MATHS PLUS 3

TEACHER BOOK

AUSTRALIAN CURRICULUM

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SAMPLE PAGES
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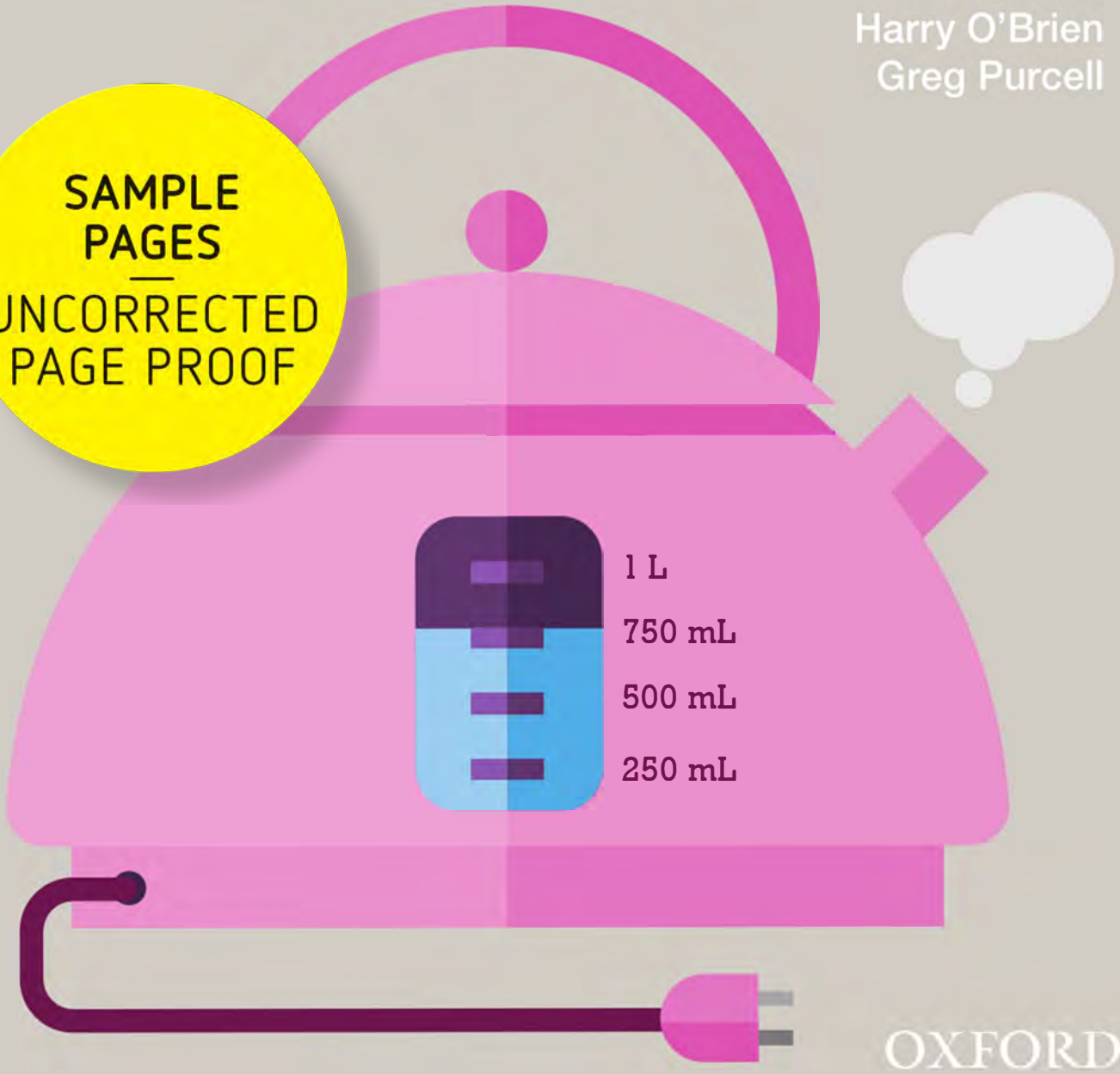

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To the teacher

The *Maths Plus* Australian Curriculum series, Foundation to Year 6, is based on the **Australian Curriculum Mathematics** (ACARA). Each book after Foundation level builds upon prior knowledge and works towards an understanding of the achievement standards for the relevant year level and beyond. *Maths Plus* provides students with opportunities to sequentially develop their skills and knowledge in the three strands of the **Australian Curriculum Mathematics**: **Number and Algebra**, **Measurement and Geometry**, **Statistics and Probability**.

Student Resources

Student Books

Work towards achieving the relevant Australian Curriculum achievement standards by developing skills and competency in **understanding**, **fluency**, **reasoning** and **problem solving**.

The **Dictionary** (Years 2 to 6) features clear and simple explanations of mathematical terms and language.

Assessment Books

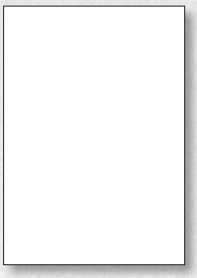
Include short post-tests with a simple marking system to assess students' skills and understanding of the concepts in the Student Books. The Assessment Books are best used at the end of the year as summative assessment for A-E reporting.

Mentals and Homework Books

Provide concise and essential revision and consolidation activities that correspond one-on-one with the concepts and units of work presented in the Student Books.

Teacher Book and Teacher Dashboard

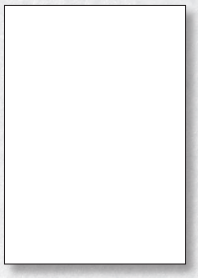
Teacher Book



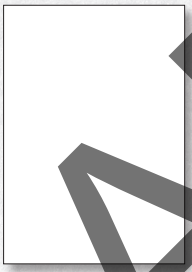
- Each lesson page features AC curriculum links, proficiency strands and general capabilities; and provides teaching instructions with links to the Teacher Dashboard and *Advanced Primary Maths* (Years 3 to 6).

Find a topic

- The **Find a topic** page allows teachers the freedom to address particular topics and student needs as appropriate, providing essential revision and consolidation opportunities.



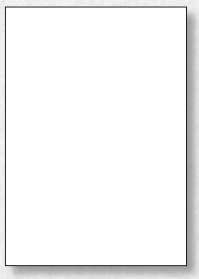
Diagnostic term reviews



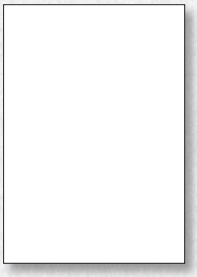
- **Diagnostic term reviews** (Years 1 to 6) assist in pinpointing students' strengths and weaknesses, allowing intervention and re-teaching opportunities where required. Answers can be found in the Teacher Book and on the Teacher Dashboard.

Term planners

- Term planners and curriculum cross-reference charts allow teachers to plan the year's work. Editable term planners can be found on the Teacher Dashboard.



Teaching resources



- Blackline masters, investigations and mastery tasks can be found on the Teacher Dashboard.

- Digital teaching objects (interactives) and videos that address potential difficulties can be found on the Teacher Dashboard.

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Find a topic

NUMBER AND ALGEBRA

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Units	1	2	3	4	5	6	7	8	9	10
NUMBER AND ALGEBRA										
Number and place value										
Investigate the conditions required for a number to be odd or even and identify odd and even numbers (ACMNA051)		■								
Recognise, model, represent and order numbers to at least 10 000 (ACMNA052)					■	■	■			
Apply place value to partition, rearrange and regroup numbers to at least 10 000 to assist calculations and solve problems (ACMNA053)					■	■	■		■	
Recognise and explain the connection between addition and subtraction (ACMNA054)			■	■						■
Recall addition facts for single-digit numbers and related subtraction facts to develop increasingly efficient mental strategies for computation (ACMNA055)	■	■	■		■		■	■	■	■
Recall multiplication facts of two, three, five and ten and related division facts (ACMNA056)	■			■		■	■			
Represent and solve problems involving multiplication using efficient mental and written strategies and appropriate digital technologies (ACMNA057)				■		■				
Fractions and decimals										
Model and represent unit fractions including $\frac{1}{2}$, $\frac{1}{4}$, $\frac{1}{3}$, $\frac{1}{5}$ and their multiples to a complete whole (ACMNA058)	■	■						■		
Money and financial mathematics										
Represent money values in multiple ways and count the change required for simple transactions to the nearest five cents (ACMNA059)										
Patterns and algebra										
Describe, continue, and create number patterns resulting from performing addition or subtraction (ACMNA060)	■				■					■
Use a function machine and the inverse machine as a model to apply mathematical rules to numbers or shapes (ACMNA139)										
MEASUREMENT AND GEOMETRY										
Using units of measurement										
Measure, order and compare objects using familiar metric units of length, mass and capacity (ACMMG061)	■	■		■	■		■	■		■
Tell time to the minute and investigate the relationship between units of time (ACMMG062)									■	
Shape										
Make models of three-dimensional objects and describe key features (ACMMG063)	■			■				■		
Location and transformation										
Create and interpret simple grid maps to show position and pathways (ACMMG065)			■			■				
Identify symmetry in the environment (ACMMG066)		■								
Geometric reasoning										
Identify angles as measures of turn and compare angle sizes in everyday situations (ACMMG064)										■
STATISTICS AND PROBABILITY										
Chance										
Conduct chance experiments, identify and describe possible outcomes and recognise variation in results (ACMSP067)										
Data representation and interpretation										
Identify questions or issues for categorical variables. Identify data sources and plan methods of data collection and recording (ACMSP068)			■						■	
Collect data, organise into categories and create displays using lists, tables, picture graphs and simple column graphs, with and without the use of digital technologies (ACMSP069)			■			■			■	
Interpret and compare data displays (ACMSP070)			■			■			■	

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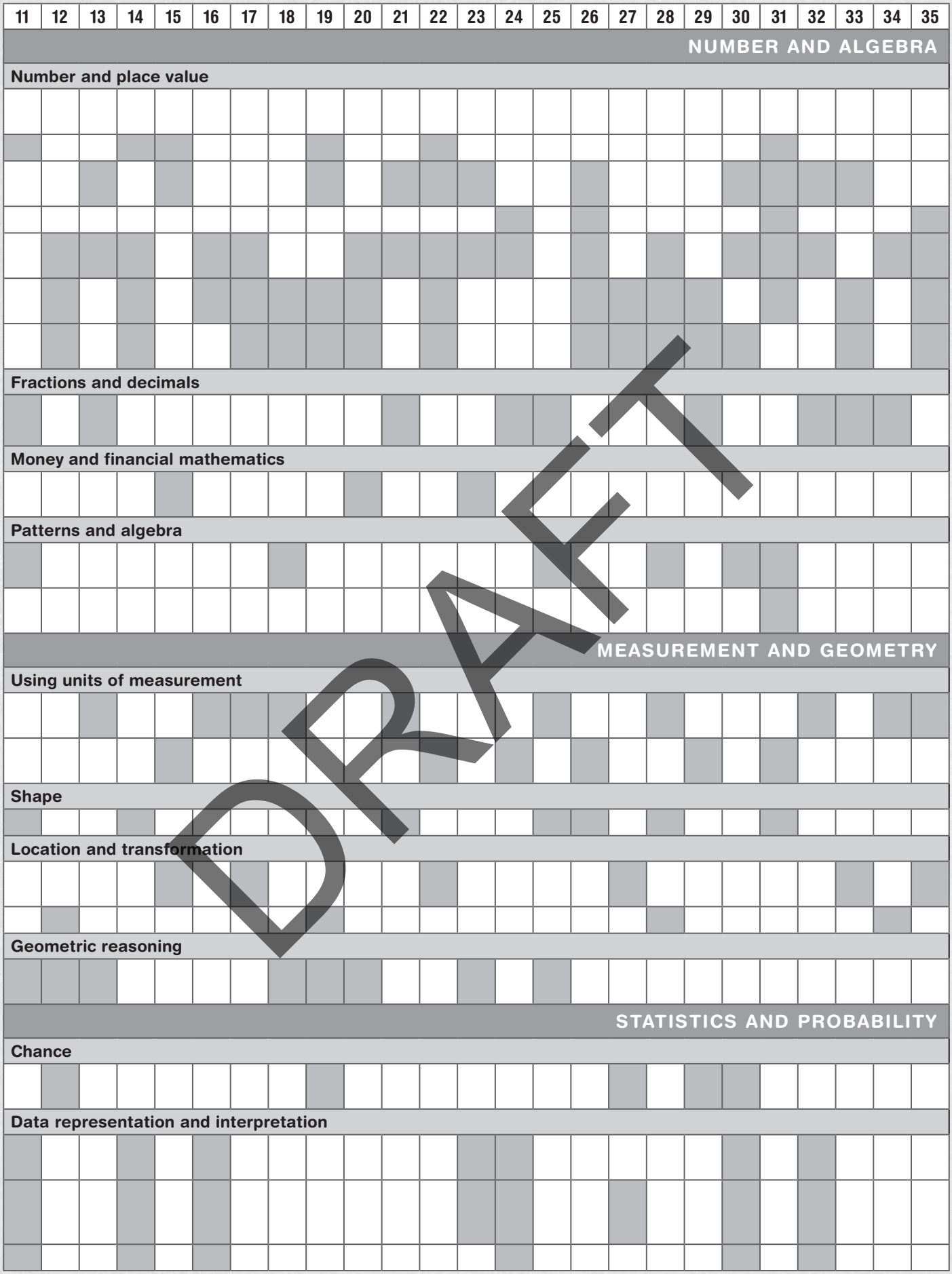
11 12 13 14 15 16 17 18 19 20 21 22 23 24 25 26 27 28 29 30 31 32 33 34 35
NUMBER AND ALGEBRA
Number and place value
Fractions and decimals
Money and financial mathematics
Patterns and algebra
MEASUREMENT AND GEOMETRY
Using units of measurement
Shape
Location and transformation
Geometric reasoning
STATISTICS AND PROBABILITY
Chance
Data representation and interpretation

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Term planners

TERM 1 SUGGESTED PLANNER

WEEK	UNIT	PAGES	Number & Algebra	Measurement & Geometry	Statistics & Probability
1	1	**2–5**	Addition facts to 9 + 9. Find a pattern in an addition grid. Add single-digit numbers with materials. Use arrays for skip counting patterns. Skip count to find a total. Skip count to complete patterns.	Identify prisms and cylinders. Match 3D objects with their names. Measure items using centimetres. Draw lines to exact centimetres.	
2	2	**6–9**	Subtraction facts to 20. Missing numbers in subtractions. Model odd and even numbers. Find patterns in odd and even numbers.	Draw lines of symmetry on shapes. Complete drawings of symmetrical shapes. Compare informal areas. Make like areas. Compare area units.	
3	3	**10–13**	Count on or back for addition or subtraction. Addition and subtraction as inverse operations.	Describe the position of objects. Follow directions to place items in a grid.	Use tally marks to record survey results. Interpret a column graph.
4	4	**14–17**	Subtraction facts from addition. Write and solve word problems and number sentences. Use mental strategies and arrays to multiply by 2.	Identify faces, edges and corners of pyramids. Describe a pyramid. Measure and estimate the length of leaves and objects in centimetres.	
5	5	**18–21**	Extend addition facts. Complete addition grids to find addition patterns. Model and write three-digit numbers. Order three-digit numbers.	Identify vertical and horizontal lines.	
6	6	**22–25**	Expand three-digit numbers. Use $>$ or $<$ to compare numbers. Use mental strategies to multiply by 5.	Use a grid to locate and give positions.	Interpret column graphs. Construct a column graph.
7	7	**26–29**	Write and solve division number sentences. Use the 'jump' strategy to solve addition of two-digit numbers. Expand numbers to 5000.	Capacity using informal units. Choose appropriate measuring units.	
8	8	**30–33**	Extend subtraction facts. Introduce numerator and denominator. Identify and model unit fractions of shapes and collections.	Match sets of faces to 3D objects. Develop strategies to calculate area.	
9	9	**34–37**	Use the split strategy to add two-digit numbers. Solve problems using the split strategy. Learn to trade in a two-digit algorithm.	Identify quarter to and quarter past on a clock face. Add hands to illustrate various times.	Interpret and construct picture graphs.
10		**38–39**		Diagnostic review 1	

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TERM 2 SUGGESTED PLANNER

WEEK	UNIT	PAGES	Number & Algebra	Measurement & Geometry	Statistics & Probability
1	10	**40–43**	Complete subtraction number sentences using addition facts. Complete number patterns to describe shapes. Write a rule for each pattern.	Recognise the right angle and angles smaller and greater than a right angle. Use a 1-metre streamer to measure objects. Measure to the nearest metre using a 1-metre rule.	
2	11	**44–47**	Count forwards and backwards by whole numbers. Identify and represent thirds of shapes and collections. Use > or < to compare fractions.	Investigate the properties of triangles.	Use a key to interpret a picture graph. Create a picture graph from a tally using a key.
3	12	**48–51**	Use doubling and near doubling skills. Explain how a problem was solved and find alternative methods of solution. Use mental strategies and arrays to multiply by 10.	Discover the number of lines of symmetry on given 2D shapes.	Conduct a simple chance experiment and record data.
4	13	**52–55**	Learn to trade in a two-digit addition algorithm. Use own strategies to determine the missing numbers in subtraction algorithms. Identify and model halves, quarters and eighths.	Identify angles where only one arm is visible. Measure and estimate using litres.	
5	14	**56–59**	Round numbers to 10. Round numbers to estimate answers to addition number sentences. Use arrays to solve divisions. Solve division problems.	Model 3D objects. Discover which nets fold to make a cube.	Record and interpret data in a table.
6	15	**60–63**	Find the correct number of coins to equal $2. Find various ways to pay for items. Write, order and represent numbers to 5000.	Introduce grid references on an informal grid. Recognise the minute, hour and second hands of a watch. Show the time on clock faces.	
7	16	**64–67**	Add two-digit numbers mentally to 100. Solve addition puzzles. Use arrays to revise 2, 5 and 10 times tables.	Measure the mass of items in kilograms using an equal arm balance.	Use tally marks to represent data. Create a column graph.
8	17	**68–71**	Solve addition number sentences by bridging to 10 or 100. Write multiplication and division facts to describe arrays.	Follow directions on a map. Interpret a map. Measure the length and width of rectangles.	
9	18	**72–75**	Relate the 2 and 4 times tables. Use the double then double again strategy. Complete missing digit number patterns. Use the constant function on a calculator.	Recognise sides and angles on 2D shapes. Draw regular and irregular shapes. Calculate area in square centimetres. Draw shapes of given areas.	
10		**76–77**		Diagnostic review 2	

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unit 2

Subtraction

SB Page 6
M&H Page 4
APM Page 6

Australian Curriculum
ACMNA055 Recall addition facts for single-digit numbers and related subtraction facts to develop increasingly efficient mental strategies for computation (Fluency) [CCT] [N]

Lesson focus
Use mental strategies when subtracting

Materials
- a large number line (0–20) drawn in chalk on the floor
- rulers
- dice
- MAB materials

Getting started

Revise the method for using a number line to subtract. Write 15 – 6 on the board and choose a student to stand on number 15 on a large number line drawn in chalk on the floor. As the student moves back to show subtracting 6 on that number line, the other students count back 6, until the student on the number line reaches 9. Write '= 9' next to 15 – 6. Repeat this for other subtractions.

Refer to the Teacher Dashboard for resources such as the digital teaching object 'Mental subtraction strategies', which can be used to introduce different subtraction strategies, and the Potential Difficulties video 'Subtraction written strategies'.

Learning activities

1 Show students how they can use their rulers as number lines. Give them some subtractions to work out and choose some students to demonstrate their method.

2 Brainstorm all the words the class can think of related to subtraction. List these on the board or a chart.

Discuss these words and their meanings. Ask students to create a problem situation using each of the words.

Discuss and solve each of the suggested problem situations. Decide whether subtraction was the best operation to use each time.

3 In pairs, students can play a subtraction game. Both students start with 30. In turn, they toss a dice and subtract the number thrown from 30. Play continues, with students continuing to subtract until one student reaches zero. That student is the winner. Allow students to use their ruler as a number line if they wish.

4 Give out MAB materials. Ask students to use the longs and small cubes to model various numbers and then subtract 10 by taking away one long. They should say what the answer is (for example, 17 – 10 = 7).

Support activities

➜ Work with students to model subtraction with a number line. Encourage students to draw an arc on the number line to represent each number that is subtracted (for example, 15 – 7 = 8).

Extension activities

➜ Students write subtraction problems using the various words for subtraction.

➜ Ask students to write an explanation about how to use MAB materials in the subtraction of larger numbers.

Reflection

Tell students a subtraction problem (for example, 17 minus 8) and ask them to solve it. Make time for as many students as possible to share the mental strategy they used.

Advanced Primary Maths

Ask students to share their tips for remembering subtraction facts, such as linking subtraction with known addition facts.

Assessment

➜ Can students solve simple subtraction situations?

➜ Which students require the support of MAB materials or number lines to solve the situations?

➜ Can students associate various words with subtraction and create subtraction problems that involve those words?

➜ The Assessment Book is best used for end-of-year assessment; however, appropriate questions from page 6 can be used to find out any facts that students are having difficulty with and target these with further activities.

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Odd and even numbers

SB Page 7
M&H Page 5
APM Page 10

Australian Curriculum
ACMNA051 Investigate the conditions required for a number to be odd or even and identify odd and even numbers (Fluency) [N] [L]

Materials
- counters
- numeral cards (11–35)
- a 10-sided dice
- 2 hoops

Lesson focus
Identify odd and even numbers

Getting started

Use counters to demonstrate to students that numbers that pair equally are even numbers. For example: 6

Demonstrate to students that numbers that do not pair equally are odd numbers. For example: 7

Refer to the Teacher Dashboard for resources such as the digital teaching object 'Odd and even', which can be used to introduce the concept, and the Potential Difficulties video 'Odd and Zero'.

Learning activities

1 Divide the class into two teams, the Odds and the Evens. Choose a student from each team to face each other with their right fist closed. On the count of 1, 2, 3 they flick out any number of fingers they choose. If the sum of their fingers is odd, the Odds score a point; if it is even, the Evens score a point. Continue until every student has had a turn.

2 Two teams of students line up in pairs. One team is the Odds and the other is the Evens. Toss a 10-sided dice for the first pair. If the number on the dice is odd, the student from the Odds remains standing and the other student sits down. Repeat for the second pair of students. Continue down the teams in this manner. The team with the most students standing at the end wins.

3 Give each student a numeral card and ask them to take that number of counters. Ask them to find out if the number on their card is odd or even by pairing their counters.
Group students according to whether their number is odd or even and ask them to hold their numeral card for others to see. Ask: *What do you notice about all the numbers that are even?* (Even numbers end in 0, 2, 4, 6 and 8.) *Is number 23 an odd number or an even number? How do you know?*

Support activities

➜ Students take a handful of counters and pair them to find out if there is an odd or even number of counters.

➜ Ask students to write even and odd numbers and say how they know which are odd and which are even.

Extension activities

➜ Ask students to investigate what happens when:
- two even numbers are added
- two odd numbers are added
- an odd and an even number are added.

Reflection

Choose different students to say what they have learnt about odd and even numbers. Place the numeral cards on the floor and choose students to put the even numbers in one hoop and the odd numbers in another hoop. (Include some numeral cards with larger numbers than 35.)

Advanced Primary Maths

Encourage students to find patterns in the number sequences and to explain how this might help them work out whether larger numbers are odd or even.

Assessment

➜ Can students distinguish odd numbers from even numbers?

➜ The Assessment Book is best used for end-of-year assessment. However, appropriate questions on page 2 can be used to check students' understanding of the results of adding different combinations of odd and even numbers.

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unit 2

Symmetry

SB Page 8
M&H Page 4
APM Page 115

Australian Curriculum
ACMMG066 Identify symmetry in the environment (Understanding, Fluency) [N] [L]

Lesson focus
Identify lines of symmetry and make symmetrical shapes

Materials
- coloured paper squares
- scissors
- **BLM 2** (1-cm dot paper and grid paper)
- paste
- drawing paper
- Internet access

Getting started

As a class, brainstorm a definition of 'symmetry'. Use the Internet to access its meaning from an online dictionary. Write your agreed definition on the board.

Ask: *Where can we see examples of symmetry around our classroom, school or home?*

Ask students to list the items on their desks that have symmetry.

Make a class list of the things around the room which have symmetry. Emphasise the need for shapes to have mirror images for them to be symmetrical.

Refer to the Teacher Dashboard for resources such as the digital teaching object 'Symmetry', which can be used to introduce the concept of line symmetry.

Learning activities

1 Ask students to fold coloured paper squares to show the lines of symmetry. Ensure that students realise that 'fold lines' resulting in identical halves can be termed 'lines of symmetry'. If students find one line of symmetry, they should be encouraged to try to find others. Record the results so that generalisations can be developed (such as squares have four lines of symmetry; rectangles have only two lines of symmetry).

2 Ask students to cut out different shapes (for example, triangles, circles, or any shape of their choice) and to draw the lines of symmetry. Ensure that students experiment with a wide range of shapes and notice, for example, that only some triangles (equilateral and isosceles) have any lines of symmetry.

Students report to the class about their experiments with different shapes and what they discovered about lines of symmetry.

3 Ask students to draw some shapes on grid paper (**BLM 2**) and include the lines of symmetry. Discuss as a whole class.

In pairs, ask one student to draw only half a shape on grid paper, and then give the half-drawn shape to their partner to complete. Discuss the results.

4 Ask students to draw some symmetrical shapes on dot paper (**BLM 2**) and include the lines of symmetry. Discuss as a whole class. Students should also draw some shapes that are not symmetrical and say why they are not.

Support activities

➜ Give students coloured paper for paper folding. Ask them to draw a variety of shapes, cut them out, glue them into their books and draw the lines of symmetry.

➜ Encourage students to draw some abstract pictures and shapes. Divide the class into pairs and ask the students to draw lines of symmetry on their partner's shapes and pictures.

Extension activities

➜ Ask students to find shapes around the room with two, three and four lines of symmetry. Have them draw the shapes in their books, showing the lines of symmetry.

Reflection

As a class, analyse the shapes in activities 10 and 11 on student book page 8 to identify those with two, three and four lines of symmetry.

Ask the students to make generalisations about 2D shapes and symmetry and share these with the class.

Advanced Primary Maths

Ask students to explain in their own words what symmetry is and to give examples and non-examples of symmetrical objects.

Assessment

➜ Can students explain symmetry and locate examples of symmetrical 2D shapes?

➜ Can students use paper folding to show lines of symmetry or to show that a shape is not symmetrical?

➜ The Assessment Book is best used for end-of-year assessment; however, appropriate questions from page 19 can be used to check that students can identify lines of symmetry in shapes in different orientations.

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Informal units

SB Page 9
M&H Page 5
APM Page 41

Australian Curriculum
ACMMG061 Measure, order and compare objects using familiar metric units of length, mass and capacity (Understanding, Reasoning) [N] [L]

Lesson focus
Estimate, measure and compare areas

Materials
- **BLM 3** (Grid paper)
- envelopes
- MAB Base 10 flats
- exercise books
- bottle tops
- multiple copies of shapes that tessellate (squares, rectangles, triangles)

Getting started

Ask: *What is area?* Ask students to brainstorm ideas and come up with an agreed definition.

Ensure that students link the idea of area with the covering of a surface.

Refer to the Teacher Dashboard for resources such as videos that address potential difficulties, digital teaching objects (interactives), blackline masters and investigations.

Learning activities

1 Ask students to draw a 3 cm by 3 cm square on grid paper (**BLM 3**). Ask: *How many square units does the shape cover?* (9) *What is the area of this square?* (9 square units)
Ask students to draw and estimate the area of some smaller shapes on the grid paper. They can share their findings with a partner.

2 Ask students to draw, on the grid paper, some different shapes that each cover the same number of square units. Ask: *Do all your shapes have the same area? How do you know?*

3 Provide envelopes, exercise books, MAB flats, bottletops, etc. Ask students to work in small groups to estimate and then measure the area of items in the room using the units provided. The students may choose the units they want to use. Make time for groups to describe the areas they measured and the units they used. Ask: *Were any of the units not suitable? Why? How close were your estimates?*

4 Discuss tessellation patterns. *Why are some shapes better to use for measuring area than others?* Make a list (or diagram) of shapes that fit together leaving gaps/ without leaving gaps.

Support activities

➜ Ask students to find the area of surfaces by using simple tessellations (squares, rectangles and triangles).

➜ Compare the areas of two or three surfaces by covering them with the same units.

Extension activities

➜ Ask students to create their own tessellation patterns and explain why they are tessellations.

➜ Ask students to find some tessellation patterns in their local environment.

Reflection

Ask the Extension group students to share their experiments with tessellating patterns (especially with triangles, squares and rectangles). Discuss the links these patterns have with area, and the importance of covering a surface exactly.

Ask students to comment why some shapes are better than others to help find the area of larger shapes. Revise what area is and how it is measured.

Advanced Primary Maths

Connect students' understanding of informal area using squares with square centimetres. Allow students to articulate strategies for estimating and measuring area.

Assessment

➜ Can students use grids to measure and compare the areas of shapes?

➜ Do students use the same units when comparing areas?

➜ Do students understand the importance of using units that tessellate when measuring areas?

➜ The Assessment Book is best used for end-of-year assessment; however, appropriate questions from page 13 can be used to check students' ability to measure and compare areas.

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Diagnostic review 4

PART 1

Solve the additions and subtractions.

a
$$\begin{array}{r} 345 \\ +\ 214 \\ \hline 559 \end{array}$$

b
$$\begin{array}{r} 6357 \\ +\ 1628 \\ \hline 7985 \end{array}$$

c
$$\begin{array}{r} 5748 \\ +\ 2146 \\ \hline 7894 \end{array}$$

d
$$\begin{array}{r} 684 \\ -\ 346 \\ \hline 338 \end{array}$$

e
$$\begin{array}{r} 8998 \\ -\ 2873 \\ \hline 6125 \end{array}$$

f
$$\begin{array}{r} 4377 \\ -\ 2236 \\ \hline 2141 \end{array}$$

PART 2

Complete the multiplications.

a 3 books at \$10 each \$ 30

b 6 books at \$5 each \$ 30

c 7 pens at \$4 each \$ 28

d 6 calculators at \$3 each \$ 18

e

Hund	Tens	Ones
	2	8
×		3
	2	4
	6	0
	8	4

f

Hund	Tens	Ones
	2	6
×		4
	2	4
	8	0
1	0	4

PART 3

Solve the divisions.

a $15 \div 3 =$ 5

b $30 \div 5 =$ 6

c $20 \div 5 =$ 4

d $18 \div 3 =$ 6

e $50 \div 10 =$ 5

f $35 \div 5 =$ 7

g $5\overline{)25}$ = 5

h $2\overline{)12}$ = 6

i $5\overline{)45}$ = 9

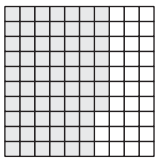
j $4\overline{)24}$ = 6

k $3\overline{)21}$ = 7

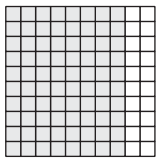
l $3\overline{)27}$ = 9

PART 4

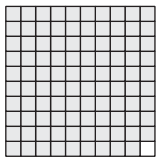
Use fractions and decimals to describe the coloured part of each grid.

a 

$\frac{67}{100}$ = 0.67

b 

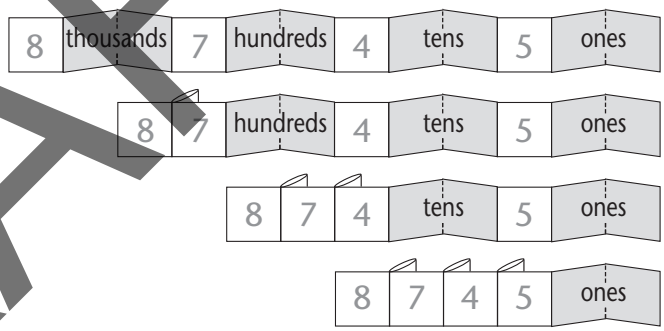
$\frac{80}{100}$ = 0.8

c 

$\frac{99}{100}$ = 0.99

PART 5

a Use the numeral expanders to show how the number 8745 can be expressed.



Expand the numbers.

b $4235 =$ 4000 + 200 + 30 + 5

c $5362 =$ 5000 + 300 + 60 + 2

d Order the numbers from smallest to largest.

3576 765 5736 36 676

36, 676, 765, 3576, 5736

PART 6

a Write a rule and then complete the outputs.

Rule	Input	6	12	18	24	30
÷ 3	Output	2	4	6	8	10

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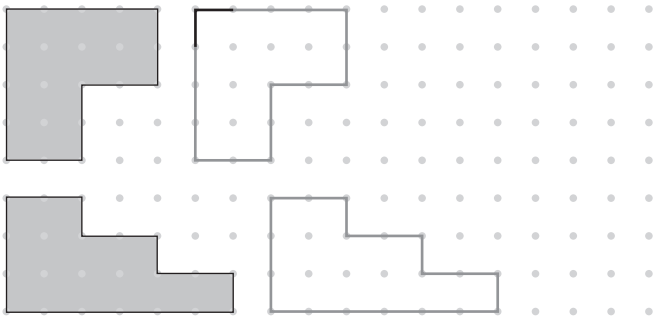
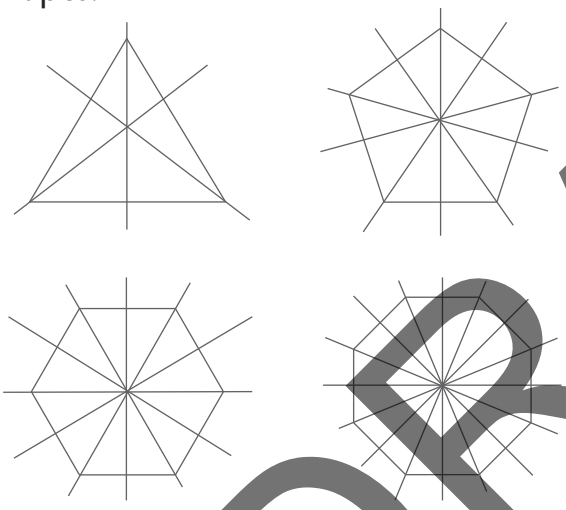
PART 7

Draw congruent copies of these shapes.



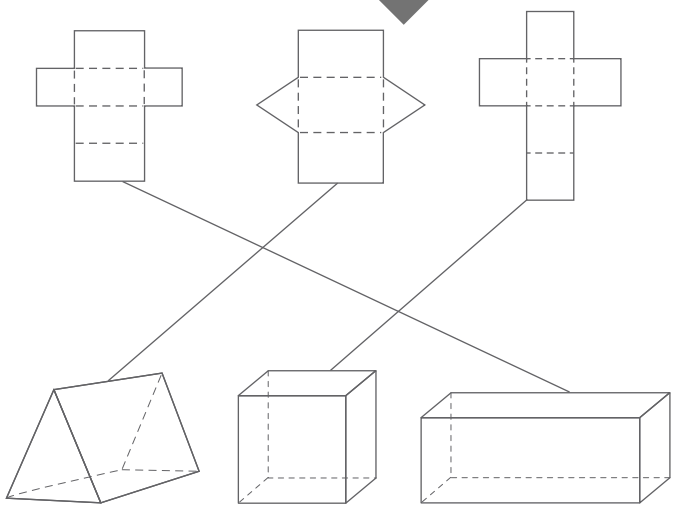
PART 8

Draw lines of symmetry on these regular 2D shapes.



PART 9

Draw a line to match each 3D object to its net.



triangular prism cube rectangular prism

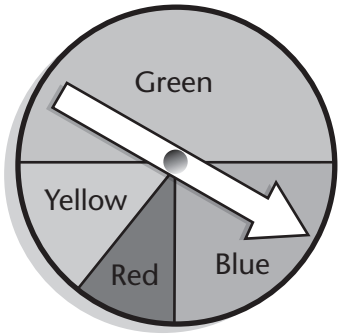
PART 10

a Which colour is most likely to be spun?

Green

b Is it more likely that blue will be spun than red?

yes



PART 11

Bus Timetable			
Beach St	Bay Rd	Lake St	School
9:30	9:38	9:45	9:56

How long are these trips?

a From Beach St to Lake St — 15 min

b From Bay Rd to the school — 18 min

c From Beach St to the school — 26 min

d From Lake St to the school — 11 min

PART 12

Record each length measurement as a decimal.

a	1 m 25 cm =	1.25	m
b	2 m 37 cm =	2.37	m
c	6 m 49 cm =	6.49	m

PART 13

Answer the questions.

a How many millilitres in 1 litre? 1000

b How many centimetres in 1 metre? 100

c How many grams in 1 kilogram? 1000

d How many minutes in 1 hour? 60

e How many millilitres in $\frac{1}{2}$ litre? 500

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