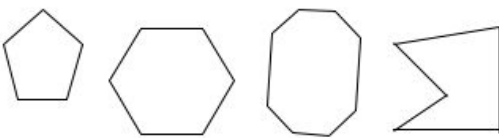
In year 7 and 8

Year 7 - Early level 4
Year 8 - At level 4

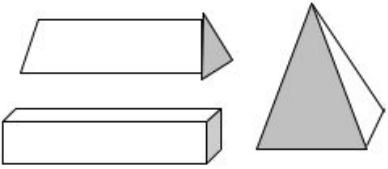
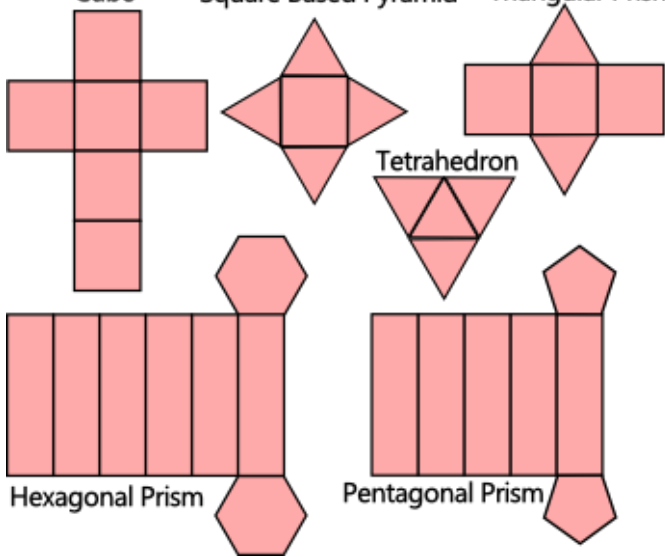
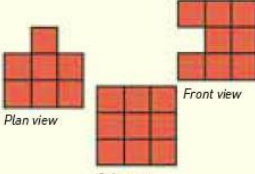
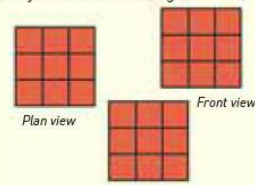
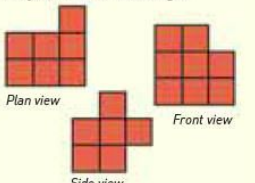
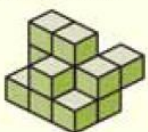

In a range of meaningful contexts students should be able to do the following:

Mathematical Behaviours (what mathematicians do)	
I am learning to...	
Explain my mathematical thinking orally, visually, in writing or using digital tools	Select and apply the appropriate representations to solve problems e.g. graphs, diagrams, tables, numbers etc.
Compare a variety of problem solving strategies	Engage in mathematical discussions with others
Take or defend a position or point of view about a strategy/answer and justify with evidence e.g recognising relationships, or using counter examples	Apply the most efficient strategy to solve a problem e.g. I know that for this problem a part-whole place value strategy is more efficient than compensating from tidy numbers.
Listen actively	I know where I am going, how I am going and where to next in maths
Use mathematical vocabulary	Make connections with what I am learning in maths to other curriculum areas, daily life, current events, art, culture or sport
Explain others' strategies by repeating or re-voicing what they have said	Pose problems and conduct mathematical investigations
Make generalisations	
Measure	
I am learning to...	
<p>Estimate and measure using a range of units and tools</p> <ul style="list-style-type: none"> ● Length ● Area ● Weight (mass) ● Time ● Temperature ● Volume and capacity ● Angles <p>Note: For volume measurements, equipment may be used e.g. how many place value cubes fill a toothpaste box</p> <p>Note:</p>	<p>Students must be able to choose and use appropriate devices to measure e.g. using a tape measure vs. a ruler, we use protractors to measure angles etc.</p> <p>Students should also be able to provide an accurate measurement for the length of an object which is longer than the measuring tool itself e.g. using a 1 metre ruler to measure the length of a room.</p> <p>Units to be used:</p> <ul style="list-style-type: none"> ● cm, m, km, mm ● cm², m², km², mm² ● cm³, m³, km³, mm³ ● kg, g, tonne ● Minute, hour, second, morning, night, afternoon, midday, evening, midnight, months of the year, seasons, o'clock, quarter past/to, half past/to

Maths Progressions - Geometry and Measurement

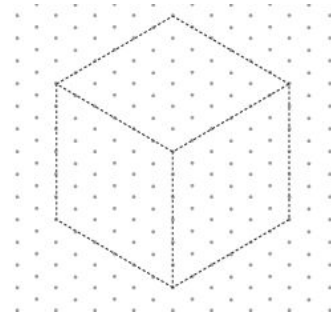
<p>Students must be able to make <i>sensible estimates</i> in the above as well as <i>measure accurately</i>. Making sensible estimates should be taught and assessed.</p>	<ul style="list-style-type: none"> ● 90°, 36° etc. ● Degrees celsius
<p>Find the perimeter of various shapes using efficient strategies</p>	
<p>Find the radius, diameter and circumference of a circle</p> <p>Note: Students are not expected to use formula to find a circumference of a circle at this level</p>	<p>Use the string and then measure the string with a ruler</p> 
<p>Find the interior angle sum of any triangle or rectangle</p>	<p> $90 + 35 = 125$ $180 - 125 = 55$ </p> 
<p style="text-align: center;">Shape and space</p> <p>I am learning to...</p>	
<p>Define, name, describe and draw classes of 2D (plane shapes) and 3D shapes (prisms) by their geometric properties</p>	<p>Classes of shapes by their geometric properties:</p> <p>Quadrilaterals:</p>  <p>Parallelograms:</p> <p>Triangles:</p> <p>Right Isoscelene Equilateral Scalene</p>  <p>Polygons:</p> <p>Regular Irregular</p> 

Maths Progressions - Geometry and Measurement

	<p>Classes of solid shapes by their surfaces:</p> <p>Rectangular prism Triangular prism Triangular pyramid Square pyramid</p> 
<p>Create nets and construct containers</p>	<p>Cube Square Based Pyramid Triangular Prism</p>  <p>Tetrahedron</p> <p>Hexagonal Prism Pentagonal Prism</p>
<p>Use projections (2D drawings) to interpret a isometric models made from cubes; and create a model from someone else's plan views</p> <p>Note: Students should engage in activities using cubes to build and investigate isometric models and their projections</p>	<p>Match the projections with the isometric views for 2 of the buildings.</p> <div data-bbox="922 1108 1206 1333"> <p>Projections for building A</p>  </div> <div data-bbox="922 1350 1206 1587"> <p>Projections for building B</p>  </div> <div data-bbox="922 1604 1206 1833"> <p>Projections for building C</p>  </div> <div data-bbox="1214 1251 1393 1434"> <p>Isometric view 1</p>  </div> <div data-bbox="1214 1499 1393 1703"> <p>Isometric view 2</p>  </div>

Maths Progressions - Geometry and Measurement

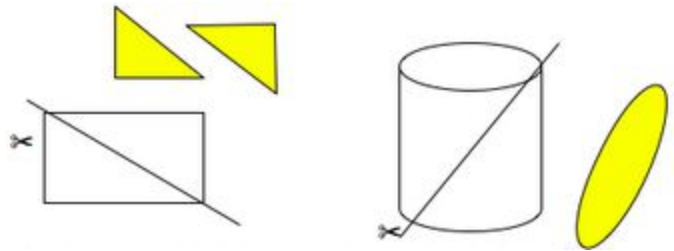
Draw cube models using isometric dot paper and make a cube model from a dot paper drawing (to size)



Solve problems involving cutting shapes and solids

What shapes are produced when a rectangle is cut along the diagonal?

What is the shape of the face produced by cutting a cylinder across the diagonal?



Position, orientation and transformation

I am learning to...

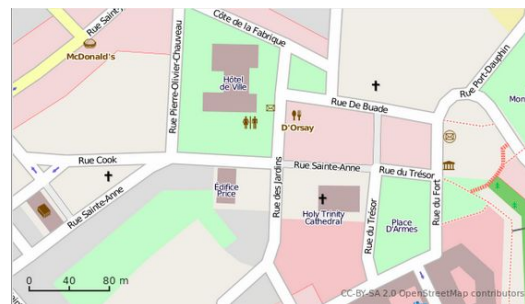
Use compass bearings to describe position

280° to the shed
067° to the sandpit

Interpret maps of the local area, New Zealand and the world

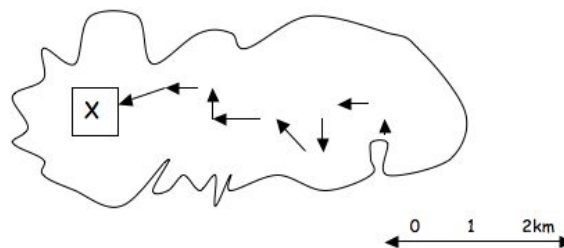
Note:

Include the use of coordinate systems and scales on maps

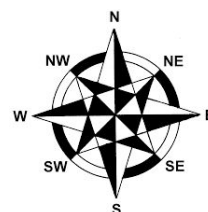


Maths Progressions - Geometry and Measurement

Use compass directions and scale to mark a route



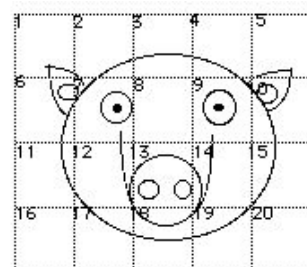
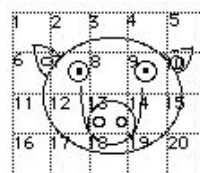
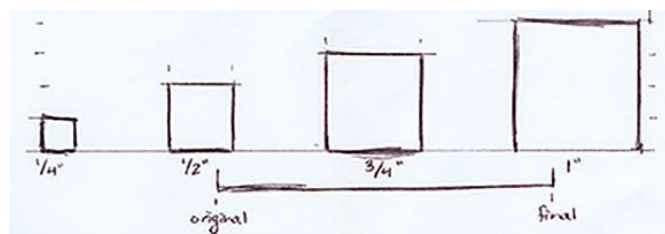
Use the compass to solve problems involving directions and movement



Examples:

- Treasure hunts
- Mazes
- Finding all possible routes to a destination and deciding on the shortest one

Enlarge and reduce simple shapes to a specific scale using grid paper




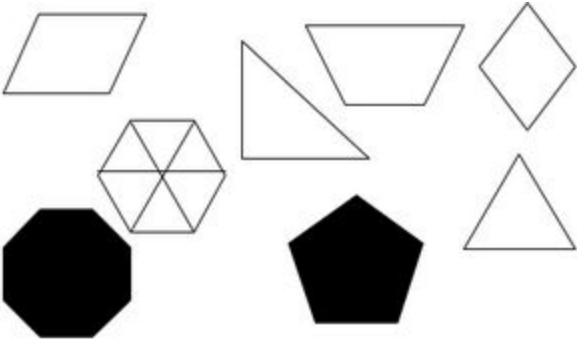
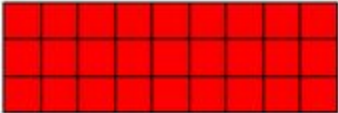
Describe patterns using the language of transformation (reflection, rotation, translation, enlargement)

Note:

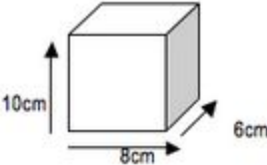

Students should also design and make their own patterns



Maths Progressions - Geometry and Measurement

	
Use drawing instruments to construct regular shapes	<p>"From A, and inside the rectangle, draw a short arc with a radius of 9 centimetres. From D, using the same radius, draw an arc that intersects the previous arc. Bisect the line BC, using a compass and a ruler."</p> <p>Vocabulary: Arc, radius, intersect, bisect, diameter, circumference etc.</p>
Find the point and order of rotational symmetry	See website for notes on rotational symmetry
Predict and check whether a particular shape will tessellate because its interior angles add to 180° or 360°	
Problem solving I am learning to...	
Solve measurement problems using a range of advanced additive strategies using decimals	<p>In the context of a problem, an example can be: $2.25\text{cm} + 1.75\text{cm} = 4\text{ cm}$</p> <p>It is now 6.15. How many minutes until it is 7.05? The plane leaves at 13.05. We have to be there 1 hour before that. What time do we need to be there ?</p>
Solve measurement problems using a range of multiplicative strategies Note: Temperature problems should involve integers	<p>Solve area problems by using equipment e.g. place value blocks or squared paper, and calculating length x width using a range of multiplicative strategies.</p> <p>$27 \times 3 = (9 \times 3) \times 3 = 9 \times 9 = 81$</p> 

Maths Progressions - Geometry and Measurement

	<p> $8 \times 6 = 48$ and $10 \times 48 = 480 \text{ cm}^3$ $8 \times 6 \times 10 = 480 \text{ cm}^3$ $(10 \times 8) \times 3 \times 2$ </p>   <p> $B = 864\text{g}$ $C = 16\text{g}$ How many C weigh the same as B? $864 \div 16$ as $432 \div 8$ as $216 \div 4$ as $108 \div 2 = 54$ or $16 \times 10 = 1600$ so $16 \times 5 = 800$ $800 + 16 = 816$ and $816 + 16 = 832$ $832 + 16 = 848$ and $848 + 16 = 864$ </p> <p> The temperatures this week were 25°, 23°, 28°, and 22°. What was the average? $98^\circ \div 4 = 24.5^\circ$ In the Antarctic it was 23° below zero. The day warmed up by 7°. What is the temperature now? $-23 + +7 = -16^\circ$ </p>
<p style="text-align: center;">Knowledge</p> <p>I am learning to...</p>	
<p>Convert between units, using whole numbers and commonly used decimals and fractions</p> <p>Note: Emphasise the learning of place value, decimals and fractions (refer to number and algebra progressions for the appropriate level of learning for each student)</p>	<p>Examples include:</p> <p> $7\text{km} = 7000\text{m} = 700\,000\text{cms}$ $8.5\text{L} = 8500\text{mL}$ $\frac{1}{4} \text{ litres} = 250\text{mL}$ </p>
<p>Read and write conventional symbols for units of measurement</p>	<ul style="list-style-type: none"> ● cm, m, km, mm ● cm^2, m^2, km^2, mm^2 ● cm^3, m^3, km^3, mm^3 ● kg, g, t ● 90°, 36° etc. ● $^\circ\text{C}$
<p>Know and understand the formula for volume and area</p>	<p>Area: Rectangles, parallelograms and triangles</p> <p>Volume: Cuboids</p>
<p>Know and describe angles</p>	<p> Line = 180° Right angle = 90° Circle = 360° The sum of the interior angles of a triangle = 180° The sum of the interior angles of a rectangle = 360° Obtuse, acute, right, reflex angles </p>

Maths Progressions - Geometry and Measurement

Know, calculate, and convert time in minutes and hours using analogue and digital time as well as 24 hour clocks	Twenty five to eight Ten past five am/pm Know that digital time works on a base of 60
Read a variety of timetables in order to gain information	E.g. train and bus timetables, class timetables If I take the 16:42 train, I will arrive ten minutes later than I need to, to my destination.
Describe and draw the features of a circle	Diameter Radius Circumference