

Mathematics Level 7

End-of-year review

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End-of-year review

End-of-year review R7 — Level 7 exit check

Assessed content descriptions

All 31 Level 7 content descriptions, across all six strands — Number VC2M7N01–VC2M7N10 (subtopics 1A–2G) · Algebra VC2M7A01–VC2M7A06 (3A–3F) · Measurement VC2M7M01–VC2M7M06 (4A–4F) · Space VC2M7SP01–VC2M7SP04 (5A–5D) · Statistics VC2M7ST01–VC2M7ST03 (6A–6C) · Probability VC2M7P01–VC2M7P02 (7A–7B)

Marks

60 — weighted to each strand's CD count: Number 20 · Algebra 12 · Measurement 12 · Space 7 · Statistics 6 · Probability 3. Part 1 (no digital tools): 20 marks · Part 2 (digital tools permitted): 40 marks

Time

70 minutes in all: 5 minutes reading time, then 65 minutes working time (just over 1 minute per mark). Allow about 23 minutes for Part 1 and about 42 minutes for Part 2

Equipment

Part 1: no digital tools — ruler and pencil only. Part 2: scientific calculator; spreadsheet or graphing software for Question 20 (VC2M7A06 names digital tools, so a tool is required there); a simulation tool for Question 32 (VC2M7P02 names digital tools, so a tool is required there). No protractor or compass is needed

This is a school-designed paper. It is not a VCAA instrument. Achievement in the Victorian Curriculum is reported against the Level 7 achievement standard, not against a mark on this paper.

Answer every question. Show your working where a question asks for it. The marks for each part are shown in brackets.

No digital tools — calculators, spreadsheets or other software — are permitted in Part 1: its content descriptions do not name digital tools, and Question 7 is marked as calculator-free because VC2M7N07 requires percentage work without digital tools as well as with them. In Part 2, digital tools are permitted where the content description allows them: a scientific calculator for every question, spreadsheet or graphing software for Question 20, and a simulation tool for Question 32. Computer algebra systems (software that does the algebra for you) are not permitted anywhere.

Part 1 — No digital tools (20 marks)

Section A — Number (10 marks)

Question 1 (1A, VC2M7N08) [2 marks]. At 7 am one winter morning, the temperature at Mt Buller was -5°C . By midday it had risen by 8°C . By 6 pm it had fallen by 6°C from the midday temperature.

Mt Buller is a real Victorian alpine resort; the temperatures here are practice figures.

- Find the temperature at midday. **[1 mark]**
- Find the temperature at 6 pm. **[1 mark]**

Question 2 (1B, VC2M7N02) [2 marks]. The estimated resident population of Victoria at 31 December 2025 was 7 121 900.

Source: Australian Bureau of Statistics, “National, state and territory population”, December 2025; retrieved 20 August 2026.

- Write 7 121 900 in expanded notation, using powers of 10. **[1 mark]**
- Write 72 as a product of powers of primes. **[1 mark]**

Question 3 (1C, VC2M7N01) [1 mark]. A square community garden has an area of 169 m^2 . Find the length of one side of the garden.

Question 4 (2A, VC2M7N03) [2 marks]. Here are five rational numbers: -2 , 0.5 , $-\frac{3}{4}$, $\frac{7}{4}$, -1.5 .

- Write the five numbers in ascending order. [1 mark]
- Write $\frac{7}{4}$ as a decimal. [1 mark]

Question 5 (2B, VC2M7N04) [1 mark]. Estimate 612×49 by rounding each number to a convenient value first. Tom says that $612 \times 49 = 2998$. Use your estimate to decide whether Tom's answer is reasonable, and say why.

Question 6 (2F, VC2M7N09) [1 mark]. The school canteen mixes cordial and water in the ratio 1:5 to make fruit punch. How much cordial is needed to make 600 mL of fruit punch?

Question 7 (2E, VC2M7N07) [1 mark]. *No calculator — this item is to be done without digital tools, as VC2M7N07 requires.*

Without using a calculator, find 15% of 60. Show how you built the answer from simpler percentages.

Section B — Algebra (4 marks)

Question 8 (3B, VC2M7A02) [2 marks].

- Write an expression for “add 4 to n , then multiply the result by 3”. Use brackets where they are needed. [1 mark]
- Find the value of your expression when $n = 6$. [1 mark]

Question 9 (3C, VC2M7A03) [2 marks]. Solve $4x - 3 = 25$. Show your working, then check your solution by substitution.

Solving and verifying: VC2M7A03 requires solutions to be verified by substitution. One mark in this question is for the check; a correct answer with no check does not score full marks.

- Solve the equation. [1 mark]
- Check your solution by substitution. [1 mark]

Section C — Measurement (2 marks)

Question 10 (4D, VC2M7M04) [2 marks]. Figure 1 shows two parallel lines crossed by a transversal. Angle $a = 65^\circ$. Do not measure angles from the diagram — use angle facts.

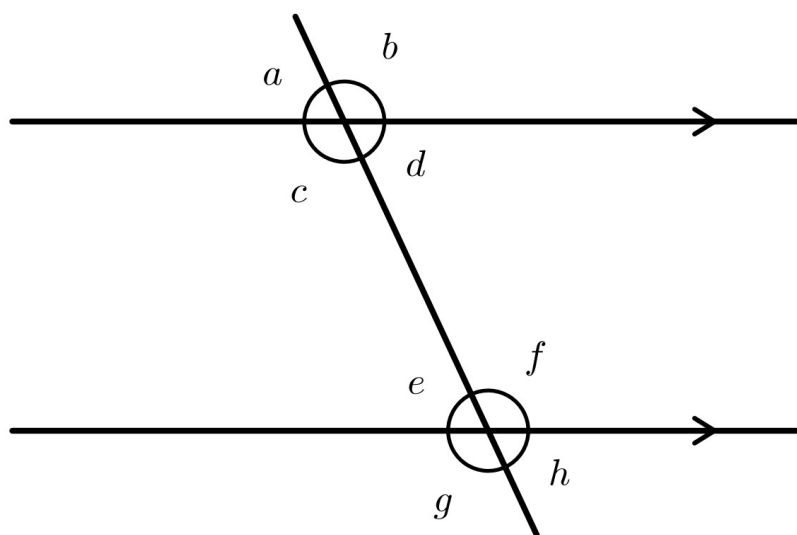


Figure 1. Two horizontal parallel lines crossed by one transversal, making eight angles lettered a to d at the top crossing and e to h at the bottom crossing.

- Find angle b , and give the reason for your answer. [1 mark]
- Find angle f , and give the reason for your answer. [1 mark]

Reasons: VC2M7M04 requires reasons. Each mark here is half for the correct value and half for the correct stated reason.

Section D — Space (2 marks)

Question 11 (5B, VC2M7SP02) [2 marks].

- A quadrilateral has four equal sides and four right angles. Give its most specific name. [1 mark]
- Explain why every square is a rectangle, but not every rectangle is a square. [1 mark]

Section E — Probability (2 marks)

Question 12 (7A, VC2M7P01) [2 marks]. A fair six-sided die is rolled once.

- Find the probability of rolling an even number. Give your answer as a fraction in simplest form. [1 mark]
- The die is rolled 60 times. Predict how many of the rolls will show an even number. [1 mark]

End of Part 1 — 20 marks.

You may now take out the digital tools that Part 2 permits.

Part 2 — Digital tools permitted (40 marks)

Digital tools are permitted in Part 2 where the content description allows them: a scientific calculator for every question; spreadsheet or graphing software for Question 20 (the tool is required by VC2M7A06); a simulation tool for Question 32 (the tool is required by VC2M7P02).

Section F — Number (10 marks)

Question 13 (2D, VC2M7N06) [2 marks]. The school canteen sells muffins for \$2.50 each and juice for \$1.80 each. Ava buys 2 muffins and 1 juice, and pays with a \$10 note.

The prices are practice figures.

- Find the total cost of Ava's order. [1 mark]
- Find her change. [1 mark]

Question 14 (2C, VC2M7N05) [3 marks]. You may use a digital tool to support your working.

- Find $\frac{3}{4} \times \frac{2}{5}$. Give your answer as a fraction in simplest form. [1 mark]
- Find $7.2 \div 0.6$. [1 mark]
- One batch of cordial uses 0.75 L of water. How much water is needed for 6 batches? [1 mark]

Question 15 (2E, VC2M7N07) [2 marks]. Use your calculator.

- Find 37.5% of 84. [1 mark]
- In the first 18 days of August 2026, the total rainfall at Melbourne (Olympic Park) was 41.4 mm. Of this, 24.4 mm fell on one storm day. Express 24.4 mm as a percentage of 41.4 mm, correct to one decimal place. [1 mark]

Source: Bureau of Meteorology, "Daily Weather Observations, Melbourne (Olympic Park), Vic" (station 086338), 1–18 August 2026, IDCJDW3033.202608, prepared 19 August 2026; retrieved 20 August 2026.

Question 16 (2G, VC2M7N10) [3 marks]. The canteen buys the same apple juice in two sizes: 2 L cartons for \$3.60, and 500 mL cartons for \$1.10.

The prices are practice figures.

- Find the cost per litre of each size. [2 marks]
- Which size is the best buy? Give a reason for your answer. [1 mark]

Section G — Algebra (8 marks)

Question 17 (3A, VC2M7A01) [2 marks].

- In AFL, a team's score is found with the formula $p = 6g + b$, where g is the number of goals and b is the number of behinds. Find the score of a team that kicked 11 goals and 8 behinds. [1 mark]

Source: the scoring rule (a goal worth 6 points, a behind worth 1 point) is VCAA's, from VC2M7A01 elaboration E01, retrieved 20 August 2026.

- The maximum heart rate, in beats per minute, is estimated by the formula $MHR = 220 - \text{age}$. Find the estimated maximum heart rate of a 13-year-old. [1 mark]

Source: "Maximum heart rate", Wikipedia (English), retrieved 20 August 2026; the rule is credited there to Haskell and Fox (2007).

Question 18 (3D, VC2M7A05) [2 marks]. The rule is $y = 2x + 3$, where x is the input and y is the output.

- Copy and complete the table of values for inputs 0, 1, 2, 3, 4. [1 mark]

input x	0	1	2	3	4
output y					

- If the ordered pairs from the table were plotted on the Cartesian plane, would the points lie on a straight line or on a curve? How can you tell from the table alone? [1 mark]

Question 19 (3E, VC2M7A04) [2 marks]. Figure 2 shows the mean maximum temperature (top panel) and the mean rainfall (bottom panel) at Mildura Airport for each month of the year.

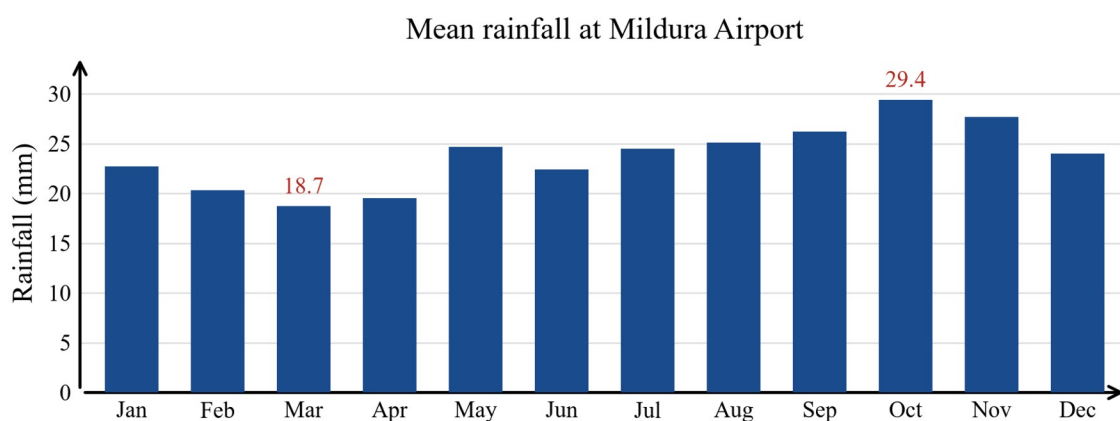
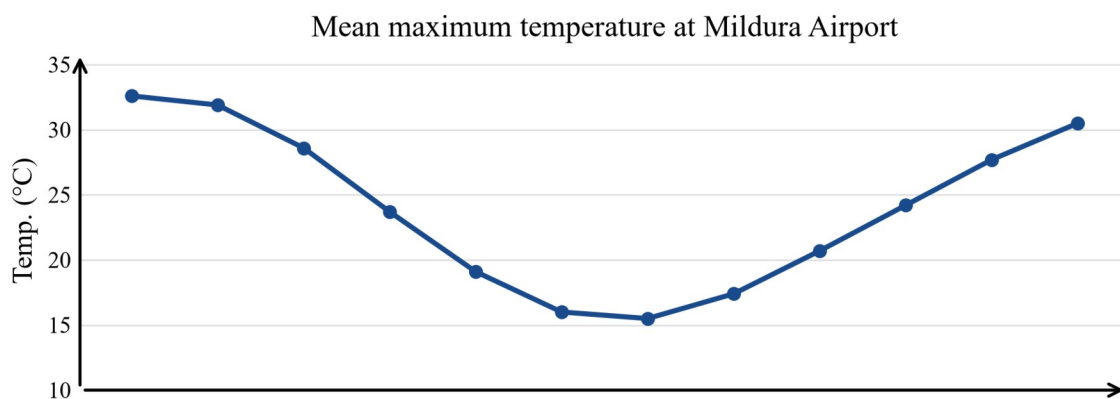


Figure 2. Two panels for Mildura Airport sharing the months on the horizontal axis: the top panel is a line graph of the mean maximum temperature, highest in January and lowest in July; the bottom panel is a bar chart of the mean rainfall, about even across the year with the tallest bar in October (29.4 mm) and the shortest in March (18.7 mm).

Source: Bureau of Meteorology, “Climate statistics for Australian locations”, station 076031 (Mildura Airport), monthly means, all years of record 1946–2026; retrieved 20 August 2026.

- In which month is the mean rainfall highest, and what is its value? **[1 mark]**
- A student says: “The colder the month, the less rain Mildura gets.” Do the two panels support this claim? Use both panels in your answer. **[1 mark]**

Question 20 (3F, VC2M7A06) [2 marks]. VC2M7A06 names digital tools: use spreadsheet or graphing software for this question.

Noah sets up a spreadsheet to sweep the area formula $A = l \times w$, where l is the length of a rectangle in cm and w is its width in cm. Cell B1 holds 6. Cells A4 to A7 hold the lengths 2, 4, 6, 8. Cell B4 holds the formula `=B1*A4`, and Noah copies it down to B7.

	A	B
1		6
2		
3		
4	2	=B1*A4
5	4	
6	6	
7	8	

- What values do cells B4 and B5 show? [1 mark]
- Describe the effect of increasing l while w stays fixed at 6. [1 mark]

Section H — Measurement (10 marks)

Question 21 (4A, VC2M7M01) [2 marks].

- A rectangular classroom floor is 9 m long and 7 m wide. Find its area. [1 mark]
- Find the area of a triangle with base 12 cm and perpendicular height 5 cm. [1 mark]

Question 22 (4B, VC2M7M02) [2 marks].

- Find the volume of a rectangular prism with length 8 cm, width 5 cm and height 3 cm. [1 mark]
- A triangular prism has base area 15 cm^2 and length 10 cm. Find its volume. [1 mark]

Question 23 (4C, VC2M7M03) [2 marks]. A circle has radius 7 cm.

- Find its diameter. [1 mark]
- Use the π key on your calculator to find its circumference, correct to one decimal place. [1 mark]

Question 24 (4E, VC2M7M05) [2 marks].

- Two angles of a triangle are 54° and 67° . Find the third angle, and give the reason for your answer. [1 mark]
- Find the angle sum of a pentagon. [1 mark]

Reasons: VC2M7M05 requires reasons. The mark in part a is half for the correct value and half for the correct stated reason.

Question 25 (4F, VC2M7M06) [2 marks].

- Two squares have side lengths in the ratio 1:3. Find the ratio of their areas. [1 mark]
- Two cubes have edge lengths in the ratio 1:2. Find the ratio of their volumes. [1 mark]

Section I — Space (5 marks)

Question 26 (5A, VC2M7SP01) [2 marks].

- Draw a net for a cube with edge length 2 cm. [1 mark]
- Give one advantage of using a net rather than a perspective drawing when you want to make a model of a cube. [1 mark]

Question 27 (5C, VC2M7SP04) [1 mark]. An algorithm sorts shapes:

- Step 1.** Does the shape have exactly 3 sides? If yes: write “triangle” and stop. If no: go to Step 2.
- Step 2.** Does the shape have exactly 4 sides? If yes: write “quadrilateral” and stop. If no: write “polygon with more than four sides” and stop.

Ravi applies the algorithm to a rhombus. What does the algorithm write?

Question 28 (5D, VC2M7SP03) [2 marks]. You may use dynamic geometry software to check your answers.

- Point A has coordinates $(3, 2)$. Find the coordinates of A' , the image of A after a reflection in the x -axis. [1 mark]
- Point B has coordinates $(-1, 4)$. It is translated 5 units to the right and 3 units down. Find the coordinates of its image. [1 mark]

Section J — Statistics (6 marks)

Question 29 (6A, VC2M7ST01) [2 marks]. A local football team kicked these scores in seven matches:

58, 61, 63, 64, 66, 68, 112

- Find the median and the range of the scores. **[1 mark]**
- Which is the more informative “typical” score for this team — the mean or the median? Give a reason. **[1 mark]**

Question 30 (6B, VC2M7ST02) [2 marks]. The ordered stem-and-leaf plot below shows the daily maximum temperatures, in °C, at Melbourne (Olympic Park) for the first 18 days of August 2026.

Stem	Leaf
13	1 3 4 6
14	1 1 3 4
15	0 6 9
16	0 6 7 8
17	6 7
20	0

Key: 13 | 1 means 13.1 °C.

Source: Bureau of Meteorology, “Daily Weather Observations, Melbourne (Olympic Park), Vic” (station 086338), 1–18 August 2026, IDCJDW3033.202608, prepared 19 August 2026; retrieved 20 August 2026.

- How many of the 18 days had a maximum temperature below 15 °C? **[1 mark]**
- Describe the shape of the distribution. **[1 mark]**

Question 31 (6C, VC2M7ST03) [2 marks]. The table shows the estimated resident population of four Australian states at 31 December 2025.

State	Population (thousands)
New South Wales	8 641.1
Victoria	7 121.9
Queensland	5 712.1
Tasmania	579.1

Source: Australian Bureau of Statistics, “National, state and territory population”, December 2025; retrieved 20 August 2026.

- A Year 7 class uses this table for an investigation. Is the data a primary source or a secondary source for the class? Give a reason. **[1 mark]**
- Name the variable in the table, and say whether it is discrete or continuous. **[1 mark]**

Section K — Probability (1 mark)

Question 32 (7B, VC2M7P02) [1 mark]. VC2M7P02 names digital tools: use a simulation tool for this question.

Use a simulation tool to simulate 600 rolls of a fair six-sided die, and record the number of sixes. The predicted number of sixes is 100. Compare your result with the prediction, and say what you expect to happen to the closeness of the match if the simulation is run again with 6 000 rolls instead of 600.

End of paper — 60 marks.

Marking guide

Mark allocation for R7. The paper is sectioned by strand, with the strand marks weighted to the strand's CD count (§7). Number and Algebra are the sections a Year 8 teacher should read first, because Level 8 opens by completing the operations on integers and rationals and by expanding and factorising the expressions 3B only forms (§7).

Strand and part totals

Strand	CDs	Part 1 marks	Part 2 marks	Total
Number	10	10 (Section A)	10 (Section F)	20
Algebra	6	4 (Section B)	8 (Section G)	12
Measurement	6	2 (Section C)	10 (Section H)	12
Space	4	2 (Section D)	5 (Section I)	7
Statistics	3	0	6 (Section J)	6
Probability	2	2 (Section E)	1 (Section K)	3
Total	31	20	40	60

Question-by-question allocation

Q	Subtopic and CD	Part	Marks	Allocation
1	1A VC2M7N08	1	2	(a) midday temperature 1; (b) 6 pm temperature 1
2	1B VC2M7N02	1	2	(a) expanded notation with powers of 10 1; (b) product of powers of primes 1
3	1C VC2M7N01	1	1	side length from the square root 1
4	2A VC2M7N03	1	2	(a) ascending order 1; (b) fraction as a decimal 1
5	2B VC2M7N04	1	1	estimate plus a reasonableness judgement based on it 1
6	2F VC2M7N09	1	1	cordial amount 1 (part-whole reasoning: 6 parts in all)
7	2E VC2M7N07	1	1	15% built from 10% and 5%, no calculator 1
8	3B VC2M7A02	1	2	(a) expression with brackets 1; (b) value at $n=6$ 1
9	3C VC2M7A03	1	2	(a) solving 1; (b)

Q	Subtopic and CD	Part	Marks	Allocation
				verification by substitution 1 — an unverified correct answer scores 1 of 2
10	4D VC2M7M04	1	2	each part: $\frac{1}{2}$ value + $\frac{1}{2}$ stated reason
11	5B VC2M7SP02	1	2	(a) name 1; (b) reasoning about the relationship 1
12	7A VC2M7P01	1	2	(a) probability as a simplified fraction 1; (b) predicted frequency in 60 rolls 1
13	2D VC2M7N06	2	2	(a) total cost 1; (b) change 1
14	2C VC2M7N05	2	3	(a) fraction product 1; (b) decimal quotient 1; (c) application 1
15	2E VC2M7N07	2	2	(a) percentage of a quantity 1; (b) one quantity as a percentage of another 1
16	2G VC2M7N10	2	3	(a) both unit prices 2 (1 each); (b) best buy with reason 1
17	3A VC2M7A01	2	2	(a) AFL substitution 1; (b) MHR substitution 1
18	3D VC2M7A05	2	2	(a) completed table 1; (b) line-or-curve from equal jumps 1
19	3E VC2M7A04	2	2	(a) reading the rainfall panel 1; (b) interpreting the claim against both panels 1
20	3F VC2M7A06	2	2	(a) cell values 1; (b) effect of the sweep 1 — a digital tool is required

Q	Subtopic and CD	Part	Marks	Allocation
21	4A VC2M7M01	2	2	(a) rectangle area 1; (b) triangle area 1
22	4B VC2M7M02	2	2	(a) rectangular prism 1; (b) triangular prism (base area $\times$ length) 1
23	4C VC2M7M03	2	2	(a) diameter 1; (b) circumference with π 1
24	4E VC2M7M05	2	2	(a) $\frac{1}{2}$ value + $\frac{1}{2}$ stated reason; (b) pentagon angle sum 1
25	4F VC2M7M06	2	2	(a) ratio of areas 1; (b) ratio of volumes 1
26	5A VC2M7SP01	2	2	(a) a correct cube net 1; (b) one advantage, reasoned 1
27	5C VC2M7SP04	2	1	following the algorithm's decisions 1
28	5D VC2M7SP03	2	2	(a) reflection image 1; (b) translation image 1
29	6A VC2M7ST01	2	2	(a) median and range 1; (b) justified choice of centre 1
30	6B VC2M7ST02	2	2	(a) reading the plot 1; (b) shape description 1
31	6C VC2M7ST03	2	2	(a) secondary source, with reason 1; (b) variable named, discrete or continuous 1
32	7B VC2M7P02	2	1	the student's own simulated count, a correct comparison with the prediction, and the effect of sample size — a digital tool is

Marking notes

- **Reasons are marked (§7).** In Q10, Q11, Q24 and Q26, the CDs require reasons or reasoning about usefulness: a correct value with no reason does not score full marks.
- **Verification is marked (§7).** Q9 awards one mark for the substitution check.
- **Calculator-free items are marked as such (§7).** The whole of Part 1, and Q7 in particular.
- **Q32:** accept the student's own simulation result — different runs give different counts. Award the mark for the comparison and the sample-size statement, not for a particular count.
- **Tools:** Q20 and Q32 require a digital tool (VC2M7A06, VC2M7P02); Q14, Q15, Q23 and Q28 permit one where the CD allows. No CAS anywhere (D9).

Solutions

Fully worked solutions for every question, followed by a compact answer key for self-checking.

Worked solutions

Question 1.

- a. Start at -5°C and add the rise of 8°C :

$$-5 + 8 = 3$$

The temperature at midday is 3°C . [1 mark]

- b. Start from the midday temperature and subtract the fall of 6°C :

$$3 - 6 = -3$$

The temperature at 6 pm is -3°C . [1 mark]

Question 2.

- a. Read each digit as a multiple of its place value:

$$7\,121\,900 = 7 \times 10^6 + 1 \times 10^5 + 2 \times 10^4 + 1 \times 10^3 + 9 \times 10^2$$

[1 mark]

- b. Split 72 into prime factors, then group equal primes with exponent notation:

$$72 = 2 \times 2 \times 2 \times 3 \times 3 = 2^3 \times 3^2$$

[1 mark]

Question 3.

The side of a square is the square root of its area. Since $13^2 = 169$:

$$\sqrt{169} = 13$$

The side length is **13 m**. [1 mark]

Question 4.

- a. Write the fractions as decimals to compare them: $-\frac{3}{4} = -0.75$ and $\frac{7}{4} = 1.75$. Order the five numbers from smallest to largest — the negative numbers come first, with the larger negative (further from zero) before the smaller one:

$$-2, -1.5, -3/4, 0.5, 7/4$$

[1 mark]

- b. Divide the numerator by the denominator:

$$7 \div 4 = 1.75$$

[1 mark]

Question 5.

Round each number: $612 \approx 600$ and $49 \approx 50$, so

$$612 \times 49 \approx 600 \times 50 = 30\,000$$

Tom's answer of 2 998 is about one-tenth of the estimate, so it is **not reasonable** — he is out by a factor of 10. (The exact value is 29 988.) [1 mark]

Question 6.

The ratio 1:5 is part–part: 1 part cordial to 5 parts water, so the whole drink is $1 + 5 = 6$ equal parts. One part is

$$600 \div 6 = 100 \text{ mL}$$

The cordial is 1 part, so **100 mL** of cordial is needed. [1 mark]

Question 7.

Build 15% from 10% and 5%:

$$10\% \text{ of } 60 = 6$$

$$5\% \text{ of } 60 = 3 \text{ (half of } 10\%)$$

$$15\% \text{ of } 60 = 6 + 3 = 9$$

The answer is **9**. [1 mark]

Question 8.

- a. The adding happens first, so it sits inside brackets:

$$3(n + 4)$$

[1 mark]

- b. Substitute $n = 6$ and work out the bracket first:

$$3 \times (6 + 4) = 3 \times 10 = 30$$

[1 mark]

Question 9.

- a. Undo the operations in reverse order, keeping both sides balanced:

$$4x - 3 = 25$$

$$4x - 3 + 3 = 25 + 3$$

$$4x = 28$$

$$4x \div 4 = 28 \div 4$$

$$x = 7$$

[1 mark]

- b. Check by substituting $x = 7$ into the original equation:

$$\text{LHS} = 4 \times 7 - 3 = 28 - 3 = 25 = \text{RHS}$$

Both sides agree, so $x = 7$ is the solution. [1 mark]

Question 10.

- a. Angles a and b sit on the same straight line, so they add to 180° :

$$b = 180^\circ - 65^\circ = 115^\circ$$

Value: $b = 115^\circ$; reason: angles on a straight line sum to 180° . [$\frac{1}{2} + \frac{1}{2} = 1$ mark]

- b. Angles b and f are in matching positions at the two crossings — they are corresponding angles, and corresponding angles are equal when the lines are parallel:

$$f = b = 115^\circ$$

Value: $f = 115^\circ$; reason: corresponding angles are equal. [$\frac{1}{2} + \frac{1}{2} = 1$ mark]

Also accept: f co-interior with d , giving $f = 180^\circ - 65^\circ = 115^\circ$ (co-interior angles sum to 180°), or f alternate with c once $c = 115^\circ$ is found.

Question 11.

- a. Four equal sides and four right angles is the definition of a **square**. [1 mark]
- b. A rectangle is a quadrilateral with four right angles. A square has four right angles (as well as four equal sides), so it meets the definition of a rectangle — every square is a rectangle. A rectangle does not have to have four equal sides, so not every rectangle is a square. [1 mark]

Question 12.

- a. The sample space for one roll is $\{1, 2, 3, 4, 5, 6\}$ — six equally likely outcomes. The favourable outcomes for an even number are 2, 4 and 6 — three of them:

$$P(\text{even}) = \frac{3}{6} = \frac{1}{2}$$

[1 mark]

- b. Multiply the number of rolls by the probability:

$$60 \times \frac{1}{2} = 30$$

Predict about **30** even numbers. [1 mark]

Question 13.

- a. Two muffins at \$2.50 each, plus one juice at \$1.80:

$$2 \times 2.50 + 1.80 = 5.00 + 1.80 = 6.80$$

The total cost is **\$6.80**. [1 mark]

- b. Subtract the cost from the amount paid:

$$10.00 - 6.80 = 3.20$$

Her change is **\$3.20**. [1 mark]

Question 14.

- a. Multiply the numerators and multiply the denominators, then simplify:

$$\frac{3}{4} \times \frac{2}{5} = \frac{6}{20} = \frac{3}{10}$$

[1 mark]

- b. Think “how many 0.6s make 7.2?” — or check with multiplication, since division is the inverse of multiplication:

$$7.2 \div 0.6 = 12 \text{ (check: } 12 \times 0.6 = 7.2 \text{)}$$

[1 mark]

- c. Multiply the amount for one batch by 6:

$$6 \times 0.75 = 4.5$$

4.5 L of water is needed. [1 mark]

Question 15.

- a. With a calculator, convert the percentage to a decimal and multiply:

$$37.5\% \times 84 = 0.375 \times 84 = 31.5$$

[1 mark]

- b. Divide the part by the whole and multiply by 100:

$$\frac{24.4}{41.4} \times 100 = 58.937 \dots \approx 58.9\%$$

The storm day was about **58.9%** of the total. [1 mark]

Question 16.

- a. Find the cost of one litre for each size. The 2 L carton:

$$3.60 \div 2 = 1.80 \text{ dollars per litre}$$

The 500 mL carton: 500 mL is 0.5 L, so

$$1.10 \div 0.5 = 2.20 \text{ dollars per litre}$$

One mark for each unit price. [2 marks]

- b. The **2 L carton** is the best buy: \$1.80 per litre is less than \$2.20 per litre, so each litre of juice costs less. [1 mark]

Question 17.

- a. Substitute $g = 11$ and $b = 8$ into $p = 6g + b$, and multiply before adding:

$$p = 6 \times 11 + 8 = 66 + 8 = 74$$

The team scored **74 points**. [1 mark]

- b. Substitute age = 13 into $\text{MHR} = 220 - \text{age}$:

$$\text{MHR} = 220 - 13 = 207$$

The estimated maximum heart rate is **207 beats per minute**. [1 mark]

Question 18.

- a. Substitute each input into $y = 2x + 3$: $x = 0$ gives $2 \times 0 + 3 = 3$; $x = 1$ gives 5; $x = 2$ gives 7; $x = 3$ gives 9; $x = 4$ gives 11.

input x	0	1	2	3	4
output y	3	5	7	9	11

[1 mark]

- b. A **straight line**. The output goes up by 2 every time the input goes up by 1; equal jumps in the output for equal jumps in the input are what make the plotted points line up straight. [1 mark]

Question 19.

- a. Read the tallest bar in the bottom panel: the mean rainfall is highest in **October**, at **29.4 mm**. [1 mark]
- b. The claim is **not supported**. The bottom panel shows the rainfall staying about even across the year — every month sits between about 19 mm and 29 mm — while the top panel shows the mean maximum temperature swinging from about 15 °C in July to about 33 °C in January. If colder months had less rain, the bars would follow the temperature down; they do not. The least rain falls in March (18.7 mm), which is not the coldest month. [1 mark]

Question 20.

- a. Cell B4 multiplies B1 by A4: $6 \times 2 = 12$. Copied down one row, B5 is $6 \times 4 = 24$. So **B4 shows 12** and **B5 shows 24**. [1 mark]
- b. With the width fixed at 6 cm, each extra 2 cm of length adds 12 cm² of area — the values climb 12, 24, 36, 48 in equal steps of 12. Equivalently: doubling the length doubles the area. [1 mark]

Question 21.

- a. Use $A = l \times w$:

$$A = 9 \times 7 = 63$$

The area is **63 m²**. [1 mark]

- b. Use $A = \frac{1}{2} \times \text{base} \times \text{height}$:

$$A = \frac{1}{2} \times 12 \times 5 = 6 \times 5 = 30$$

The area is **30 cm²**. [1 mark]

Question 22.

- a. Use $V = l \times w \times h$:

$$V = 8 \times 5 \times 3 = 120$$

The volume is **120 cm³**. [1 mark]

- b. A prism's volume is the area of its base times its length:

$$V = 15 \times 10 = 150$$

The volume is **150 cm³**. [1 mark]

Question 23.

- a. The diameter is twice the radius:

$$d = 2 \times 7 = 14$$

The diameter is **14 cm**. [1 mark]

- b. Use $C = \pi d$ with the π key:

$$C = \pi \times 14 = 43.98... \approx 44.0$$

The circumference is **44.0 cm** (to one decimal place). [1 mark]

Question 24.

- a. The angles of a triangle add to 180°, so the third angle is



$$180^{\circ} - (54^{\circ} + 67^{\circ}) = 180^{\circ} - 121^{\circ} = 59^{\circ}$$

Value: 59° ; reason: the angle sum of a triangle is 180° . [$\frac{1}{2} + \frac{1}{2} = 1$ mark]

- b. A pentagon can be split into 3 triangles from one vertex, so its angle sum is

$$180^{\circ} \times (5 - 2) = 180^{\circ} \times 3 = 540^{\circ}$$

[1 mark]

Question 25.

- a. Area grows with the square of the length. With side lengths in the ratio 1:3, the areas are in the ratio

$$1^2 : 3^2 = 1 : 9$$

[1 mark]

- b. Volume grows with the cube of the length. With edge lengths in the ratio 1:2, the volumes are in the ratio

$$1^3 : 2^3 = 1 : 8$$

[1 mark]

Question 26.

- a. Any arrangement of six equal squares, joined edge to edge, that folds into a closed cube scores the mark — for example, four squares in a row with one square attached above the second square and one below it. Each edge in the drawing is 2 cm. [1 mark]
- b. A net shows every face at its true size and shape, and it can be cut out and folded to build the solid — a perspective drawing shows what the solid looks like, but its faces are drawn distorted and it cannot be folded into a model. Accept any clear advantage of the net. [1 mark]

Question 27.

A rhombus has 4 sides. Step 1 asks for exactly 3 sides — no, so the algorithm goes on to Step 2. Step 2 asks for exactly 4 sides — yes, so the algorithm writes “**quadrilateral**” and stops. [1 mark]

Question 28.

- a. A reflection in the x -axis keeps the x -coordinate the same and changes the sign of the y -coordinate:

$$A(3, 2) \rightarrow A'(3, -2)$$

[1 mark]

- b. Add 5 to the x -coordinate and subtract 3 from the y -coordinate:

$$x : -1 + 5 = 4, y : 4 - 3 = 1$$

The image of B is $(4, 1)$. [1 mark]

Question 29.

- a. The values are already ordered. With 7 values, the median is the 4th one: **64**. The range is the largest minus the smallest:

$$112 - 58 = 54$$

Median **64**, range **54**. [1 mark]

- b. The **median** is the more informative centre. The score of 112 is an outlier — far from the other six scores — and it drags the mean up to $492 \div 7 \approx 70.3$, which is higher than six of the seven scores. The median of 64 sits with the rest of the data and is the truer “typical” score. [1 mark]

Question 30.

- a. Count the leaves on the stems below 15: stem 13 has 4 leaves and stem 14 has 4 leaves, so

$$4 + 4 = 8$$

8 days had a maximum temperature below 15 °C. (The 15.0 on stem 15 is not below 15.) [1 mark]

- b. The values cluster between about 13 °C and 18 °C, with one high value at 20.0 °C giving the distribution a short tail on the high side — it is slightly positively skewed. Accept “roughly symmetric with one high value”. [1 mark]

Question 31.

- a. It is a **secondary source**: the class is not collecting the counts itself — the ABS collected them, and the class obtains the numbers from the ABS. [1 mark]
- b. The variable is the **population of a state**, measured in people (the table reports it in thousands). Populations are counted, so the variable is **discrete**. [1 mark]

Question 32.

The predicted number of sixes is $600 \times \frac{1}{6} = 100$. A student’s simulation will return a count near 100 — different runs give different results (say anywhere from about 85 to about 115), and that variation is normal: chance results wander around the prediction. Award the mark for a response that (i) records the student’s own simulated count, (ii) compares it with 100, and (iii) says that with 6 000 rolls the observed fraction of sixes is expected to be closer to $\frac{1}{6}$ — the more trials, the closer the observed results tend to sit to the prediction. [1 mark]

Answer key

Question	Answer	Marks
1a	3 °C	1
1b	− 3 °C	1
2a	$7 \times 10^6 + 1 \times 10^5 + 2 \times 10^4 + 1 \times 10^3 + 1$	1
2b	$2^3 \times 3^2$	1
3	13 m	1
4a	$-2, -1.5, -\frac{3}{4}, 0.5, \frac{7}{4}$	1
4b	1.75	1
5	$600 \times 50 = 30\,000$; not reasonable — 2 998 is about one-tenth of the estimate	1
6	100 mL	1
7	9 (10% is 6, 5% is 3, so 15% is 9)	1
8a	$3(n + 4)$	1
8b	30	1
9	$x = 7$; check: $4 \times 7 - 3 = 25$	2
10a	$b = 115^\circ$ — angles on a straight line sum to 180°	1

Question	Answer	Marks
10b	$f = 115^\circ$ — corresponding angles are equal	1
11a	Square	1
11b	A square has four right angles, so it fits the definition of a rectangle; a rectangle need not have four equal sides	1
12a	$\frac{1}{2}$	1
12b	30	1
13a	\$6.80	1
13b	\$3.20	1
14a	$\frac{3}{10}$	1
14b	12	1
14c	4.5 L	1
15a	31.5	1
15b	58.9%	1
16a	\$1.80 per litre; \$2.20 per litre	2
16b	The 2 L carton — cheaper per litre	1
17a	74 points	1
17b	207 beats per minute	1
18a	3, 5, 7, 9, 11	1
18b	A straight line — the jumps between outputs are all the same	1
19a	October, 29.4 mm	1
19b	No — the rainfall stays about even (roughly 19–29 mm) while the temperature swings	1
20a	B4: 12; B5: 24	1
20b	Each extra 2 cm of length adds 12 cm ² (doubling the length doubles the area)	1
21a	63 m ²	1
21b	30 cm ²	1
22a	120 cm ³	1
22b	150 cm ³	1
23a	14 cm	1
23b	44.0 cm	1
24a	59° — the angle sum of a triangle is 180°	1
24b	540°	1
25a	1:9	1
25b	1:8	1
26a	Any net of six squares that folds into	1

Question	Answer	Marks
	a cube	
26b	A net shows every face at true size and can be cut out and folded	1
27	Quadrilateral	1
28a	$(3, -2)$	1
28b	$(4, 1)$	1
29a	Median 64; range 54	1
29b	The median — the outlier 112 drags the mean up to about 70.3	1
30a	8 days	1
30b	A cluster from about 13 °C to 18 °C with one high value at 20.0 °C (slightly positive skew)	1
31a	Secondary — the ABS collected the counts, not the class	1
31b	Population of a state; discrete	1
32	Own simulation count compared with 100; closer match expected at 6 000 rolls	1
	Total	60

Total: 60 marks — Number 20 · Algebra 12 · Measurement 12 · Space 7 · Statistics 6 · Probability 3. Part 1 (no digital tools): 20 marks · Part 2 (digital tools permitted): 40 marks.