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Mathematics and Statistics for Aotearoa New Zealand Phase 2
Sample materials

Welcome to *Mathematics and Statistics for Aotearoa New Zealand* Phase 2 sample materials

Mathematics and Statistics for Aotearoa New Zealand is a brand-new series developed to support the implementation of the Te Mātaiaho Mathematics and Statistics curriculum.

The programme delivers a wealth of teaching and learning resources for students and teachers, summarised below.

Student Workbook	Student Dashboard	Teacher Dashboard
• Full-colour student workbook with guided, independent and extended practice activities for every topic, glossary of key terms and answers	• Student workbook (digital version) Years 1–8. Activity content for Year 0 • Pre-tests for every topic • Access to additional resources including activity sheets, blackline masters and mastery tasks – assigned by the teacher based on ability level • Post-tests for every topic	• Curriculum and planning documents that support teachers in implementing the refreshed curriculum (Years 0–8) • References to the OECD PISA 2022 Mathematics Framework, specifically Mathematical Literacy and the three domains for the literacy skills required for the 21st Century • Lesson plans for every topic, outlining the explicit teaching and modelling, guided practice and skill development, and independent and extended practice content for the topic (Years 0–8) • Learning resources for every topic including interactive topic introductions, blackline masters, activity sheets, and mastery tasks (mastery tasks Years 4–8) • Pre-tests for every topic • Post-tests for every topic • Auto-generated reporting for student pre- and post-test results, to assist with student allocation to above-, on- or below-level groups for each topic

We have collated sample materials from Year 4 of the programme in this downloadable sample. These materials provide examples of the planning and curriculum content, along with teaching and learning materials for a Year 4 topic (*Number and algebra: Unit 6 Spatial reasoning, Topic 2 3D shapes*).

Planning materials (available on Teacher Dashboard)

The following materials will support your planning across the year:

- **Curriculum planner**: Year 4 Unit and Topics aligned to the Te Mātaiaho Mathematics and Statistics curriculum.
- **Term planner**: a suggested teaching sequence of the Year 4 content across the 4 terms.
- **Generic learning sequences pathways**: editable templates for teachers to adapt when planning lesson sequences to suit the needs of the students in their classes. These templates will support teachers to plan for and manage learning sequences to cater for students who are on, above and below the expected standard.
- **Generic learning sequences pathway composite**: editable templates for teachers to adapt when planning lesson sequences to suit the needs of the students in their classes. These templates will support teachers to plan for and manage multi-age/composite class situations by suggesting how to cater for each year level throughout the learning sequence.

Mathematics and Statistics for Aotearoa New Zealand Phase 2
Sample materials

Teaching and learning materials

The following resources support teaching and learning for the Year 4 topic *Number and algebra: Unit 6 Spatial reasoning, Topic 2 3D shapes*

Student Workbook pages (in print and on Student and Teacher Dashboards)

- Pages for *Unit 6 Spatial reasoning, Topic 2 3D shapes.* Including guided, independent and extended practice
- Contents page (for overview of Year 4 content)
- Key terms (glossary)
- Answers (a sample of the answers included at the back of the Student Workbook)

Lesson Plan (on Teacher Dashboard)

The program's lesson plans give you all the resources you need to teach 1 hour of mathematics and statistics every day. For each topic they include:

- Session timing
- Learning focus, success criteria, curriculum links
- Materials list
- Support for potential difficulties
- Daily practice activity
- Whole class explicit and intentional teaching
- Whole class, small group and independent activities (targeted to students ability levels, based on pre-test results).

Additional learning materials (on Teacher Dashboard, assignable to Student Dashboard)

- Activity Sheet 21: The built Environment for Unit 6 Spatial reasoning, Topic 2 3D shapes
- Mastery Task 2: Gardening as a hobby
- Mastery Task 2: Answers
- Mastery Task 4: Houses and homes
- Mastery Task 4: Answers

Years 5 and 6

Also included in this downloadable sample are the Year 5 and 6 Curriculum planners. Each document shows the Year level Unit and Topic content.

Mathematics and Statistics for Aotearoa New Zealand 4
Curriculum planner

Curriculum links: Year 4

Number and algebra

Unit	Topic	Focus	New Zealand Curriculum
Number structure and operations	Place value	Read, write, represent and order numbers up to 5 digits	• count to and within 1,000, from any multiple of 100, forwards and backwards in 25s and 50s • recognise the base ten structure of numbers up to 10,000 • identify, read, write, compare, and order whole numbers up to 10,000
Number structure and operations	Addition mental methods	Explore and choose appropriate mental addition methods such as the split method and extending number facts to solve addition problems	• recognise the base ten structure of numbers up to 10,000 • add and subtract 2- and 3-digit numbers • explore the associative property with addition and multiplication
Number structure and operations	Addition written methods	Explore and choose appropriate written addition methods such as the jump method and vertical addition to solve addition problems	• recognise the base ten structure of numbers up to 10,000 • add and subtract 2- and 3-digit numbers
Number structure and operations	Subtraction mental methods	Explore and choose appropriate mental subtraction methods such as extending number facts and getting to a 10 to solve subtraction problems	• add and subtract 2- and 3-digit numbers
Number structure and operations	Subtraction written methods	Explore and choose appropriate written subtraction methods such as the jump method and vertical subtraction to solve subtraction problems	• add and subtract 2- and 3-digit numbers
Number structure and operations	Inverse operations	Explore the connection between addition and subtraction and identify related families of fact	• add and subtract 2- and 3-digit numbers

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Curriculum planner

Number structure and operations	Multiplication and division facts	Investigate the relationship between multiplication and division facts and use them to problem solve	• use inverse operations to solve multiplication and division problems • recall multiplication and corresponding division facts for 4s, 6s, 9s, and 10s • divide whole numbers by a 1-digit divisor, with no remainders • use rounding and estimation to predict and to check the reasonableness of calculations • round whole numbers to the nearest thousand, hundred, or ten, and round tenths to the nearest whole number
Number structure and operations	Multiplication and division mental methods	Explore and choose appropriate mental multiplication and division methods such as doubling, halving and using known number facts	• multiply a 2-digit by 1-digit number and two 1-digit whole numbers • divide whole numbers by a 1-digit divisor, with no remainders • use doubling or halving to scale a quantity
Number structure and operations	Multiplication written methods	Explore and choose appropriate written multiplication methods such as the split method and the grid method to solve problems involving 1- and 2-digit numbers	• multiply a 2-digit by 1-digit number and two 1-digit whole numbers • explore the distributive property of multiplication over addition

Rational numbers	Equivalent fractions and decimals	Model, identify, compare and order equivalent fractions and decimals	• identify, read, write, and represent tenths as fractions and decimals
			• compare and order tenths as fractions and decimals, and convert decimals to fractions
			• divide whole numbers by 10 to make decimals
			• for fractions with related denominators of 2, 4, and 8, 3 and 6, or 5 and 10:
			  ○ compare and order the fractions
			  ○ identify when two fractions are equivalent
			  ○ represent the fractions in their simplest form

Rational numbers	Improper fractions and mixed numbers	Use number lines to count by unit fractions and compare the size of different fractions	• convert, using number lines, between improper fractions and mixed numbers for fractions with denominators of 2, 3, 4, 5, 6, and 10

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Curriculum planner

Rational numbers	Fractions of quantities	Explore, identify and represent unit fractions as part of a set, and part of a whole	• find a unit fraction of a whole number, using multiplication or division facts and where the answer is a whole number • identify, from a unit fraction part of a set, the whole set
Rational numbers	Adding and subtracting fractions	Apply knowledge of equivalent fractions to add and subtract fractions with a common denominator	• add and subtract fractions with the same denominators to make up one whole or less than one whole • add and subtract decimals to one decimal place
Financial mathematics	Money	Explore different combinations of coins to make a total, calculate change and round to the nearest ten cents	• make amounts of money using dollars and cents • estimate and calculate the total cost and change for items costing whole dollar amounts
Patterns and algebra	Number patterns	Follow and create rules for number patterns and identify missing numbers based on function machine rules	• recognise and describe the rule for a growing pattern using words, tables, and diagrams, and predict further elements in the pattern
Patterns and algebra	Number sentences	Interpret, represent and solve word problems, and find missing numbers to balance equations	• form and solve true or false number sentences and open number sentences involving multiplication and division, using understanding of the equal sign

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Curriculum planner

Measurement and geometry

Unit	Topic	Focus	New Zealand Curriculum
Using units of measurement	Length and area	Estimate, measure and compare lengths using centimetres. Estimate, measure and compare areas using square centimetres and square metres	- develop personal benchmarks for estimation and measure length, area, mass (weight), capacity, and duration, using appropriate metric units - use appropriate units to describe length, mass (weight), capacity, and time - use the metric measurement system to explore relationships between units - visualise, estimate, and calculate: - the perimeter of polygons using metric units - the area of shapes covered with squares or half squares - the volume of shapes filled with centicubes, taking note of layers and stacking
Using units of measurement	Volume and capacity	Estimate, measure and compare volume and capacity using cubic centimetres, litres and millilitres	- develop personal benchmarks for estimation and measure length, area, mass (weight), capacity, and duration, using appropriate metric units - use appropriate units to describe length, mass (weight), capacity, and time - use the metric measurement system to explore relationships between units - visualise, estimate, and calculate: - the perimeter of polygons using metric units - the area of shapes covered with squares or half squares - the volume of shapes filled with centicubes, taking note of layers and stacking

Mathematics and Statistics for Aotearoa New Zealand 4
Curriculum planner

Using units of measurement	Mass	Estimate and measure masses using grams and kilograms. Compare and classify the mass of common items in relation to 1 kg and 500 g	• develop personal benchmarks for estimation and measure length, area, mass (weight), capacity, and duration, using appropriate metric units • use appropriate units to describe length, mass (weight), capacity, and time • use the metric measurement system to explore relationships between units
Using units of measurement	Time	Record and interpret digital and analog time to the minute. Convert between common units of time	• develop personal benchmarks for estimation and measure length, area, mass (weight), capacity, and duration, using appropriate metric units • use appropriate units to describe length, mass (weight), capacity, and time • tell the time to the nearest 5 minutes, using the language of minutes past the hour and to the hour
Geometry and spatial reasoning	2D shapes	Explores, describes and classifies 2D shapes according to their features	• identify, classify, and describe the properties of polygons (including triangles and quadrilaterals) using properties of shapes, including line and rotational symmetry
Geometry and spatial reasoning	3D shapes	Recognise, describe and draw 3D shapes according to their features and the 2D shapes that make them up	• identify the 2D shapes that compose 3D shapes (e.g., a triangular prism is made up of two triangles and three rectangles)
Geometry and spatial reasoning	Angles	Compare and classify angles in shapes and the environment in relation to a right angle	• compare and classify angles in 2D shapes equal to, smaller than, or larger than a right angle • recognise that angles can be measured in degrees, using 90, 180, and 360 degrees as benchmarks
Geometry and spatial reasoning	Symmetry	Classify items as symmetrical or not symmetrical and identify lines of symmetry	• identify, classify, and describe the properties of polygons (including triangles and quadrilaterals) using properties of shapes, including line and rotational symmetry

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Curriculum planner

Pathways	Flips, slides and turns	Identify, classify and represent slide and turn transformations	• visualise, predict, and identify which shape is a reflection, rotation, or translation of a given 2D shape
Pathways	Grids and maps	Use grid references to interpret and create simple maps	• use grid references to identify regions and to plot positions on a grid map • interpret and describe pathways, including half and quarter turns and the distance travelled

Statistics and probability

Unit	Topic	Focus	New Zealand Curriculum

Statistics	Collecting data	Explore and choose appropriate data sources to collect and classify data	• investigate summary and comparison situations with categorical and discrete numerical data, using multivariate (2 or more variables) data, by
			  o posing summary and comparison investigative questions that can be answered with data
			  o making predictions or assertions about expected findings
			• create and describe data visualisations for summary and comparison investigations that make meaning from the data, with statements including the name of the variable
			• choose the best descriptive statements to answer the investigative question, reflecting on findings and how they compare with initial predictions or assertions

Statistics	Graphs	Understand and use the features of common data displays such as picture graphs and column graphs	• use a variety of tools to collect data, and check for errors in the data

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Curriculum planner

Statistics	Interpreting data	Draw conclusions from data presented in graphs, and compare the effectiveness of different data displays	- investigate summary and comparison situations with categorical and discrete numerical data, using multivariate (2 or more variables) data, by: - posing summary and comparison investigative questions that can be answered with data - making predictions or assertions about expected findings - create and describe data visualisations for summary and comparison investigations that make meaning from the data, with statements including the name of the variable - check the statements that others make about data to see if they make sense, using information to clarify or correct statements where needed.
Probability	Chance events	Identify possible outcomes of chance events and classify events using the language of probability	- engage in chance-based investigations with equally likely outcomes by: - posing investigative questions - anticipating what might happen - identifying possible outcomes for the investigative questions - generating all possible ways to get each outcome (a theoretical approach) or undertaking a probability experiment and recording the occurrences of each outcome - creating data visualisations for possible outcomes - describing what these visualisations show - finding probabilities as fractions - answering investigative questions - reflecting on anticipated outcomes

Probability	Chance experiments	Conduct multiple chance experiments and predict and compare the results	- engage in chance-based investigations with equally likely outcomes by: - posing investigative questions - anticipating what might happen - identifying possible outcomes for the investigative questions - generating all possible ways to get each outcome (a theoretical approach) or undertaking a probability experiment and recording the occurrences of each outcome - creating data visualisations for possible outcomes - describing what these visualisations show - finding probabilities as fractions - answering investigative questions - reflecting on anticipated outcomes - agree or disagree with others' conclusions about chance-based investigations

Suggested term planner: Year 4

Term 1

Weeks	Unit	Topic	Focus	Student workbook pages
1–2	1. Number structure and operations	1. Place value	Read, write, represent and order numbers up to 5 digits	6–9
3	1. Number structure and operations	2. Addition mental methods	Explore and choose appropriate mental addition methods such as the split method and extending number facts to solve addition problems	10–13
4	5. Using units of measurement	4. Time	Record and interpret digital and analog time to the minute. Convert between common units of time	tbc
5–6	1. Number structure and operations	3. Addition written methods	Explore and choose appropriate written addition methods such as the jump method and vertical addition to solve addition problems	14–17
7	6. Geometry and spatial reasoning	1. 2D shapes	Explore, describe and classify 2D shapes according to their features	tbc
8–9	2. Rational numbers	1. Equivalent fractions and decimals	Use diagrams to investigate and identify equivalent fractions	44–47
		2. Improper fractions and mixed numbers	Understand and convert between fractions and mixed numbers using number lines and diagrams	48–51

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Term planner

Term 2

Weeks	Unit	Topic	Focus	Student workbook pages
1	1. Number structure and operations	4. Subtraction mental methods	Explore and choose appropriate mental subtraction methods such as extending number facts and getting to a 10 to solve subtraction problems	18–22
2	5. Using units of measurement	1. Length and area	Estimate, measure and compare lengths using centimetres. Estimate, measure and compare areas using square centimetres and square metres	tbc
3–4	1. Number structure and operations	5. Subtraction written methods	Explore and choose appropriate written subtraction methods such as the jump method and vertical subtraction to solve subtraction problems	23–26
5	6. Geometry and spatial reasoning	1. Angles	Compare and classify angles in shapes and the environment in relation to a right angle	tbc
6	7. Pathways	2. Flips, slides and turns	Identify, classify and represent flip, slide and turn transformations	tbc
7	4. Algebra	1. Number patterns	Follow and create rules for number patterns and identify missing numbers based on function machine rules	tbc
8–9	2. Rational numbers	3. Fractions of quantities	Write, represent and compare fractions of wholes and collections and find equivalent fractions	56 – tbc
		4. Adding and subtracting fractions	Apply knowledge of equivalent fractions to add and subtract fractions with the same or related denominators	tbc

Term 3

Weeks	Unit	Topic	Focus	Student workbook pages
1	1. Number structure and operations	7. Multiplication and division facts	Investigate the relationship between multiplication and division facts and use them to problem solve	32–35
2	7. Pathways	1. Symmetry	Classify items as symmetrical or not symmetrical and identify lines of symmetry	tbc
3	1. Number structure and operations	6. Inverse operations	Explore the connection between addition and subtraction and identify related families of facts	27–31
4–5	1. Number structure and operations	9. Multiplication written methods	Explore and choose appropriate written multiplication methods such as the split method and the grid method to solve problems involving one- and two-digit numbers	40–43
6–8	8. Statistics	1. Collecting data	Explore and choose appropriate data sources to collect and classify data	tbc
		2. Graphs	Understand and use the features of common data displays such as pictographs and column graphs	tbc
		3. Interpreting data	Draw conclusions from data presented in graphs, and compare the effectiveness of different data displays	tbc
9	4. Algebra	2. Number sentences	Interpret, represent and solve word problems, and find missing numbers to balance equations	tbc

Mathematics and Statistics for Aotearoa New Zealand 4
Term planner

Term 4

Weeks	Unit	Topic	Focus	Student workbook pages
1–2	1. Number structure and operations	8. Multiplication and division mental methods	Explore and choose appropriate mental multiplication and division methods such as doubling, halving and using known number facts	36–39
3	6. Geometry and spatial reasoning	2. 3D shapes	Recognise, describe and draw 3D shapes according to their features and the 2D shapes that make them up	tbc
4–5	9. Probability	1. Chance events	Identify possible outcomes of chance events and classify events using the language of probability	tbc
		2. Chance experiments	Conduct multiple chance experiments and predict and compare the results	tbc
6	3. Financial mathematics	1. Money	Explore different combinations of coins to make a total, calculate change and round to the nearest ten cents	tbc
7	5. Using units of measurement	3. Mass	Estimate and measure masses using grams and kilograms. Compare and classify the mass of common items in relation to 1 kg and 500 g	tbc
8	7. Pathways	3. Grids and maps	Use grid references to interpret and create simple maps	tbc
9	5. Using units of measurement	2. Volume and capacity	Estimate, measure and compare volume and capacity using cubic centimetres, litres and millilitres	tbc

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Mathematics and Statistics for Aotearoa New Zealand 4
Learning sequence

Suggested learning sequences and student pathways

The suggested learning sequences below can be used as editable templates for teachers to adapt when planning lesson sequences to suit the needs of the students in their classes. These templates will support teachers to plan for and manage learning sequences to cater for students who are on, above and below the expected standard.

Generic 4 - session sequence

Session 1 – Pre-assessment: 60 minutes

Teacher to identify on-, above- and below-level students; introduce the learning focus; introduce the daily practice activity.

Session 2 – Getting started: 50 minutes plus daily practice activity 10 minutes

Interactive – whole class
and/or
Introductory activity – whole class

On-level group	Below-level group	Above-level group
Student book – Guided to Independent Practice activities + **Early finisher** activity if needed	**Small group with teacher** – skill consolidation or potential difficulties + **Student book** – Guided Practice activity	**Student book** – Guided to Independent Practice activities **Activity sheet** – Extension activity or investigation

Session 3 – Exploration and consolidation: 50 minutes plus daily practice activity 10 minutes

Consolidation – whole class activity

On-level group	Below-level group	Above-level group
Small group with teacher	**Student book** – Guided to Independent Practice activities	**Student book** – Extended Practice
Student book – Extended Practice activity	**Small group with teacher** – skill consolidation or potential difficulties	**Activity sheet** – Extension activity or investigation

Session 4 – Post-assessment: 60 minutes

On-level group	Below-level group	Above-level group
Post-assessment	Repeat of **Pre-assessment** and/or **Post-assessment**	**Post-assessment**

For all groups, review results, re-visit the learning focus, allow students to reflect on the topic, and discuss the success criteria.

Generic 5 - session sequence

Session 1 – Pre-assessment: 60 minutes

Teacher to identify on-, above- and below-level students, introduce the learning activity; introduce the daily practice activity.

Session 2 – Getting started: 50 minutes plus daily practice activity 10 minutes

Interactive – whole class activity
and/or
Introductory Activity – whole class, mixed ability group

On-level group	Below-level group	Above-level group
Student book – Guided to Independent Practice activities + **Early finisher** activity if needed	**Small group with teacher** – skill consolidation or potential difficulties + **Student book** – Guided Practice activity	**Student book** – Guided to Independent Practice activities **Activity sheet** – Extension activity or investigation

Sessions 3 & 4 – Exploration and consolidation: 50 minutes plus daily practice activity 10 minutes

Interactive – whole class activity
Consolidation – whole class activity

On-level group	Below-level group	Above-level group
Small group with teacher	**Student book** – Guided to Independent Practice activities	**Student book** – Extended Practice
Student book – Extended Practice activity	**Small group with teacher** – skill consolidation or potential difficulties	**Activity sheet** – Extension activity or investigation

Session 5 – Pre-assessment: 60 minutes

On-level group	Below-level group	Above-level group
Post-assessment	Repeat of **Pre-assessment** and/or **Post-assessment**	**Post-assessment**

For all groups, review results, re-visit the learning focus, allow students to reflect on the topic, and discuss the success criteria.

Suggested learning sequences and student pathways for composite classes

The suggested Learning Sequences below can be used as editable templates for teachers to adapt when planning lesson sequences to suit the needs of the students in their classes. These templates will support teachers to plan for and manage multi-age/composite class situations by suggesting how to cater for each year level throughout the learning sequence.

Same topic/concept being taught

Session 1 – Preparation: 60 minutes

Pre-assessment – teacher to identify on-, above- and below-level students; introduce the learning focus; introduce the daily practice activity

Session 2 – Getting started: 50 minutes plus daily practice activity 10 minutes

Interactive – whole class activity (Use the interactive from the lower year level if necessary, which acts as revision for higher level.)
and/or
Introductory activity – whole class, mixed ability group. (Use the activity from the upper year level in cross-age/mixed-ability groupings.)

On-level group	Below-level group	Above-level group
Student book – Guided to Independent Practice activities + **Early finisher** activity if needed **Both year levels** working from own year level **Student books**.	**Small group with teacher** – skill consolidation or potential difficulties. **Both year levels** with teacher for cross-level hands-on activity **Student book** – Guided Practice activity at own year level.	**Student book** – Guided to Independent Practice activities **Activity sheet** – Extension activity or investigation. **Both year levels** working on Activity Sheet from own year level.

Session 3 – Exploration and consolidation: 50 minutes plus daily practice activity 10 minutes

Consolidation – whole class activity. [Choose most appropriate activity, from either lower or upper year level, depending on needs of the class.]

On-level group	Below-level group	Above-level group
Option 1: **Both year levels** working with teacher then completing **Student book** – Extended Practice activity.	**Student book** – Independent to Extended Practice activities, individually or in pairs.	**Student book** – Extended Practice activity from own year level.

Option 2: **Lower year level with teacher** while upper year level completes **Student book** – Extended Practice activity; then **upper year level with teacher** while lower year level completes **Student book** – Extended Practice activity.	**Teacher** check-in to discuss any difficulties.	**Activity sheet** – both year levels working on Activity Sheet from own year level.

Session 4 – Post-assessment: 60 minutes

On-level group	Below-level group	Above-level group
Post-assessment	Repeat of **Pre-assessment** and/or **Post-assessment**	**Post-assessment**

For all groups, review results, re-visit the learning focus, allow students to reflect on the topic, and discuss the success criteria.

Example A: Teaching sequence for a composite/multi-age class where same topic is taught

Topic: Place value Years 4 & 5

Session 1

Pre-assessment:
- Year 4 students complete pre-test
- Year 5 students complete pre-test

Session 2

Interactive: Year 4 Place value
Introductory activity (whole class): Year 5 Place value to 100 000

On-level group	Below-level group	Above-level group
Year 4 students complete Guided Practice and Independent Practice from Student Book 4. Year 5 students complete Guided Practice and Independent Practice from Student Book 5.	Choose the most appropriate Place Value activity, depending on the overall needs of students who struggle in this area. If necessary, adjust number sizes up or down to suit the group. Year 4 students complete Guided Practice from Student Book 4, with teacher support Year 5 students complete Guided Practice from Student Book 5, with teacher support	Year 4 students complete Guided Practice and Independent Practice from Student Book 4 – and year 4 activity card for Place value Year 5 students complete Guided Practice and Independent Practice from Student Book 5 – and year 5 activity card for Place value

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Learning sequence

Session 3

Consolidation activity (whole class): Choose most appropriate activity from Year 4 and Year 5 levels. Adjust number sizes if needed.

On-level group	Below-level group	Above-level group
Option 1: Choose most appropriate activity from year 4 and year 5, and work with one larger group. Option 2: Year 5 students start with Extended Practice while teacher works with Year 4, then Year 4 start Extended Practice while teacher works with Year 5.	Students to complete Independent Practice, pp. x from own year level and attempt Extended Practice from own year level individually or with a partner of like ability. Opportunity for teacher check-in for any difficulties.	Year 4 students complete Year 3 Student Book Extended Practice Year 5 students complete Year 4 Student Book Extended Practice All students work on/complete Activity Sheet for their level.

Session 4

Post-assessment:
- Year 4 students complete Post-test
- Year 5 students complete Post-test

Teaching different topics to each year level

Session 1 – Preparation: 60 minutes

Pre-assessment – teacher to identify on-, above- and below-level students; introduce the learning focus; introduce the daily practice activity. (Students in each year level to complete applicable pre-test for the topic being studied.)

Session 2 – Getting started: 50 minutes plus daily practice activity 10 minutes

Interactive – whole class activity. [Use the interactive from the lower year level, which acts as revision for higher level.] **and/or**
Introductory Activity – whole class, mixed ability group. [Use the interactive from the upper year level for the **upper year level group**.]

On-level group	Below-level group	Above-level group
Student book – Guided to Independent Practice activities + **Early finisher** activity if needed for the **lower year level group** only	**Small group with teacher** – skill consolidation or potential difficulties & Student Book – Guided Practice activity for the **lower year level group** only.	**Student book** – Guided to Independent Practice activities as instructed by teacher. Extension activity for the **lower year level group** only.

Session 3 – Exploration and Consolidation: 50 minutes plus daily practice activity 10 minutes

Consolidation – whole class activity. [Use the activity from the lower year level for the **lower year level group.**]

On-level group	Below-level group	Above-level group

Student book – Guided to Independent Practice activities + Early finisher activity for the **upper year level group** only.	**Small group with teacher** – skill consolidation or potential difficulties & **Student** Book – Guided Practice activity for the **upper year level** group only.	**Student book** – Guided to Independent Practice activities as instructed by teacher. Extension activity for the **upper year level group** only.

Session 4 – Exploration and Consolidation: 50 minutes plus daily practice activity 10 minutes

Consolidation – whole class activity. [Use the activity from the upper year level for the **upper year level group.**]

On-level group	Below-level group	Above-level group
Small group with teacher –from **lower year level** group.	**Student book** – Independent to Extended Practice activities, independently or in pairs.	**Student book** – Extended Practice & Activity Sheet for **lower year level** group only.
Student book – Extended Practice activity for **lower year level** group only.	Check-in with teacher –**lower year level** group only.	

Session 5 – Exploration and Consolidation: 50 minutes plus daily practice activity 10 minutes

Consolidation – whole class activity. [Use the activity from the lower year level for the **lower year level group.**]

On-level group	Below-level group	Above-level group
Small group with teacher –from **upper year level** group.	**Student book** – Independent to Extended Practice activities, independently or in pairs.	**Student book** – Extended Practice & Activity Sheet for **upper year level** group only.
Student book – Extended Practice activity for **upper year level** group only.	Check-in with teacher –**upper year level** group only.	

Session 6 – Post-assessment: 60 minutes

On-level group	Below-level group	Above-level group
Post-assessment	Repeat of **Pre-assessment** and/or **Post-assessment**	**Post-assessment**

For all groups, review results, re-visit the learning focus, allow students to reflect on the topic, and discuss the success criteria.

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Mathematics and Statistics for Aotearoa New Zealand 4
Lesson plans

Lesson plans: Year 4

Unit 6 Topic 2: 3D objects

📖 **Pages**   xx

⏰ **Total time:** Daily Practice: 5-10 mins; Session 1 – 60 mins, Session 2 – 50 mins, Session 3 – 50 mins, Session 4 – 50 mins, Session 5 – 60 mins

🎯 Learning focus

- We are learning to recognise, describe and draw 3D shapes according to their features and the 2D shapes that make them up.

☀️ Success criteria

- I can recognise, name and describe 3D shapes and their features.
- I can draw and compare 3D shapes.
- I can recognise 2D nets and match them to 3D shapes.

🔗 Curriculum links

Year 4

identify the 2D shapes that compose 3D shapes (e.g., a triangular prism is made up of two triangles and three rectangles)

Materials

- paper for book pages
- iPad or digital camera (optional)
- 3D shape models
- 2D pattern blocks
- straws
- plasticine
- craft sticks
- feely bags
- business cards or cards of similar size and thickness
- *Activity sheet 21: The built environment*

Potential difficulties

Recognising real-life 3D shapes

Some students may have difficulty connecting models of 3D shapes with their everyday applications.

- Use students' knowledge or experience of objects as a foundation for building recognition. For example, students will have encountered rectangular prisms in the form of boxes; instead of asking a student to bring the box of calculators, ask for the rectangular prism.
- Encourage students to identify objects in the classroom and compare them with geometric models to consolidate the connection between the two.

Mathematics and Statistics for Aotearoa New Zealand 4
Lesson plans

Classroom activities

Daily practice activity

Group	Time	Description	What you'll need
Whole class	5-10 minutes	• Choose a different 3D shape every day to focus on. Ask students to describe the shape and to identify different places where they might find it. Use the mathematical names for items, such as rectangular prisms, to help students get used to them.	• 3D shape models

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Session 1: Pre-assessment

Group	Time	Description	What you'll need
Whole class	60 minutes	• Students to complete the pre-test. Read the questions aloud to students as a whole class or in small groups. • Identify on-, above- and below-level students. • Discuss the learning intention and observe what students already know about the topic. • Consider the potential difficulties for this topic to check and avoid any misconceptions. • Observe and identify on-, above- and below-level students. • Introduce the learning focus and daily practice activity for this topic.	• Teacher/Student Dashboard

---

Session 2: Getting started

Group	Time	Description	What you'll need
Whole class	30 minutes	**Interactive**	• Interactive • Paper for book pages

---

		• Use the interactive on the Teacher Dashboard to introduce the key mathematical concepts and language. **Introductory activity: Features of 3D shapes** • Organise students into small groups and allocate each group a 3D shape. Each group must produce a page that names and describes the key features of their shape. Students may use a computer to make and label a drawing of their shape, take photos of the shape in their environment, make a model of it, or anything else they can think of. Encourage students to be creative and include aspects such as tracing around the faces of their shape to show the 2D shapes that make it up or listing different places where their shape can be found in everyday life. Combine the pages to form a class 3D shape book. **Introductory activity: 3D models** • Moving on from the previous activity, ask students to use their photo or picture of a 3D shape to make a model of it using various materials provided to them, such as straws, craft sticks, plasticine, etc. Display the models and ask students to view and guess the names of the model shapes.	• iPad or digital camera (optional) • Materials such as straws, craft sticks, plasticine, etc
On-level group	20 minutes	**Student book** • Students to complete: Guided and Independent Practice activities, pp. xx. Ask early finishers to choose a 3D shape from the classroom and sketch it. Students should label the base, faces, edges and corners and name their shape.	• Student book • 3D shapes
Below-level group	20 minutes	**Concept exploration and skill development: Attributes of shapes and objects** • Students need to build a solid understanding of the language associated with shapes and objects. Put a selection of 3D shape models and 2D pattern blocks into a feely bag. Invite one student to draw out an item without showing it to the group. The rest of the group takes turns asking yes/no questions to deduce which shape or object the student has. Discuss which questions are the most effective for narrowing down the options, focusing on properties that are shared between 2D and 3D shapes and properties that are unique to one	• Student book • 3D shapes • 2D pattern blocks • Feely bags

		or the other. Put students into smaller groups to play the game, ensuring that each student has a turn at guessing and a turn at answering. **Student book with teacher support** • Students to complete: Guided Practice activities, p. x. Allow students to handle and discuss 3D shapes of the objects to connect them with the 2D representations as needed.	
Above-level group	20 minutes	**Student book** • Students to complete: Guided and Independent Practice activities, pp. x. **Activity sheet** • Students to begin: *Activity sheet 21: The built environment*.	• Student book • Teacher Dashboard • Activity sheet 21: The built environment • Building blocks in the shape of various 3D shapes
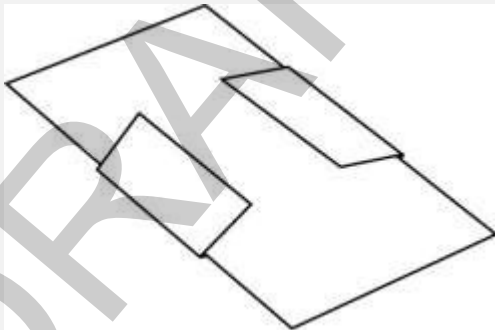
Session 3: Instruction and consolidation

Group	Time	Description	What you'll need
Whole class	30 minutes	**Topic exploration: Shape names** • Students may find the different terminology associated with geometry confusing, especially if they have not been exposed to the names of common 3D shapes, such as cubes, spheres and cones. • Investigate the naming conventions for objects to build an understanding of how the language relates to the properties of an object. For example, introduce the prefix *penta*, explaining that it means "five", and brainstorm *penta* words that students know. Link this to shapes they know of that have five sides or faces. • Show students a group of prisms, such as a rectangular prism, a triangular prism and a hexagonal prism. Ask pairs of students to identify what is the same about each one and what is different. Share their ideas and record what students know about prisms. Introduce the	• 3D shape models

		name of each prism and ask students to suggest how each one gets its name, introducing them to the concept of a base shape. To consolidate students' understanding, hold up a real-life 3D shape or a teaching model and ask them to shout out its name in chorus. Invite a student to explain how they knew. Repeat for other shapes.	
On-level group	20 minutes	**Teacher activity: Origami** • Origami is a good way for students to experience the different features of 3D shapes. A cube can be made from six business cards. Take pairs of the cards and organise them into a cross, with one card horizontal and one vertical. Fold the overhanging top and bottom edges of the bottom card over the top of the upper card, then fold in the overhanging edges of the top card. • Separate the cards again, then assemble them so that each of the six cards forms one face of the cube:	• Student book • Paper • Business cards or cards of similar size and thickness
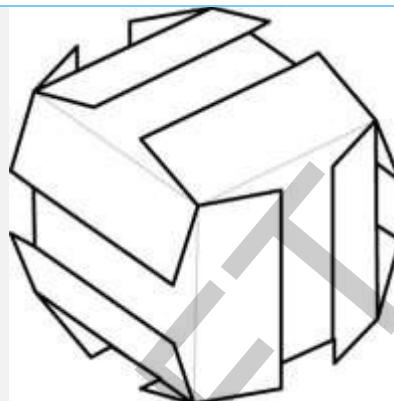
- If the flaps are positioned on the outside, the cube will hold itself together. Ask students how they know what they have made is a cube. Does the object have any other names?
- Challenge students to investigate online and then try out ways to make other 3D shapes out of paper. Allow time for them to share their experiences and discoveries with the rest of the class.

Student book

- Students to complete: Extended Practice activities, p. x.

Below-level group	20 minutes	**Student book with teacher support** • Students to complete: Independent and Extended Practice activities, pp. xx. Check-in with students as they work through the Independent Practice activities, discussing any difficulties, before supporting them to complete the Extended Practice activities, guiding them to compare the faces of the 3D shapes with the shapes on the nets.	• Student book
Extension group	20 minutes	**Student book** • Students to complete: Extended Practice activities, p. x.	• Student book • Teacher Dashboard • *Activity sheet 21: The built environment*

Mathematics and Statistics for Aotearoa New Zealand 4

Lesson plans

		Activity sheet	• Building blocks in the shape of various 3D shapes
		• Students to complete: *Activity sheet 21: The built environment*.	

Session 4: Post-assessment

Group	Time	Description	What you'll need
Whole class	60 minutes	• Students to complete the post-assessment test. Read the questions aloud to students as a whole class or in small groups. • Discuss students' results if appropriate and re-visit the success criteria for this topic.	• Teacher/Student Dashboard

mathematics and statistics

for Aotearoa New Zealand **4**

contents

DRAFT

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3D shapes

prism   pyramid   cone   cylinder   sphere
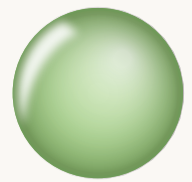
You can describe 3D shapes by their faces, edges, and corners (vertices).

Guided practice

1 Match the objects with their descriptions.

cylinder   prism   sphere   pyramid   cone
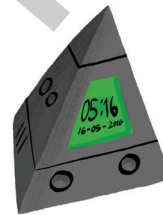
• polygon as a base • all other faces are triangles	• perfectly round 3D object	• object with a circular base and a point at the tip	• 2 parallel bases the same shape • all other faces are rectangles	• object with 2 circular ends and 1 curved face

2 Circle all the pyramids.
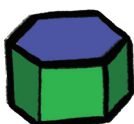
Independent practice

1
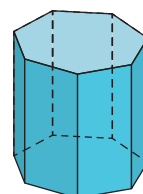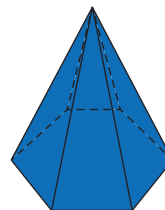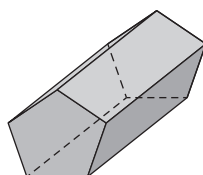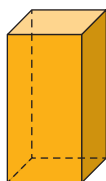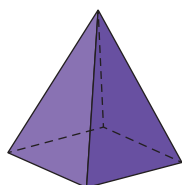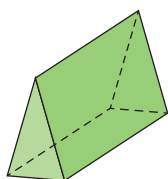
| A | B | C | D | E | F | G |

a Write the letters of the objects that are prisms.

_____

b Match the letters from question 1a to the descriptions of the prisms below.

I have 10 corners and 15 edges. The shape of my bases has 5 sides.	☐

All my faces are the same shape, but not the same size. I have 8 corners.	☐

I have 16 corners. I have 10 faces. I have 24 edges.	☐

I have 5 faces. I have 6 corners. I have 9 edges.	☐

c Draw a square prism.
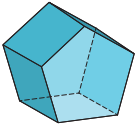
d What is another name for a square prism?

_____
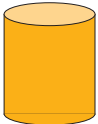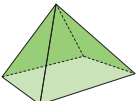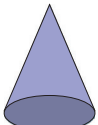
2 Circle all the 2D shapes you need to make these 3D shapes.
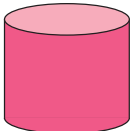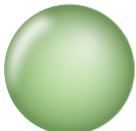
a
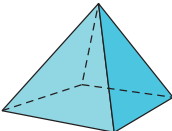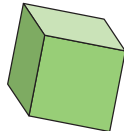
b
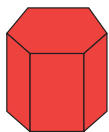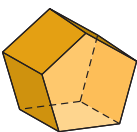
c
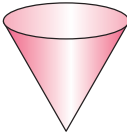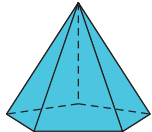
d

---

3 Write 1 similarity and 1 difference between these shapes.

a

Similarity: _____

_____

Difference: _____

_____

b

Similarity: _____

_____

Difference: _____

_____

c

Similarity: _____

_____

Difference: _____

_____

d

Similarity: _____

_____

Difference: _____

_____

Extended practice

When an object such as a box is flattened out, the 2D shape is called a **net**.
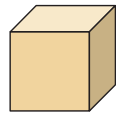
cube
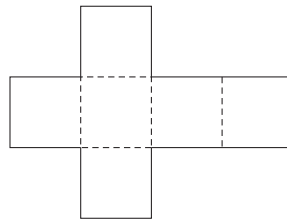
This is the net of a cube.

1 Match the nets to the objects.
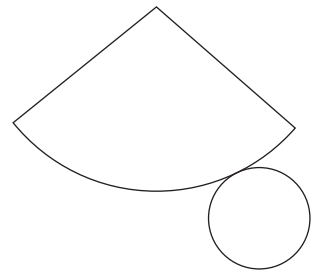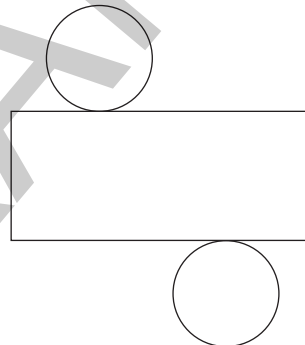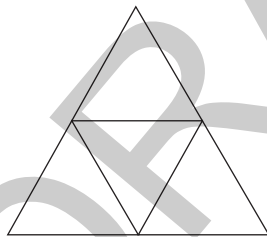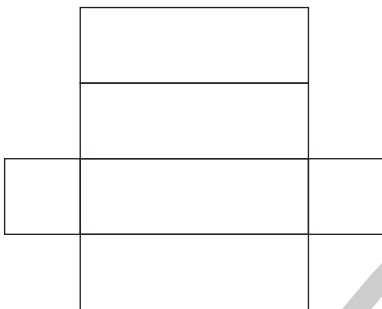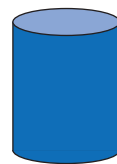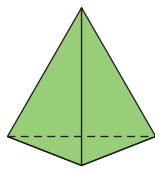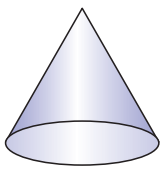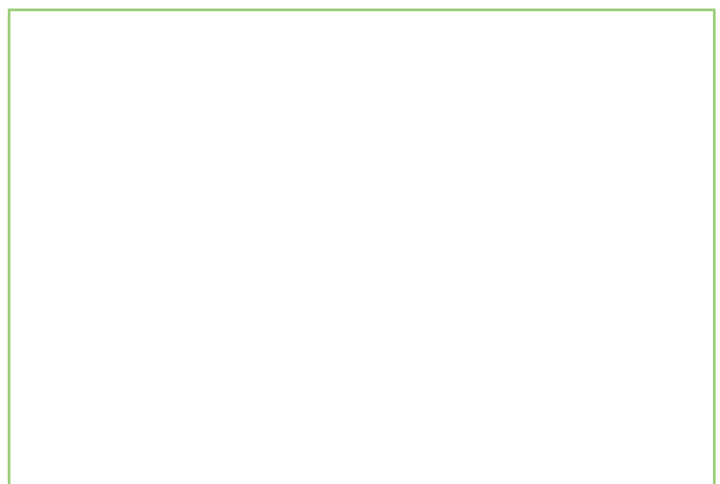
2
a Draw a prism.

b Name your prism.

c Write a description of your prism.

_____

_____

_____

Name: _____

Glossary

acute angle An angle that is smaller than a right angle or 90 degrees.

right angle
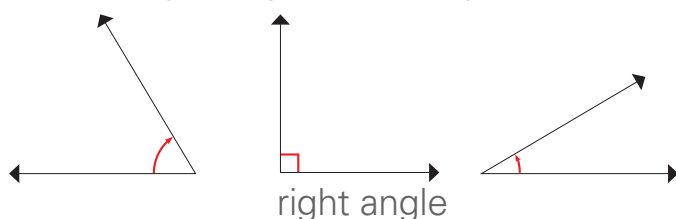
addition The joining or adding of two numbers together to find the total. Also known as *adding, plus* and *sum*. See also *vertical addition*.

★★★ + ★★ = ★★★★★

3 and **2** is **5**

algorithm A process or formula used to solve a problem in maths.

Examples:
horizontal vertical
algorithms algorithms
24 **+** 13 **=** 37

T	O
2	4
1	3
3	7

+

analog time Time shown on a clock or watch face with numbers and hands to indicate the hours and minutes.

angle The space between two lines or surfaces at the point where they meet, usually measured in degrees.

75-degree angle
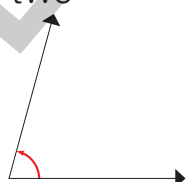
anticlockwise Moving in the opposite direction to the hands of a clock.

area The size of an object's surface.

Example: It takes 12 tiles to cover this poster.
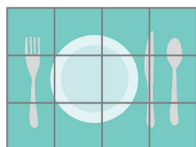
area model A visual way of solving multiplication problems by constructing a rectangle with the same dimensions as the numbers you are multiplying and breaking the problem down by place value.

$6 \times 10 = 60$
$6 \times 8 = 48$
so
$6 \times 18 = 108$

10   8

6
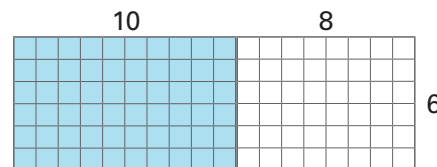
array An arrangement of items into even columns and rows to make them easier to count.
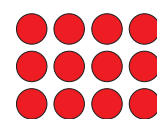
balance scale Equipment that balances items of equal mass; used to compare the mass of different items. Also called *pan balance* or *equal arm balance*.

base The bottom edge of a 2D shape or the bottom face of a 3D object.

base
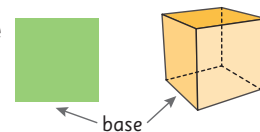
capacity The amount that a container can hold.

Example: The jug has a capacity of 4 cups.
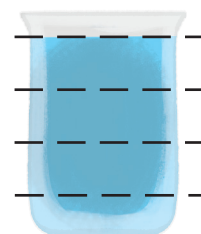
Cartesian plane A grid system with numbered horizontal and vertical axes that allow for exact locations to be described and found.
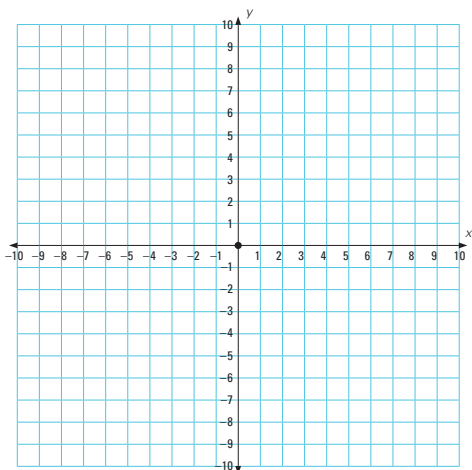
categorical variables   The different groups that objects or data can be sorted into based on common features.

Example: Within the category of ice cream flavours, variables include:

vanilla   chocolate   strawberry

centimetre or **cm**   A unit for measuring the length of smaller items.
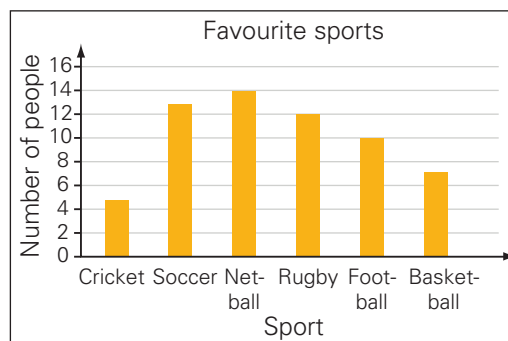

Example: Length is 80 cm.

circumference   The distance around the outside of a circle.

clockwise   Moving in the same direction as the hands of a clock.

column graph   A way of representing data using columns or bars to show the values of each variable.

Favourite sports

common denominator
Denominators that are the same. To find a common denominator, you need to identify a multiple that two or more denominators share.

Example: $\frac{1}{2} + \frac{1}{4} + \frac{1}{8} =$
$\frac{4}{8} + \frac{2}{8} + \frac{1}{8} = \frac{7}{8}$

compensation method   A way of solving a problem that involves rounding a number to make it easier to work with, and then paying back or 'compensating' the same amount.

Example: $24 + 99 =$
$24 + 100 - 1 = 123$

composite number   A number that has more than two factors, that is, a number that is not a prime number.
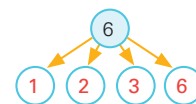
cone   A 3D shape with a circular base that tapers to a point.
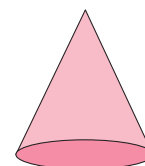
coordinates   A combination of numbers or numbers and letters that show location on a grid map.
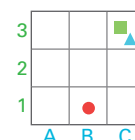
corner   The point where two edges of a shape or object meet. Also known as a *vertex*.

corner
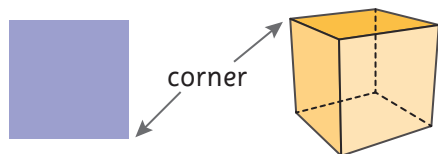
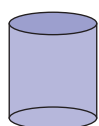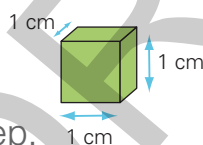**cross-section**   The surface or shape that results from making a straight cut through a 3D shape.
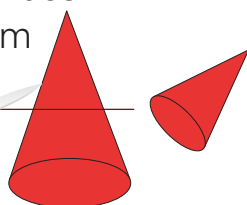
cube   A rectangular prism where all six faces are squares of equal size.

cubic centimetre or **cm³**   A unit for measuring the volume of smaller objects.

Example: This cube is exactly 1 cm long, 1 cm wide and 1 cm deep.

1 cm
1 cm
1 cm

cylinder   A 3D shape with two parallel circular bases and one curved surface.

data   Information gathered through methods such as questioning, surveys or observation.

decimal fraction   A way of writing a number that separates any whole numbers from fractional parts expressed as tenths, hundredths, thousandths and so on.

1 $\frac{9}{10}$

Example: 1.9 is the same as 1 whole and 9 parts out of 10 or $1\frac{9}{10}$.

degrees Celsius   A unit used to measure the temperature against the Celsius scale where 0°C is the freezing point and 100°C is the boiling point.

denominator   The bottom number in a fraction, which shows how many pieces the whole or group has been divided into.

$\frac{3}{4}$
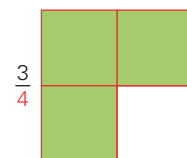
diameter   A straight line from one side of a circle to the other, passing through the centre point.
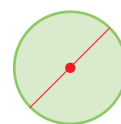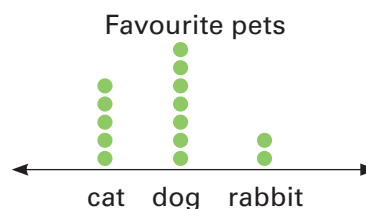
digital time   Time shown on a clock or watch face with numbers only to indicate the hours and minutes.

AM 7:00

division/dividing   The process of sharing a number or group into equal parts, with or without remainders.

dot plot   A way of representing pieces of data using dots along a line labelled with variables.
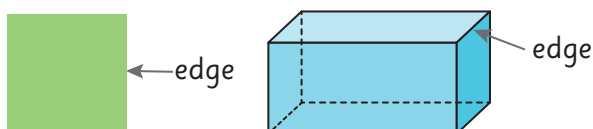
Favourite pets

cat   dog   rabbit

double/doubles   Adding two identical numbers or multiplying a number by 2.
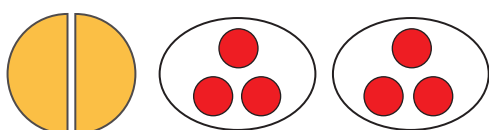
Example: 2 + 2 = 4   4 × 2 = 8

duration   How long something lasts.

Example: Most movies have a duration of about 2 hours.

edge   The side of a shape or the line where two faces of an object meet.
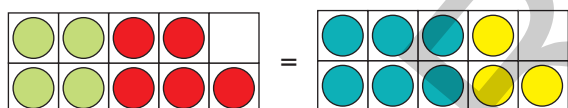

equal   Having the same number or value.

Example: Equal size   Equal numbers

equation   A written mathematical problem where both sides are equal.

Example: $4 + 5 = 6 + 3$

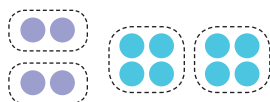**equilateral triangle**   A triangle with three sides and angles the same size.

equivalent fractions   Different fractions that represent the same size in relation to a whole or group.

$\frac{1}{2}$ $\frac{2}{4}$ $\frac{3}{6}$ $\frac{4}{8}$

estimate   A thinking guess.

even number   A number that can be divided equally into 2.

Example: 4 and 8 are even numbers

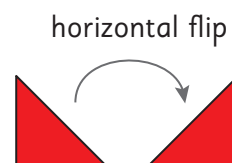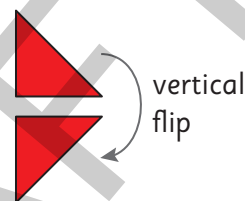**face**   The flat surface of a 3D shape.
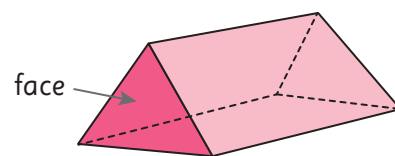
factor   A whole number that will divide evenly into another number.

Example: The factors of 10 are 1 and 10, 2 and 5.

financial plan   A plan that helps you to organise or manage your money.

flip   To turn a shape over horizontally or vertically. Also known as *reflect*.

vertical flip   horizontal flip

fraction   An equal part of a whole or group.

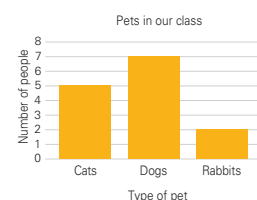Example: One out of two parts or $\frac{1}{2}$ is shaded.

frequency   The number of times a particular outcome occurs in a chance experiment.

function machine   A machine that can be programmed to do the same thing to any number that is fed into it.

gram or **g**   A unit for measuring the mass of smaller items. There are 1000 g in 1 kg.

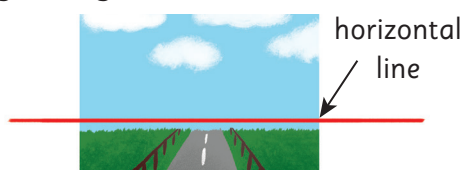**graph**   A visual way to represent data or information.

GST or **Goods and Services Tax**   A tax, such as 15%, that applies to most goods and services bought in New Zealand.

Example: Cost + GST (15%) = Amount you pay: $10 + $1.50 = $11.50
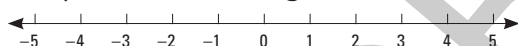
hexagon   A 2D shape with six sides.

**horizontal**   Parallel with the horizon or going straight across.

horizontal line

improper fraction   A fraction where the numerator is greater than the denominator, such as $\frac{3}{2}$.

integer   A whole number. Integers can be positive or negative.

$-5 \quad -4 \quad -3 \quad -2 \quad -1 \quad 0 \quad 1 \quad 2 \quad 3 \quad 4 \quad 5$

inverse operations   Operations that are the opposite or reverse of each other. Addition and subtraction are inverse operations.

Example: 6 + 7 = 13 can be reversed with 13 − 7 = 6
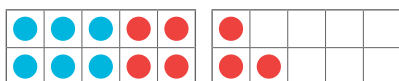
invoice   A written list of goods and services provided, including their cost and any GST.

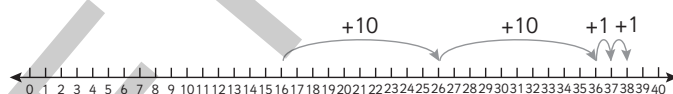| Priya's Pet Store			
Tax Invoice			
Item	Quantity	Unit price	Cost
Siamese cat	1	$500	$500.00
Cat food	20	$1.50	$30.00
Total price of goods		$530.00	
GST (10%)		$53.00	
Total		$583.00	

irregular shape   A shape in which the sides are not all the same length and the angles are not all the same size.

isosceles triangle   A triangle with two sides and two angles of the same size.

jump method   A way to solve number problems that uses place value to "jump" along a number line by hundreds, tens and ones.

Example: 16 + 22 = 38

+10   +10   +1 +1

0 1 2 3 4 5 6 7 8 9 10 11 12 13 14 15 16 17 18 19 20 21 22 23 24 25 26 27 28 29 30 31 32 33 34 35 36 37 38 39 40

kilogram or **kg**   A unit for measuring the mass of larger items.

kilometre or **km**   A unit for measuring long distances or lengths.

5 km

kite   A four-sided shape where two pairs of adjacent sides are the same length.

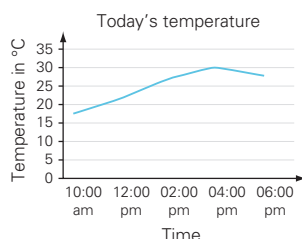**legend**   A key that tells you what the symbols on a map mean.

Park   Service station   Campground   Railway   Road

length   The longest dimension of a shape or object.

line graph A type of graph that joins plotted data with a line.
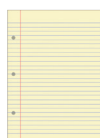
Today's temperature

litre or **L** A unit for measuring the capacity of larger containers.

Example: The capacity of this bucket is 8 litres.

mass How heavy an object is.

Example: 4.5 kilograms   4.5 grams

method A way to solve a problem. In maths, you can often use more than one method to get the right answer.

Example: 32 + 27 = 59
Jump method

Split method
30 + 2 + 20 + 7 = 30 + 20 + 2 + 7 = 59

metre or **m** A unit for measuring the length or height of larger objects.

milligram or **mg** A unit for measuring the mass of lighter items or to use when accuracy of measurements is important.
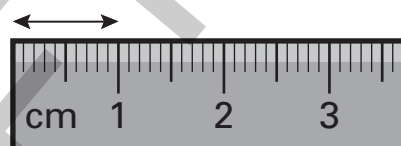
700 mg

millilitre or **mL** A unit for measuring the capacity of smaller containers.

1000 mL is 1 litre

millimetre or **mm** A unit for measuring the length of very small items or to use when accuracy of measurements is important.

There are 10 mm in 1 cm.

mixed number A number that contains both a whole number and a fraction.
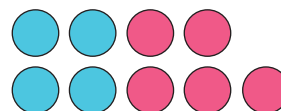
Example: $2\frac{3}{4}$

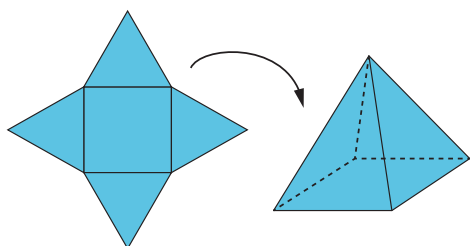**multiple** The result of multiplying a particular whole number by another whole number.

Example: 10, 15, 20 and 100 are all multiples of 5.

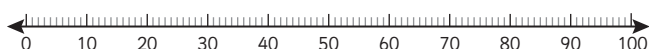**near doubles** A way to add two nearly identical numbers by using known doubles facts.

Example: 4 + 5 = 4 + 4 + 1 = 9

net   A flat shape that when folded up makes a 3D object.

number line   A line on which numbers can be placed to show their order in our number system or to help with calculations.

number sentence   A way to record calculations using numbers and mathematical symbols.

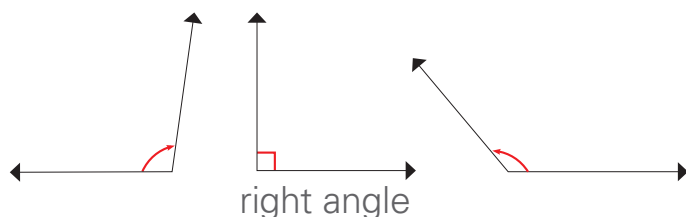Example: 23 + 7 = 30

numeral   A figure or symbol used to represent a number.

Examples: 1 – one   2 – two
          3 – three

numerator   The top number in a fraction, which shows how many pieces you are dealing with.

$\frac{3}{4}$

obtuse angle   An angle that is larger than a right angle or 90 degrees, but smaller than 180 degrees.
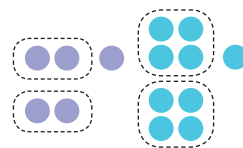
right angle

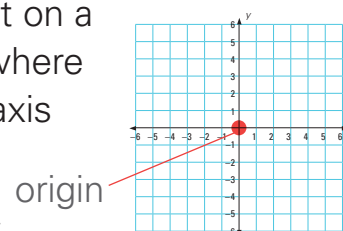**octagon**   A 2D shape with eight sides.

odd number   A number that cannot be divided equally into 2.

Example: 5 and 9 are odd numbers.

operation   A mathematical process. The four basic operations are addition, subtraction, multiplication and division.
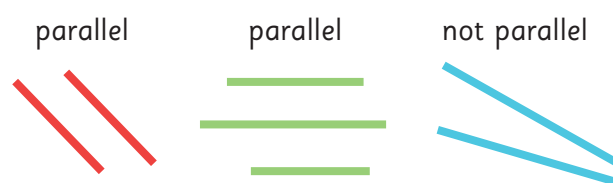
origin   The point on a Cartesian plane where the *x*-axis and *y*-axis intersect.

origin

outcome   The result of a chance experiment.

Example: The possible outcomes if you roll a dice are 1, 2, 3, 4, 5 or 6.

parallel lines   Straight lines that are the same distance apart and so will never cross.

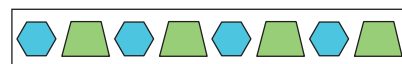parallel   parallel   not parallel

parallelogram   A four-sided shape where each pair of opposite sides is parallel.

pattern   A repeating design or sequence of numbers.

Example:
Shape pattern
Number pattern   2, 3, 6, 8, 10, 12

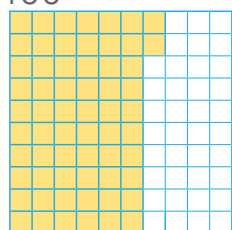**pentagon**   A 2D shape with five sides.

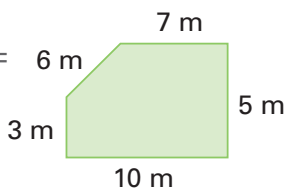**per cent** or **%**   A fraction out of 100.

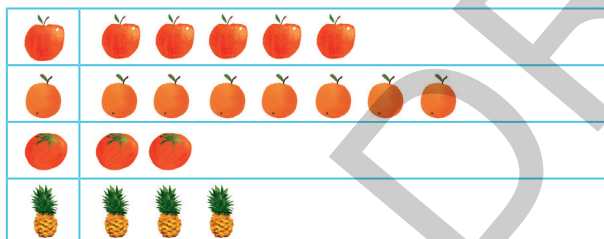Example: $\frac{62}{100}$ or 62 out of 100

 is also 62%.

perimeter   The distance around the outside of a shape or area.

Example: Perimeter = 7 m + 5 m + 10 m + 3 m + 6 m = 31 m

picture graph   A way of representing data using pictures so that it is easy to understand.
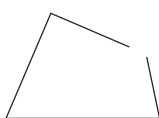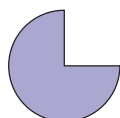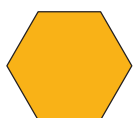
Example: Favourite juices in our class

place value   The value of a digit depending on its place in a number.

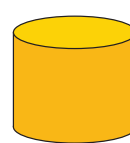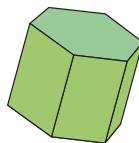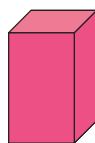| M	H Th	T Th	Th	H	T	O
			2	7	4	8
		2	7	4	8	6
	2	7	4	8	6	3
2	7	4	8	6	3	1

polygon   A closed 2D shape with three or more straight sides.

polygons   not polygons

polyhedron (plural: **polyhedra**)   A 3D shape with flat faces.

polyhedra   not polyhedra

power of   The number of times a particular number is multiplied by itself.

Example: 4^3 is 4 to the power of 3 or $4 \times 4 \times 4$.

prime number   A number that has just two factors – 1 and itself. The first four prime numbers are 2, 3, 5 and 7.

prism   A 3D shape with parallel bases of the same shape and rectangular side faces.
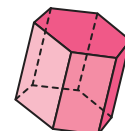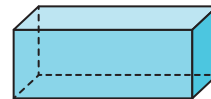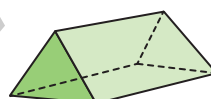
triangular   rectangular   hexagonal
prism   prism   prism

probability   The chance or likelihood of a particular event or outcome occurring.

 Example: There is a 1 in 8 chance this spinner will land on red.

protractor   An instrument used to measure the size of angles in degrees.

pyramid   A 3D shape with a 2D shape as a base and triangular faces meeting at a point.

square pyramid   hexagonal pyramid

quadrant   A quarter of a circle or one of the four quarters on a Cartesian plane.

quadrant
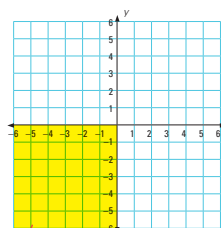
quadrant

quadrilateral   Any 2D shape with four sides.

radius   The distance from the centre of a circle to its circumference or edge.

reflect   To turn a shape over horizontally or vertically. Also known as *flipping*.
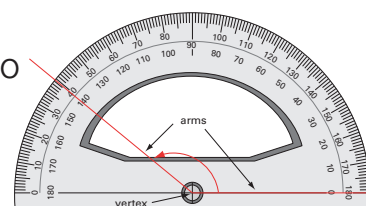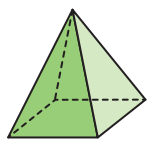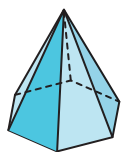
vertical reflection
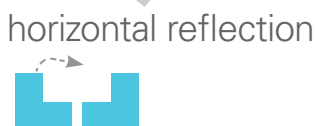
horizontal reflection

reflex angle   An angle that is between 180 and 360 degrees in size.
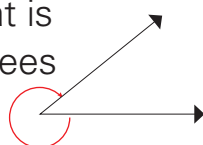
regular shape   A shape in which all the sides are the same length and all the angles are the same size.

remainder   An amount left over after dividing one number by another.
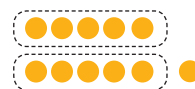
Example: 11 ÷ 5 = 2 r1

rhombus   A 2D shape with four sides, all of the same length and opposite sides parallel.
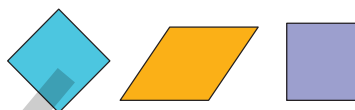
right angle   An angle of exactly 90 degrees.

90°

90°
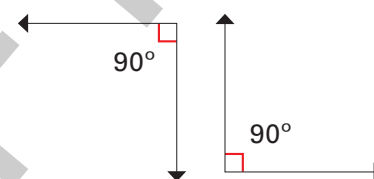
right-angled triangle   A triangle where one angle is exactly 90 degrees.

90°
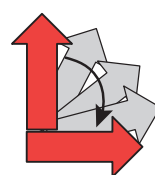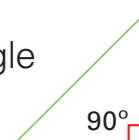
rotate   Turn around a point.

rotational symmetry   A shape has rotational symmetry if it fits into its own outline at least once while being turned around a fixed centre point.

1st position

2nd position

Back to the start

round/rounding   To change a number to another number that is close to it to make it easier to work with.

229 can be

rounded up to the nearest 10 ↑**230**   OR   rounded down to the nearest 100 ↓**200**

scale   A way to represent large areas on maps by using ratios of smaller to larger measurements.

Example: 1 cm = 5 m

scalene triangle   A triangle where no sides are the same length and no angles are equal.

sector   A section of a circle bounded by two radius lines and an arc.

radius lines
sector
arc
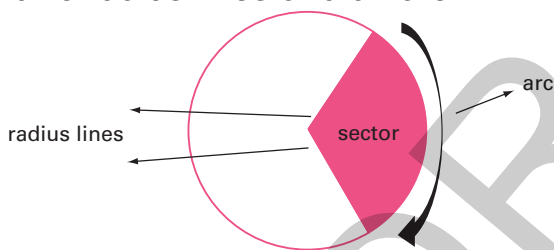
semi-circle   Half a circle, bounded by an arc and a diameter line.

semi-circle
arc
diameter line
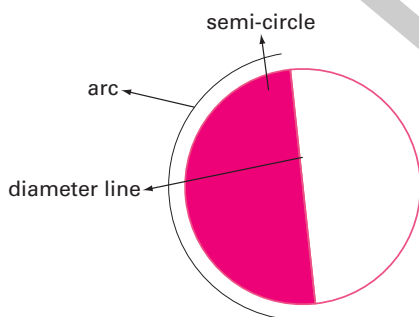
skip counting   Counting on or back by the same number each time.

Examples:
Skip counting by fives: 5, 10, 15, 20, 25, 30
Skip counting by twos: 1, 3, 5, 7, 9, 11, 13

slide   To move a shape to a new position without flipping or turning it. Also known as *translate*.
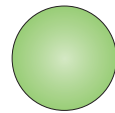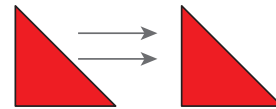
sphere   A 3D object that is perfectly round.

split method   A way to solve number problems that involves splitting numbers up using place value to make them easier to work with.

Example:
21 + 14 =   20 + 10 + 1 + 4 = 35
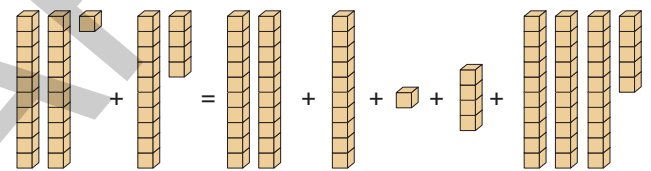
square centimetre or **cm²**   A unit for measuring the area of smaller objects. It is exactly 1 cm long and 1 cm wide.

1 cm
1 cm
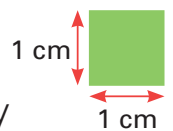
square metre or **m²**   A unit for measuring the area of larger spaces. It is exactly 1 m long and 1 m wide.

1 m
1 m
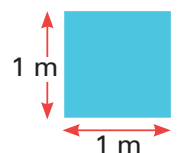
square number   The result of a number being multiplied by itself. The product can be represented as a square array.

Example: 3×3 or $3^2 = 9$

straight angle   An angle that is exactly 180 degrees in size.

180°

subtraction The taking away of one number from another number. Also known as *subtracting, take away, difference between* and *minus*. See also *vertical subtraction*.

Example: 5 take away 2 is 3

⭐⭐⭐✖✖

survey A way of collecting data or information by asking questions.

Strongly agree	☐
Agree	☑
Disagree	☐
Strongly disagree	☐

symmetry A shape or pattern has symmetry when one side is a mirror image of the other.
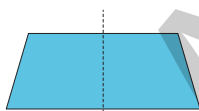
table A way to organise information that uses columns and rows.

Flavour	Number of people
Chocolate	12
Vanilla	7
Strawberry	8

tally marks A way of keeping count that uses single lines with every fifth line crossed to make a group.

term A number in a series or pattern.

Example: The sixth term in this pattern is 18.

| 3 | 6 | 9 | 12 | 15 | 18 | 21 | 24 |

tessellation A pattern formed by shapes that fit together without any gaps.
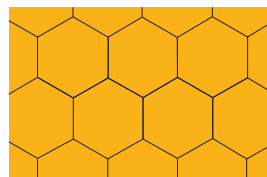
thermometer An instrument for measuring temperature.

three-dimensional or **3D**
A shape that has three dimensions – length, width and depth.
3D shapes are not flat.
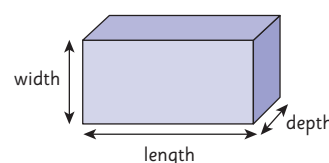
width
length
depth

timeline A visual representation of a period of time with significant events marked in.

| 29 January | 25 March | 19 May | 28 June | 3–6 August | 17 December |
| School starts | Easter holidays | School production | Mid-year holidays | Camp | School finishes |
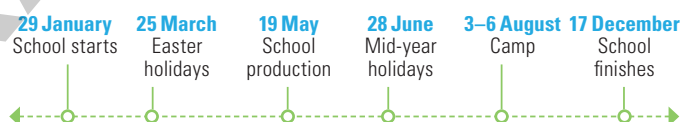
translate To move a shape to a new position without flipping or turning it. Also known as *slide*.
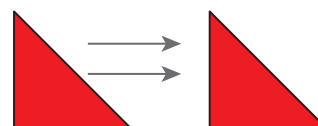
trapezium A 2D shape with four sides and only one set of parallel lines.

triangular number   A number that can be organised into a triangular shape. The first four are:

① ③ ⑥ ⑩
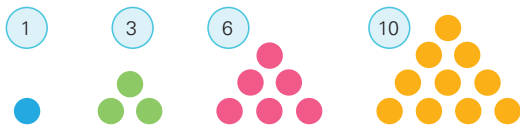
two-dimensional or **2D**
A flat shape that has two dimensions – length and width.

width

length
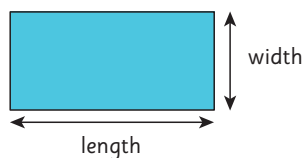
turn   Rotate around a point.

unequal   Not having the same size or value.

Example: Unequal size   Unequal numbers
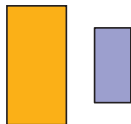
value   How much something is worth.
Example:

This coin is worth 10c.   This coin is worth $1.

vertex (plural: **vertices**)   The point where two edges of a shape or object meet. Also known as a *corner*.

corner
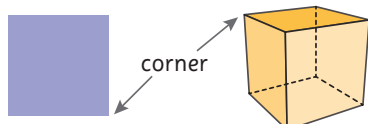
vertical   At a right angle to the horizon or straight up and down.

vertical line

horizon
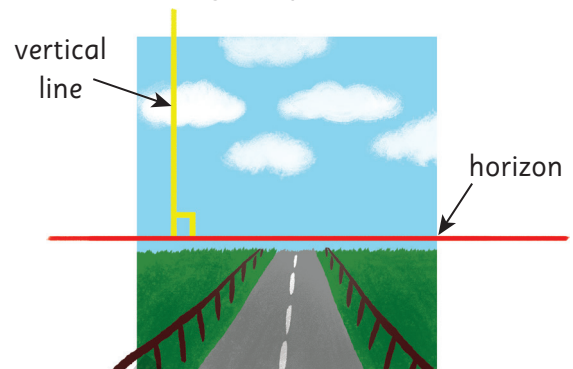
vertical addition   A way of recording addition so that the place value columns are lined up vertically to make calculation easier.

	T	O
	3	6
+	2	1
	5	7

vertical subtraction   A way of recording subtraction so that the place value columns are lined up vertically to make calculation easier.

	T	O
	5	7
−	2	1
	3	6

volume   How much space an object takes up.
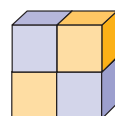
Example: This object has a volume of 4 cubes.

whole   All of an item or group.
Example: A whole shape   A whole group
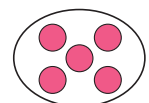
width   The shortest dimension of a shape or object. Also known as *breadth*.

x-axis   The horizontal reference line showing coordinates or values on a graph or map.

Favourite sports
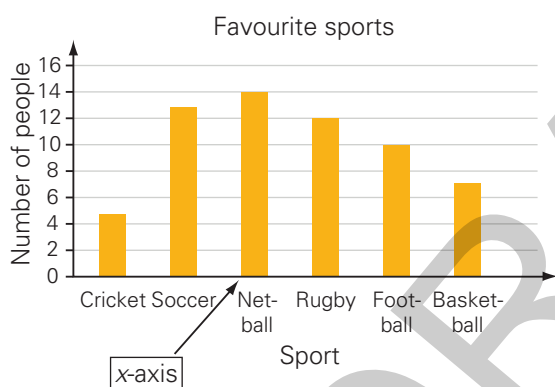
y-axis   The vertical reference line showing coordinates or values on a graph or map.

Favourite sports

c   **d**

e   **f**
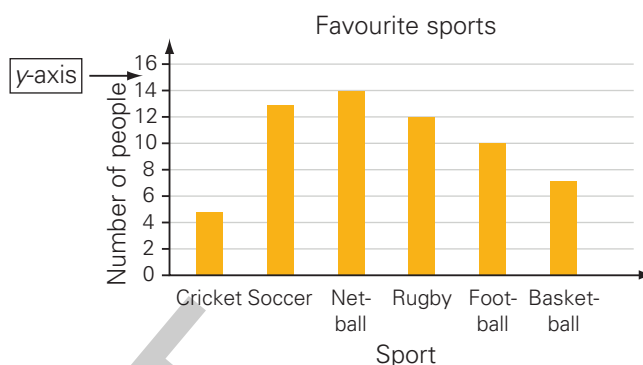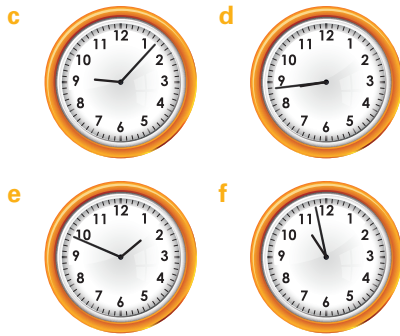
4 **a** 10 minutes **b** 5 minutes
c 20 minutes
d 60 minutes or 1 hour

5 **a** 60 **b** 120 **c** 30 **d** 90
e 15 **f** 45

6 **a** 60 **b** 120 **c** 300 **d** 600
e 210 **f** 630

Extended practice

1 **a**

b 7:57 **c** 3 minutes to 8

2 **a**

b 5:22 **c** 22 minutes past 5

3 **a** 4 **b** 32 **c** 60 **d** 44

4 **a** 3 minutes
b 1 hour and 18 minutes OR 78 minutes
c 11 hours and 58 minutes

UNIT 6: Topic 1

Guided practice

1

Independent practice

1 Teacher: In many cases, there are multiple answers for the name of a shape – e.g. a square could also be known as a rectangle or a quadrilateral. The most likely responses are given below; however, accept any correct response.

a hexagon Parallel lines: Yes Regular: Yes No. of sides: 6

b square Parallel lines: Yes Regular: Yes No. of sides: 4

c pentagon Parallel lines: No Regular: No No. of sides: 5

d hexagon Parallel lines: Yes Regular: No No. of sides: 6

e triangle Parallel lines: No Regular: Yes No. of sides: 3

2 Teacher: As with question 1, students' descriptions may vary.

a pentagon, 5 sides, all sides equal, no parallel sides

b trapezium, 4 sides, type of quadrilateral, 1 pair of parallel sides

c triangle, 1 right angle, no sides equal, no parallel sides

d octagon, 8 sides, irregular, 8 corners

e octagon, 8 sides, irregular, 1 pair of parallel sides

Extended practice

1 Teacher: Several different ways of dividing the shapes are possible. The most likely are given below. Students' descriptions of the shapes will vary. Look for students who show a sophisticated understanding of shape and who can use a variety of criteria to describe the shapes in a way that makes them easily recognisable.

a 2 trapeziums **b** square, triangle
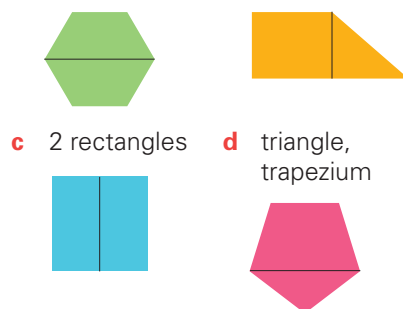
c 2 rectangles **d** triangle, trapezium

2 **a & b** Teacher to check. Look for students who can combine the shapes into a new polygon.

3 Teacher: Answers will vary depending on the shape made. Look for students who can accurately name and describe the new shape they made using a range of criteria.

UNIT 6: Topic 2

Guided practice

1

2
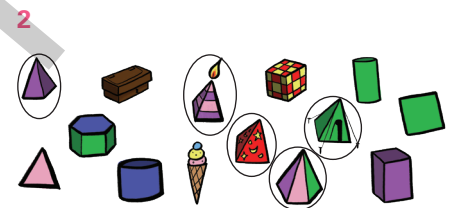
Independent practice

1 **a** A C D G
b D C G A
c Teacher to check. Look for students who can make a reasonable attempt at drawing a 3D shape, and who recognise that the faces of a square prism are all square and the same size.
d a cube

2 **a**

b

c

d

3 **a–d** Teacher to check. Look for students who can identify mathematical similarities or differences, such as the shape of faces or the number of edges, rather than other cosmetic differences such as colour.

Extended practice

1
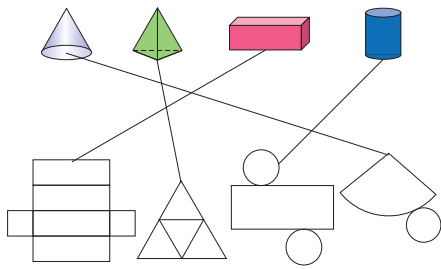
2 **a** Teacher to check. Look for students who demonstrate an understanding of what a prism is, and who can identify the shapes that make up their 3D shape.

b Teacher to check. Look for students who can use the features of their prism to accurately name it.

c Teacher to check. Look for students who show a solid understanding of the features of 3D shapes and can write an accurate description that matches their sketch.

UNIT 7: Topic 1

Guided practice

1 **a** smaller   **b** smaller
   c larger   **d** smaller
   e larger   **f** larger

Independent practice

1 Teacher to check. Look for students who show an understanding of right angles by finding and accurately representing items in the classroom that include them.

2 The following shapes should be circled: **a**, **e**, **f**

3 **a** 4   **b** 1   **c** 0

4 **a** 3 o'clock, 9 o'clock
   b C, D   **c** B, F

5 Teacher to check. Look for students who understand how to indicate an angle, and who can accurately classify the size of the angle in relation to a right angle.

Extended practice

1 Teacher to check. Look for students who can apply their knowledge of angle sizes to successfully select and classify angles within the classroom.

2
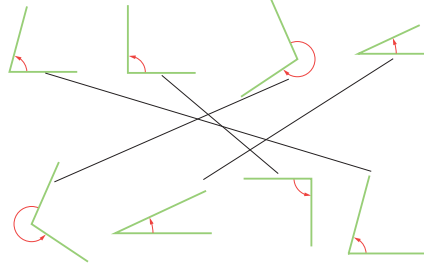
UNIT 8: Topic 1

Guided practice

1 **a** symmetrical
   b symmetrical
   c not symmetrical
   d not symmetrical
   e not symmetrical
   f symmetrical

Independent practice

1 In some cases, more than one answer is possible. The most likely responses are shown here.

a

b
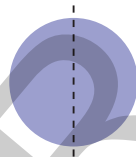
c

d

e
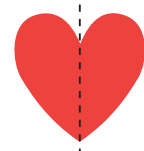
f

2 Teacher: Some of the shapes have more than two lines of symmetry. The most likely responses are shown, but accept any correct responses.

---

a
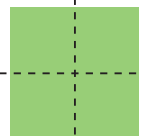
b
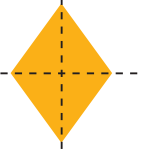
c
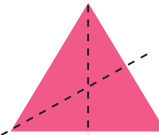
d
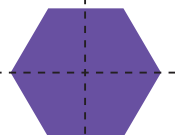
e
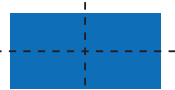
f

3 **a** Triangle or Shape c.

   b Square and cross or Shapes a and f.

4 Teacher to check. For questions a and b, only one correct answer is possible. In questions 4c and 4d, there is more than one possible correct answer. Teachers could use this as a point of discussion.

5 **a, c** and **d** should be circled

Extended practice

1 Teacher to check. Look for students who can apply their knowledge of symmetry to make a simple picture that has either horizontal or vertical line symmetry.

2 Teacher to check. Look for students who can demonstrate an understanding of line symmetry as two halves that are a reflection of each other.

UNIT 8: Topic 2

Guided practice

1 **a** slide   **b** slide
   c turn   **d** turn

The built environment

You will need

- building blocks in the shape of various 3D objects

The term *built environment* refers to everything in our world that is not part of nature. Most buildings in our environment are based on regular 3D objects.

1 Name something in the built world around us that is based on these 3D objects.

a
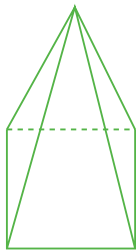
square-based pyramid

b
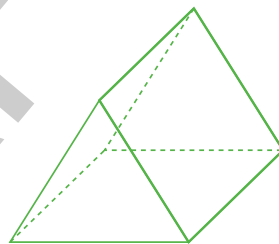
triangular prism

c
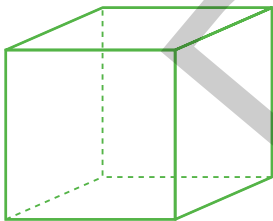
cube

d
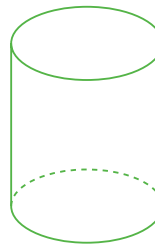
cylinder

e
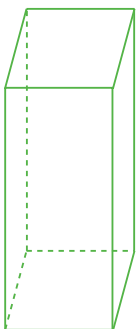
square prism

f
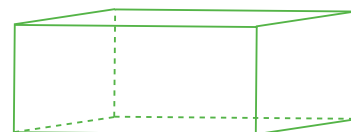
rectangular prism

(continued)

2 The following pictures show some buildings from around the world. Name the 3D object (or objects) on which each building is based. Draw a sketch of the 3D object.

a

b

c

d

3 **a** Build a tower by stacking five or six of your building blocks, one on top of the other. Think of a safe way to find out if it is stable or unstable. Write a short report and draw a diagram to illustrate it.

b Find a way of building a tower that is more stable. Test it, then draw a diagram and write a short report.

4 If you have time, find out how a tall building that is based on a rectangular prism can be made stable. Write a short and illustrated explanation.

Gardening as a hobby

Many people have a hobby. Some hobbies are mainly for children, such as collecting football cards. Some hobbies, such as mountain climbing, are more likely to be done by adults. Gardening is a hobby that can be enjoyed by people of any age.

1 **a** Write a sentence to describe other hobbies that are:

- for children (… is a hobby that is mainly for children).
- for adults.
- for people of all ages.

b The difference between the ages of the grandfather and the granddaughter in the picture is 77 years. What might their ages be?

c If you began gardening at the age of 8 and stopped at the age of 75, how many years would your hobby last?

2 Some flowers are grown in pots. They need water to grow. These daffodils need about 120 mL of water every four days.

a If you watered the daffodils on Saturday, what would be the next day they need water?

b If you poured an equal part of the 120 mL of water onto the daffodils each day for 4 days, how much water would they get each day?

c How much water would have been put on the plant after 12 days?

d Plants will die if they do not get water and something else. What is the *something else* that all plants need?

e What is the shape of the side face of the pot for the daffodils?

f Which 3D object is the pot for the daffodils like?

(continued)

3 When flowers are cut, they can be put into a vase. Vases come in different shapes and sizes.

   a What is the difference between a *flowerpot* and a *vase*?

   b What colour is the vase that is shaped like a cylinder?

   c Describe the shape of the red vase.

   d What colour is the vase that is shaped like a triangular prism?

   e Draw the side of a vase that is a rectangular prism. Then draw some flowers in the vase. Draw a symmetrical design on the side of the vase.

4 Some gardeners grow flowers from seeds that are planted in pots. The plant pots are put into arrays.

   a If you had 36 pots, you could put them into one long row of 36. Most gardeners do not have a bench that long. How else could you arrange the 36 pots into equal rows?

   b Each of the 36 pots has one seed in it. If a quarter of the seeds did not grow, how many is that?

   c How many plants would you have left?

5 Gardeners can grow fruit and vegetables from seeds. You can buy 30 tomato seeds for $3. If you are lucky, they will all grow into tomato plants.

   a How many tomato seeds would you get for $1?

   b How much would six packets of 30 tomato seeds cost?

(continued)

c If you paid for eight packets of tomato seeds and got $6 in change, which notes might you have given?

d If you bought one packet of 30 tomato seeds and half of the plants gave you three tomatoes each, how many tomatoes would that be?

e If a third of the packet of 30 tomato seeds gave you four tomatoes each, how many tomatoes would that be?

f If every seed in one packet gave you five tomatoes, how many tomatoes would you have altogether?

g If you sold all the tomatoes that grew from one packet for $25, how much profit would you make?

Mastery task 2: Gardening as a hobby

Question	Answer
1	a. Answers will vary. Teacher to check. b. Answers will vary. Teacher to check (e.g. 83 and 6). c. 67
2	a. Wednesday b. 30 mL c. 360 mL d. (sun)light e. square f. cube (or rectangular prism)
3	a. Teacher to check (e.g. a pot is for growing flowers but a vase is for displaying them). b. pink c. a ball or sphere d. orange e. Teacher to check.
4	a. 2 × 18, 3 × 12, 4 × 9, 6 × 6, 18 × 2, 12 × 3, 9 × 4 b. 9 c. 27

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Mastery task answers

5	a. 10
	b. $18
	c. Answers may vary. Teacher to check (e.g. 1 × $20 and 1 × $10, or 3 × $10).
	d. 45
	e. 40
	f. 150
	g. $22

MASTERY TASK 4

Houses and homes

Survival means staying alive. There are things we need to survive. Some of these things are food, water and shelter.

1 **a** We need over a litre of water a day to keep us healthy. How many millilitres is 1 L?

b We could survive with water as our only drink, but we need more than just apples as food to survive. What is another type of food that we need to keep us healthy?

c Why do you think we could not survive if we did not have some type of shelter?

d Apart from food, water and shelter, write down anything else that you think we need to survive.

2 Nowadays, most people's shelter is the place where they live. Long, long ago people could not buy or rent a place to live. They had to use whatever was around them for shelter.

a A cave was one type of shelter. An advantage of finding a cave to shelter in was that you didn't have to build it. What might have been a disadvantage of a cave shelter?

b People who lived near lots of trees might make a shelter from branches. Two people could sleep under one branch shelter. How many branch shelters would be needed for a tribe of 28 people?

c It took about 50 branches to make one branch shelter. How many branches would each of the two people need to collect?

(continued)

3 In the past, many people did not stay in one place all year. They moved from place to place to find food. These people were called *nomads*. Sometimes nomads built a new shelter each time they moved. Sometimes they took their shelter with them. The type of shelter in the photo is still used today by some people in a place called Mongolia. This movable shelter is called a *yurt*.

a Find Mongolia on a map. It is below a huge country called Russia. What is the name of the other big country below Mongolia?

b The nomads in Mongolia take their yurts with them when they move. What is an advantage and a disadvantage of taking a house with you when you move?

c The top part of a yurt is shaped like a cone. What sort of 3D object is the bottom part of a yurt?

d The roof of a yurt has a hole in the top of the cone. Why do you think it has a hole?

4 Did you know that there are over 9 million houses in Australia? Places such as Sydney have over a million homes. Some places have just a few houses.

This is a list of imaginary towns and the number of houses in each place.

Town	Number of houses
Billsville	4317
Ellaville	3417
Lilyville	4371
Jacksville	3741
Lucasville	4713
Charlotteville	3714
Saraville	4731

(continued)

a Rewrite the list by putting the towns in order from the smallest number of houses to the most houses.

b Which town has a 3 in the thousands and a 4 in the ones?

c Which town has 4000 + 300 + 70 + 1 houses?

d True or false? None of the towns has less than 3420 houses.

e Which towns have more than 4350 houses?

f What is something that is similar about the number of houses in each of the towns?

g The number of houses in another town, Hannahville, has the same digits as Billsville, but the 7 is in the thousands place and the 1 is in the tens place. What might be the number of houses in Hannahville?

h Write a fact comparing the number of houses in Charlotteville and Jacksville.

Mastery task 4: Houses and homes

Question	Answer
1	a. 1000 mL b. Answers will vary. Teacher to check (e.g. vegetables). c. Answers will vary. Teacher to check (e.g. we would die from the cold). d. Answers will vary. Teacher to check (e.g. clothes).
2	a. Answers will vary. Teacher to check (e.g. other people may try to get in). b. 14 c. 25
3	a. China b. Answers will vary. Teacher to check (e.g. advantage: they don't have to look for a home when they get to where they're going; disadvantage: they have to carry the heavy yurt with them). c. cylinder d. Teacher to check (e.g. to let out the smoke from the fire).

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Mastery task answers

4

a.

Town	Number of houses
Ellaville	3417
Charlotteville	3714
Jacksville	3741
Billsville	4317
Lilyville	4371
Lucasville	4713
Saraville	4731

b. Charlotteville
c. Lilyville
d. false (Ellaville: 3417)
e. Lilyville, Lucasville, Saraville
f. Answers will vary. Teacher to check (e.g. they all have the same digits).
g. 7314 or 7413
h. Answers will vary. Teacher to check (e.g. both numbers are greater than 3700).

Curriculum links: Year 5

Number and algebra

Unit	Topic	Focus	New Zealand Curriculum
Number structure and operations	Place value	Read, write, represent and order numbers up to 6 digits	• recognise the base ten structure of numbers up to 100,000 • identify, read, write, compare, and order whole numbers up to 100,000 • round whole numbers to a specified power of 10, and round tenths and hundredths to the nearest whole number
Number structure and operations	Odd and even	Understand the properties of odd and even numbers and how this knowledge can help with checking calculations	• Looking back: Year 4
Operations	Addition methods	Explore and choose appropriate written addition methods such as the split method and vertical addition to solve addition problems	• recognise the base ten structure of numbers up to 100,000 • identify, read, write, compare, and order whole numbers up to 100,000 • add and subtract whole numbers up to 10,000
Operations	Subtraction methods	Explore and choose appropriate written subtraction methods such as the split method and vertical subtraction to solve subtraction problems	• recognise the base ten structure of numbers up to 100,000 • identify, read, write, compare, and order whole numbers up to 100,000 • add and subtract whole numbers up to 10,000
Operations	Multiplication and division facts	Use arrays and number charts to explore the connection between multiplication and division and learn related number facts	• multiply a 3-digit by 1-digit number and two 2-digit whole numbers • use inverse operations to solve multiplication and division problems • recall multiplication facts to 10 × 10 and corresponding division facts • use known multiplication facts to scale a quantity

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Operations	Multiplication methods	Explore and choose appropriate written multiplication methods such as extended and contracted multiplication to solve problems involving one- and two-digit numbers	• multiply a 3-digit by 1-digit number and two 2-digit whole numbers
Operations	Division methods	Explore and choose appropriate written division methods such as short division to solve problems involving one- and two-digit numbers	• divide whole numbers by a 1-digit divisor, with a remainder
Rational numbers	Equivalent fractions	Use diagrams and fraction walls to investigate and identify equivalent fractions	• identify, read, write, and represent tenths and hundredths as fractions and decimals • for fractions with denominators of 2, 3, 4, 5, 6, 8, 10, 12, or 100: ○ compare and order the fractions ○ identify when two fractions are equivalent ○ represent the fractions in their simplest form
Rational numbers	Equations with fractions	Understand and convert between fractions and mixed numbers using number lines and diagrams	• convert between improper fractions and mixed numbers for fractions with denominators up to 10 • find a fraction of a whole number, using multiplication and division facts and where the answer is a whole number • identify, from a fractional part of a set, the whole set • add and subtract fractions with the same denominators, including to make more than one whole • explore why the commutative and associative properties do not work for subtraction and division • form and solve true or false number sentences and open number sentences involving all four operations

Rational numbers	Decimal fractions	Read, write and interpret numbers to hundredths, and convert between decimals and fractions	• identify, read, write, and represent tenths and hundredths as fractions and decimals • compare and order tenths and hundredths as fractions and decimals, and convert decimals to fractions • divide whole numbers by 10 and 100 to make decimals and whole numbers • add and subtract decimals to two decimal places
Financial mathematics	Money and money calculations	Round money amounts to the nearest five cents and calculate money totals and change	• represent money values in multiple ways using notes and coins • estimate the cost to the nearest dollar of items costing dollars and cents, and the change from the nearest ten dollars
Algebra	Number patterns	Explore, complete and identify rules for number patterns and identify multiples of given numbers	• recall multiplication facts to 10 × 10 and corresponding division facts • use tables to recognise the relationship between the ordinal position and its corresponding element in a growing pattern, develop a rule in words, and predict further elements in the pattern • identify factors of numbers up to 100
Algebra	Number operations and properties	Investigate the effect of changes in the order of operations and use this knowledge to solve problems across the four operations	• form and solve true or false number sentences and open number sentences involving all four operations • explore why the commutative and associative properties do not work for subtraction and division

Algebra	Problem solving	Interpret, represent and solve word problems involving the four processes	- explore the distributive property of multiplication over addition and subtraction - recall multiplication facts to 10 × 10 and corresponding division facts - use inverse operations to solve multiplication and division problems - form and solve true or false number sentences and open number sentences involving all four operations - explore the distributive property of multiplication over addition and subtraction

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Measurement and geometry

Unit	Topic	Focus	New Zealand Curriculum
Using units of measurement	Length	Estimate, measure and compare lengths using centimetres and millimetres and convert between the units	• estimate and then accurately measure length, mass (weight), capacity, temperature, and duration, using appropriate metric units or a combination of units • use the appropriate unit and tool for the task and the attribute being measured • use the metric measurement system based on powers of ten to explore relationships between units, including benchmark fractions and decimals • visualise, estimate, and calculate: • the perimeter of polygons • the area of shapes covered with squares or partial squares • the volume of rectangular prisms, taking note of layers and stacking

Using units of measurement	Area	Estimate, measure and compare areas using square centimetres and square metres	• visualise, estimate, and calculate:
			  o the perimeter of polygons
			  o the area of shapes covered with squares or partial squares
			  o the volume of rectangular prisms, taking note of layers and stacking

Using units of measurement	Angles	Explore common angle types and describe them in relation to a right angle	• describe an angle using the terms acute, right, obtuse, straight, and reflex, by comparing the angle with benchmarks of 90, 180, and 360 degrees

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Using units of measurement	Volume and capacity	Estimate, measure and compare volume and capacity using cubic centimetres, litres and millilitres. Convert between litres and millilitres	• estimate and then accurately measure length, mass (weight), capacity, temperature, and duration, using appropriate metric units or a combination of units • use the appropriate unit and tool for the task and the attribute being measured • visualise, estimate, and calculate: • the perimeter of polygons • the area of shapes covered with squares or partial squares • the volume of rectangular prisms, taking note of layers and stacking
Using units of measurement	Mass	Estimate, measure and compare masses using grams and kilograms. Convert between the units	• estimate and then accurately measure length, mass (weight), capacity, temperature, and duration, using appropriate metric units or a combination of units
Using units of measurement	Temperature	Read and record temperatures on thermometers and measure and compare the temperature of familiar items and places	• estimate and then accurately measure length, mass (weight), capacity, temperature, and duration, using appropriate metric units or a combination of units
Using units of measurement	Time	Investigate and record am and pm time to the minute. Convert between common units of time	• estimate and then accurately measure length, mass (weight), capacity, temperature, and duration, using appropriate metric units or a combination of units • describe the differences in duration between units of time (e.g., days and weeks, months and years) • solve duration-of-time problems involving 'am' and 'pm' notation

Shapes	2D shapes	Identify and describe common features of 2D shapes. Investigate the effects of combining or splitting shapes	- identify, classify, and describe the properties of: - regular and irregular polygons, using edges, vertices, and angles - prisms, using the cross section, faces, edges, and vertices - visualise, estimate, and calculate: - the perimeter of polygons - the area of shapes covered with squares or partial squares - the volume of rectangular prisms, taking note of layers and stacking - use known multiplication facts to scale a quantity - identify and describe parallel and perpendicular lines, including those forming the sides of polygons - resize a 2D shape so that it is either bigger or smaller
Shapes	3D shapes	Identify and describe 3D shapes including top, front and side views. Sketch and name common 3D shapes	- identify, classify, and describe the properties of: - regular and irregular polygons, using edges, vertices, and angles - prisms, using the cross section, faces, edges, and vertices - visualise and connect 3D shapes with their nets, their 2D diagrams, verbal descriptions of them, and the same shapes drawn from different perspectives
Pathways	Scales and maps	Interpret and create maps using scales and legends, and follow directions involving compass points	interpret and create a grid map to plot positions and pathways, using grid references and directional language, including the four main compass points

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Curriculum planner

Statistics and probability

Unit	Topic	Focus	New Zealand Curriculum
Statistics	Collecting data	Construct appropriate questions to collect data using methods such as surveys. Use efficient methods to record collected data	- investigate summary and comparison situations with categorical and discrete numerical data, using multivariate data by - posing summary and comparison investigative questions that can be answered with data - making predictions or assertions about expected findings - plan how to collect primary data to support answering an investigative question, including: - deciding on the group of interest - deciding the variable(s) for which data will be collected - taking account of ethical practices in data collection - use a variety of tools to collect data, check for errors in the data, and correct errors by re-collecting the data, if possible

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Statistics	Displaying and interpreting data	Construct and interpret data displays including pictographs, column graphs and tables using given and collected data. Analyse the effectiveness of data displays	• investigate summary and comparison situations with categorical and discrete numerical data, using multivariate data by
			  • posing summary and comparison investigative questions that can be answered with data
			  • making predictions or assertions about expected findings
			• create and describe data visualisations for summary and comparison investigations that make meaning from the data, with statements including the names of the variable and group of interest
			• answer the investigative question, comparing findings with initial predictions or assertions and their existing knowledge of the world
			• check and, if needed, improve the statements others make about data, including data from two or more sources.

Probability	Chance	Compare, rank and evaluate the likelihood of common events	• engage in chance-based investigations, including those with not equally likely outcomes, by:
			  ○ posing investigative questions
			  ○ anticipating what might happen
			  ○ identifying possible outcomes for the investigative questions
			  ○ generating all possible ways to get each outcome (a theoretical approach) or undertaking a probability experiment and recording the occurrences of each outcome
			  ○ creating data visualisations for possible outcomes
			  ○ describing what these visualisations show
			  ○ finding probabilities as fractions
			  ○ answering investigative questions
			  ○ reflecting on anticipated outcomes
			• agree or disagree with others' conclusions about chance-based investigations, with justification.

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	Chance experiments	Predict and explore the possible outcomes of chance experiments and evaluate the effects of one event on another	- engage in chance-based investigations, including those with not equally likely outcomes, by: - posing investigative questions - anticipating what might happen - identifying possible outcomes for the investigative questions - generating all possible ways to get each outcome (a theoretical approach) or undertaking a probability experiment and recording the occurrences of each outcome - creating data visualisations for possible outcomes - describing what these visualisations show - finding probabilities as fractions - answering investigative questions - reflecting on anticipated outcomes - agree or disagree with others' conclusions about chance-based investigations, with justification.

Curriculum links: Year 6

Number and algebra

Unit	Topic	Focus	New Zealand Curriculum
Number structure and operations	Place value	Read, write, represent and order numbers beyond 5 digits	• recognise the base ten structure of numbers up to 1,000,000 • identify, read, write, compare, and order whole numbers up to 1,000,000
	Rounding numbers	Round numbers to a a multiple of 10 and round decimals to the nearest whole number	• round whole numbers to a specified multiple of powers of 10, and round tenths and hundredths to the nearest whole number or one decimal place • add and subtract whole numbers and decimals to two decimal places • use known multiplication and division facts to scale a quantity
	Addition mental methods	Choose and apply appropriate mental addition strategies such as rounding, estimation and the split strategy	• add and subtract any whole numbers
	Addition written methods	Use strategies such as identifying easy to add numbers within the vertical algorithm for addition	• add and subtract any whole numbers
	Subtraction mental methods	Choose and apply appropriate subtraction strategies such as rounding, the compensation strategy and counting up	• add and subtract any whole numbers
	Subtraction written methods	Use the vertical algorithm to solve subtraction problems with larger numbers and identify and apply strategies to check answers	• add and subtract any whole numbers • use rounding and estimation to predict and to check the reasonableness of calculations

	Multiplication mental methods	Explore and choose appropriate mental multiplication strategies such as the tens trick and doubling and halving	• recall multiplication facts to at least 10 × 10 and corresponding division facts • multiply multi-digit whole numbers • multiply and divide numbers by 10 and 100 to make decimals and whole numbers
	Multiplication written methods	Explore and choose appropriate written multiplication strategies such as the area model and contracted multiplication	• recall multiplication facts to at least 10 × 10 and corresponding division facts • multiply multi-digit whole numbers • multiply and divide numbers by 10 and 100 to make decimals and whole numbers • use the distributive, commutative, and associative properties
	Multiplication property	Consolidate understanding of commutative, associative, and distributive properties to make multiplication problems easier	• recall multiplication facts to at least 10 × 10 and corresponding division facts • use the distributive, commutative, and associative properties
	Division written methods	Choose and apply appropriate division strategies such as the split strategy and the formal division algorithm to solve division problems	• divide whole numbers by a 1-digit divisor, with a remainder • multiply and divide numbers by 10 and 100 to make decimals and whole numbers
	Factors, multiples and square numbers	Explore the concepts of factors and multiples and identify and problem solve using them	• identify square numbers and factors of numbers up to 125
	Divisibility	Explore divisibility tests for numbers to 10 and use them in calculations and problem solving	• identify square numbers and factors of numbers up to 125 • multiply and divide numbers by 10 and 100 to make decimals and whole numbers • recall multiplication facts to at least 10 × 10 and corresponding division facts

Rational numbers	Comparing and ordering fractions	Read, interpret and order unit fractions with different denominators, and place them on number lines	• identify, read, write, and represent fractions, decimals (to two places), and percentages
			• compare and order fractions, decimals (to two places), and percentages and convert decimals, and percentages to fractions
			• for fractions with denominators of 2, 3, 4, 5, 6, 8, 10, 12, or 100:
			  ○ compare and order the fractions
			  ○ identify when two fractions are equivalent
			  ○ represent the fractions in their simplest form
			• identify, from a fractional part of a set, the whole set

	Adding and subtracting fractions	Apply knowledge of equivalent fractions to add and subtract fractions with a common denominator	• convert between improper fractions and mixed numbers • add and subtract fractions with the same or related denominators
	Decimal fractions	Represent, interpret and compare decimal fractions to thousandths	• identify, read, write, and represent fractions, decimals (to two places), and percentages
	Percentages	Explore percentages as a fraction of 100 and convert fractions, decimals and percentages	• identify, read, write, and represent fractions, decimals (to two places), and percentages • compare and order fractions, decimals (to two places), and percentages and convert decimals, and percentages to fractions • find a fraction or percentage of a whole number where the answer is a whole number
Financial mathematics	Financial plans	Investigate and create simple financial plans including GST	• solve problems involving purchases • create simple financial plans

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Patterns and algebra	Number patterns	Articulate and apply rules to continue and create number and geometric patterns. Use diagrams to represent pattern choices	• use inverse operations to solve multiplication and division problems • use tables, XY graphs, and diagrams to recognise relationships in a linear pattern, develop a rule in words that identifies the constant amount of change between consecutive elements or terms in the pattern, and predict further elements in the pattern • create and use algorithms for making decisions that involve clear choices
	Number operations and properties	Investigate the effect of changes in the order of operations and use this knowledge to solve problems across the four operations	• use the order of operations rule GEMA with grouping, addition, subtraction, multiplication, and division • use inverse operations to solve multiplication and division problems • use commutative, associative, and identity properties, deciding which operations they work for and which they don't
	Problem solving	Investigate linear relationships using a table and XY graphs and find patterns in changes of values. Explore and create an algorithm for daily routine to formulate each action	• form and solve true or false number sentences and open number sentences involving all four operations, using equality or inequality • create and use algorithms for making decisions that involve clear choices • use tables, XY graphs, and diagrams to recognise relationships in a linear pattern, develop a rule in words that identifies the constant amount of change between consecutive elements or terms in the pattern, and predict further elements in the pattern

Measurement and geometry

Unit	Topic	Focus	New Zealand Curriculum
Using units of measurement	Length and perimeter	Accurately measure lengths to the millimetre and convert between common units of length. Use appropriate strategies to calculate perimeter	• estimate and then accurately measure length, mass (weight), capacity, temperature, and duration, using appropriate metric units or a combination of units • select and use the appropriate unit and tool for the task and the attribute being measured • convert between common metric units for length, mass (weight), and capacity; and use decimals to express parts of wholes in measurements
	Area	Use effective strategies to calculate area using appropriate units	• visualise, estimate, and calculate the area of rectangles and right-angled triangles and the volume of rectangular prisms, by applying multiplication
	Volume and capacity	Use effective strategies to calculate capacity and volume using formal metric units. Compare and order capacities expressed in different units	• estimate and then accurately measure length, mass (weight), capacity, temperature, and duration, using appropriate metric units or a combination of units • convert between common metric units for length, mass (weight), and capacity; and use decimals to express parts of wholes in measurements
	Mass	Identify and convert between appropriate units of mass and accurately use measurement devices	• estimate and then accurately measure length, mass (weight), capacity, temperature, and duration, using appropriate metric units or a combination of units • convert between common metric units for length, mass (weight), and capacity; and use decimals to express parts of wholes in measurements

	Time	Explore 24-hour time and identify the connections and convert between 12-hour, 24-hour and am and pm time	• estimate and then accurately measure length, mass (weight), capacity, temperature, and duration, using appropriate metric units or a combination of units • convert between units of time and solve duration-of-time problems, in both 12- and 24-hour time systems
Shapes	2D shapes	Identify and classify polygons by their properties, including types of triangles	• classify, identify, and explain similarities and differences between: o 2D shapes, including types of triangle o prisms and pyramids • identify and describe the interior angles of triangles and quadrilaterals • identify and describe the interior angles of triangles and quadrilaterals
	3D shapes	Identify and classify three-dimensional shapes by their properties and recognise their nets	• classify, identify, and explain similarities and differences between: o 2D shapes, including types of triangle o prisms and pyramids • visualise and draw nets for rectangular prisms • visualise and draw nets for rectangular prisms
Spatial reasoning	Angles	Estimate and accurately measure and construct angles using a protractor, and identify angle types	• visualise, measure, and draw (to the nearest degree), the amount of turn in angles up to 360 degrees
Pathways	Transformations	Use the reflection, rotation and translation transformations to continue, describe and create patterns	• visualise, create, and describe 2D geometric patterns and tessellations using rotation, reflection, and translation, and identifying the properties of shapes that do not change
	Grid references	Accurately interpret and record positions using grid map coordinates	• interpret and create grid references and simple scales on maps

	Giving directions	Use compass points and directional language to follow and give instructions	• interpret and create grid references and simple scales on maps • use directional language, including the four main compass points, turn (in degrees), and distance (in m, km), to locate and describe positions and pathways

Statistics and probability

Unit	Topic	Focus	New Zealand Curriculum
Statistics	Collecting and representing data	Explore the concepts of numerical and categorical data and use this knowledge to collect data and construct appropriate displays	• investigate summary, comparison, and time-series situations, using multivariate data to: o pose investigative questions that can be answered with data o make predictions or assertions about expected findings • plan how to collect primary data or how to use provided data, including identifying the variables of interest and, for provided data: o identifying who the data was collected from o identifying the original investigator's purpose for collecting the data o deciding if the source is reputable, by checking if any survey questions appear to be biased towards a particular point of view • describe information about variables in secondary data by using publisher-provided data dictionaries • create and describe a variety of data visualisations that make meaning from the data, identifying features, patterns, and trends in context, including the variable and group of interest • answer the investigative question, comparing findings with initial predictions or assertions and their existing knowledge of the world • identify, explain, check, and, if needed, improve features in others' data investigations
	Representing and interpreting data	Create a variety of data displays and make accurate inferences based on the data	
Probability	Chance	Explore chance outcomes using fractions, decimals and percentages and make reasonable evaluations of chance events	• engage in one-stage, chance-based investigations, including those with not equally likely outcomes, by: • posing investigative questions

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	Chance experiments	Predict and analyse the outcomes of chance experiments	- anticipating what might happen - identifying possible outcomes for the investigative questions - generating all possible ways to get each outcome (a theoretical approach) or undertaking a probability experiment and recording the occurrences of each outcome - creating data visualisations for possible outcomes - describing what these visualisations show - finding probabilities as fractions - answering investigative questions - reflecting on anticipated outcomes - comparing findings from probability experiments and associated theoretical probabilities, if the theoretical model exists - interrogate statements that others make about one-stage, chance-based situations, referring to evidence.