

VCE VM Numeracy Units 3 & 4

Chapter 13 — Unit 4 outcome demonstration assessment

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Chapter 13 Unit 4 outcome demonstration assessment — 13A Unit 4 — Outcome 1 assessment: numeracy in context

A note for teachers — outcome-demonstration assessments (Chapters 12 and 13).

The papers in Chapters 12 and 13 give students practice at demonstrating the key knowledge and skills of each outcome in a written-paper format. They **complement** — **they do not replace** — the school-designed assessment tasks that your school uses to make the judgement of satisfactory achievement. The VCE VM Numeracy Study Design expects that judgement to be based on a selection of its listed task types: investigations and projects; multimedia presentation, poster or report; and portfolio.

If you use any task from this book for assessment, the Study Design's authentication rule (in its sections on flexible delivery and satisfactory completion) applies: if a student uses a task to show one of the outcomes of a VCE Vocational Major unit, that task cannot be used again as evidence for a different unit or study — not for another VCE Vocational Major unit, a VCE study, a VET unit of competency or a Victorian Pathways Certificate unit.

Check the full task options and conditions in the VCAA *VCE Vocational Major Numeracy* study design — Unit 4, Outcome 1.

Source: VCAA, VCE Vocational Major Numeracy Study Design, retrieved 2026-10-07.

Unit 4 — Outcome 1: across the numeracies, students apply the key maths knowledge and skills of the unit's four areas of study, and critically analyse, evaluate and justify them. This paper covers Areas of Study 5–8 (Dimension and direction, Data, Uncertainty, and Systematics) across the six numeracies (personal, civic, financial, health, vocational and recreational), and draws only on Unit 4 content (Chapters 7 to 11 of this book). Materials: pen, paper; a scientific calculator may be used. Section A: 25 multiple-choice questions (25 marks). Section B: 5 short-answer questions (15 marks). Total: 40 marks. Approximate time: 60 minutes.

Answer all questions in the spaces provided. In all questions where a numerical answer is required, you should only round when instructed to do so, and then to the precision stated. Where more than one mark is available, appropriate working must be shown.

About the data in this assessment. The prices, times and other numbers here are **made up** (not real): pretend people, pretend businesses and pretend numbers, built for this book so you can practise the maths. Nothing here is real data about a real business, person or place.

Section A

Choose the response that is correct for the question.

Question 1

On a town grid map, Maya's home is at the position $(2, 1)$ and the market is at the position $(7, 5)$. Each position is written as (blocks across, blocks up), and Maya walks only along the grid streets. The number of blocks Maya walks from home to the market is

- A. 9 blocks
- B. 4 blocks
- C. 5 blocks
- D. 12 blocks

Question 2

A bushwalking track leaves the camp on a bearing of $N60^{\circ}E$. The walkers later return to camp along the same straight track. The reverse bearing of $N60^{\circ}E$ is

- A. $N60^{\circ}W$
- B. $S60^{\circ}E$
- C. $S30^{\circ}W$
- D. $S60^{\circ}W$

Question 3

A site plan for a new equipment shed is drawn at a scale of 1 : 500. On the plan, one wall measures 8.4 cm. The real length of this wall is

- A. 4.2 m
- B. 420 m
- C. 42 m
- D. 4200 m

Question 4

At 8:20 pm, the smaller angle between the hour hand and the minute hand of an analogue clock is

- A. 120°
- B. 130°
- C. 250°
- D. 230°

Question 5

On a building site, a pipe bends through an angle of 112° . The reflex angle at the bend is

- A. 248°
- B. 68°
- C. 112°
- D. 228°

Question 6

Five people at a community centre report their weekly pay: \$ 465, \$ 495, \$ 525, \$ 550 and \$ 4 300. The centre's newsletter wants to report one number that describes what a typical person there earns. The best choice is

- A. the median, \$ 525, because the \$ 4 300 value pulls the mean far above what most people earn
- B. the mean, \$ 1 267, because it uses all five values
- C. the median, \$ 525, because the median is always a fairer statistic than the mean
- D. the range, \$ 3 835, because it shows how spread out the pay is

Question 7

A medical centre shows last month's 90 appointments on a pie chart. 15 of the appointments were cancelled. The sector angle for the cancelled appointments is

- A. 6°
- B. 90°
- C. 300°
- D. 60°

Question 8

Two bowlers each roll five ends at their club. Priya's scores are 138, 150, 164, 150 and 148. Tom's scores are 147, 152, 149, 151 and 151. Both means are 150. Which statement best describes their consistency?

- A. Both are equally consistent, because their means are the same.
- B. Priya is more consistent, because her range is larger.
- C. Tom is more consistent, because his range is smaller.
- D. Consistency cannot be compared from these scores.

Question 9

A courier records the times, in minutes, for six deliveries: 14, 16, 17, 18, 15 and 57. Using the big-empty-gap rule, the correct statement about this data is

- A. there is no outlier, because 57 could be a real delivery time
- B. 57 is an outlier; removing it drops the mean a lot and barely changes the median
- C. 57 is an outlier; removing it drops the median a lot and barely changes the mean
- D. 57 is an outlier; removing it drops the mean and the median by the same amount

Question 10

A council's recycling rate rose from 41 % to 47 % in one year. A newspaper reported: "Recycling rose by 6 % this year." Which statement best evaluates the report? (Round percentages to 1 decimal place.)

- A. The report is correct — $47 - 41 = 6$, so the rate rose by 6 %.
- B. The report is wrong — the rate rose by 14.6 percentage points.
- C. The report is wrong — the rate rose by 6 percentage points, which is a rise of about 14.6 %.
- D. The report is correct — percentage points and per cent are the same thing.

Question 11

A first-aid kit holds 25 items, and 4 of them are out of date. One item is picked at random. The probability that it is out of date, written as a percentage, is

- A. 4 %
- B. 21 %
- C. 84 %
- D. 16 %

Question 12

A game at the school fete involves tossing one coin and rolling one six-sided die. The probability of tossing a head and rolling a number less than 3 is

- A. $\frac{1}{12}$
- B. $\frac{1}{6}$
- C. $\frac{1}{3}$
- D. $\frac{1}{2}$

Question 13

In a practice race market, a horse has decimal odds of 4.50. The implied probability that the horse wins, correct to 1 decimal place, is

- A. 4.5 %
- B. 22.5 %
- C. 22.2 %
- D. 77.8 %

Question 14

A town's school bus was late on 21 of the last 60 school days. Using this record, the expected number of late days over the next 200 school days is

- A. 70
- B. 35
- C. 21
- D. 130

Question 15

A workshop risk assessment rates the hazard "splashing while mixing cleaning chemicals" as likelihood 4 and consequence 3. The risk score is likelihood $\times$ consequence, and the zones are 1–4 low, 5–9 medium, 10–14 high and 15–25 extreme. The hazard has a

- A. score of 7, which is in the medium zone
- B. score of 12, which is in the medium zone
- C. score of 12, which is in the extreme zone
- D. score of 12, which is in the high zone

Question 16

A family drives 260 km in a car that uses 7.5 litres of fuel per 100 km. Fuel costs \$1.84 per litre. The fuel cost for the trip is

- A. \$ 4.78
- B. \$ 35.88
- C. \$ 19.50
- D. \$ 3588.00

Question 17

A worker's rostered shift runs from 10:30 to 19:00 and includes an unpaid meal break of 45 minutes. The number of paid hours in the shift, written in decimal hours, is

- A. 7.25 h
- B. 8.5 h
- C. 7.75 h
- D. 8.25 h

Question 18

Jack must be at work by 8:40 am. It takes him 15 minutes to walk to the station, 35 minutes to travel by train and 10 minutes to walk from the station to work. The latest time Jack can leave home and still arrive by 8:40 am is

- A. 7:25 am
- B. 7:55 am
- C. 8:00 am
- D. 7:40 am

Question 19

A school fete stall has \$120 to spend on prizes. There is a one-off set-up fee of \$45, and each prize item costs \$6. The greatest number of prize items the stall can buy is

- A. 12.5
- B. 13
- C. 20
- D. 12

Question 20

A cyclist rides 13.5 km in 45 minutes. Her average speed is

- A. 0.3 km/h
- B. 18 km/h
- C. 13.5 km/h
- D. 30 km/h

Question 21

A pair of work boots has a price of \$385 including GST. The amount of GST included in the price is

- A. \$35.00
- B. \$38.50
- C. \$42.35
- D. \$350.00

Question 22

Over one year, building Site A recorded 6 reportable injuries across 150 workers, and Site B recorded 5 reportable injuries across 80 workers. Which site had the higher injury rate, and why?

- A. Site A, because it had more injuries (6 against 5).
- B. Site A, because 6 out of 150 workers is a bigger fraction than 5 out of 80 workers.
- C. Site B, because its rate is 6.25 per 100 workers against Site A's 4.0.
- D. Site A, because its rate is 6.25 per 100 workers against Site B's 4.0.

Question 23

The probability that a particular phone's screen cracks in a year is 0.08, and a replacement screen costs \$180. A screen cover costs \$19.90. Judged on average cost only, the cover is

- A. worth buying, because \$19.90 is less than the \$180 replacement cost
- B. worth buying, because the expected cost of \$14.40 is less than \$19.90
- C. not worth buying, because there is only an 8% chance the screen cracks, so the cost will never be needed
- D. not worth buying, because the expected cost of \$14.40 is less than the \$19.90 price of the cover

Question 24

A train departs at 14:52 and the journey takes 1 hour 23 minutes. Using 24-hour time, the train arrives at

- A. 15:15
- B. 16:15
- C. 15:75
- D. 16:05

Question 25

A games-night organiser claims that "most players score over 500 points". On one night, 27 of the 60 players scored over 500 points. Which statement best evaluates the claim?

- A. Not supported — 45% of players scored over 500, and "most" means more than half.
- B. Supported — 27 players is a large number.
- C. Supported — 45% is close to 50%, so "most" is fair.
- D. Not supported — exactly 50% of the players scored over 500.

End of Section A

Section B

Answer all questions in the spaces provided.

Question 26 (3 marks)

A walking-track map is drawn at a scale of 1 : 25 000, so 1 cm on the map represents 250 m on the ground. On the map, the track from the campground to the lookout measures 7.2 cm. The group walks this stretch at an average speed of 4 km/h.

- a. Find the real distance, in kilometres, from the campground to the lookout. 1 mark

- b. Find the time, in minutes, that the group takes to walk from the campground to the lookout. 1 mark

- c. The group leaves the campground at 09:45 and rests for 22 minutes at the lookout. Find the time at which they start walking again. 1 mark

Question 27 (3 marks)

Ava's fitness app records her daily steps over seven days: 6 800, 7 400, 7 100, 6 500, 15 800, 7 500 and 7 300.

- a. Find the mean number of steps per day. Round your answer to the nearest whole step. 1 mark

- b. Use the big-empty-gap rule to identify the outlier in this data, and support your answer with the gaps between the sorted values. 1 mark

- c. Find the mean number of steps per day with the outlier removed. Round your answer to the nearest whole step. 1 mark

Question 28 (3 marks)

At the school fete, players guess the number of jelly beans in a jar. A guess within 10 beans of the true number is called a close guess. Of the first 80 guesses, 12 were close guesses.

- a. Find the relative frequency of a close guess. Give your answer as a percentage. 1 mark

- b. Using this relative frequency, find the expected number of close guesses if 300 people play. 1 mark

- c. The organiser says that "about 1 in every 5 guesses will be close". Use the record of the first 80 guesses to evaluate this statement. 1 mark

Question 29 (3 marks)

A community garden has \$ 450 to spend on raised garden bed kits. Each kit costs \$ 58, and a one-off delivery fee of \$ 35 is charged on the whole order.

- a.** Find the greatest number of kits the garden can buy, and show the check that your number fits within the budget. 1 mark

- b.** Find the amount of the budget left over when this number of kits is bought. 1 mark

- c.** The delivery fee later rises to \$ 50. Find the new greatest number of kits that can be bought with the same \$ 450 budget. 1 mark

Question 30 (3 marks)

Over one year, an apprentice's weekly wage rose from \$ 640 to \$ 704. Over the same year, the prices of the things the apprentice buys rose by 6 %.

- a.** Find the percentage increase in the apprentice's weekly wage. 1 mark

- b.** Did the apprentice's purchasing power — how much the wage can actually buy — rise or fall over the year? Give a reason. 1 mark

- c.** A basket of goods that cost \$ 640 one year ago now costs 6 % more. Use a calculation to show how much better or worse off the apprentice is when buying this basket. 1 mark

End of Section B

Chapter 13 Unit 4 outcome demonstration assessment — 13B Unit 4 — Outcome 2 assessment: problem-solving cycle task

Note for teachers. This paper is a practice paper. It gives students the chance to demonstrate Outcome 2 of Unit 4 — selecting and using the four stages of the problem-solving cycle — through multiple-choice and simple short-answer questions. It **complements, and does not replace**, the assessment tasks your school designs. The study design sets the task types schools draw on (investigations and projects; a multimedia presentation, poster or report; a portfolio), and how achievement of the outcome is recorded is a matter for school decision.

If any task in this paper is adapted for reporting, the study design’s authentication rule (in its sections on flexible delivery and satisfactory completion) applies: if a student uses a task to show one of the outcomes of a VCE Vocational Major unit, that task cannot be used again as evidence for a different unit or study — not for another VCE Vocational Major unit, a VCE study, a VET unit of competency or a Victorian Pathways Certificate unit.

Check the full task options and conditions in the VCAA *VCE Vocational Major Numeracy* study design — Unit 4, Outcome 2.

Source: VCAA, VCE Vocational Major Numeracy Study Design, retrieved 2026-10-07.

Unit 4, Outcome 2 — the four-stage problem-solving cycle: identify the mathematics; act on and use mathematics; evaluate and reflect; communicate and report. Draws on Chapters 1, 7, 8, 9 and 10. Materials: pen and paper; a scientific calculator may be used. 13B: 12 questions (30 marks). Approximate time: 60 minutes. Answer all questions in the spaces provided. In all questions where a numerical answer is required, you should only round when instructed to do so, and then to the precision stated. Where more than one mark is available, appropriate working must be shown.

About the data in this assessment. The names, places, maps, tables and numbers here are **made up** (not real): pretend people, pretend committees and pretend numbers, built for this book so you can practise the maths. Nothing here is real data about a real business, person or place.

Section A — Multiple choice (10 marks)

Choose the response that is correct for the question.

Question 1

The four stages of the problem-solving cycle, in order, are

- A. identify the mathematics, act on and use mathematics, evaluate and reflect, communicate and report
- B. identify the mathematics, evaluate and reflect, act on and use mathematics, communicate and report
- C. act on and use mathematics, identify the mathematics, communicate and report, evaluate and reflect
- D. identify the mathematics, act on and use mathematics, communicate and report, evaluate and reflect

Question 2

Priya’s manager hands her a spreadsheet of last month’s delivery times and asks, “Are our deliveries getting slower?” Priya is at Stage 1 of the problem-solving cycle. The best first move is to

- A. decide what question the data must answer, and which mathematics and which columns of the sheet she needs
- B. use a calculator to find the mean of every time in the sheet
- C. compare her first answer with an estimate to check it is sensible
- D. wait until the manager tells her which calculation to do

Question 3

A walking track measures 6 cm on a map with scale 1 : 25 000. The real length of the track is

- A. 150 km
- B. 4.17 km
- C. 15 km
- D. 1.5 km

Question 4

A delivery app records five trip times, in minutes, in the order they happened: 18, 45, 20, 22, 21. The median trip time is

- A. 20 minutes
- B. 25.2 minutes
- C. 21 minutes
- D. 21.5 minutes

Question 5

A shuttle bus was late on 6 of the last 40 days. The probability that the bus is late on a day chosen at random, as a fraction in simplest form, is

- A. $\frac{3}{20}$
- B. $\frac{20}{3}$
- C. $\frac{17}{20}$
- D. $\frac{3}{17}$

Question 6

A volunteer group lists the ages of its eight members: 15, 16, 16, 17, 17, 18, 19 and 64. The mean age is 22.75 years. The best evaluation of the claim “the typical member is about 22.75 years old” is that it is

- A. sound, because the mean is always the best measure of “typical”
- B. not the best choice, because 64 sits far above the other ages and pulls the mean up; the median, 17 years, better shows a typical member’s age
- C. wrong, because a typical age must always be found from the range
- D. sound, because with only eight people the mean and the median are always equal

Question 7

A route planner offers two walking routes between the same two street corners in a grid of straight streets. Both routes are shown as 3.2 km, although they look different on the screen. The best evaluation of this result is

- A. it must be wrong, because the route that looks longer on the screen must be longer in real life
- B. it is reasonable, because on a street grid any route between the same two corners covers the same number of blocks across and the same number of blocks up
- C. it must be wrong, because route planners always get distances wrong
- D. it is reasonable, because any two routes between any two places anywhere are the same length

Question 8

A forecast gives the probability of rain on market day as 0.15. The chance word that best matches this probability is

- A. impossible
- B. unlikely
- C. an even chance
- D. likely

Question 9

In a cost planner, the costs of seven items sit in cells B2 to B8. The formula that finds the **total** cost is

- A. =AVERAGE (B2 : B8)
- B. =COUNT (B2 : B8)
- C. =SUM (B2 : B8)
- D. =TOTAL (B2 : B8)

Question 10

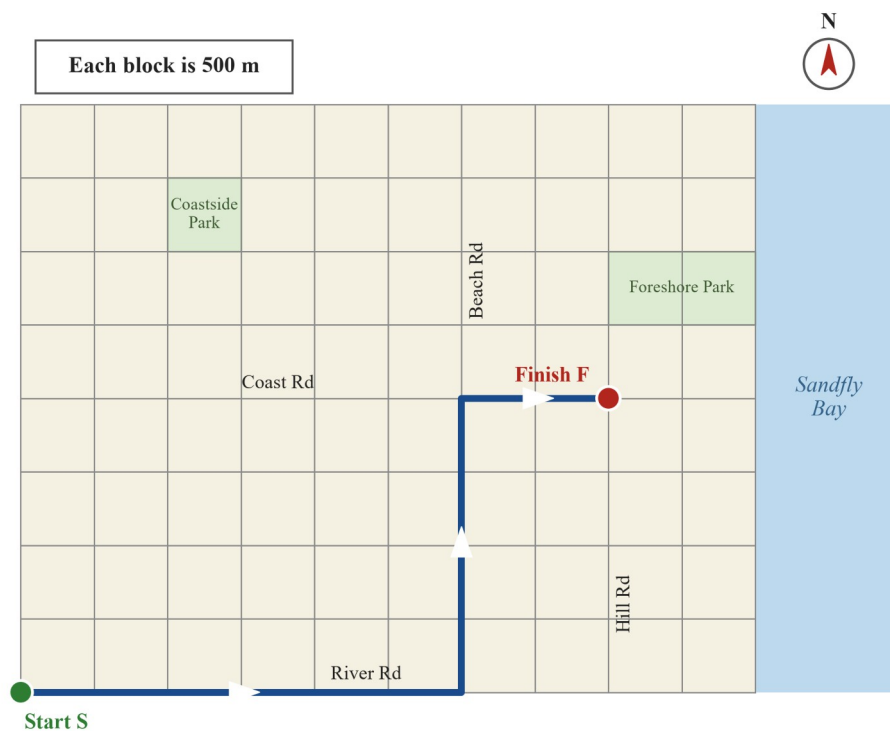
The committee wants one display that shows how the ride budget splits across five cost areas, as shares of the whole budget. The most appropriate display is

- A. a line graph
- B. a dot plot
- C. a pie chart
- D. a table of the five amounts

End of Section A

Section B — Structured task (20 marks)

The task. The Coastside Community Committee runs a charity bike ride each spring, the Coastside Cruise. This year's route is shown on the map below. Riders start at S, ride east along River Rd, turn north up Beach Rd, then ride east along Coast Rd to the finish at F on the foreshore. Each block on the map is 500 m.



Made-up map: the town, its streets and the ride route are made up for this assessment.

The committee expects 175 riders. Each rider will be given 2 bottles of water from the drink stops, and the bottles are sold in boxes of 24. Table 1 shows the times recorded by last year's riders.

Table 1. Ride times from last year (minutes)

Rider	1	2	3	4	5	6	7	8	9
Time (minutes)	42	45	46	47	48	50	52	55	95

Made-up data: every time in Table 1 is made up for this assessment.

The committee also checked the weather records for the ride date: on 5 of the last 20 ride days it rained.

Question 11 (16 marks)

Work through the committee's task, one stage of the problem-solving cycle at a time.

a. Stage 1 — identify the mathematics.

- i.** The committee must work out how many boxes of water to order. State the question to be answered, and list two pieces of information from the task that you would need. 2 marks

- ii.** List, in order, the operations needed to find the number of boxes, and name one tool you could use for the calculation. 2 marks

b. Stage 2 — act on and use mathematics.

i. Use the map to find the total length of the route, in km.

2 marks

ii. Find the median and the range of the ride times in Table 1.

2 marks

c. Stage 3 — evaluate and reflect.

i. The mean of the times in Table 1 is 53.3 minutes, correct to 1 decimal place. Explain whether the mean or the median better shows a typical rider's time.

2 marks

ii. The planning sheet shows $350 \div 24 = 14.583$, correct to 3 decimal places. Boxes are sold whole. Explain why the committee should order 15 boxes and not 14.

2 marks

d. Stage 4 — communicate and report.

i. Write the probability of a wet ride day as a fraction in simplest form and as a percentage.

2 marks

ii. In one or two sentences, advise the committee whether they need a wet-weather plan. Justify your advice using the probability and a chance word.

2 marks

Question 12 (4 marks)

Quinn carries out a small task about crowd numbers at the Coastside football club. For each action below, name the stage of the problem-solving cycle it belongs to: *identify the mathematics*, *act on and use mathematics*, *evaluate and reflect*, or *communicate and report*.

a. Quinn reads the club newsletter, underlines the five crowd numbers, and decides to find the mean. 1 mark

b. Quinn keys the five numbers into a calculator, adds them, and divides by 5. 1 mark

c. Quinn compares the answer with an earlier guess of “about 210” and agrees the answer is sensible. 1 mark

d. Quinn writes to the club: “The mean home crowd was 213 people.” 1 mark

End of Section B

Chapter 13 Unit 4 outcome demonstration assessment — 13C Unit 4 — Outcome 3 assessment: mathematical toolkit

Note for teachers. This paper gives students an opportunity to demonstrate Outcome 3 of Unit 4 (the mathematical toolkit): choosing tools from a large maths toolkit, using them, and judging and explaining their use. It **complements, and does not replace**, the school-based assessment tasks the study design requires, drawn from its task types — investigations and projects, a multimedia presentation, poster or report, and a portfolio. The study design’s authentication rule (in its sections on flexible delivery and satisfactory completion) applies to any task used for assessment: if a student uses a task to show one of the outcomes of a VCE Vocational Major unit, that task cannot be used again as evidence for a different unit or study — not for another VCE Vocational Major unit, a VCE study, a VET unit of competency or a Victorian Pathways Certificate unit.

Check the full task options and conditions in the VCAA *VCE Vocational Major Numeracy* study design — Unit 4, Outcome 3.

Source: VCAA, VCE Vocational Major Numeracy Study Design, retrieved 2026-10-07.

Unit 4, Outcome 3 — mathematical toolkit. Materials: pen, paper and a basic scientific calculator. Section A: 12 multiple-choice questions (12 marks). Section B: 2 short-answer questions (8 marks). Total: 20 marks. Approximate time: 45 minutes. Every calculator screen, spreadsheet and app result in this paper is printed on the page — you do not need any device to answer any question. Round only where a question tells you to, and state the precision in your answer.

About the data in this paper. Every business, app, person and number in this paper is **made up** (not real). They are built for this book so you can practise the maths. Nothing here is real data about a real person, business, app or place.

Section A — Multiple-choice questions

Choose the response that is correct for the question.

Question 1

Tama is fixing a shelf to a wall. Before he loads it, he needs to check the shelf is horizontal — flat, with no end tilting down. Which tool in his kit is the most valid choice for this check?

- A. a tape measure
- B. a protractor
- C. a spirit level
- D. a measuring jug

Question 2

The roster in a care home is written next to an analogue wall clock. Elsie’s shift starts at the time the clock shows when the hour hand is just past the 2 and the minute hand is pointing at the 7. Her shift starts in the afternoon. In 24-hour time, Elsie’s shift starts at

- A. 02:35
- B. 14:35
- C. 14:07
- D. 19:10

Question 3

Priya's calculator is set to show every answer to 2 decimal places. She needs two-thirds of a market stall's \$900 takings. She presses $2 \div 3$, the screen shows 0.67, and she then multiplies the displayed 0.67 by 900 and gets \$603. The true value of $\frac{2}{3} \times 900$ is \$600. Which habit would have avoided the \$3 error?

- A. rounding every step to 2 decimal places before continuing
- B. copying the calculator's displayed value into each next step
- C. doing all of the working to the nearest whole number
- D. carrying full precision through the working and rounding once, at the end

Question 4

Dev's car travels 12.5 km on one litre of fuel. He is entering its fuel use into an online trip-fuel calculator, and the input box is labelled "L/100 km" (litres per 100 km). Which number should Dev type into that box?

- A. 12.5
- B. 8
- C. 0.125
- D. 125

Question 5

Kiran's pay-sheet spreadsheet holds the hours he worked, 7.5, in cell B4, and his hourly rate, \$32.40, in cell C4. Cell D4 should show his pay for that row: hours multiplied by rate, which is \$243.00. What should Kiran type into cell D4?

- A. =B4 * C4
- B. B4 * C4
- C. =SUM (B4 : C4)
- D. =B4 + C4

Question 6

A soccer coach keeps her players in a spreadsheet with a **Names** column and a **Goals** column. She wants the top goal-scorer listed first. What should she do?

- A. sort the **Names** column in ascending order
- B. sort the **Goals** column in ascending order
- C. sort the **Goals** column in descending order
- D. sort the **Names** column in descending order

Question 7

A community garden club keeps its total membership at the end of each month, for twelve months, in a spreadsheet. It wants to build a chart that shows how the membership changed over the year. Which chart type is the valid choice?

- A. a pie chart
- B. a pictograph
- C. a histogram
- D. a line graph

Question 8

Jonah is quoting to paint a fence. The paint app asks for the fence length in metres. Jonah's fence is 1 200 cm long, and he types 1 200 into the box. The app says the job needs 300 one-litre cans of paint. Jonah's own estimate was about 3 cans. Which sentence best explains the difference?

- A. the app rounds every output up to the next whole number
- B. the input was in the wrong units — the app received 1 200 m instead of 12 m, so its output is 100 times too big
- C. apps cannot multiply correctly, so their outputs cannot be used
- D. Jonah's estimate must be wrong, because an app's output is always right

Question 9

Minh gets this text message: "Your parcel is on hold. Pay the \$3.50 fee now or it will be returned — click here: <http://fastparcel-hold.com/pay>". Using the online-safety habits of Section 1F, what should Minh do?

- A. tap the link and pay the \$3.50 quickly, so the parcel is not returned
- B. reply to the message and ask whether it is real
- C. treat the message as a scam until proven otherwise, and check the parcel on the delivery company's official site or app himself
- D. forward the link to a friend, to see if it works for them

Question 10

A roofer uses a drone to photograph a rectangular roof, and a measuring app computes the roof's area as 182 m² from the photo. Before she quotes, she compares this output with her own estimate from the building plans: about 18 m by about 10 m, or about 180 m². Why is comparing the two good toolkit practice?

- A. comparing an estimate with a result checks whether the app's output is reasonable before she acts on it
- B. drones are too new to be trusted with any measurement
- C. an app's area is always wrong, so it must be recomputed by hand
- D. estimates are always more accurate than app measurements

Question 11

A sports club with 400 members spread right across Melbourne wants to ask every member to choose a date for a club working bee — a day when members come and do jobs together. The club holds an email address for every member. Which data collection tool is the most appropriate for this job?

- A. a paper tally sheet left at the clubroom door on one Saturday
- B. an online survey form emailed to all members
- C. a spreadsheet of last season's match results
- D. a stopwatch used at the clubroom gate

Question 12

An angle app on a tablet reports the slope angle of a roof as 43.678° . The carpenter's saw can only be set to the nearest degree. Which angle should the carpenter set on the saw?

- A. 43°
- B. 43.7°
- C. 44°
- D. 45°

End of Section A

Section B — Short-answer questions

Answer every question in the space provided. Round only where a question tells you to, and state the precision in your answer.

Question 13 (4 marks)

A walking group records one member's steps for a week in a spreadsheet. Row 9 will hold the total for the week and row 10 will hold the mean per day. The spreadsheet looks like this:

	A	B
1	Day	Steps
2	Mon	4 200
3	Tue	5 600
4	Wed	3 900
5	Thu	6 100
6	Fri	4 800
7	Sat	5 200
8	Sun	5 200
9	Total	
10	Mean	

- a. Write the formula the member could type into cell B9 to find the total steps for the week.

1 mark

b. Write the function the member could type into cell B10 to find the mean steps per day, and state the value it shows for this data. 1 mark

c. The group finds Tuesday was under-counted, and corrects cell B3 from 5 600 to 6 300. State the new values shown in B9 and B10, and explain why they change even though nobody retypes the formulas. 1 mark

d. The group wants to build one chart from this table to show how the steps changed across the week. Name the chart type that is the valid choice, and justify your choice. 1 mark

Question 14 (4 marks)

Marisa quotes a rectangular backyard for mowing. She uses a phone measuring app to find the area. The yard's true measurements are length 9.8 m and width 6.4 m, but Marisa mistypes the width as 4.6 m, and the app's output is 45.08 m².

a. Calculate the correct area of the backyard. Give your answer to 1 decimal place. 1 mark

b. The error is the gap between the app's output and the true value. Find the error in the app's output. Give your answer to 2 decimal places. 1 mark

c. Before she checks her inputs, Marisa paces the yard out: about 10 m by about 6 m, so about 60 m². Explain how this estimate shows that the app's output of 45.08 m² cannot be trusted. 1 mark

d. Marisa has two choices: retype the same numbers into the app, or measure the width again with a tape measure. Justify which choice is the better one. 1 mark

End of Section B

Chapter 13 Unit 4 outcome demonstration assessment — Answers and fully-worked solutions

This section gives the answers and the fully-worked solutions for the three Unit 4 outcome-demonstration assessments: **13A** (Outcome 1 — numeracy in context), **13B** (Outcome 2 — problem-solving cycle task) and **13C** (Outcome 3 — mathematical toolkit). An answer is rounded only where the question asks for it, and the precision the question states is restated at every rounding step.

13A — Answers

Section A (multiple choice)

Questions 1–13

Question	1	2	3	4	5	6	7	8	9	10	11	12	13
Answer	A	D	C	B	A	A	D	C	B	C	D	B	C

Questions 14–25

Question	14	15	16	17	18	19	20	21	22	23	24	25
Answer	A	D	B	C	D	D	B	A	C	D	B	A

Section B (short-answer questions)

Q26. a. 1.8 km b. 27 minutes c. arrives at the lookout at 10:12; starts walking again at 10:34 am

Q27. a. 8 343 steps (nearest whole step) b. 15 800 — in the sorted data the gap from 7 500 to 15 800 is 8 300, far bigger than any other gap (at most 300) c. 7 100 steps (nearest whole step)

Q28. a. 15% b. 45 close guesses c. not supported — “1 in every 5” is 20%, but the record gives $12 \div 80 = 15\%$

Q29. a. 7 kits; check: $\$35 + 7 \times \$58 = \$441$, which fits within \$450, while 8 kits would cost \$499 b. \$9 c. 6 kits

Q30. a. 10% b. rose — the 10% wage rise beats the 6% rise in prices c. the basket now costs \$678.40, so the apprentice is $\$704 - \$678.40 = \$25.60$ better off

13A — Fully-worked solutions

Section A

Question	Answer	Working
1	A	Walking distance on a grid counts the blocks across plus the blocks up: $(7 - 2) + (5 - 1) = 5 + 4 = 9$ blocks. Option B (4) counts only the blocks up; option C (5) counts only the blocks across; option D (12) adds the coordinates $7 + 5$ instead of the differences.
2	D	To reverse a quadrant bearing, swap both letters — N with S and E with W — and keep the angle: the reverse of $N60^\circ E$ is $S60^\circ W$. Option A swaps only the E; option B swaps only the N; option C replaces 60° with its complement ($90^\circ - 60^\circ = 30^\circ$).
3	C	Scale 1 : 500 means 1 cm on the plan = 500 cm in real life: $8.4 \times 500 = 4200$ cm. Convert to metres: $4200 \div 100 = 42$ m. Options

Question	Answer	Working
4	B	A (4.2 m) and B (420 m) are each out by a factor of 10; option D leaves the value in centimetres and calls it metres. At 8:20 the minute hand points at the 4: $20 \times 6^\circ = 120^\circ$ from the 12. The hour hand has moved past the 8: $8 \times 30^\circ + 20 \times 0.5^\circ = 240^\circ + 10^\circ = 250^\circ$. The smaller angle $= 250^\circ - 120^\circ = 130^\circ$ (the other angle is $360^\circ - 130^\circ = 230^\circ$, so 130° really is the smaller one). Option A (120°) assumes the hour hand still points exactly at the 8; option C (250°) is the hour hand's own angle from the 12; option D (230°) takes the reflex angle instead of the smaller angle.
5	A	A reflex angle completes the full turn: $360^\circ - 112^\circ = 248^\circ$. Option B ($68^\circ$) is the supplement ($180^\circ - 112^\circ$); option C is the given angle itself; option D (228°) is a subtraction slip.
6	A	Mean $= (465 + 495 + 525 + 550 + 4300) \div 5$. The single \$4 300 value sits far above the other four (all between \$465 and \$550) — an outlier — and drags the mean far above what most people earn. Sorted pays: 465, 495, 525, 550, 4 300, so the median is the middle value, \$525, which describes a typical pay. Option B defends the dragged mean; option C over-generalises (“always” — the mean is a fine summary when there is no outlier); option D offers the range (\$3 835), a measure of spread, not a typical value.
7	D	Sector angle $= \frac{\text{frequency}}{\text{total}} \times 360^\circ = \frac{15}{90} \times 360^\circ = \frac{1}{6}$. Option A ($6^\circ$) divides 90 by 15; option B (90°) takes a quarter of the circle; option C (300°) is the sector for the appointments that were not cancelled.
8	C	Equal means (150 each) say nothing about consistency — compare the spread. Priya's range

Question	Answer	Working
		$= 164 - 138 = 26$; Tom's range $= 152 - 147 = 5$. A smaller range means the scores sit closer to the mean, so Tom is more consistent. Option A mistakes equal means for equal consistency; option B reverses the range rule — a larger range means less consistent; option D rejects a comparison the range makes directly.
9	B	Sorted times: 14, 15, 16, 17, 18, 57 . The gap from 18 to 57 is 39, while every other gap is 1 or less, so 57 is an outlier by the big-empty-gap rule. With it: mean $= 137 \div 6 = 22.8$ minutes (to 1 d.p.) and median $= (16 + 17) \div 2 = 16.5$. Without it: mean $= 80 \div 5 = 16$ minutes and median $= 16$. The mean drops a lot; the median barely changes. Option A ignores the huge gap; option C swaps the roles of the mean and the median; option D claims equal drops.
10	C	The rate rose by $47 - 41 = 6$ percentage points. As a percentage rise: $\frac{6}{41} \times 100 = 14.6\%$ (to 1 d.p.). Reporting "rose by 6%" calls a percentage-point rise a per cent rise, so the report is wrong. Option A repeats the confusion; option B mislabels the 14.6% rise as percentage points; option D claims the two units are the same thing.
11	D	P(out of date) $= \frac{\text{favourable}}{\text{total}} = \frac{4}{25} = 0.16 = 16\%$. Option A reports the count as the percentage; option B (21%) is $25 - 4$; option C (84%) is the complement, $100\% - 16\%$.
12	B	One coin and one die give $2 \times 6 = 12$ equally likely outcomes. A head and a number less than 3 happens for H1 and H2 — 2 outcomes — so $P = \frac{2}{12} = \frac{1}{6}$. Option A counts only one of the two favourable outcomes; option C $\left(\frac{4}{12} = \frac{1}{3}\right)$ counts {1, 2} on

Question	Answer	Working
13	C	both coin faces, ignoring which face the coin shows; option D uses the coin's probability alone. Implied probability = $1 \div \text{decimal odds} = 1 \div 4.50 = 0.2222\dots$; to 1 decimal place, 22.2 %. Option A treats the odds number itself as a percentage; option B (22.5 %) is a slip in the division; option D (77.8 %) is the complement.
14	A	Relative frequency = $21 \div 60 = 0.35$. Expected number of late days = $0.35 \times 200 = 70$. Option B (35) is the rate per 100 days; option C repeats the observed count; option D (130) is the expected number of on-time days (0.65×200).
15	D	Risk score = likelihood $\times$ consequence = $4 \times 3 = 12$. The zones place 10–14 in high, so the hazard has a score of 12 in the high zone. Option A adds instead of multiplying ($4 + 3 = 7$); options B and C keep the right score but put it in the wrong zone.
16	B	Fuel used = $260 \times \frac{7.5}{100} = 19.5$ L. Cost = $19.5 \times \\$1.84 = \\$35.88$. Option A multiplies the kilometres by the price per litre and divides by 100 ($260 \times 1.84 \div 100 = \\$4.78$), ignoring the fuel rate; option C states the litres as though they were dollars; option D forgets the $\div 100$ ($260 \times 7.5 \times 1.84 = \\$3588.00$).
17	C	From 10:30 to 19:00 is 8 h 30 min = 8.5 h. The unpaid break is 45 minutes = 0.75 h, so paid hours = $8.5 - 0.75 = 7.75$ h. Option B forgets the break; option A subtracts 75 minutes; option D subtracts only 15 minutes.
18	D	Total travel time = $15 + 35 + 10 = 60$ minutes. Plan backwards from the arrive-by time: 60 minutes before 8:40 am is 7:40 am. Option A counts back 75 minutes; option B counts back 45 minutes; option C counts back 40 minutes.
19	D	Money left after the set-up fee: $\\$120 - \\$45 = \\$75$.

Question	Answer	Working
		$\$75 \div \$6 = 12.5$ — items are bought whole and the budget must not be exceeded, so round down: 12 items. Check: $\$45 + 12 \times \$6 = \$117$, which fits; 13 items would cost $\$45 + \$78 = \$123$, which breaks the \$120 budget. Option A leaves the answer as a decimal; option B rounds the wrong way; option C ignores the set-up fee ($\$120 \div \$6 = 20$).
20	B	Convert the time first: 45 minutes = 0.75 h. Average speed = distance $\div$ time = $13.5 \div 0.75 = 18$ km/h — a sensible cycling speed. Option A divides kilometres by minutes (0.3); option C quotes the distance as the speed; option D treats 45 minutes as 0.45 h ($13.5 \div 0.45 = 30$).
21	A	The GST inside a GST-inclusive price = price $\div$ 11: $\$385 \div 11 = \$35.00$. Check: the GST-exclusive price $\$350.00 + \$35.00 = \$385.00$. Option B takes 10 % of the full price (\$38.50); option C takes 11 % of it (\$42.35); option D is the GST-exclusive price itself.
22	C	Compare rates, not counts — the two workforces are different sizes. Site A: $\frac{6}{150} \times 100 = 4.0$ injuries per 100 workers. Site B: $\frac{5}{80} \times 100 = 6.25$ per 100 workers. Site B's rate is higher even though it recorded fewer injuries, because its workforce is smaller. Options A and B judge by raw counts (B also misreads the fractions: $0.04 < 0.0625$); option D swaps the two rates.
23	D	Expected cost = probability $\times$ cost = $0.08 \times \$180 = \$14.40$. The cover costs \$19.90, more than the \$14.40 expected loss, so judged on average cost alone the cover is not worth buying. Option A compares the cover with the full replacement cost, ignoring the 8 % chance;

Question	Answer	Working
24	B	option B does the right calculation but draws the wrong conclusion; option C treats an 8 % chance as no chance at all. Arrival = departure + duration. Minutes: $52 + 23 = 75$ minutes = 1 h 15 min, so 14:52 plus 1 h 23 min is 16:15. Option A adds only the 23 minutes; option C leaves “15:75” unconverted — minutes carry at 60, so 15:75 is not a valid time; option D adds 73 minutes.
25	A	$\frac{27}{60} = 0.45 = 45\%$ of the players scored over 500. “Most” means more than half — more than 50 % — and $45\% < 50\%$, so the record does not support the claim. Option B mistakes a large count for “most”; option C accepts “close to 50 %” as “most”; option D quotes the wrong percentage.

Section B

Question 26.

- a. At a scale of 1 : 25 000, 1 cm on the map represents 250 m on the ground, so 7.2 cm represents $7.2 \times 250 = 1800$ m. Convert to kilometres: $1800 \div 1000 = 1.8$. $\therefore$ the real distance from the campground to the lookout is **1.8 km**.
- b. Time = distance $\div$ speed = $1.8 \div 4 = 0.45$ hours. Convert to minutes: $0.45 \times 60 = 27$. $\therefore$ the group takes **27 minutes** to walk from the campground to the lookout.
- c. Arrival at the lookout: 09:45 plus 27 minutes is 10:12. Add the 22-minute rest: 10:12 plus 22 minutes is 10:34. $\therefore$ the group arrives at 10:12 and starts walking again at **10:34 am**.

Question 27.

- a. Sum = $6800 + 7400 + 7100 + 6500 + 15\,800 + 7500 + 7300 = 58\,400$. Mean = $58\,400 \div 7 = 8342.857 \dots$. Round to the nearest whole step, as the question asks: the first decimal digit is 8, which is 5 or more, so round up. The mean is **8 343 steps** per day.
- b. Sorted data: 6500, 6800, 7100, 7300, 7400, 7500, 15 800. The gap from 7500 to 15 800 is $15\,800 - 7500 = 8300$, while every other gap is at most 300. By the big-empty-gap rule, the outlier is **15 800** steps.
- c. Sum without the outlier = $58\,400 - 15\,800 = 42\,600$. Mean = $42\,600 \div 6 = 7100$ exactly — an exact value, so no rounding is needed. The mean without the outlier is **7 100 steps** per day. Removing the outlier drops the mean by $8343 - 7\,100 = 1243$ steps, which shows how far the one extreme day had pulled it up.

Question 28.

- a. Relative frequency $= \frac{12}{80} = \frac{3}{20} = 0.15$. As a percentage: $0.15 \times 100 = 15\%$. The relative frequency of a close guess is **15%**.
- b. Expected number $= 0.15 \times 300 = 45$. If 300 people play, **45 close guesses** are expected.
- c. “About 1 in every 5” means $\frac{1}{5} = 0.2 = 20\%$. The record of the first 80 guesses gives 15%, and $15\% < 20\%$, so the organiser’s statement is **not supported** — it overstates the rate the record shows.

Question 29.

- a. Money left for kits after the delivery fee: $\$450 - \$35 = \$415$. $\$415 \div \$58 = 7.155\dots$ (to 2 decimal places, 7.16). Kits are bought whole and the budget must not be exceeded, so round down to 7 kits. Check: $\$35 + 7 \times \$58 = \$35 + \$406 = \$441$, which fits within the $\$450$ budget, while 8 kits would cost $\$35 + \$464 = \$499$ and break it. $\therefore$ the greatest number of kits is **7**.
- b. Left over $= \$450 - \$441 = \$9$. The budget has **\$9** left over.
- c. Money left for kits after the higher fee: $\$450 - \$50 = \$400$. $\$400 \div \$58 = 6.896\dots$ (to 2 decimal places, 6.90), so round down to 6 kits. Check: $\$50 + 6 \times \$58 = \$50 + \$348 = \$398$, which fits, while 7 kits would cost $\$50 + \$406 = \$456$ and break the budget. $\therefore$ the new greatest number of kits is **6**.

Question 30.

- a. Increase $= \$704 - \$640 = \$64$. Percentage increase $= \frac{64}{640} \times 100 = 10\%$. The weekly wage rose by **10%**.
- b. Purchasing power **rose**. The wage rose by 10%, which is greater than the 6% rise in prices, so the wage now buys more than it did a year ago.
- c. The basket now costs $\$640 \times 1.06 = \$678.40$. After buying it, the apprentice has $\$704 - \$678.40 = \$25.60$ left over, so on this basket the apprentice is **\$25.60 better off** per week than a year ago.

13B — Answers

Section A (multiple choice)

Question	1	2	3	4	5	6	7	8	9	10
Answer	A	A	D	C	A	B	B	B	C	C

Section B (structured task)

Q11. a. i. Question: how many boxes of water should the committee order? Information needed: the 175 riders expected and the 2 bottles each rider gets (the box size, 24 bottles, is the third piece the calculation needs). **ii.** Multiply ($175 \times 2 = 350$ bottles), then divide ($350 \div 24$), then round up to whole boxes; a scientific calculator (or a spreadsheet cell such as $=350/24$). **b. i.** 6 km **ii.** median 48 minutes; range 53 minutes **c. i.** the median — the one 95-minute time sits far above the rest and pulls the mean up **ii.** boxes are sold whole: 14 boxes hold only 336 bottles, which is 14 short, so round up to 15 boxes (360 bottles, enough for all 350) **d. i.** $\frac{1}{4} = 25\%$ **ii.** any advice justified by the 25% (one-in-4, “unlikely”) chance — for example, keep a simple wet-weather plan because one year in four is often enough to matter.

Q12. a. identify the mathematics **b.** act on and use mathematics **c.** evaluate and reflect **d.** communicate and report

13B — Fully-worked solutions

Section A

Question	Answer	Working
1	A	The cycle always runs in the one order: identify the mathematics, then act on and use mathematics, then evaluate and reflect, then communicate and report. Only option A lists the four stages in that order. Option B evaluates before any working exists; option C acts before the mathematics is identified; option D reports before the result is checked.
2	A	Stage 1 (identify the mathematics) is deciding what question the data must answer and which mathematics and which columns are needed — before any calculating. Option B is a Stage 2 move (acting) and option C is a Stage 3 move (checking against an estimate); both come too early. Option D hands the thinking to someone else instead of running the cycle.
3	D	Real length = map length $\times$ scale factor: $6 \times 25\,000 = 150\,000$ cm. Convert: $150\,000$ cm = 1500 m = 1.5 km. Option A reads the centimetres as metres (150 km); option B divides instead of multiplying ($25\,000 \div 6 \approx 4\,166.67$

Question	Answer	Working
4	C	m $\approx$ 4.17 km); option C converts with the wrong factor (150 000 $\div$ 10 000 = 15 km). Sort the times first: 18, 20, 21, 22, 45. With $n = 5$ the median is the middle (3rd) value: 21 minutes. Option A takes the middle of the list as printed (20); option B is the mean (126 $\div$ 5 = 25.2 minutes); option D averages the two middle values, which is only done for an even number of values.
5	A	$P(\text{late}) = \text{late days} \div \text{all days} = \frac{6}{40}$. Divide top and bottom by 2: $\frac{3}{20}$. Option B turns the fraction upside down; option C $\left(\frac{34}{40} = \frac{17}{20}\right)$ is the probability the bus is <i>not</i> late; option D compares the late days with the on-time days instead of with all 40 days.
6	B	Mean = 182 $\div$ 8 = 22.75 years, but seven of the eight ages are 19 or under. The single 64 sits far above the rest (an outlier) and pulls the mean up. The median of 15, 16, 16, 17, 17, 18, 19, 64 is $\frac{17+17}{2} = 17$ years, so the median better shows a typical member's age. Option A's "always the best" and option D's "always equal" rules are false here (22.75 against 17); option C confuses the range (a measure of spread) with a measure of centre.
7	B	On a grid of straight streets, every route between the same two corners covers the same number of blocks across plus the same number of blocks up, so the walking distances are equal — the 3.2 km result is reasonable. Option D overstates the rule ("any two routes anywhere"); options A and C reject a reasonable result with no check behind them.
8	B	0.15 sits between 0 (impossible) and 0.5 (an even chance), and much closer to 0, so the matching chance word is unlikely. It is not impossible

Question	Answer	Working
9	C	— 0.15 is greater than 0, so rain can still happen — and “likely” would need a probability above 0.5. =SUM (B2 : B8) adds the seven costs, which is the total. Option A (=AVERAGE (B2 : B8)) returns the mean cost; option B (=COUNT (B2 : B8)) returns how many cells hold numbers (7); option D (=TOTAL) is not a spreadsheet function at all.
10	C	A pie chart shows each cost area as a share of the one whole budget, which is exactly what the committee asked for. A line graph shows change over time; a dot plot shows one set of values; a table lists the exact amounts but does not show each area as a part of the whole at a glance.

Section B

Question 11.

a. i. The question to be answered: *how many boxes of water should the committee order?* Two pieces of information needed from the task: the number of riders expected (175) and the number of bottles each rider gets (2). (The box size — 24 bottles — is the third piece a full plan would list.)

ii. Operations in order: multiply ($175 \times 2 = 350$ bottles), then divide ($350 \div 24$ boxes), then round up to a whole number of boxes. One tool that could be used: a scientific calculator (or a spreadsheet cell such as $=350/24$).

b. i. Count the blocks along the route on the map: 6 blocks east along River Rd, 4 blocks north up Beach Rd, 2 blocks east along Coast Rd — 12 blocks in all. Each block is 500 m: $12 \times 500 = 6000$ m. Convert: $6000 \text{ m} = 6 \text{ km}$. $\therefore$ the route is 6 km long.

ii. The nine times are already in order and $n=9$, so the median is the 5th value: 48 minutes. Range = highest – lowest = $95 - 42 = 53$ minutes.

c. i. Eight of the nine times are 55 minutes or under, and the mean (53.3 minutes, correct to 1 decimal place) sits above seven of the nine times. That happens because the one 95-minute time sits far above the rest and drags the mean up. The median (48 minutes) is not moved by that one extreme time, so the **median** better shows a typical rider's time.

ii. Boxes are sold whole, and $350 \div 24 = 14.583$ (correct to 3 decimal places), so 14 boxes are not enough: $14 \times 24 = 336$ bottles, which is $350 - 336 = 14$ bottles short — at 2 bottles each, 7 riders would get no water. Rounding up, 15 boxes hold $15 \times 24 = 360$ bottles, enough for all 350 with 10 spare. $\therefore$ the committee should order 15 boxes. (This is a round-up-in-context decision, not ordinary rounding: 14.583 would round to 15 anyway, but the reason is the real-world limit, and a value like 14.1 would also round up here.)

d. i. $P(\text{wet ride day}) = \frac{5}{20}$. Divide top and bottom by 5: $\frac{1}{4}$. As a percentage: $\frac{1}{4} \times 100 = 25\%$.

ii. Example report: “Rain fell on 25 % of past ride days — about 1 year in 4 — so a wet ride day is unlikely but not rare. The committee should keep a simple wet-weather plan, because 1 year in 4 is often enough to matter.” Any advice — plan or no plan — earns the mark when it is justified with the 25 % (or one-in-4, or “unlikely”) chance.

Question 12.

a. Identify the mathematics — Quinn reads the context, picks out the five crowd numbers that matter, and decides to find the mean. **b.** Act on and use mathematics — keying the numbers into a calculator, adding them and dividing by 5 is carrying out the calculation with a tool. **c.** Evaluate and reflect — comparing the answer with the earlier estimate (“about 210”) and agreeing it is sensible is the checking stage. **d.** Communicate and report — writing the result to the club as a full sentence (“The mean home crowd was 213 people.”) is reporting it.

13C — Answers

Section A (multiple choice)

Question	1	2	3	4	5	6	7	8	9	10	11	12
Answer	C	B	D	B	A	C	D	B	C	A	B	C

Section B (short-answer questions)

Q13. **a.** $\text{=SUM}(B2:B8)$ — it shows 35 000 steps (exact). **b.** $\text{=AVERAGE}(B2:B8)$ — 5 000 steps per day (exact). **c.** B9: 35 700; B10: 5 100 (both exact) — a spreadsheet recalculates every formula that uses the changed cell. **d.** a line graph — the days are in time order and a line graph shows change over time.

Q14. **a.** $9.8 \times 6.4 = 62.72 \text{ m}^2$; to 1 decimal place, 62.7 m^2 . **b.** $62.72 - 45.08 = 17.64 \text{ m}^2$ (to 2 decimal places). **c.** the estimate is about $10 \times 6 = 60 \text{ m}^2$; the true area (62.72 m^2) sits right beside it, but 45.08 m^2 is about 15 m^2 below it — too far out to trust. **d.** measure the width again with the tape measure — retyping the same wrong input returns the same wrong output.

13C — Fully-worked solutions

Section A

Question	Answer	Working
1	C	A spirit level is built for exactly this check: when the bubble sits between the two centre lines, the surface is horizontal (Section 1E). A tape measure measures length, a protractor measures angles on paper, and a measuring jug measures liquid volume — none of them can tell you whether a surface is flat with no end tilting down.
2	B	The minute hand pointing at the 7 means $7 \times 5 = 35$ minutes past the hour; the hour hand just past the 2 makes the clock read 2:35. The shift is in the afternoon, so add 12 to the hour: $2 + 12 = 14$, giving 14:35 . Option A (02:35) is the same clock reading in the morning; option C (14:07) reads the 7 as “7 minutes”; option D (19:10) swaps the two hands over.
3	D	$\frac{2}{3} \times 900 = \$600$ exactly, but the calculator displays 0.67, a rounded value: $0.67 \times 900 = \$603$ — the \$3 drift. Carrying full precision through the working and rounding once, at the end, to the precision the task needs avoids it (Sections 1F, 10A). Options A, B and C all keep using rounded displayed values, which is

Question	Answer	Working
4	B	the habit that creates the drift. “L/100 km” asks for the litres used per 100 km. The car travels 12.5 km on 1 litre, so over 100 km it uses $100 \div 12.5 = 8$ litres — Dev types 8. Option A (12.5) is the km-per-litre figure, the wrong unit for this box; option C (0.125) is $12.5 \div 100$; option D (125) is 12.5×10. Read the unit on every input box before typing (Section 10D).
5	A	A spreadsheet formula must start with =, so option B would sit in the cell as text, not as a value. =B4 * C4 multiplies the hours by the rate: $7.5 \times \\$32.40 = \\$243.00$, the pay for the row. Options C and D both add the two cells instead: $7.5 + \\$32.40 = \\$39.90$ — the wrong operation for pay (Sections 1F, 10B).
6	C	Descending order sorts largest to smallest, so the top goal-scorer is listed first. Ascending (option B) puts the lowest scorer first; sorting the Names column (options A and D) orders the players alphabetically, which says nothing about goals (Section 10B).
7	D	The data is membership at the end of each month, and the question is change over time. A line graph plots a point at each month and joins the points, so the rises and falls show the change (Section 8B). A pie chart shows shares of a whole, a pictograph gives a quick picture with symbols, and a histogram shows measured data grouped into intervals — none of them displays change over time.
8	B	The app asked for metres and Jonah typed a centimetre measurement, so it received 1 200 m instead of 1200 cm = 12 m — a length $1200 \div 12 = 100$ times too long — and returned about 100 times too much paint: 3 cans became 300. Rounding (option A) can never move an answer by a factor of 100; options C and D are overstatements. Jonah’s estimate of about 3 cans is

Question	Answer	Working
9	C	exactly the check that catches a wrong-unit input (“wrong input, wrong output”, Sections 10A, 10D). An urgent message demanding payment through a link from an address Minh does not recognise is treated as a scam until proven otherwise (Section 1F). The safe move is to go to the delivery company’s official site or app directly and check the parcel there. Tapping the link (option A), replying (option B) and forwarding the link (option D) all interact with a possible scam.
10	A	The estimate is about $18 \times 10 = 180 \text{ m}^2$, and the app’s output of 182 m^2 sits right beside it — only 2 m^2 away — so the output passes the reasonableness check and the roofer can quote from it. Comparing an estimate with a tool’s result is how she checks whether the output is reasonable before acting on it (Sections 1C, 1F). Options B, C and D are overstatements: an estimate is a check on a measurement, not a replacement for one.
11	B	The club needs answers from all 400 members, who are spread right across Melbourne, and it holds an email address for every member — an online survey form emailed to all members reaches everyone and collects the answers in one place (Sections 8A, 10B). A paper tally sheet at the door on one Saturday (option A) reaches only the members who attend that day; last season’s results (option C) are old data that do not answer the new question; a stopwatch (option D) measures time, not choices.
12	C	Rounding 43.678 to the nearest degree: the first decimal digit is 6, which is 5 or more, so round up to 44° — the precision the saw accepts. Option A (43°) truncates the decimal instead of rounding; option B (43.7°) is the value correct to 1 decimal place, which the saw cannot be set to; option D (45°) is a guess.

Section B

Question 13.

- a.** The total of a block of cells is found with the SUM function: $=\text{SUM}(B2:B8)$. For this data it returns $4\,200 + 5\,600 + 3\,900 + 6\,100 + 4\,800 + 5\,200 + 5\,200 = 35\,000$ steps — an exact value, so no rounding is needed.
- b.** The mean of a block of cells is found with the AVERAGE function: $=\text{AVERAGE}(B2:B8)$. It returns $35\,000 \div 7 = 5\,000$ steps per day — exact, so no rounding is needed.
- c.** Correcting B3 from 5 600 to 6 300 adds $6\,300 - 5\,600 = 700$ steps. B9 now shows $35\,000 + 700 = 35\,700$ steps and B10 now shows $35\,700 \div 7 = 5\,100$ steps per day — both exact. They change even though nobody retypes the formulas because a spreadsheet recalculates every formula that uses a changed cell at once: both formulas read the range B2:B8, which includes the corrected B3 (Section 1F: outputs follow inputs).
- d.** A line graph. The seven days are in time order, and a line graph is the display for showing change over time (Section 8B): each day gets a point, and the rises and falls of the joining line show how the steps moved across the week. A pie chart would show shares of one total, which is not the question being asked.

Question 14.

- a.** Area of a rectangle = length $\times$ width:

$$9.8 \times 6.4 = 62.72 \text{ m}^2$$

To 1 decimal place, the correct area is 62.7 m^2 .

- b.** Error = correct area – app’s output:

$$62.72 - 45.08 = 17.64 \text{ m}^2$$

To 2 decimal places, the error is 17.64 m^2 — the app’s output is too small by this much, because the typed width (4.6 m) was smaller than the true width (6.4 m).

- c.** Marisa’s stride estimate is about $10 \times 6 =$ about 60 m^2 . The correct area, 62.72 m^2 , sits right beside that estimate (only 2.72 m^2 above it), but the app’s output, 45.08 m^2 , is about 15 m^2 below it — far too far out for a real measurement of the same yard. An output that fails the estimate check cannot be trusted until the inputs are checked (Sections 1C, 10A).

- d.** Measure the width again with the tape measure. The app’s arithmetic is not the problem — the typed width is: retyping the same wrong number would return the same wrong output (“wrong input, wrong output”, Section 1F). Measuring the width again finds the actual cause — the digits 4.6 typed instead of 6.4 — and a tape measure is a valid, familiar tool for a straight length (Section 1E).

End of fully-worked solutions