**OXFORD** UNIVERSITY PRESS **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
<ul> <li>Full-colour student workbook with guided, independent and extended practice activities for every topic, glossary of key terms and answers</li> </ul>	<ul> <li>Student workbook (digital version) Years 1– 8. Activity content for Year 0</li> <li>Pre-tests for every topic</li> <li>Access to additional resources including activity sheets, blackline masters and mastery tasks – assigned by the teacher based on ability level</li> <li>Post-tests for every topic</li> </ul>	<ul> <li>Curriculum and planning documents that support teachers in implementing the refreshed curriculum (Years 0–8)</li> <li>References to the OECD PISA 2022 Mathematics Framework, specifically Mathematical Literacy and the three domains for the literacy skills required for the 21<sup>st</sup> Century</li> <li>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)</li> <li>Learning resources for every topic including interactive topic introductions, blackline masters, activity sheets, and mastery tasks (mastery tasks Years 4–8)</li> <li>Pre-tests for every topic</li> <li>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</li> </ul>

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.

#### Sample materials

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# 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.

# Curriculum links: Year 4

*Curriculum links apply to topics as a whole and can be found in the Student Book, Teacher Notes and Resources.* 

# Number and algebra

Unit	Торіс	Focus	New Zealand Curriculum
Number structure and operations	Place value	Read, write, represent and order numbers up to 5 digits	<ul> <li>skip count from any multiple of 100, forwards and backwards in 25s and 50s</li> <li>identify, read, write, compare, and order whole numbers up to 10,000, and represent them using base 10 structure</li> </ul>
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	<ul> <li>identify, read, write, compare, and order whole numbers up to 10,000, and represent them using base 10 structure</li> <li>add and subtract two- and three- digit numbers</li> </ul>
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	<ul> <li>identify, read, write, compare, and order whole numbers up to 10,000, and represent them using base 10 structure</li> <li>add and subtract two- and three- digit numbers</li> </ul>
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	<ul> <li>add and subtract two- and three- digit numbers</li> </ul>
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	<ul> <li>add and subtract two- and three- digit numbers</li> </ul>
Number structure and operations	Inverse operations	Explore the connection between addition and subtraction and identify related families of fact	<ul> <li>add and subtract two- and three- digit numbers</li> </ul>

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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	<ul> <li>use inverse operations to solve multiplication and division problems</li> <li>recall multiplication and corresponding division facts for 4s, 6s</li> <li>divide up to a three-digit whole number by a one-digit divisor, with no remainder</li> <li>use rounding, estimation, and inverse operations to predict results and to check the reasonableness of calculations</li> <li>round whole numbers to the nearest thousand, hundred, or ten</li> </ul>
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	<ul> <li>multiply a two-digit by one-digit number and two one-digit whole numbers</li> <li>divide up to a three-digit whole number by a one-digit divisor, with no remainder</li> <li>use doubling or halving to scale a quantity</li> </ul>
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	<ul> <li>multiply a two-digit by one-digit number and two one-digit whole numbers</li> </ul>
Rational numbers	Equivalent fractions and decimals	Model, identify, compare and order equivalent fractions and decimals	<ul> <li>identify, read, write, and represent tenths as fractions and decimals</li> <li>compare and order tenths as fractions and decimals, and convert decimal tenths to fractions</li> <li>divide whole numbers by 10 to make decimals</li> <li>for fractions with related denominators of 2, 4, and 8, 3 and 6, or 5 and 10:         <ul> <li>compare and order the fractions</li> <li>identify when two fractions are equivalent by directly comparing them, noticing the simplest form</li> </ul> </li> </ul>
Rational numbers	Improper fractions and mixed numbers	Use number lines to count by unit fractions and compare the size of different fractions	<ul> <li>convert (using number lines) between mixed numbers and improper fractions with denominators of 2, 3, 4, 5, 6, 8 and 10</li> </ul>

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

Curriculum planner

# Measurement and geometry

Unit	Торіс	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	<ul> <li>measure body parts or familiar objects and use these as benchmarks to estimate and then measure length, mass (weight), capacity, and duration, using appropriate metric or time-based units</li> <li>use appropriate units to describe length, mass (weight), capacity, and time</li> <li>use the metric measurement system to explore relationships between units</li> <li>visualise, estimate, and calculate:         <ul> <li>the perimeter of polygons, using metric units (cm and m)</li> <li>the area of shapes covered with squares or half squares</li> <li>the volume of shapes filled with centicubes, taking note of layers and stacking</li> </ul> </li> </ul>
Using units of measurement	Volume and capacity	Estimate, measure and compare volume and capacity using cubic centimetres, litres and millilitres	<ul> <li>measure body parts or familiar objects and use these as benchmarks to estimate and then measure length, mass (weight), capacity, and duration, using appropriate metric or time-based units</li> <li>use appropriate units to describe length, mass (weight), capacity, and time</li> <li>use the metric measurement system to explore relationships between units</li> <li>visualise, estimate, and calculate:         <ul> <li>the perimeter of polygons using metric units (cm and m)</li> <li>the area of shapes covered with squares or half squares</li> <li>the volume of shapes filled with centicubes, taking note of layers and stacking</li> </ul> </li> </ul>



# 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	<ul> <li>measure body parts or familiar objects and use these as benchmarks to estimate and then measure length, mass (weight), capacity, and duration, using appropriate metric or time-based units</li> <li>use appropriate units to describe length, mass (weight), capacity, and time</li> <li>use the metric measurement system to explore relationships between units</li> </ul>
Using units of measurement	Time	Record and interpret digital and analog time to the minute. Convert between common units of time	<ul> <li>measure body parts or familiar objects and use these as benchmarks to estimate and then measure length, mass (weight), capacity, and duration, using appropriate metric or time-based units</li> <li>use appropriate units to describe length, mass (weight), capacity, and time</li> <li>tell the time to the nearest 5 minutes, using the language of 'minutes past the hour' and 'to the hour'</li> </ul>
Geometry and spatial reasoning	2D shapes	Explores, describes and classifies 2D shapes according to their features	<ul> <li>identify, classify, and describe the attributes of polygons (including triangles and quadrilaterals) using properties of shapes, including line and rotational symmetry</li> </ul>
Geometry and spatial reasoning	3D shapes	Recognise, describe and draw 3D shapes according to their features and the 2D shapes that make them up	<ul> <li>identify the 2D shapes that compose 3D shapes</li> </ul>
Geometry and spatial reasoning	Angles	Compare and classify angles in shapes and the environment in relation to a right angle	<ul> <li>compare angles in 2D shapes, classifying them as equal to, smaller than, or larger than a right angle</li> <li>recognise that angles can be measured in degrees, using 90, 180, and 360 degrees as benchmarks</li> </ul>
Geometry and spatial reasoning	Symmetry	Classify items as symmetrical or not symmetrical and identify lines of symmetry	<ul> <li>identify, classify, and describe the attributes of polygons (including triangles and quadrilaterals) using properties of shapes, including line and rotational symmetry</li> </ul>

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# Curriculum planner

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

# Statistics and probability

Unit	Торіс	Focus	New Zealand Curriculum
Statistics	Collecting data	Explore and choose appropriate data sources to collect and classify data	<ul> <li>use multivariate data to investigate summary and comparison situations with categorical and discrete numerical data, by:         <ul> <li>posing an investigative question that can be answered with data</li> <li>making conjectures or assertions about expected findings</li> </ul> </li> <li>plan how to collect primary data to support answering the investigative question, including:         <ul> <li>deciding on the group of interest</li> <li>deciding on the variable or variables for which data will be collected</li> <li>taking account of ethical practices in data collection</li> </ul> <li>create and describe data visualisations to make meaning from the data, with statements including the name of the variable</li> <li>choose descriptive statements that best answer the investigative question, reflecting on findings and how they compare with initial conjectures or assertions</li> </li></ul>
Statistics	Graphs	Understand and use the features of common data displays such as picture graphs and column graphs	<ul> <li>create and describe data visualisations to make meaning from the data, with statements including the name of the variable</li> </ul>

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# Curriculum planner

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



## Curriculum planner

# Suggested term planner: Year 4

Weeks	Unit	Торіс	Focus	Student Book pages
1–2	1. Number structure and operations	1. Place value	Read, write, represent and order numbers up to 5 digits	2–5
3	1. Number structure and operations	2. Addition mental methods	Explore and choose appropriate mental addition strategies such as the split method and extending number facts to solve addition problems	6–9
4	5. Using units of measurement	4. Time	Record and interpret digital and analog time to the minute. Convert between common units of time	82–85
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	10–14
7	6. Geometry and spatial reasoning	1. 2D shapes	Explore, describe and classify 2D shapes according to their features	86–89
8	2. Rational numbers	1. Equivalent fractions and decimals	Make, identify, compare and order equivalent fractions and decimals	40–43
9	2. Rational numbers	2. Improper fractions and mixed numbers	Use number lines to count by unit fractions and compare the size of different fractions	44–47
10	2. Rational numbers	3. Fractions of quantities	Explore, identify and represent unit	48–51

Weeks	Unit	Торіс	Focus	Student Book 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	15–18
2–3	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	68–72
4–5	1. Number structure and operations	5. Subtraction written methods	Explore and choose appropriate written subtraction strategies such as the jump method and vertical subtraction to solve subtraction problems	19–23
6	6. Geometry and spatial reasoning	3. Angles	Compare and classify angles in shapes and the environment in relation to a right angle	94–97
7–8	6. Geometry and spatial reasoning	5. Flips, turns and slides	Identify, classify and represent slide and turn transformations	102–105
9	4. Patterns and algebra	1. Number patterns	Follow and create rules for number patterns and identify missing numbers based on function machine rules	60–63
10	2. Rational numbers	4. Adding and subtracting fractions and decimals	Apply knowledge of equivalent fractions to add and subtract fractions with a common denominator	52–55

Weeks	Unit	Торіс	Focus	Student Book 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	28–31
2	6. Geometry and spatial reasoning	4. Symmetry	Classify items as symmetrical or not symmetrical and identify lines of symmetry	98–101
3	1. Number structure and operations	6. Inverse operations	Explore the connections between addition and subtraction and identify related fact families	24–27
4–5	1. Number structure and operations	8. Multiplication and division mental methods	Explore and choose appropriate mental multiplication and division strategies such as doubling, halving and using known number facts	32–35
6	8. Statistics	1. Collecting data	Explore and choose appropriate data sources to collect and classify data	110–113
7	8. Statistics	2. Graphs	Understand and use the features of common data displays such as picture graphs and column graphs	114–117
8	8. Statistics	3. Interpreting data	Draw conclusions from data presented in graphs, and compare the effectiveness of different data displays	118–121
9	4. Patterns and algebra	2. Number sentences	Interpret, represent and solve word problems, and find missing numbers to balance equations	64–67

Weeks	Unit	Торіс	Focus	Student Book pages
1	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	36–39
2	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	90–93
3	9. Probablity	1. Chance events	Identify possible outcomes of chance events and classify events using the language of probability	122–125
4	9. Probablity	2. Chance experiments	Conduct multiple chance experiments and predict and compare the results	126–129
5	3. Financial mathematics	1. Money	Explore different combinations of coins to make a total, calculate change and round to the nearest ten cents	56–59
6	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	78–81
7	7. Pathways	1. Grids and maps	Use grid references to interpret and create simple maps	106–109
8–9	5. Using units of measurement	2. Volume and capacity	Estimate, measure and compare volume and capacity using cubic centimetres, litres and millilitres	73–77

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# 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 level.

### 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. The timing is a guide only. Teachers can also consider reviewing related topics from the previous year level, introducing or reviewing terminology specific to the topic, playing related maths games or working on a related creative project in pairs/ small groups/as a class.

#### 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
<b>Student book</b> – Guided to Independent practice activities + <b>Early finisher</b> 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	<b>Student book</b> – Guided to Independent practice activities	Student book – Extended practice activities
<b>Student book</b> – Extended practice activities	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

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# Generic 5-session sequence

#### Session 1 – Pre-assessment: 60 minutes

Teacher to identify above-, on- and below-level students, introduce the learning activity; introduce the daily practice activity. The timing is a guide only. Teachers can also consider reviewing related topics from the previous year level, introducing or reviewing terminology specific to the topic, playing related maths games or working on a related creative project in pairs/small groups/as a class.

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
<b>Student book</b> – Guided to Independent Practice activities + <b>Early finisher</b> activity if needed	Small group with teacher – skill consolidation or potential difficulties + Student book – Guided Practice activity	<b>Student book</b> – Guided to Independent Practice activities <b>Activity sheet</b> – Extension activity or investigation

#### Sessions 3 & 4 – 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	<b>Student book</b> – Guided to Independent practice activities	Student book – Extended practice activities
Student book – Extended practice activities	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. The timing is a guide only. Teachers can also consider reviewing specific questions from the post-test that may have caused difficulties, checking on individual students who may still have misconceptions, re-visiting key content from the topic (terminology, formulas, rules, processes), or setting a self-reflection task for students to assess their own learning (I understand..., I don't understand..., I enjoyed..., I would like to know more about...)

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# 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 above-, on- and below-level students; introduce the learning focus; introduce the daily practice activity. The timing is a guide only. Teachers can also consider reviewing related topics from the previous year level, introducing or reviewing terminology specific to the topic, playing related maths games or working on a related creative project in pairs/small groups/as a class.

#### 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
<b>Student book</b> – Guided to Independent practice activities + <b>Early finisher</b> activity if needed	Small group with teacher – skill consolidation or potential difficulties. Both year levels with teacher for cross-	<b>Student book</b> – Guided to Independent practice activities
<b>Both year levels</b> working from own year level <b>Student books</b> .	level hands-on activity <b>Student book</b> – Guided Practice activity at own year level.	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 –	<b>Student book</b> – Independent to Extended Practice activities, individually	Student book – Extended practice activities from own year level.
Extended practice activities.	or in pairs.	

assessment

#### Learning sequence

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Option 2: Lower year level with teacher while upper year level completes Student book – Extended practice activities; then upper year level with teacher while lower year level completes Student book – Extended practice activities.	<b>Teacher</b> 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-	Post-assessment		

For all groups, review results, re-visit the learning focus, allow students to reflect on the topic, and discuss the success criteria. The timing is a guide only. Teachers can also consider reviewing specific questions from the post-test that may have caused difficulties, checking on individual students who may still have misconceptions, re-visiting key content from the topic (terminology, formulas, rules, processes), or setting a self-reflection task for students to assess their own learning.

# Teaching different topics to each year level

#### Session 1 – Preparation: 60 minutes

**Pre-assessment** – teacher to identify above-, on- 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.) The timing is a guide only. Teachers can also consider reviewing related topics from the previous year level, introducing or reviewing terminology specific to the topic, playing related maths games or working on a related creative project in pairs/small groups/as a class.

#### 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	<b>Small group with teacher</b> – skill consolidation or potential difficulties & Student Book – Guided practice activities for the <b>lower year level group</b> only.	<b>Student book</b> – Guided to Independent practice activities as instructed by teacher. Extension activity for the <b>lower year</b>
		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
<b>Student Book</b> – Guided to Independent practice activities + <b>Early finisher</b> activity for the <b>upper year level group</b> only.	Small group with teacher – skill consolidation or potential difficulties & Student Book – Guided practice activities for the <b>upper year level group</b> only.	Student Book – Guided to Independent practice activities as instructed by teacher. Extension activity for the upper year level group only.

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#### Learning sequence

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#### 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.	<b>Student book</b> – Independent to Extended practice activities, independently or in pairs.	Student book – Extended practice activities & Activity sheet for lower year level group only.
Student book – Extended practice activities for lower year level group only.	Check-in with teacher – <b>lower year level</b> 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.	<b>Student book</b> – Independent to Extended practice activities, independently or in pairs.	Student book – Extended practice activities & Activity sheet for <b>upper year</b> level group only.
Student book – Extended practice activities for upper year level group only.	Check-in with teacher – <b>upper year level</b> 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. This is a review session and the timing is a guide only. Teachers can also consider reviewing specific questions from the post-test that may have caused difficulties, checking on individual students who may still have misconceptions, re-visiting key content from the topic (terminology, formulas, rules, processes), or setting a self-reflection task for students to assess their own learning.

# Unit 6

# Topic 2 3D shapes

#### Pages 90–93

Total time: Session 1 – 60 minutes, Session 2 and 3 – both 50 minutes (with Daily practice activity – 10 minutes), Session 4 – 60 minutes

#### C Learning intention

• 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.

#### S Curriculum links

#### NZ Curriculum

• identify the 2D shapes that compose 3D shapes

#### Mathematics and Statistics for Aotearoa New Zealand Year 4 Lesson plan

#### Materials

- paper for book pages
- iPad or digital camera (optional)
- 3D shape models
- 2D pattern blocks
- feely bags
- business cards or cards of similar size and thickness
- Activity sheet: The built environment
- building blocks in the shape of various 3D shapes

#### 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 3D shapes 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 3D shapes in the classroom and compare them with geometric models to consolidate the connection between the two.

## Learning sequences

#### 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,	• N/A
		such as rectangular prisms, to help students get used to them.	

#### Session 1: Pre-assessment

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

#### Session 2: Getting started

Group	Time	Description	What you'll need
Whole class	25 minutes	<ul> <li>Interactive</li> <li>Use the interactive on the Teacher Dashboard to introduce the key mathematical concepts and language.</li> <li>Introductory activity: Features of 3D shapes</li> </ul>	<ul> <li>Interactive</li> <li>Computer (optional)</li> <li>Camera (optional)</li> <li>straws, icy block sticks, plasticine, etc.</li> </ul>
		• 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, and listing different places where their shape can be found in everyday life. Combine the pages to form a class shape book.	
		Introductory activity: 3D models	
		<ul> <li>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, icy block sticks,</li> </ul>	

# Mathematics and Statistics for Aotearoa New Zealand Year 4 Lesson plan

		plasticine, etc. Display the models and ask students to view and guess the names of the model shapes.	
On level	25 minutes	<ul> <li>Student Book</li> <li>Students to complete: Guided and Independent Practice activities, pp. 90–92. 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.</li> </ul>	Student Book
Below level	25 minutes	<ul> <li>Concept exploration and skill development: Attributes of 2D shapes and 3D shapes</li> <li>Students need to build a solid understanding of the language associated with 2D and 3D shapes. 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 2D or 3D shape 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 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.</li> <li>Student book with teacher support</li> <li>Students to complete: Guided Practice activities, p. 90. Allow students to handle and discuss 3D models of the shapes to connect them with the 2D representations as needed</li> </ul>	<ul> <li>Student Book</li> <li>3D shape models</li> <li>2D pattern blocks</li> <li>Feely bag</li> </ul>
Above level	25 minutes	<ul> <li>Student Book</li> <li>Students to complete: Guided and Independent Practice activities, pp. 90–92.</li> <li>Activity sheet</li> <li>Students to begin: Activity sheet: The built environment.</li> </ul>	<ul> <li>Student Book</li> <li>Activity sheet: The built environment</li> </ul>

Group	Time	Description	What you'll need
Whole class	25 minutes	<ul> <li>Topic exploration: 3D shape names</li> <li>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 shapes to build an understanding of how the language relates to the properties of an shape. For example, introduce the prefix <i>penta</i>, explaining that it means "five", and brainstorm <i>penta</i> words that students know. Link this to shapes and shapes they know of that have five sides or faces.</li> <li>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 shape and what is different. Share their ideas and record what students know about prisms. Introduce the name of each prism and ask students to suggest how each shape 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.</li> </ul>	• 3D shape models
On level	25 minutes	<ul> <li>Teacher activity: Origami shapes</li> <li>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.</li> </ul>	<ul> <li>Student Book</li> <li>Business cards/card paper</li> </ul>

#### Session 3: Instruction and consolidation



## Mathematics and Statistics for Aotearoa New Zealand Year 4 Lesson plan

Below level	25 minutes	<ul> <li>Student book with teacher support</li> <li>Students to complete: Independent and Extended Practice activities, pp. 91–93. 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.</li> </ul>	• Student Book
Above level	25 minutes	<ul> <li>Student Book</li> <li>Students to complete: Extended Practice activities, p. 93.</li> <li>Activity sheet</li> <li>Students to complete: Activity sheet: The built environment.</li> </ul>	<ul> <li>Student Book</li> <li>Activity sheet: The built environment</li> </ul>

#### Session 4: Post-assessment

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

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# **Unit 6: Topic 2** 3D shapes



Indepen	dent practio	ce				
1						
Α	В	С	D	Е	F	G

- a Write the letters of the 3D shapes that are prisms.
- b Match the letters from question 1a to the descriptions of the prisms below.



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.	f	Make sure you circle 1 shape or every face of the 3D shapes.
2			
a			
b			
С			
d			
3	Write 1 similarity and 1 difference	oetv	veen these shapes.
а		b	
	Similarity:		Similarity:
	Difference:		Difference:
С		d	
	Similarity:		Similarity:
	Difference:		Difference:

When a 3D shape such as a box is flattened out, the 2D shape is called a **net**.



Name:

# Glossary

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



**addition** The joining or adding of two numbers together to find the total. Also known as *adding, plus* and

*sum*. See also *vertical addition*.

 $\star \star \star + \star \star = \star \star \star \star \star \star \\ 3 \text{ and } 2 \text{ is } 5$ 

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

Examples: horizontal algorithms 24 + 13 = 37

vertical algorithms



**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  $6 \times 18 = 108$ 

**array** An arrangement of items into even columns and rows to make them easier to count.



6

**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 shape.



**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.



# 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. 6

**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 2D or 3D shape meet. Also known as a *vertex*.



**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 **cm<sup>3</sup>** A unit for measuring the volume of smaller objects.

Example: This cube is exactly 1 cm long,



1 cm

1 cm wide and 1 cm deep. 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.



**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.



**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.



**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.



**double/doubles** Adding two identical numbers or multiplying a number by 2.

Example: 2 + 2 = 4  $4 \times 2 = 8$ 

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 a 3D shape 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.

 $\begin{array}{c|c} 2 \\ \hline 2 \\ \hline 4 \\ \hline \end{array} \begin{array}{c} 3 \\ \hline 6 \\ \hline \end{array} \begin{array}{c} 4 \\ \hline 8 \\ \hline 8 \\ \hline \end{array} \begin{array}{c} 4 \\ \hline 8 \\ \hline 8 \\ \hline \end{array} \begin{array}{c} 4 \\ \hline 8 \\ \hline 8 \\ \hline \end{array} \begin{array}{c} 4 \\ \hline 8 \\ \hline 8 \\ \hline \end{array} \begin{array}{c} 4 \\ \hline 8 \\ \hline 8 \\ \hline \end{array} \begin{array}{c} 4 \\ \hline 8 \\ \hline 8 \\ \hline \end{array} \begin{array}{c} 4 \\ \hline 8 \\ \hline 8 \\ \hline 8 \\ \hline \end{array} \begin{array}{c} 4 \\ \hline 8 \\ \hline 8 \\ \hline 8 \\ \hline \end{array} \begin{array}{c} 4 \\ \hline 8 \\ \hline 8 \\ \hline 8 \\ \hline 8 \\ \hline \end{array} \begin{array}{c} 4 \\ \hline 8 \\ \hline 8 \\ \hline \end{array} \begin{array}{c} 4 \\ \hline 8 \\ \hline 8 \\ \hline \end{array} \begin{array}{c} 4 \\ \hline 8 \\ \hline 8 \\ \hline \end{array} \begin{array}{c} 4 \\ \hline 8 \\ \hline 8 \\ \hline 8 \\ \hline \end{array} \begin{array}{c} 4 \\ \hline 8 \\ \hline 8 \\ \hline \end{array} \begin{array}{c} 4 \\ \hline 8 \\ \hline 8 \\ \hline \end{array} \begin{array}{c} 4 \\ \hline 8 \\ \hline 8 \\ \hline \end{array} \begin{array}{c} 4 \\ \hline 8 \\ \hline 8 \\ \hline \end{array} \begin{array}{c} 4 \\ \hline 8 \\ \hline 8 \\ \hline \end{array} \begin{array}{c} 4 \\ \hline 8 \\ \hline 8 \\ \hline \end{array} \begin{array}{c} 4 \\ \hline 8 \\ \hline 8 \\ \hline \end{array} \begin{array}{c} 4 \\ \hline 8 \\ \hline 8 \\ \hline \end{array} \end{array}$ 

**estimate** A thinking guess.

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

Example: 4 and 8 are even numbers

2



**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*.



**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.



**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 -4 -3 -2 -1 0 1 2 3 4 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 (15%)	\$79.50						
	Total	\$609.50						

**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

O 1 2 3 4 5 6 7 8 9 10111213141516171819202122232425262728293031323334353637383940

+10

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



+10

+1 +1

## kilometre or km A unit for

measuring long distances or lengths.



**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.



12:00 02:00 04:00 06:00 m pm pm pm pm pm Time

**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.



**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:  $2\frac{3}{4}$ 

<u>3</u> 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 shape.



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

↓ 0 10 20 30 40 50 60 70 80 90 100

**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.



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



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.



**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.







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



**pattern** A repeating design or sequence of numbers.



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



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

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



**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.

Μ	H Th	T Th	Th	н	Т	0
			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.



# 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 prism rectangular prism hexagonal 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 guarters on a Cartesian plane.

quadrant



quadrant

four sides.

quadrilateral Any 2D shape with



**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



**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:  $11 \div 5 = 2 r1$ 

**rhombus** A 2D shape with four sides, all of the same length and opposite sides parallel.



**right angle** An angle of exactly 90 degrees.



**right-angled triangle** A triangle

where one angle is exactly 90 degrees.

90°



Turn around a point. rotate

**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.



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

229 can be:

<b>†</b> 230		200
nearest 10.		100.
up to the	OR	to the nearest
rounded		rounded down

**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.



**semi-circle** Half a circle, bounded by an arc and a 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 shape 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.



### square centimetre or cm<sup>2</sup>

A unit for measuring the area <sup>1 cm</sup>, of smaller objects. It is exactly 1 cm long and 1 cm wide.

square metre or m<sup>2</sup> A unitfor measuring the area oflarger spaces. It is exactly1 m long and 1 m wide.

1 cm

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:  $3 \times 3$  or  $3^2 = 9$ 



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



**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	$\checkmark$
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.

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



**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:

### two-dimensional or 2D

A flat shape that has two dimensions – length and width.





turn Rotate around a point.

**unequal** Not having the same size or value.

Example: Unequal size



Unequal

**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 2D or 3D shape meet. Also known as a *corner*.



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



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

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

	Т	0
	5	7
-	2	1
	3	6

**volume** How much space an object takes up.



Example: This shape 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.



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



#### Independent practice

- 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**

- 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





#### Independent practice

1	a	А	С	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



**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**



- 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 6: Topic 3

#### Guided practice

1	а	Smaller	b	Smaller
	С	Larger	d	Smaller
	е	Larger	f	Equal

#### 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

<mark>3 a</mark> Equal <mark>b</mark> Smaller c La	irgei
--	-------

- 4 a 3 o'clock, 9 o'clock
  - b B c F

С

- 5 a 360 degrees b 180 degrees
  - 360 degrees d 180 degrees
  - e 90 degrees f 90 degrees

#### **Extended practice**

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

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## **Unit 6 Topic 2** 3D Shapes Activity sheet 23

## The built environment

### You will need:

1

a

building blocks in the form of various 3D shapes.

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 shapes.







square-based pyramid



cube

e





b

d

f

triangular prism



cylinder

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rectangular prism

(continued)

square prism

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## Activity sheet 23

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

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- **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.

## **Activity sheets**

## Answers

#### Unit 6 Topic 2: 3D shapes

#### Activity sheet 23: The built environment

- 1 This could form part of an introductory discussion. Possible answers include:
  - a the glass pyramid at the Louvre, Paris
  - b a traditional tent
  - c a dice
  - d a drink can
  - e an apartment block
  - f a tissue box
- 2 a square pyramid
  - b rectangular prism
  - c cylinder
  - d sphere
- 3 Practical activity. This would make an ideal partner or group activity, with a follow-up discussion about how a wide base helps to make a stable structure.
- 4 Students could begin this task by entering "How does a skyscraper stand?" into an internet search engine.

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## Mastery task 2

## 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.

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 shape 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)

- 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?
- 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?



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### YTUSK

## Answers

#### Mastery Task 2: Gardening as a hobby

- 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  $2 \times 18$ ,  $3 \times 12$ ,  $4 \times 9$ ,  $6 \times 6$ ,  $18 \times 2$ ,  $12 \times 3$ ,  $9 \times 4$ 
  - **b** 9
  - **c** 27
- 5 a 10
  - b \$18
  - c Answers may vary. Teacher to check
  - (e.g.  $1 \times$ \$20 and  $1 \times$ \$10, or  $3 \times$ \$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?
  - 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. Traditionally, 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



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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 shape 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?
- Did you know that there are around 2 million houses in New Zealand? Places such as Auckland have around half 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.

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## Answers

#### **Mastery Task 4: Houses and homes**

- 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).

#### 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).

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# Curriculum links: Year 5

*Curriculum links apply to topics as a whole and can be found in the Student Book, Teacher Notes and Resources.* 

## Number and algebra

Unit	Торіс	Focus	New Zealand Curriculum
Number structure and operations	Place value	Read, write, represent, round and order numbers up to 6 digits	<ul> <li>identify, read, write, compare, and order whole numbers up to 100,000, and represent them using base 10 structure</li> <li>round whole numbers to the nearest ten thousand, thousand, hundred, or ten, and round tenths to the nearest whole number</li> </ul>
Operations	Addition methods	Explore and choose appropriate written addition methods such as the split method and vertical addition to solve addition problems	<ul> <li>identify, read, write, compare, and order whole numbers up to 100,000, and represent them using base 10 structure</li> <li>add and subtract whole numbers up to 10,000</li> <li>use rounding, estimation, and inverse operations to predict results and to check the reasonableness of calculations</li> </ul>
Operations	Subtraction methods	Explore and choose appropriate written subtraction methods such as the split method and vertical subtraction to solve subtraction problems	<ul> <li>identify, read, write, compare, and order whole numbers up to 100,000, and represent them using base 10 structure</li> <li>add and subtract whole numbers up to 10,000</li> <li>use rounding, estimation, and inverse operations to predict results and to check the reasonableness of calculations</li> </ul>



Operations	Multiplication and division facts	Use arrays and number charts to explore the connection between multiplication and division and learn related number facts	<ul> <li>multiply a three-digit by one-digit number and two two-digit whole numbers</li> <li>recall multiplication facts for 7s, 8s, and 9s and corresponding division facts</li> <li>use known multiplication facts to scale a quantity</li> </ul>
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	<ul> <li>multiply a three-digit by one-digit number and two two-digit whole numbers</li> <li>use rounding, estimation, and inverse operations to predict results and to check the reasonableness of calculations</li> </ul>
Operations	Division methods	Explore and choose appropriate written division methods such as short division to solve problems involving one- and two-digit numbers	<ul> <li>divide up to a three-digit whole number by a one-digit divisor, with a remainder</li> <li>use rounding, estimation, and inverse operations to predict results and to check the reasonableness of calculations</li> </ul>
Rational numbers	Equivalent fractions	Use diagrams and fraction walls to investigate and identify equivalent fractions	<ul> <li>identify, read, write, and represent tenths and hundredths as fractions and decimals</li> <li>for fractions with denominators of 2, 3, 4, 5, 6, 8, 10, 12, or 100:         <ul> <li>compare and order the fractions</li> <li>identify when two fractions are equivalent</li> </ul> </li> </ul>



Rational numbers	Equations with fractions	Understand and convert between fractions and mixed numbers using number lines and diagrams	<ul> <li>convert between mixed numbers and improper fractions with denominators of up to 10</li> <li>find a fraction of a whole number, using multiplication and division facts and where the answer is a whole number</li> <li>identify, from a fractional part of a set, the whole set</li> <li>add and subtract fractions with the same denominators, including to make more than one whole</li> <li>form and solve true or false number sentences and open number sentences involving all four operations</li> </ul>
Rational numbers	Decimal fractions	Read, write and interpret numbers to hundredths, and convert between decimals and fractions	<ul> <li>identify, read, write, and represent tenths and hundredths as fractions and decimals</li> <li>compare and order tenths and hundredths as fractions and decimals, and convert decimal tenths and hundredths to fractions</li> <li>divide whole numbers by 10 and 100 to make decimals</li> <li>add and subtract whole numbers and decimals to two decimal places</li> </ul>
Financial mathematics	Money and money calculations	Round money amounts to the nearest ten cents and calculate money totals and change	<ul> <li>represent money values in multiple ways using notes and coins</li> <li>estimate to the nearest dollar and calculate the total cost of items costing dollars and cents, and the change from the nearest ten dollars</li> </ul>



Algebra	Number patterns	Explore, complete and identify rules for number patterns and identify multiples of given numbers	<ul> <li>recall multiplication facts for 7s, 8s, and 9s and corresponding division facts</li> <li>use tables to recognise the relationship between the ordinal position and its corresponding element in a growing pattern, develop a rule for the pattern in words, and make conjectures about further elements or terms in the pattern</li> <li>identify factors of numbers up to 100</li> <li>create and use an algorithm for generating a pattern, procedure, or pathway</li> </ul>
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	<ul> <li>form and solve true or false number sentences and open number sentences involving all four operations</li> </ul>
Algebra	Problem solving	Interpret, represent and solve word problems involving the four processes	<ul> <li>recall multiplication facts for 7s, 8s, and 9s and corresponding division facts</li> <li>form and solve true or false number sentences and open number sentences involving all four operations</li> </ul>

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## Measurement and geometry

Unit	Торіс	Focus	New Zealand Curriculum
Using units of measurement	Length	Estimate, measure and compare lengths using centimetres and millimetres and convert between the units	<ul> <li>estimate and then accurately measure length, mass (weight), capacity, temperature, and duration, using appropriate metric units or time-based units or a combination of units</li> <li>use the appropriate tool for a measurement and the appropriate unit for the attribute being measured</li> <li>use the metric measurement system to explore relationships between units, including relationships represented by benchmark fractions and decimals</li> <li>visualise, estimate, and calculate:         <ul> <li>the perimeter of regular polygons (in m, cm, and mm)</li> <li>the area of shapes covered with squares or partial squares</li> <li>the volume of rectangular prisms filled with centicubes, taking note of layers and stacking</li> </ul> </li> </ul>
Using units of measurement	Area	Estimate, measure and compare areas using square centimetres and square metres	<ul> <li>visualise, estimate, and calculate:         <ul> <li>the perimeter of regular polygons (in m, cm, and mm)</li> <li>the area of shapes covered with squares or partial squares</li> <li>the volume of rectangular prisms filled with centicubes, taking note of layers and stacking</li> </ul> </li> </ul>
Shape	Angles	Explore common angle types and describe them in relation to a right angle	• describe angles using the terms acute, right, obtuse, straight, and reflex, comparing them with benchmarks of 90, 180, and 360 degrees



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	<ul> <li>estimate and then accurately measure length, mass (weight), capacity, temperature, and duration, using appropriate metric units or time-based units or a combination of units</li> <li>use the appropriate tool for a measurement and the appropriate unit for the attribute being measured</li> <li>visualise, estimate, and calculate:         <ul> <li>the perimeter of regular polygons (in m, cm, and mm)</li> <li>the area of shapes covered with squares or partial squares</li> <li>the volume of rectangular prisms filled with centicubes, taking note of layers and stacking</li> </ul> </li> </ul>
Using units of measurement	Mass	Estimate, measure and compare masses using grams and kilograms. Convert between the units	<ul> <li>estimate and then accurately measure length, mass (weight), capacity, temperature, and duration, using appropriate metric units or time-based units or a combination of units</li> </ul>
Using units of measurement	Temperature	Read and record temperatures on thermometers and measure and compare the temperature of familiar items and places	<ul> <li>estimate and then accurately measure length, mass (weight), capacity, temperature, and duration, using appropriate metric units or time-based units or a combination of units</li> </ul>
Using units of measurement	Time	Investigate and record am and pm time to the minute. Convert between common units of time	<ul> <li>estimate and then accurately measure length, mass (weight), capacity, temperature, and duration, using appropriate metric units or time-based units or a combination of units</li> <li>describe the differences in duration between units of time, and solve duration-of-time problems involving 'am' and 'pm' notation</li> </ul>



Shapes	2D shapes	Identify and describe common features of 2D shapes. Investigate the effects of combining or splitting shapes	<ul> <li>identify, classify, and describe the attributes of:         <ul> <li>regular and irregular polygons, using edges, vertices, and angles</li> <li>prisms, using cross sections, faces, edges, and vertices</li> </ul> </li> <li>visualise, estimate, and calculate:         <ul> <li>the perimeter of regular polygons (in m, cm, and mm)</li> <li>the area of shapes covered with squares or partial squares</li> <li>the volume of rectangular prisms filled with centicubes, taking note of layers and stacking</li> </ul> </li> <li>use known multiplication facts to scale a quantity</li> <li>identify and describe parallel and perpendicular lines, including those forming the sides of polygons</li> <li>resize (enlarge or reduce) a 2D shape</li> </ul>
Shapes	3D shapes	Identify and describe 3D shapes including top, front and side views. Sketch and name common 3D shapes	<ul> <li>identify, classify, and describe the attributes of:         <ul> <li>regular and irregular polygons, using edges, vertices, and angles</li> <li>prisms, using cross sections, faces, edges, and vertices</li> </ul> </li> <li>visualise 3D shapes and connect them with nets, 2D diagrams, verbal descriptions, and the same shapes drawn from different perspectives</li> </ul>
Pathways	Scales and maps	Interpret and create maps using scales and legends, and follow directions involving compass points	<ul> <li>interpret and create grid maps to plot positions and pathways, using grid references and directional language, including the four main compass points</li> </ul>

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## Statistics and probability

Unit	Торіс	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	<ul> <li>use multivariate data to investigate summary and comparison situations with categorical and discrete numerical data, by:         <ul> <li>posing an investigative question that can be answered with data</li> <li>making conjectures or assertions about expected findings</li> </ul> </li> <li>plan how to collect primary data to support answering an investigative question, including:         <ul> <li>deciding on the group of interest</li> <li>deciding the variable or variables for which data will be collected</li> <li>taking account of ethical practices in data collection</li> </ul> </li> <li>use a variety of tools to collect data, check for errors in it, and correct them by re-collecting the data, if possible</li> </ul>
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	<ul> <li>use multivariate data to investigate summary and comparison situations with categorical and discrete numerical data, by:         <ul> <li>posing an investigative question that can be answered with data</li> <li>making conjectures or assertions about expected findings</li> </ul> </li> <li>create and describe data visualisations to make meaning from the data, with statements including the names of the variable and group of interest</li> <li>answer the investigative question, comparing findings with initial predictions or assertions and their existing knowledge of the world</li> <li>check and, if needed, improve the statements others make about data, including data from two or more sources</li> </ul>



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

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# Curriculum links: Year 6

*Curriculum links apply to topics as a whole and can be found in the Student Book, Teacher Notes and Resources.* 

## Number and algebra

Unit	Торіс	Focus	New Zealand Curriculum
Number structure and operations	Place value	Read, write, represent and order numbers beyond 5 digits Round numbers to a a multiple of 10 and round decimals to the nearest whole number	<ul> <li>identify, read, write, compare, and order whole numbers up to 1,000,000, and represent them using base 10 structure</li> <li>round whole numbers to a specified power of 10, and round tenths and hundredths to the nearest whole number or one decimal place</li> </ul>
	Addition mental methods	Choose and apply appropriate mental addition strategies such as rounding, estimation and the split strategy	<ul> <li>add and subtract any whole numbers</li> <li>use rounding and estimation to predict and to check the reasonableness of calculations</li> </ul>
	Addition written methods	Use strategies such as identifying easy to add numbers within the vertical algorithm for addition	<ul> <li>add and subtract any whole numbers</li> <li>use rounding and estimation to predict and to check the reasonableness of calculations</li> </ul>
	Subtraction mental methods	Choose and apply appropriate subtraction strategies such as rounding, the compensation strategy and counting up	<ul> <li>add and subtract any whole numbers</li> <li>use rounding and estimation to predict and to check the reasonableness of calculations</li> </ul>
	Subtraction written methods	Use the vertical algorithm to solve subtraction problems with larger numbers and identify and apply strategies to check answers	<ul> <li>add and subtract any whole numbers</li> <li>use rounding and estimation to predict and to check the reasonableness of calculations</li> </ul>



Rational numbers	Multiplication mental methods	Explore and choose appropriate mental multiplication strategies such as the tens trick and doubling and halving	<ul> <li>recall multiplication facts to at least 10 × 10 and corresponding division facts</li> <li>multiply multi-digit whole numbers</li> <li>multiply and divide numbers by 10 and 100 to make decimals and whole numbers</li> </ul>
	Multiplication written methods	Explore and choose appropriate written multiplication strategies such as the area model and contracted multiplication	<ul> <li>recall multiplication facts to at least 10 × 10 and corresponding division facts</li> <li>multiply multi-digit whole numbers</li> <li>multiply and divide numbers by 10 and 100 to make decimals and whole numbers</li> </ul>
	Division written methods	Choose and apply appropriate division strategies such as the split strategy and the formal division algorithm to solve division problems	<ul> <li>divide whole numbers by a 1-digit divisor, with a remainder</li> <li>multiply and divide numbers by 10 and 100 to make decimals and whole numbers</li> </ul>
	Factors, multiples and square numbers	Explore the concepts of factors and multiples and identify and problem solve using them	<ul> <li>identify square numbers and factors of numbers up to 125</li> </ul>
	Comparing, ordering and simplifying fractions	Read, interpret and order unit fractions with different denominators, and place them on number lines	<ul> <li>identify, read, write, and represent fractions, decimals (to two places), and related percentages</li> <li>compare and order fractions, decimals (to two places), and percentages and convert decimals, and percentages to fractions</li> <li>for fractions with denominators of 2, 3, 4, 5, 6, 8, 10, 12, or 100:         <ul> <li>compare and order the fractions</li> <li>identify when two fractions are equivalent</li> <li>represent the fractions in their simplest form</li> </ul> </li> </ul>
	Adding and subtracting fractions	Apply knowledge of equivalent fractions to add and subtract fractions with a common denominator	<ul> <li>convert between mixed numbers and improper fractions</li> <li>add and subtract fractions with the same or related denominators</li> </ul>



	Decimal fractions	Represent, interpret and compare decimal fractions to thousandths	<ul> <li>identify, read, write, and represent fractions, decimals (to two places), and percentages</li> </ul>
	Adding and subtracting decimals	Apply knowledge of vertical algorithms to add and subtract decimals	<ul> <li>add and subtract whole numbers and decimals to two decimal places</li> </ul>
	Percentages	Explore percentages as a fraction of 100 and convert fractions, decimals and percentages	<ul> <li>identify, read, write, and represent fractions, decimals (to two places), and percentages</li> <li>compare and order fractions, decimals (to two places), and percentages and convert decimals, and percentages to fractions</li> <li>find a fraction or percentage of a whole number where the answer is a whole number</li> </ul>
Financial mathematics	Financial plans	Investigate and create simple financial plans including GST	<ul> <li>solve problems involving purchases</li> <li>create simple financial plans</li> <li>calculate 10%, 25%, and 50% of whole-dollar amounts</li> </ul>
Patterns and algebra	Number patterns and algorithm	Articulate and apply rules to continue and create number and geometric patterns. Use diagrams to represent pattern choices	<ul> <li>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</li> <li>create and use algorithms for making decisions that involve clear choices</li> </ul>
	Order of operations and number properties	Investigate the effect of changes in the order of operations and use this knowledge to solve problems across the four operations	<ul> <li>use the order of operations rule with grouping, addition, subtraction multiplication, and division</li> <li>form and solve true or false number sentences and open number sentences involving all four operations, using an understanding of equality or inequality</li> </ul>

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Curriculum planner

## Measurement and geometry

Unit	Торіс	Focus	New Zealand Curriculum
Using units of measurement	Length and perimeter	Accurately measure lengths to the millimetre and convert between common units of length.	<ul> <li>estimate and then accurately measure length, mass (weight), capacity, temperature, and duration, using appropriate metric units or time-based units or a combination of units</li> <li>select and use the appropriate tool for a measurement and the appropriate unit for the attribute being measured</li> <li>convert between common metric units for length, mass (weight), and capacity, and use decimals to express parts of wholes in measurements</li> </ul>
	Area	Use effective strategies to calculate area using appropriate units	<ul> <li>visualise, estimate, and calculate the area of rectangles and right-angled triangles (in cm<sup>2</sup> and m<sup>2</sup>) and the volume of rectangular prisms (in cm<sup>3</sup>), by applying multiplication</li> </ul>
	Volume and capacity	Use effective strategies to calculate capacity and volume using formal metric units. Compare and order capacities expressed in different units	<ul> <li>estimate and then accurately measure length, mass (weight), capacity, temperature, and duration, using appropriate metric units or time-based units or a combination of units</li> <li>convert between common metric units for length, mass (weight), and capacity, and use decimals to express parts of wholes in measurements</li> </ul>
	Mass	Identify and convert between appropriate units of mass and accurately use measurement devices	<ul> <li>estimate and then accurately measure length, mass (weight), capacity, temperature, and duration, using appropriate metric units or time-based units or a combination of units</li> <li>convert between common metric units for length, mass (weight), and capacity; and use decimals to express parts of wholes in measurements</li> </ul>



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

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Curriculum planner

## Statistics and probability

Unit	Торіс	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	<ul> <li>use multivariate data to investigate summary, comparison, and time- series situations, by:         <ul> <li>pose investigative questions that can be answered with data</li> </ul> </li> </ul>
	Representing and interpreting data	Create a variety of data displays and make accurate inferences based on the data	<ul> <li>make predictions or assertions about expected findings</li> <li>plan how to collect primary data or how to use provided data, including identifying the variables of interest and, for provided data:         <ul> <li>identifying who the data was collected from</li> <li>identifying the original investigator's purpose for collecting the data</li> <li>deciding if the source is reputable</li> </ul> </li> <li>collect primary data and check for errors, and provide information about variables in secondary data</li> <li>create and describe a variety of data visualisations to make meaning from the data, identifying features, patterns, and trends in context, including the variable and group of interest</li> <li>answer the investigative question, comparing findings with initial conjectures or assertions and their existing knowledge of the world</li> <li>identify, explain, check, and, if needed, improve features in others' data investigations</li> </ul>
Probability	Chance	Explore chance outcomes using fractions, decimals and percentages and make reasonable evaluations of chance events	<ul> <li>engage in one-stage, chance-based investigations, including those with not equally likely outcomes, by:</li> <li>pose investigative questions</li> </ul>



Chance experiments Predict and analyse the outcomes of chance experiments	<ul> <li>identifying possible outcomes for the investigative question</li> <li>generating all possible ways to get each outcome (a theoretical approach), or undertaking</li> <li>a probability experiment and recording the occurrences of each outcome</li> <li>creating data visualisations for possible outcomes</li> <li>describing what these visualisations show</li> <li>finding probabilities as fractions</li> <li>answering the investigative question</li> <li>reflecting on anticipated</li> </ul>
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