Dr Paul Swan & Narelle Rice

# Year 6 Quick Curriculum Guide

A reference and guide to the Australian Curriculum Version 9



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These **Quick Curriculum Guides** have been designed to take a look at the new Australian Mathematics Curriculum (AC9), explain terminology and provide interpretations. Narelle and I have used our professional judgement to put forward what is appropriate for students at this year level.

## Using the Guide Cards



The Curriculum 9 code, strand, and our categorisation of content.



- Our estimate of teaching time required.
  - I = a short time (1 or a few lessons)
  - () () = more time (a few weeks)

() () () = lots of time (3 weeks+)



This icon C means we think this content is best approached with multiple exposures (interleaving).



4

The filled in star 🔶 means, in our opinion, this is one of the most vital topics for the year level. Often these are pre-requisites for later learning.

Text from the curriculum. Terms we define are highlighted.



Our explanations, inferences, clarifications and suggestions.

Practical tips and sometimes activity ideas.



Resources and materials recommendations.



Links to other descriptors. Bottom left: previous year Middle: within this year Bottom right: next year

## Dr Paul Swan & Narelle Rice



A reference and guide to the Australian Curriculum Version

## Acknowledgements

Authors: Dr Paul Swan & Narelle Rice

We would like to also thank Linda Marshall, David Dunstan and Lyndon Rice for comments and assistance.

## Visual Overview

For a visual overview / planner, see our accompanying overview documents.

We have illustrated the direct connections that exist between and within year levels.

With this information, you can check out the directly related cards in the previous / next year. This is helpful to:

- understand what the students should be bringing in from previous years, and what might need revision,
- the exact difference in understanding from previous years to this year,
- the content that you may be able to bundle together, and,
- what the curriculum describes for next year, so you can avoid accidentally teaching beyond the year level.



These documents serve as general advice only and do not take into account your specific needs and conditions. While best care has been taken in compiling these materials, mistakes may exist.

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Number > Integers

**6N01** 





## A.C. VERSION 9 SAYS:

Recognise situations, including financial contexts, that use <u>integers</u>; locate and represent integers on a number line and as coordinates on the Cartesian plane.



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## A.C. VERSION 9 SAYS:

Number > Fractions

Apply knowledge of equivalence to compare, order and represent common fractions including halves, thirds and quarters on the same number line and justify their order.

6N03

## WHAT THIS MEANS

Common fractions are halves quarters eighths and twelfths or thirds, sixths, ninths and twelfths. Note how they are related. Fractions can be ordered on a number line.

• Students can describe fractions as greater than, less than or equal (equivalent).

## TIPS AND RESOURCES

 Double number lines can be helpful.



 Connect fraction walls with the number line. For example, show the relationships and number line positions for unit fractions.





## A.C. VERSION 9 SAYS:

Apply knowledge of place value to add and subtract decimals, using digital tools where appropriate; use estimation and rounding to check the reasonableness of answers.

## WHAT THIS MEANS

Adding and subtracting decimals to 3 decimal places (thousandths).

- If doing a written calculation, it is important to line up the decimal places, e.g., adding 3.51 and 12.07
  - 3.51 + 12.07 = 15.58
- The number of decimal places does not need to be the same.

## **RESOURCES & MANIPULATIVES**



Calculators in Classrooms Book



Teaching Place Value Year 5+ (p.50-52) TIPS

• Try grid paper as an aid to help line up decimal calculations.

	2	•	3	4	
+	6	•	4	8	5
=	8	•	8	2	5





\*\*Click the icon or QR to add resources to your cart.

## AC9M6N05

Number > Fractions Addition and Subtraction





## A.C. VERSION 9 SAYS:

Solve problems involving addition and subtraction of fractions using knowledge of equivalent fractions.

### WHAT THIS MEANS

Adding fractions with related denominators, e.g., halves, fourths and eighths. Example:

## TIPS

- Students represent equivalence using number lines and drawings.
- Link folding paper strips and fraction walls to number lines.



#### ▲ Linked to Year 5: AC9M5N0

Linked to AC9M6N02

Linked to Year 7: AC9M7N06 >

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Quick Curriculum Guides • Year 6 AC9M6N06 Number > Multiplication

## A.C. VERSION 9 SAYS:

Multiply and divide decimals by multiples of powers of 10 without a calculator, applying knowledge of place value and proficiency with multiplication facts; using estimation and rounding to check the reasonableness of answers.

#### TIPS

- Converting from metres to centimetres (and vice versa) involves multiplication/division by 100 (10<sup>2</sup>), converting kg to g involves multiplying by 1000 (10<sup>3</sup>).
- Some powers of ten are: 10° = 1, 10¹ = 10, 10² = 100, 10³ = 10 x 10 x 10 = 1000, etc.

## WHAT THIS MEANS

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Multiplying and dividing decimal numbers by 10, 100, 1000 ...

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- Note decimal points do not move.
- A number slide will help to establish these relationships.
- Students were last exposed to this idea in Year 4 with whole numbers.



## AC9M**6N07**

Number > Fractions, Decimals and Percentages

## 000 C

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Solve problems that require finding a familiar fraction, decimal or percentage of a quantity, including percentage discounts, choosing efficient calculation strategies and using digital tools where appropriate.

## WHAT THIS MEANS

Calculating a fraction or a percentage of a number or multiplying a number by a decimal.

• Examples include:

TIP

- $\frac{1}{4}$  × 24 solving through division 24 ÷ 4
- 25% of 50 might be solved by multiplying 50 by 0.25
- Students would need to be familiar with fraction, decimal percentage equivalents e.g., ¼ = 0.25 = 25%
  - Note: links may be made to Fact Families for multiplication and division. That is;
- $3 \times 4 = 12$   $4 \times 3 = 12$ 
   $12 \div 3 = 4$   $12 \div 4 = 3$ 
   $\frac{1}{3}$  of 12 = 4  $\frac{1}{4}$  of 12 = 3





Calculators in Classrooms Book

**Pocket Dice** 

Book C

Calculators

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Linked to Year 7: AC9M7N06 ►

**RESOURCES & MANIPULATIVES** 

Linked to Year 5: AC9M5N04

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## A.C. VERSION 9 SAYS:

Approximate numerical solutions to problems involving rational numbers and percentages, including financial contexts, using appropriate estimation strategies.

## WHAT THIS MEANS

Estimating with fractions and percentages.

 A rational number can be expressed as a fraction. The numerator and denominator have to be integers. The denominator cannot be zero.
 Examples of rational numbers include:

$$\frac{3}{1}$$
,  $2\frac{1}{4} = \frac{9}{4}$ ,  $3.7 = \frac{37}{10}$ 

• An example would be estimating 27% of 325 by thinking 27% is close to 25% (or  $\frac{1}{4}$ ). 320 divided by 4 is 80, so an estimate of 80 or 81 is appropriate.

## TIP

 Teach calculating benchmark percentages such as 10% of and 50% of, which can then be used to form estimates.

## Quick Curriculum Guides • Year 6 6N09 (000)Number > Problem Solving

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A.C. VERSION 9 SAYS:

Use mathematical modelling to solve practical problems, involving rational numbers and percentages, including in financial contexts; formulate the problems, choosing operations and efficient calculation strategies, and using digital tools where appropriate; interpret and communicate solutions in terms of the situation, justifying the choices made.

## WHAT THIS MEANS

Determine which operation is required and which form of calculation (mental, written, digital) to solve problems.

- The elaborations refer to calculations related to financial contexts such as determining sales prices, discounts, and making budgets.
- The change from Year 5 is the inclusion of rational numbers and percentages.

## **TIPS & RESOURCES**

 See ACARA's Mathematical Modelling Process poster.



ACARA's Mathematical Modelling Process Poster



Mathematics and Money Book



Teaching **Mathematics** Through Story **Books Book 3** 



**Problem Solving Money Puzzles For** Years 4-6



\*\*Click the icon or QR to add resources to your cart.

## A.C. VERSION 9 SAYS:

Recognise and use rules that generate visually growing patterns and number patterns involving rational numbers.

## WHAT THIS MEANS

Look for numerical and geometric patterns. Follow rules to generate patterns.

 Students need to look for repeating elements or components of a pattern.

#### TIP

Patterns are often generated when problem solving. Some students do not recognise that a pattern has been formed as they haven't been systematic, e.g., recorded results in a table.

## ×9 Table Pattern

1	2	3	4	5	6	7	8	9	10
11	12	13	14	15	16	17	18	19	20
21	22	23	24	25	26	27	28	29	30
31	32	33	34	35	36	37	38	39	40
41	42	43	44	45	46	47	48	49	50
51	52	53	54	55	56	57	58	59	60
61	62	63	64	65	66	67	68	69	70
71	72	73	74	75	76	77	78	79	80
81	82	83	84	85	86	87	88	89	90
91	92	93	94	95	96	97	98	99	100
101	102	103	104	105	106	107	108	109	110
111	112	113	114	115	116	117	118	119	120

#### \*\*Click the icon or QR to add resources to your cart.

## **Growing Pattern**



#### **RESOURCES & MANIPULATIVES**





Numeracy with Number **Boards Book** 

**Colour Tiles** 

**Colour Tiles Book** 





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Algebra > Equations

Find unknown values in numerical equations involving brackets and combinations of arithmetic operations, using the properties of numbers and operations.

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## WHAT THIS MEANS

Apply the rule of order when performing calculations involving a mix of operations.

The agreed order is as follows:

• Calculations inside brackets are performed first.

6A02

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- Indices or powers are performed next e.g., 4<sup>2</sup>
- Multiplication and division are equally powerful operations performed **left to right** as they appear in a number sentence.
- Calculate addition and subtraction from left to right. For example, to calculate 10 2 + 3 you subtract first. This makes 8 + 3 = 11. The most common error is calculating the 2 + 3 first, then incorrectly thinking the number sentence is 10 5, which it is not.

## TIP

 Caution: Students are often taught rules like BIMDAS, BOMDAS and PEDMAS, but some students think as a result that multiplication is given priority over division or addition is given priority over subtraction, neither of which is true.

#### RESOURCE



Problem Solving Symbols and Number Puzzles Book

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inked to Year 7: AC9M7A02 ►

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Q: Explain how each of these sets of function machines could be replaced by a single machine.



Students should be able to interpret that the rules here could be represented by +30 (row a) and ×1000 (row b).

A sequence of +10, -2, +10, -2, ... can be identified as a +8 pattern.

Measurement > Units

9M 6**M01** 

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#### A.C. VERSION 9 SAYS:

Convert between common metric units of length, mass and capacity; choose and use decimal representations of metric measurements relevant to the context of a problem.

### WHAT THIS MEANS

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Converting between metric units. The change from Year 5 is the inclusion of **decimal representations**.

Units matter. Students should use their number sense / measurement sense when deciding whether they need to multiply or divide when converting. Ask the question: "Am I converting from a small unit (e.g., mm) to a large unit (e.g., m)? - If so, I need to divide." If converting from a large unit to a small unit then they would multiply.

Length: 1000 mm = 1 m by 10, 100, 1000, etc.

• Mass: 1000 g = 1 kg

TIPS

Capacity: 1000 mL = 1 L

## COMMON PREFIXES

Prefix	Symbol	Factor	Name
Kilo	<b>k_</b>	1000×	thousand
Centi	<b>c</b> _	0.01	hundredth
Milli	m_	0.001	thousandth

#### ▲ Linked to Year 5: AC9M5M01

#### Linked to AC9M6N06

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#### A.C. VERSION 9 SAYS:

Establish the formula for the area of a rectangle and use it to solve practical problems.

### TIPS

- Calculating area links to multiplication and, depending on the numbers, tables facts.
- The same unit of measure should be used, e.g., a rectangle of 2 m × 70 cm would require a conversion, e.g., 2 m × 0.7 m (1.4 m<sup>2</sup>)

### WHAT THIS MEANS

This is the first mention of the use of formulas in measurement. 'Establish' means that rather than present students with the formula, it is developed from counting squares and recognising patterns.

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 Tabulating the findings of counting squares to determine the area of rectangles will help lead to the realisation that multiplying the length by the width will produce the same result.

## EXAMPLE:

Length	Width	Area
7 cm	3 cm	21 cm <sup>2</sup>
5 cm	4 cm	20 cm²
6 cm	3 cm	18 cm²
9 cm	4 cm	36 cm²

Read as "21 square centimetres" not "21 centimetres squared."

Q: What do you notice?

∕/ 6M03

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### A.C. VERSION 9 SAYS:

Measurement ► Time

Interpret and use timetables and itineraries to plan activities and determine the duration of events and journeys.

#### WHAT THIS MEANS

Reading different timetables.

- This will be an application of digital time, 12- and 24- hour time and am / pm notation.
- The new inclusions for this year are the elements of reading off a table and planning for multi-events (e.g., taking a flight then bus) or an event with multiple stages (e.g., a high school daily class timetable).

#### **EXAMPLE: FLIGHT TIMETABLE**

Flight Number	Departs	Arrives
161	13:30	17:10
350	13:40	16:30
84	15:50	20:15
904	20:20	02:15

## AIRPORT TO CITY BUS

Departure Times 5:00 pm, 5:30 pm, 6:00 pm, 6:30 pm, 7:00 pm, 8:00 pm, 9:00 pm, 10:00 pm, 11:00 pm, 12:00 am, 2:00 am, 4:00 am, 6:00 am

#### TIPS

- To read a timetable students will need to be familiar with digital time and how to read a table in general.
- Calculations of time duration can be difficult due to the non-metric nature of time.

#### ▲ Linked to Year 5: AC9M5N03

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# AC9M 6SP01

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## A.C. VERSION 9 SAYS:

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Compare the parallel cross-sections of objects and recognise their relationships to right prisms.

## WHAT THIS MEANS

Slicing cross sections of objects (3D) and examining them.

• Slicing a carrot (a rough cone) horizontally will produce a cross section that is a circle. Slicing it on an angle will produce a cross section that is an ellipse.



#### Planes cutting through 3D objects.

e.g. A triangular prism has a triangle cross-section, a cube has a square cross-section and a cylinder has a circle cross-section.



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A.C. VERSION 9 SAYS: Locate points in the 4 quadrants of a Cartesian plane; describe changes to the coordinates when a point is moved to a different position in the plane.

## TIPS

- Coordinates are read horizontally (x-axis) then vertically (y-axis).
- Play 'Battleships'.

## WHAT THIS MEANS

Use Cartesian grids with all four quadrants.

When the point moved right from A to B, only the first coordinate (horizontal) changed.

When the point moved down from A to C, the second coordinate (vertical) changes.





Space > Transformations

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**TIPS, RESOURCES & MANIPULATIVES** 

**Teaching Mathematics** 

Through Story Books Book 3

Pattern Blocks Book

See the artwork of Escher.

## A.C. VERSION 9 SAYS:

Recognise and use combinations of transformations to create tessellations and other geometric patterns, using dynamic geometric software where appropriate.

## WHAT THIS MEANS

Mix translations (slides), reflections (flips) and rotations (turns) to create patterns. Tessellate or tile shapes.

• Transformations is the general term to describe translations, reflections and rotations.



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## A.C. VERSION 9 SAYS:

Interpret and compare data sets for ordinal and nominal categorical, discrete and continuous numerical variables using comparative displays or visualisations and digital tools; compare distributions in terms of mode, range and shape.

## WHAT THIS MEANS

This is the first mention of 'range'. Range is the difference between the greatest and least values. Discrete data typically means the data was collected by means of counting. Continuous data typically means it is determined as a result of measuring.

- A **variety** of graph types are mentioned in the elaborations. These include:
  - Side-by-side column graphs comparative data display,
  - Dot plots,
  - Bar charts (graphs) typically used for discrete data,
  - Line graphs typically used for continuous data.

## TIP

 Mean and median are first mentioned in Year 7 (AC9M7ST01 and AC9M7ST02)

Statistics ► (3) Communicate

9M 6ST02



of secondary data (data collected by someone else).

• The elaborations mention Pie Graphs.

Looking out for misleading graphs and statements. Questioning the source

Misleading Graphs. Look for broken scales, non-linear axes, the scale of the

images used in graphs e.g., pictographs and the incorrect use of graphs.



## A.C. VERSION 9 SAYS:

Identify statistically informed arguments presented in traditional and digital media; discuss and critique methods, data representations and conclusions.

## TIPS

- Pie graphs should only be used when the 'whole' is known. Slices of the pie represent categories.
- Pie graphs require an understanding of angles within a circle (see AC9M5M04).
- See AC9M4ST02 which involves analysing the effectiveness of different displays.



WHAT THIS MEANS

By not starting the graph at zero the differences between groups seem huge.



Starting the vertical axis at 0 more accurately shows the relative size of the groups.

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## A.C. VERSION 9 SAYS:

Plan and conduct statistical investigations by posing and refining questions or identifying a problem and collecting relevant data; analyse and interpret the data and communicate findings within the context of the investigation.

## WHAT THIS MEANS

Designing, carrying out and interpreting the results from collecting data, whether it be from surveys or collecting data from science experiments.

- (1) Gather the data, (2) display the data using tables and graphs and
- (3) interpret and communicate the data.

## LINKING ST01, ST02 AND ST03

Elements of statistics this year:



## TIPS AND RESOURCES

- The elaborations mention the use of scales (five point, e.g., 1-5 stars) when collecting data.
- See ACARA's Statistical Investigation Process poster.



ACARA's Statistical Investigation Process Poster

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**TIPS AND RESOURCES** 

5

7 6

Start with AC9M6P01 but then

Students understand that, for

example, a 100% probability of an event occurring is the same as a

Pegs on a String

**Probability Chance** 

**Experiments Upper** Primary (Years 5 - 6)

probability of 1 in a 0 to 1 scale.

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apply to 6P02 together.

## A.C. VERSION 9 SAYS:

Probability > Language

Recognise that probabilities lie on numerical scales of 0 – 1 or 0% – 100% and use estimation to assign probabilities that events occur in a given context, using common fractions, percentages and decimals.

## WHAT THIS MEANS

Assign a reasonable probability value to various events.

6P01

• The language of chance can be tricky. For example, impossible means zero chance, whereas possible could mean a range of chances greater than impossible up to 100%



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## Quick Curriculum Guides • Year 6 9M6P02 $\bigcirc \bigcirc$

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Probability > Experiments

## A.C. VERSION 9 SAYS:

Conduct repeated chance experiments and run simulations with an increasing number of trials using digital tools; compare observations with expected results and discuss the effect on variation of increasing the number of trials.

#### TIPS

- Combining class data is a good way to increase the number of trials conducted.
- Use tools like the adjustable spinner:

www.nctm.org/adjustablespinner

### WHAT THIS MEANS

Conduct chance experiments with materials (e.g., dice, spinners, etc.) There can be a lot of variance in results when only conducing a few trials (e.g., tossing a coin). The more trials conducted, the more likely the result will be close to the theoretical probability (in this case 50% heads, 50% tails).

#### **RESOURCES & MANIPULATIVES**



Spinners (spinners, suction spinners and plastic spinner arrows)



**Probability Chance Experiments Upper** Primary (Years 5 - 6)









Interactive
Probability
Chance
Experiments



Interactive Dice Simulator

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