

VCE VM Numeracy Unit 2

Chapter 7 — Outcome demonstration assessment

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Chapter 7 Outcome demonstration assessment — 7A Outcome 1 assessment: numeracy in context

Note for teachers. This paper is a practice paper. It gives students the chance to demonstrate Outcome 1 of Unit 2 — choosing the right maths from Areas of Study 5–8, making sense of it and using it, when the maths sits inside familiar or routine situations and some less familiar ones, across the six numeracies — 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 applies (see its sections on flexible delivery and satisfactory completion): 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 2, Outcome 1.

Source: VCAA, VCE Vocational Major Numeracy Study Design, retrieved 2026-10-08.

Unit 2, Outcome 1 — numeracy in context: choose the right maths from Areas of Study 5–8, make sense of it and use it, in familiar or routine situations and in some less familiar ones, across the numeracies (all six appear here: personal, civic, financial, health, vocational and recreational). This paper draws only on Unit 2 content from this book (Chapters 1 to 6). Materials: pen, paper and a basic calculator. Every table and screen you need is printed on the page — you do not need any device. 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. Round only where a question tells you to, and then to the precision stated, and say the precision in your answer.

About the data in this assessment. The names, people, places, timetables, tables, screens and numbers in this paper 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 — Multiple choice (25 marks)

Choose the response that is correct for the question.

Question 1

Etta’s map of Marlin Bay has columns labelled A, B, C and D from left to right, and rows labelled 1, 2, 3 and 4 from top to bottom. North is at the top of the map. The pharmacy is in column B, row 3. What is the grid reference for the pharmacy?

- A. 3B
- B. B2
- C. B3
- D. C3

Question 2

On Ida's map of Marlin Bay, north is at the top. The park is drawn directly to the right of the library. Which compass direction is the park from the library?

- A. east
- B. west
- C. north
- D. south

Question 3

Ray is riding in a fun race. He is heading east, then makes a 90° clockwise turn onto a trail. Which compass direction is Ray heading now?

- A. north
- B. south
- C. east
- D. west

Question 4

On a building site, north is at the top of the site plan. Mick is facing north. He is told to make a 90° anticlockwise turn and walk to the shed. Which compass direction is Mick facing now?

- A. west
- B. east
- C. north
- D. south

Question 5

A plan of the Eastbrook Community Garden shows a scale of $1 \text{ cm} = 4 \text{ m}$. A vegetable bed measures 3 cm on the plan. What is the real length of the vegetable bed?

- A. 7 m
- B. 12 m
- C. 0.75 m
- D. 4 m

Question 6

Val records her walking minutes for one week: Monday 15, Tuesday 20, Wednesday 15, Thursday 25 and Friday 20. What is the total number of minutes Val walked this week?

- A. 95 minutes
- B. 19 minutes
- C. 25 minutes
- D. 100 minutes

Question 7

Eastbrook Council weighs the recycling collected each week. The weights were: week 1, 120 kg; week 2, 150 kg; week 3, 180 kg; week 4, 90 kg. How many more kilograms were collected in week 3 than in week 1?

- A. 30 kg
- B. 90 kg
- C. 60 kg
- D. 270 kg

Question 8

Gail's pay for five part-time shifts was \$185, \$195, \$215, \$225 and \$230. What is the mean of Gail's pay per shift?

- A. \$210
- B. \$215
- C. \$1 050
- D. \$230

Question 9

Sid and Jill each played five basketball games. Sid's scores were 8, 10, 12, 14 and 16. Jill's scores were 11, 12, 12, 12 and 13. Both players have a mean of 12 points per game. Which player is more consistent, and why?

- A. Sid, because his range of 8 points is larger
- B. Neither player, because their means are the same
- C. This cannot be worked out from the scores
- D. Jill, because her scores are closer together — her range is 2 points and Sid's range is 8 points

Question 10

Eastbrook Library counted visits in each year: 620 in 2021, 650 in 2022, 640 in 2023, 680 in 2024 and 700 in 2025. What is the overall trend in visits across these five years?

- A. an overall fall
- B. an overall rise
- C. a rise, then a fall
- D. no change

Question 11

A warehouse records how many minutes late five trucks were: 6, 8, 10, 12 and 19. What is the mean late time?

- A. 55 minutes
- B. 10 minutes
- C. 11 minutes
- D. 19 minutes

Question 12

A clinic draws a bar chart of the ages of patients at a health-check day. The oldest patient is 78 years old and the age axis starts at 0. Use the simple scale rule from this book: try steps of 1, 2, 5, 10, 20 or 50; choose the smallest step for which counting from 0 up to the top number takes 10 numbers or fewer; the top number is the first multiple of the step that is at least as big as the largest value. Which step and top number does the rule give?

- A. steps of 5, top number 80
- B. steps of 10, top number 80
- C. steps of 10, top number 78
- D. steps of 1, top number 78

Question 13

Cole rolls a fair die numbered 1 to 6. What is the probability of rolling a 5 or a 6? Give your answer as a fraction in simplest form.

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

Question 14

A football club raffle sells 200 tickets and has one prize. Stan buys 10 tickets. What is the probability that Stan wins the prize, as a fraction in simplest form?

- A. $\frac{1}{20}$
- B. $\frac{1}{10}$
- C. $\frac{1}{19}$
- D. $\frac{1}{200}$

Question 15

A council survey finds that 4 in every 5 residents want a new bike path. What is “4 in 5” as a percentage?

- A. 20 %
- B. 45 %
- C. 50 %
- D. 80 %

Question 16

A weather app says there is an even chance of rain in Marlin Bay on Saturday. Which value is the same as an even chance?

- A. 25 %
- B. 50 %
- C. 75 %
- D. 100 %

Question 17

Glen's board game has a bag of 9 tokens: 6 stars and 3 blanks. The probability of drawing a star is $\frac{6}{9}$, which is $\frac{2}{3}$ in simplest form. Write this probability as a decimal correct to 2 decimal places, and as a percentage to the nearest whole number.

- A. 0.33 and 33 %
- B. 0.67 and 6.7 %
- C. 0.67 and 67 %
- D. 0.66 and 66 %

Question 18

At a health clinic, the chance that a patient needs extra visits is 1 in 10. After a new care program, the chance becomes 1 in 20. Which statement is correct?

- A. The chance has decreased; the new chance is 5 %
- B. The chance has increased; the new chance is 5 %
- C. The chance has decreased; the new chance is 2 %
- D. The chance has decreased; the new chance is 10 %

Question 19

Hope catches a bus into Eastbrook to meet a friend. Buses leave her stop at 07:40, 08:10, 08:40 and 09:10. Every bus takes 20 minutes. Hope must arrive by 09:15. What is the latest bus Hope can catch?

- A. 07:40
- B. 08:10
- C. 09:10
- D. 08:40

Question 20

Fred's shift starts at 14:10 and runs for 3 hours 45 minutes. At what time does Fred's shift finish, in 24-hour time?

- A. 17:45
- B. 18:05
- C. 17:55
- D. 17:50

Question 21

Pam's budget app takes her weekly income of \$820 and subtracts her expenses: rent \$310, food \$215 and phone \$45. What surplus — the money left over — should the app show?

- A. \$570
- B. \$250
- C. \$295
- D. \$1 390

Question 22

Dale's trip planner shows the legs of his trip to Saturday's game: walk 8 min, wait 4 min, bus 22 min, walk 6 min. What total time should the planner show?

- A. 30 min
- B. 36 min
- C. 40 min
- D. 44 min

Question 23

A council worker sorts files for four community groups into alphabetical order: the Art Group, the Drama Group, the Music Group and the Sport Group. Which list is in alphabetical order?

- A. Art, Drama, Music, Sport
- B. Drama, Music, Sport, Art
- C. Music, Art, Sport, Drama
- D. Sport, Music, Drama, Art

Question 24

Tea bags are sold in two boxes. Box A holds 40 bags and costs \$6.00. Box B holds 60 bags and costs \$8.40. Which box is better value per bag, and what is the cost per bag for that box?

- A. Box A, at 15 cents per bag
- B. Box A, because it costs less in total
- C. Box B, at 21 cents per bag
- D. Box B, at 14 cents per bag

Question 25

A nurse records a patient's temperature each morning for a week. The lowest temperature is 36.4°C and the range is 1.5°C . What is the highest temperature?

- A. 34.9°C
- B. 1.5°C
- C. 36.4°C
- D. 37.9°C

Section B — Short-answer questions (15 marks)*Answer every question in the space provided.***Question 26** (3 marks)

Sal catches the train from Pelican Point to Eastbrook for the Saturday market. Every train on the line takes the same time.

Departs Pelican Point	Arrives Eastbrook
09:50	10:10
10:20	10:40
10:50	11:10
11:20	11:40

a. How many minutes does the 09:50 train take to reach Eastbrook? 1 mark

b. Sal wants to arrive in Eastbrook by 11:00. What is the latest train Sal can catch? 1 mark

c. At Eastbrook station, Sal uses a map with north at the top. The market is drawn directly to the right of the station. Which compass direction does Sal walk from the station to the market? 1 mark

Question 27 (3 marks)

Marge records her hours of sleep for one week.

Night	Mon	Tue	Wed	Thu	Fri	Sat	Sun
Hours of sleep	8	7	9	7	8	10	9

a. Find the mean number of hours Marge slept per night. Round your answer to 1 decimal place. 1 mark

b. Find the range of Marge's hours of sleep. 1 mark

c. Marge's goal is a mean of at least 8 hours per night. Using your answer to part **a**, did Marge meet her goal this week? 1 mark

Question 28 (3 marks)

At the Eastbrook supermarket, pasta is sold in two sizes: a 2 kg bag for \$5.60 and a 5 kg bag for \$13.50.

- a. Find the cost per kilogram of the 2 kg bag. 1 mark

- b. Find the cost per kilogram of the 5 kg bag, and say which bag is the better buy. 1 mark

- c. The shop's savings app says the probability that a shopper wins a prize this month is 0.1. Choose the chance word that best matches this probability: *impossible, unlikely, an even chance, likely* or *certain*. 1 mark

Question 29 (3 marks)

Ross works at the Marlin Bay plant nursery. This week's roster is shown below. The nursery's rostering rule sets a limit of 25 hours per worker per week.

Day	Mon	Tue	Wed	Thu	Fri
Hours	4.5	6	4.5	6	5

- a. Find the total number of hours on Ross's roster. 1 mark

- b. How many hours over the 25-hour limit is the roster? 1 mark

- c. The manager adjusts one input: Ross's Friday shift is shortened so that the total is exactly 25 hours. How many hours long is Ross's new Friday shift? 1 mark

Question 30 (3 marks)

The Marlin Bay Sports Club runs a prize wheel at its summer fete. The wheel has 10 equal sections: 4 say "free drink", 3 say "hat", 1 says "ball" and 2 say "miss".

- a. What is the probability that the wheel lands on "free drink"? Give your answer as a fraction in simplest form. 1 mark

- b. Write the probability of "hat" as a percentage. 1 mark

- c. The club wants to increase the probability of winning the ball. State one change the club could make to the wheel, and say why that change increases the probability. 1 mark

End of Section B

7A — Answers

Section A — Multiple choice (1 mark each)

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

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

Section B — Short answer

Q26. a. 20 minutes b. 10:20 c. east

Q27. a. 8.3 hours (to 1 decimal place) b. 3 hours c. Yes — the mean of 8.3 hours is at least 8 hours

Q28. a. \$2.80 per kg b. \$2.70 per kg; the 5 kg bag is the better buy c. unlikely

Q29. a. 26 hours b. 1 hour over c. 4 hours

Q30. a. $\frac{2}{5}$ b. 30 % c. for example, repaint one “miss” section as “ball” — the ball sections rise from 1 of 10 to 2 of 10, so the probability rises from $\frac{1}{10}$ (10 %) to $\frac{1}{5}$ (20 %)

7A — Fully-worked solutions

Section A — Multiple choice (1 mark each)

Question	Answer	Working
1	C	A grid reference is written letter first, then number: column B, row 3 is B3. Option A reverses the order; options B and D are the wrong squares.
2	A	On a map with north at the top, directly right is east.
3	B	Clockwise turns go north, east, south, west. A 90° clockwise turn from east faces south.
4	A	Anticlockwise from north goes to west, so a 90° anticlockwise turn from north faces west.
5	B	Real length = plan length $\times$ scale $= 3 \times 4 = 12$ m. Option A adds the two numbers instead of multiplying; option C divides instead of multiplying.

Question	Answer	Working
6	A	Total = $15 + 20 + 15 + 25 + 20 = 95$ minutes. Option B is the mean ($95 \div 5 = 19$), which is not the total; option C is the highest value.
7	C	“How many more” means subtract: week 3 – week 1 = $180 - 120 = 60$ kg. Option A compares weeks 3 and 2; option D adds weeks 3 and 4.
8	A	Mean = total $\div$ count $= (185 + 195 + 215 + 225 + 230) \div 5 =$ (exact — no rounding needed). Option B is the middle value; option C is the total.
9	D	Both means are 12. Sid’s range = $16 - 8 = 8$; Jill’s range = $13 - 11 = 2$. With equal means, the smaller range decides: Jill’s scores are closer together, so Jill is more consistent.
10	B	Overall change = $700 - 620 = 80$ more visits, so the overall trend is a rise (with a small dip in 2023). Option C does not fit: visits finish higher than they started.
11	C	Mean $= (6 + 8 + 10 + 12 + 19) \div 5 = 55 \div 5 = 11$ minutes (exact — no rounding needed). Option A is the total; option B is the middle value.
12	B	Largest value 78. Steps of 1 give 79 numbers (too many); steps of 2 give 40; steps of 5 give a top of 80 but 17 numbers; steps of 10 give a top of 80 and 9 numbers (0, 10, 20 up to 80), which is 10 or fewer. The smallest step that works is 10, and the top is the first multiple of 10 at least as big as 78, which is 80. Option C’s top is not a multiple of its step.
13	B	The favourable outcomes are a 5 or a 6: 2 of the 6 equally likely outcomes. $P = \frac{2}{6} = \frac{1}{3}$ in simplest form. Option A counts only one outcome.
14	A	$P = \frac{10}{200} = \frac{1}{20}$ in simplest form. Option B uses Stan’s ticket count as the total; option D is the chance for a

Question	Answer	Working
15	D	single ticket. 4 in 5 = $4 \div 5 = 0.8 = 80\%$. Option A is 1 in 5; option B puts the two numbers side by side.
16	B	An even chance is 0.5, which is 50% — fifty-fifty.
17	C	$\frac{6}{9} = \frac{2}{3}$. As a decimal, $2 \div 3 = 0.666\dots$, which is 0.67 to 2 decimal places. As a percentage, 66.66...%, which is 67% to the nearest whole number. Option A gives the complement ($\frac{1}{3}$); option B misplaces the decimal point in the percentage.
18	A	1 in 10 = 10% and 1 in 20 = 5%. Because 5% is less than 10%, the chance has decreased, and the new chance is 5%. Option C is the chance for 1 in 50.
19	D	Add the 20-minute ride to each departure: the 08:40 bus arrives at 09:00, which is in time; the 09:10 bus arrives at 09:30, which is too late. The latest bus that arrives by 09:15 is 08:40.
20	C	Count on: 14:10 plus 3 hours is 17:10, and plus 45 minutes is 17:55.
21	B	Expenses = $310 + 215 + 45 = \$570$. Surplus = income – expenses = $820 - 570 = \$250$. Option A is the total expenses; option C forgets the phone bill; option D adds everything together.
22	C	The total counts every leg, waits included: $8 + 4 + 22 + 6 = 40$ min. Option B drops the 4-minute wait; option A counts only the walks and the bus.
23	A	Alphabetical order compares first letters: A comes before D, D before M and M before S — Art, Drama, Music, Sport.
24	D	Box A: $600 \text{ cents} \div 40 = 15$ cents per bag. Box B: $840 \text{ cents} \div 60 = 14$ cents per bag. The lower cost per bag wins, so Box B at 14 cents per bag. Option C swaps the two numbers ($840 \div 40 = 21$).

Question	Answer	Working
25	D	Range = highest – lowest, so highest = lowest + range $= 36.4 + 1.5 = 37.9^{\circ}\text{C}$ (exact — no rounding needed). Option A subtracts instead of adding; options B and C repeat numbers given in the question.

Section B — Short answer

Question 26 (3 marks)

- a. Count on from 09:50 to 10:10: 10 minutes to 10:00, then 10 more. The ride takes **20 minutes**.
- b. Check each service against the 11:00 limit: the 10:20 train arrives at 10:40, which is in time, and the 10:50 train arrives at 11:10, which is too late. The latest train Sal can catch is **10:20**.
- c. On a map with north at the top, directly right is east, so Sal walks **east** from the station to the market.

Question 27 (3 marks)

- a. Total = $8 + 7 + 9 + 7 + 8 + 10 + 9 = 58$ hours. Mean = $58 \div 7 = 8.2857\dots$ Rounded to 1 decimal place, the mean is **8.3 hours** per night. (Check: the mean sits between the lowest night, 7, and the highest night, 10.)
- b. Range = highest – lowest = $10 - 7 = 3$ **hours**.
- c. **Yes**. The mean of 8.3 hours is at least the 8-hour goal, so Marge met her goal this week.

Question 28 (3 marks)

- a. Cost per kg \$ = $5.60 = \$$ **\$2.80 per kg** (exact — no rounding needed).
- b. Cost per kg \$ = $13.50 = \$$ **\$2.70 per kg** (exact). Because \$2.70 is less than \$2.80, the **5 kg bag is the better buy**.
- c. 0.1 sits between 0 and 0.5 — closer to impossible than to an even chance — so the chance word that matches is **unlikely**.

Question 29 (3 marks)

- a. Total = $4.5 + 6 + 4.5 + 6 + 5 = 26$ **hours**.
- b. $26 - 25 = 1$ **hour over** the limit.
- c. Take the 1 extra hour off Friday: $5 - 1 = 4$ **hours**. Check: $4.5 + 6 + 4.5 + 6 + 4 = 25$ hours exactly, so the roster now fits the limit.

Question 30 (3 marks)

- a. The favourable sections are the 4 “free drink” sections out of 10 equal sections, so $SP() = \$ \frac{2}{5}$ in simplest form.
- b. $SP() = 0.3 = \$$ **30 %** (exact — no rounding needed).
- c. For example, **repaint one “miss” section as “ball”**. The wheel still has 10 equal sections, but the ball sections rise from 1 to 2, so $P(\text{ball})$ rises from $\frac{1}{10}$ (10 %) to $\frac{2}{10} = \frac{1}{5}$ (20 %). More favourable sections with the same total means a higher probability.

Chapter 7 — 7B Outcome 2 assessment: problem-solving cycle task

Note for teachers — 7B (Outcome 2). This paper is one of three outcome-demonstration assessments in Chapter 7 (7A Outcome 1, 7B Outcome 2, 7C Outcome 3). It gives students the opportunity to demonstrate Outcome 2 — using the problem-solving cycle in a practical, real-life setting — on one embedded task walked stage by stage, at a one-or-two-step pitch, with teacher prompting available at any stage, exactly as it is when the cycle is taught. These papers **complement, and never replace**, the school-assessed coursework that each school designs, runs and signs off as the student's own work. For a school's own tasks, the Study Design offers task types including investigations and projects, a multimedia presentation, poster or report, and a portfolio, and its authentication rule applies (see its sections on flexible delivery and satisfactory completion): 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 2, Outcome 2.

Source: VCAA, VCE Vocational Major Numeracy Study Design, retrieved 2026-10-14.

Outcome demonstration assessment 7B — Unit 2 Outcome 2, the problem-solving cycle. Draws on Chapter 1 (Sections 1A–1D) and uses the mean, money, fraction, percentage and rounding work from Chapters 1 to 4. Allowed materials: pen, paper and a basic calculator. Section A: 10 questions (10 marks). Section B: 4 questions (20 marks). Total: 30 marks. Time: about 45 minutes. Show your working for every part. Only round where the question tells you to, and give each rounded answer at the precision asked for.

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

Section A — Multiple-choice questions

Choose the response that is correct for the question.

Question 1

Which list shows the four stages of the problem-solving cycle in the correct order?

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

Question 2

'What do I need to find, and how will I find it?' is the key question for which stage of the problem-solving cycle?

- A. Stage 2
- B. Stage 3
- C. Stage 1
- D. Stage 4

Question 3

Kit has finished her working. She now checks her answer against her estimate, and asks whether it makes sense in the real world. Which stage of the problem-solving cycle is Kit working in?

- A. Stage 1
- B. Stage 3
- C. Stage 4
- D. Stage 2

Question 4

Which of these is the best example of work in Stage 4, communicate and report?

- A. Estimating the total before calculating
- B. Choosing a plan and a tool before starting
- C. Checking the answer against the real world
- D. Writing the answer as a clear sentence with units

Question 5

Which of these is a Stage 2 habit, from the stage named act on and use the mathematics?

- A. Estimate first, then do the mathematics carefully, one step per line
- B. Choose a plan and a tool before starting
- C. Check the answer against your estimate
- D. Write the answer as a full sentence

Question 6

Una's answer fails the estimate check. What should she do next?

- A. Change her estimate so that it matches her answer
- B. Skip ahead to Stage 4 and report the answer
- C. Loop back to Stage 1 or Stage 2, and find and fix the mistake
- D. Ask a friend what answer they got

Question 7

What is an estimate?

- A. The exact answer from a calculator
- B. A rough value that is close enough to the real answer to be used for checking
- C. The answer written as a full sentence
- D. A check that the units are correct

Question 8

The garden club packs 182 handmade keyrings into boxes. Each box holds up to 15 keyrings, and every keyring must be packed. The calculation is $182 \div 15 = 12.13$ (to 2 decimal places). How many boxes does the club need?

- A. 12 boxes
- B. 13 boxes
- C. 12.13 boxes
- D. 15 boxes

Question 9

Write the fraction $\frac{1}{8}$ as a percentage.

- A. 8%
- B. 1.8%
- C. 12%
- D. 12.5%

Question 10

Suki pays \$8.00 for 3 identical fridge magnets. Her calculator shows $8 \div 3 = 2.666666$. Which response best reports the price of one fridge magnet, correct to 2 decimal places?

- A. \$2.66
- B. \$2.666666
- C. \$2.67 (to 2 decimal places)
- D. about \$3

End of Section A

Section B — Problem-solving cycle task

Answer every question in the space provided. Show your working. Where a question asks for a sentence, answer in a full sentence.

The Tuart Street Garden Club fundraiser

Kit belongs to the Tuart Street Garden Club. To raise money, club members make jars of chutney, and each Saturday morning Kit delivers jars to the local families who order them. The club charges \$11.50 for each jar. Kit records the number of jars delivered on five Saturdays in a row.

Saturday	Jars delivered
1	32
2	41
3	37
4	45
5	40

Made-up data: the club, the families and every number in this table are made up for this assessment.

The club committee asks Kit two questions.

1. What is the mean number of jars delivered each Saturday?
2. What is the mean amount of money collected for one Saturday's deliveries?

Kit answers both questions by working through the four stages of the problem-solving cycle. Questions 1 to 4 walk through Kit's four stages, one stage per question.

Question 1 (3 marks)

Kit starts with Stage 1, *identify the mathematics*.

- a.** Write down the two questions Kit needs to answer. 1 mark

- b.** Name the two operations Kit uses to answer the first question. Write them in the order she uses them. 1 mark

- c.** Name one tool Kit could use for her working. 1 mark

Question 2 (7 marks)

Kit moves on to Stage 2, *act on and use the mathematics*. She estimates first, then works carefully, one step per line.

- a.** Estimate the mean number of jars delivered each Saturday. Round each number in the table to the nearest 10 and use the rounded numbers. Show your working and write your estimate. 2 marks

- b.** Find the total number of jars delivered over the five Saturdays. 1 mark

- c.** Find the mean number of jars delivered each Saturday. 2 marks

- d.** The club charges \$11.50 for each jar. Find the mean amount of money collected for one Saturday's deliveries. 2 marks

Question 3 (4 marks)

Kit moves on to Stage 3, *evaluate and reflect*.

a. Is Kit's mean from Question 2c close to her estimate from Question 2a? Answer yes or no, and give both numbers. 1 mark

b. A mean should sit between the lowest and highest values in the data. Show that Kit's mean passes this check. 1 mark

c. Una does the same working as Question 2d and reports \$4 485. Use Kit's estimate to explain why Una's answer is wrong. 2 marks

Question 4 (6 marks)

Kit finishes with Stage 4, *communicate and report*.

a. Write a result sentence reporting the mean number of jars delivered each Saturday. Include the units. 1 mark

b. Write the price '\$11.50 for each jar' using rate shorthand. 1 mark

c. Write a result sentence reporting the mean amount of money collected for one Saturday's deliveries. Include the units. 2 marks

d. The committee asks: 'Is the mean number of jars delivered more than 40 each Saturday?' Answer in one full sentence, using your mean. 2 marks

End of Section B

Chapter 7 Outcome demonstration assessment — 7C Outcome 3 assessment: mathematical toolkit

Note for teachers. This paper gives students an opportunity to demonstrate Outcome 3 of Unit 2. The study design assesses this outcome by whether students can work with a wider range of maths tools: picking out the tools that suit a task, choosing between them and using them well. The paper covers the analogue toolkit (Section 1E) and the digital toolkit (Section 1F) in use across Areas of Study 5–8. 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 2, Outcome 3.

Source: VCAA, VCE Vocational Major Numeracy Study Design, retrieved 2026-10-09.

Unit 2, Outcome 3 — mathematical toolkit. This paper asks you to choose the right maths tools for each job from a wider range of tools, both analogue and digital, and to use them well. It draws only on the chapters of this book. 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, app and planner 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

Edie is making a costume for the Fern Gully theatre group. She needs to measure around a performer’s waist — a length that curves around the body — so she can cut the fabric to the right size. Which tool is the right choice for this measurement?

- A. a rigid 30 cm ruler
- B. a measuring jug
- C. a set of bathroom scales
- D. a soft tape measure

Question 2

Gita is pouring vegetable stock into a soup pot at the community kitchen. Her measuring jug has a label every 200 mL, and four small spaces between each pair of labels. The level of the stock sits three spaces past the 600 mL label. How much stock is in the jug?

- A. 603 mL
- B. 650 mL
- C. 720 mL
- D. 750 mL

Question 3

Nils starts an afternoon shift at the Holloway bakery. His shift starts at the time shown on the staff-room clock when the minute hand points exactly at the 4 and the hour hand sits just past the 3. In 24-hour time, Nils's shift starts at

- A. 03:20
- B. 15:04
- C. 15:20
- D. 16:20

Question 4

Mick is a carpenter. He measures a piece of timber with a tape measure whose finest mark is 1 cm. The end of the timber lines up exactly with the 184 cm mark. Which length should Mick record?

- A. 1.8432 m
- B. 184 cm
- C. 184.3 cm
- D. 184.32 cm

Question 5

Sofia orders 4 pairs of work gloves online for her team. The gloves cost \$12.50 a pair, and delivery of \$6.00 is added once to the whole order. Sofia wants to key the whole calculation into her scientific calculator in one line. Which keying gives the correct bill?

- A. $4 \times (12.50 + 6)$
- B. $4 + 12.50 \times 6$
- C. $4 \times 12.50 + 6$
- D. $(12.50 + 6) \div 4$

Question 6

Rhea and 2 friends split a \$50 fuel bill equally, so Rhea presses $50 \div 3$. Her calculator's display is set to 2 decimal places, and the screen shows 16.67. Which statement about that display is correct?

- A. The screen is showing a rounded view of the answer; the calculator still holds the full value inside.
- B. The calculator has stored 16.67 exactly, so 3×16.67 gives back exactly \$50.
- C. 16.67 is the exact value of $50 \div 3$.
- D. Setting the display to 2 decimal places changes the stored answer the calculator uses in later steps.

Question 7

The Pelican Point community garden club records the hours of its 7 volunteers for the month in cells C3 to C9 of a spreadsheet. The club wants the total hours for all 7 volunteers in cell C10. What should be typed into cell C10?

- A. =SUM(C3:C8)
- B. =SUM(C3:C9)
- C. =AVERAGE(C3:C9)
- D. =C3+C9

Question 8

A market stall has a digital scale that runs on a battery, and an old dial scale. Halfway through a market day, the digital scale's battery goes flat. Which statement is correct?

- A. Both scales stop working, because every scale needs power to show a number.
- B. The digital scale still works, because it shows the number as digits.
- C. The dial scale still works, because it needs no battery — its scale can still be read with the four steps.
- D. The dial scale stops working, because its needle needs power to move.

Question 9

Sofia is ordering a piece of garden hose online, for a repair. The order form's length box is labelled "millimetres (mm)". Sofia has measured the piece of hose at 45 cm. What number should Sofia type into the length box?

- A. 4.5
- B. 45
- C. 450
- D. 4500

Question 10

A swim coach records one swimmer's 50 m freestyle time at training each week for 8 weeks. The coach wants one display that shows whether the times are dropping across the 8 weeks. Which display is the right choice?

- A. a bar chart of the 8 times
- B. a pie chart of the 8 times
- C. a table of the 8 times
- D. a line graph of the 8 times

Question 11

Neil catches the bus home from work. His phone's trip planner shows the trip departing at 15:42 and arriving at 16:17. How long is the bus trip, in minutes?

- A. 17 minutes
- B. 35 minutes
- C. 25 minutes
- D. 85 minutes

Question 12

Ross is checking bus times on a free travel website when a pop-up appears: "WARNING — 5 viruses found on your device! Pay \$9.90 now to remove them. Enter your card details." What should Ross do?

- A. Close the pop-up without entering anything, and report what happened to a teacher or supervisor.
- B. Enter his card number but not his PIN, because the PIN is the only part that can be misused.
- C. Click "cancel" inside the pop-up to stop the virus warnings.
- D. Reply to the website to ask whether the warning is real.

End of Section A

Section B — Short-answer questions

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

Question 13 (4 marks)

Gita is weighing flour for a batch of bread at the community kitchen. She uses the kitchen's dial scale. The scale runs from 0 to 2000 g. It has a label every 500 g, and four small spaces between each pair of labels. The needle sits three spaces past the 1000 g label.

- a. What is one small space worth? Give the unit. 1 mark

- b. What mass of flour is on the scale? 1 mark

- c. Write this mass in kilograms. 1 mark

- d. The bread recipe needs 1500 g of flour in total. How many more grams does Gita need to add? 1 mark

Question 14 (4 marks)

Ida works weekend shifts at a fruit stall at Pelican Point Sunday Market. The stall's spreadsheet shows her pay for one weekend. Row 1 holds a title, and row 2 holds the headings. Column D already holds formulas: cell D3 holds $=B3*C3$, filled down through the rows. Cell D6 will hold the total for the weekend.

	A	B	C	D
1	Weekend pay			
2	Day	Hours	Rate \$/h	Pay \$
3	Fri	3.5	26.00	91.00
4	Sat	5	26.00	130.00
5	Sun	4.5	26.00	117.00
6	Total			

Made-up data: Ida, the stall and every number in this table are made up for this paper.

a. Write a formula Ida could type into cell D6 to find her total pay for the weekend. 1 mark

b. What value does D6 show? Give your answer in dollars, to the nearest cent. 1 mark

c. Ida actually worked 6 hours on Sunday. The stall owner corrects cell B5 from 4.5 to 6, and nobody retypes any formula. State the new values shown in D5 and in D6. 1 mark

d. Before checking the sheet, Ida estimates her weekend pay: “about 13 hours at about \$25 an hour, so about \$325”. Does Ida's estimate suggest the original total of \$338.00 is sensible? Explain in one sentence. 1 mark

End of Section B

7C — Answers

Section A (multiple choice)

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

Section B (short-answer questions)

Q13. (a) 125 g. (b) 1375 g. (c) 1.375 kg. (d) 125 g.

Q14. (a) $=\text{SUM}(D3:D5)$. (b) \$338.00 (the exact value, to the nearest cent). (c) D5 shows \$156.00 and D6 shows \$377.00. (d) Yes — the estimate is $13 \times 25 = 325$ dollars, which is close to \$338.00; the \$13 gap comes from rounding the rate down by \$1 an hour ($13 \times 1 = 13$), so the total is sensible.

7C — Fully-worked solutions

Section A

Question	Answer	Working
1	D	The waist measurement is a length around a curve. A soft tape measure bends around the body and reads a length in cm — the tailor's tool for exactly this job (Section 1E). A rigid ruler cannot follow the curve; a measuring jug reads capacity and bathroom scales read mass, so both measure the wrong quantity.
2	D	Use the four steps (Section 1E). Step 1: the labels sit every 200 mL. Step 2: one small space $= 200 \div 4 = 50$ mL. Step 3: count up from the smaller label — the level is 3 spaces past 600. Step 4: $600 + 3 \times 50 = 750$ mL. 603 adds the space count as if it were mL; 650 counts down from the 800 label; 720 splits the gap into 5 spaces of 40 mL instead of 4 spaces of 50 mL.
3	C	The minute hand pointing at the 4 means $4 \times 5 = 20$ minutes. The hour hand has passed the 3 but not reached the 4, so the clock reads 3:20 (Section 1E — read the number the hand has passed). The shift is in the afternoon, so it is pm: add 12 to the hour, $3 + 12 = 15$, giving 15:20. 03:20 misses the pm change; 15:04 reads the 4 as 4 minutes; 16:20 reads the number the hour hand is travelling towards.

Question	Answer	Working
4	B	The finest mark on the tape is 1 cm, so an honest record goes to the nearest cm and no finer: 184 cm (Section 1E — the finest mark sets the precision of the record). 184.3 cm invents a mm digit the tape cannot show, 184.32 cm invents two, and 1.8432 m is the same invented digits in metres, because $1.8432 \text{ m} = 184.32 \text{ cm}$.
5	C	The gloves cost $4 \times \$12.50 = \$50.00$, and delivery of \$6.00 is added once, so the bill $= \$50.00 + \$6.00 = \$56.00$. A scientific calculator does multiplication before addition, so $4 \times 12.50 + 6$ gives \$56.00 with no brackets needed (Section 1F). $4 \times (12.50 + 6)$ gives 74.00 — it adds delivery to every pair; $4 + 12.50 \times 6$ gives 79.00 — it multiplies the wrong numbers; $(12.50 + 6) \div 4$ gives 4.625 — it divides instead of multiplies.
6	A	$50 \div 3 = 16.666\dots$ A 2-decimal-place display setting rounds that to 16.67 on the screen — a rounded view, not a rounded value: the calculator still holds the full value inside (Section 1F). So 16.67 is not the exact value of $50 \div 3$; the stored answer is not 16.67, because $3 \times 16.67 = 50.01$, not \$50; and a display setting changes what you see, not what is stored for later steps.
7	B	<code>=SUM(. . .)</code> adds a block of cells (Section 1F). The hours sit in C3 : C9 — rows 3 to 9, one row for each of the 7 volunteers — so <code>=SUM(C3 : C9)</code> adds all 7. <code>=SUM(C3 : C8)</code> stops one row early and misses C9; <code>=AVERAGE(C3 : C9)</code> gives the mean hours per volunteer, not the total; <code>=C3+C9</code> adds only the first and last volunteers.
8	C	Analogue tools need no battery (Section 1E). The dial scale is read from its scale with the four steps, so it keeps working when the digital scale's battery goes flat. A digital scale needs power to show its digits,

Question	Answer	Working
9	C	so the other three statements are wrong: the dial scale does not stop, and the digital scale cannot keep working on a flat battery. To go from cm to mm, multiply by 10 (Section 1E): $45 \times 10 = 450$, so the mm box takes 450. 4.5 divides by 10 — the wrong direction; 45 puts a cm number into a mm box, an input 10 times too small; 4500 multiplies by 100 — the rate for metres to centimetres.
10	D	Times recorded week by week are change over time, and the display for change over time is a line graph (Section 3B) — times dropping show as a line running downhill. A bar chart compares counts across categories; a pie chart shows shares of one whole, and 8 times are not shares of a whole; a table gives accurate look-up numbers but shows no trend.
11	B	Count on from departure to arrival (Section 5D): 15:42 to 16:00 is 18 minutes, and 16:00 to 16:17 is 17 minutes, so the trip takes $18 + 17 = 35$ minutes. 17 is only the arrival minutes; 25 subtracts the minutes as ordinary numbers ($42 - 17$) — time runs in 60s, so that does not work; 85 treats 1 hour and 25 minutes as if time were decimal.
12	A	Pop-ups announcing viruses are traps, not messages, and a travel site has no reason to ask for card details (Section 1F). The safe response is to close the pop-up without entering anything and report it to a teacher or supervisor. A card number without a PIN is still card details typed into a trap; clicking anything inside the pop-up, even “cancel”, engages with the trap; and replying to the site engages with the scammers — the warning is not real, so there is nothing to check.

Section B

Question 13.

- a. The labels sit every 500 g and four small spaces sit between each pair of labels, so one small space = $500 \div 4 = 125$ g.
- b. Use the four steps (Section 1E): count up from the smaller label. The needle is 3 spaces past 1000, so the reading = $1000 + 3 \times 125 = 1375$ g.
- c. To go from g to kg, divide by 1000: $1375 \div 1000 = 1.375$ kg.
- d. $1500 - 1375 = 125$, so Gita needs to add 125 g more flour.

Question 14.

- a. A total of a block of cells uses `=SUM ( . . . )` (Section 1F): `=SUM (D3 : D5)` covers the Fri, Sat and Sun rows.
- b. $D6 = 91.00 + 130.00 + 117.00 = 338.00$, so the cell shows \$338.00 — the exact value, to the nearest cent. Check: the hours total $3.5 + 5 + 4.5 = 13$, and $13 \times \$26.00 = \$338.00$ — the same, so the total can be trusted.
- c. The formulas use cell references, so when an input changes, every output that depends on it updates itself (Section 1F): $D5 = 6 \times \$26.00 = \$156.00$, and $D6 = \$91.00 + \$130.00 + \$156.00 = \$377.00$.
- d. Yes. The estimate is $13 \times \$25 = \$325$, which is close to the sheet's \$338.00, and the \$13 gap is fully explained: rounding the rate down from \$26 to \$25 an hour takes $13 \times \$1 = \$13$ off the estimate. A computed value that sits close to a careful estimate is sensible — the estimate is the safety net (Section 1F).

End of fully-worked solutions

Chapter 7 Outcome demonstration assessment — Answers and fully-worked solutions

Note for teachers. The answers and fully-worked solutions for all three outcome-demonstration papers are in this section: 7A (Outcome 1), 7B (Outcome 2) and 7C (Outcome 3). These papers **complement, and never replace**, the school-assessed coursework that each school designs, runs and signs off as the student's own work. If any task here is adapted for school assessment, the study design's authentication rule applies (see its sections on flexible delivery and satisfactory completion): 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.

Source: VCAA, VCE Vocational Major Numeracy Study Design, retrieved 2026-10-14.

*This section carries the answers and fully-worked solutions for the three outcome-demonstration assessments in this booklet: 7A (Outcome 1: numeracy in context), 7B (Outcome 2: the problem-solving cycle) and 7C (Outcome 3: the mathematical toolkit). Where a question asked for a rounded answer, the question stated the precision, and the working here restates that precision at the rounding step. Full precision is carried through the working, and rounding happens only where the question says to. As each paper states, every name, place, club, price and data set in these assessments is **made up** (not real) — built for this book so that you can practise the mathematics.*

7A — Answers

Section A — Multiple choice (1 mark each)

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

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

Section B — Short answer

Q26. a. 20 minutes b. 10:20 c. east

Q27. a. 8.3 hours (to 1 decimal place) b. 3 hours c. Yes — the mean of 8.3 hours is at least 8 hours

Q28. a. \$2.80 per kg b. \$2.70 per kg; the 5 kg bag is the better buy c. unlikely

Q29. a. 26 hours b. 1 hour over c. 4 hours

Q30. a. $\frac{2}{5}$ b. 30 % c. for example, repaint one “miss” section as “ball” — the ball sections rise from 1 of 10 to 2 of 10, so the probability rises from $\frac{1}{10}$ (10 %) to $\frac{1}{5}$ (20 %)

7A — Fully-worked solutions

Section A — Multiple choice (1 mark each)

Question	Answer	Working
1	C	A grid reference is written letter first, then number: column B, row 3 is B3. Option A reverses the order; options B and D are the wrong squares.
2	A	On a map with north at the top, directly right is east.
3	B	Clockwise turns go north, east, south, west. A 90° clockwise turn from east faces south.
4	A	Anticlockwise from north goes to west, so a 90° anticlockwise turn from north faces west.
5	B	Real length = plan length $\times$ scale $= 3 \times 4 = 12$ m. Option A adds the two numbers instead of multiplying; option C divides instead of multiplying.

Question	Answer	Working
6	A	Total = $15 + 20 + 15 + 25 + 20 = 95$ minutes. Option B is the mean ($95 \div 5 = 19$), which is not the total; option C is the highest value.
7	C	“How many more” means subtract: week 3 – week 1 = $180 - 120 = 60$ kg. Option A compares weeks 3 and 2; option D adds weeks 3 and 4.
8	A	Mean = total $\div$ count $= (185 + 195 + 215 + 225 + 230) \div 5 =$ (exact — no rounding needed). Option B is the middle value; option C is the total.
9	D	Both means are 12. Sid’s range = $16 - 8 = 8$; Jill’s range = $13 - 11 = 2$. With equal means, the smaller range decides: Jill’s scores are closer together, so Jill is more consistent.
10	B	Overall change = $700 - 620 = 80$ more visits, so the overall trend is a rise (with a small dip in 2023). Option C does not fit: visits finish higher than they started.
11	C	Mean $= (6 + 8 + 10 + 12 + 19) \div 5 = 55 \div 5 = 11$ minutes (exact — no rounding needed). Option A is the total; option B is the middle value.
12	B	Largest value 78. Steps of 1 give 79 numbers (too many); steps of 2 give 40; steps of 5 give a top of 80 but 17 numbers; steps of 10 give a top of 80 and 9 numbers (0, 10, 20 up to 80), which is 10 or fewer. The smallest step that works is 10, and the top is the first multiple of 10 at least as big as 78, which is 80. Option C’s top is not a multiple of its step.
13	B	The favourable outcomes are a 5 or a 6: 2 of the 6 equally likely outcomes. $P = \frac{2}{6} = \frac{1}{3}$ in simplest form. Option A counts only one outcome.
14	A	$P = \frac{10}{200} = \frac{1}{20}$ in simplest form. Option B uses Stan’s ticket count as the total; option D is the chance for a

Question	Answer	Working
15	D	single ticket. 4 in 5 = $4 \div 5 = 0.8 = 80\%$. Option A is 1 in 5; option B puts the two numbers side by side.
16	B	An even chance is 0.5, which is 50% — fifty-fifty.
17	C	$\frac{6}{9} = \frac{2}{3}$. As a decimal, $2 \div 3 = 0.666\dots$, which is 0.67 to 2 decimal places. As a percentage, 66.66...%, which is 67% to the nearest whole number. Option A gives the complement ($\frac{1}{3}$); option B misplaces the decimal point in the percentage.
18	A	1 in 10 = 10% and 1 in 20 = 5%. Because 5% is less than 10%, the chance has decreased, and the new chance is 5%. Option C is the chance for 1 in 50.
19	D	Add the 20-minute ride to each departure: the 08:40 bus arrives at 09:00, which is in time; the 09:10 bus arrives at 09:30, which is too late. The latest bus that arrives by 09:15 is 08:40.
20	C	Count on: 14:10 plus 3 hours is 17:10, and plus 45 minutes is 17:55.
21	B	Expenses = $310 + 215 + 45 = \$570$. Surplus = income – expenses = $820 - 570 = \$250$. Option A is the total expenses; option C forgets the phone bill; option D adds everything together.
22	C	The total counts every leg, waits included: $8 + 4 + 22 + 6 = 40$ min. Option B drops the 4-minute wait; option A counts only the walks and the bus.
23	A	Alphabetical order compares first letters: A comes before D, D before M and M before S — Art, Drama, Music, Sport.
24	D	Box A: $600 \text{ cents} \div 40 = 15$ cents per bag. Box B: $840 \text{ cents} \div 60 = 14$ cents per bag. The lower cost per bag wins, so Box B at 14 cents per bag. Option C swaps the two numbers ($840 \div 40 = 21$).

Question	Answer	Working
25	D	Range = highest – lowest, so highest = lowest + range $= 36.4 + 1.5 = 37.9^{\circ}\text{C}$ (exact — no rounding needed). Option A subtracts instead of adding; options B and C repeat numbers given in the question.

Section B — Short answer

Question 26 (3 marks)

- a. Count on from 09:50 to 10:10: 10 minutes to 10:00, then 10 more. The ride takes **20 minutes**.
- b. Check each service against the 11:00 limit: the 10:20 train arrives at 10:40, which is in time, and the 10:50 train arrives at 11:10, which is too late. The latest train Sal can catch is **10:20**.
- c. On a map with north at the top, directly right is east, so Sal walks **east** from the station to the market.

Question 27 (3 marks)

- a. Total = $8 + 7 + 9 + 7 + 8 + 10 + 9 = 58$ hours. Mean = $58 \div 7 = 8.2857\dots$ Rounded to 1 decimal place, the mean is **8.3 hours** per night. (Check: the mean sits between the lowest night, 7, and the highest night, 10.)
- b. Range = highest – lowest = $10 - 7 = 3$ **hours**.
- c. **Yes**. The mean of 8.3 hours is at least the 8-hour goal, so Marge met her goal this week.

Question 28 (3 marks)

- a. Cost per kg \$ = $5.60 = \$$ **\$2.80 per kg** (exact — no rounding needed).
- b. Cost per kg \$ = $13.50 = \$$ **\$2.70 per kg** (exact). Because \$2.70 is less than \$2.80, the **5 kg bag is the better buy**.
- c. 0.1 sits between 0 and 0.5 — closer to impossible than to an even chance — so the chance word that matches is **unlikely**.

Question 29 (3 marks)

- a. Total = $4.5 + 6 + 4.5 + 6 + 5 = 26$ **hours**.
- b. $26 - 25 = 1$ **hour over** the limit.
- c. Take the 1 extra hour off Friday: $5 - 1 = 4$ **hours**. Check: $4.5 + 6 + 4.5 + 6 + 4 = 25$ hours exactly, so the roster now fits the limit.

Question 30 (3 marks)

- a. The favourable sections are the 4 “free drink” sections out of 10 equal sections, so $SP() = \$ \frac{2}{5}$ in simplest form.
- b. $SP() = 0.3 = \$$ **30 %** (exact — no rounding needed).
- c. For example, **repaint one “miss” section as “ball”**. The wheel still has 10 equal sections, but the ball sections rise from 1 to 2, so $P(\text{ball})$ rises from $\frac{1}{10}$ (10 %) to $\frac{2}{10} = \frac{1}{5}$ (20 %). More favourable sections with the same total means a higher probability.

7B — Answers

Section A — Multiple choice (1 mark each)

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

Section B — Problem-solving cycle task

Q1. a. The committee’s two questions: “What is the mean number of jars delivered each Saturday?” and “What is the mean amount of money collected for one Saturday’s deliveries?” **b.** addition, then division **c.** e.g. a basic calculator

Q2. a. Rounded to the nearest 10: 30, 40, 40, 50, 40; estimated total = 200 jars; estimate of the mean = $200 \div 5 = 40$ jars **b.** 195 jars **c.** 39 jars (exact) **d.** \$448.50 (exact to the cent)

Q3. a. Yes — the mean (39 jars) is 1 jar from the estimate (40 jars) **b.** $32 < 39 < 45$ — the mean sits between the lowest (32) and highest (45) values **c.** The estimate is about $40 \times \$11.50 = \$460$; \$4 485 is about ten times that, so Una’s answer is far too big — the decimal point slipped one place ($\$4\,485 = 10 \times \$448.50$)

Q4. a. “The mean number of jars delivered each Saturday is 39 jars.” **b.** \$11.50/jar **c.** “The mean amount of money collected for one Saturday’s deliveries is \$448.50.” **d.** No — the mean is 39 jars each Saturday, and 39 is less than 40

Rounding notes. Question 8: $182 \div 15 = 12.13$ (to 2 decimal places), and the real-world context (whole boxes, every keyring packed) rounds this up to 13 boxes. Question 10: 2.666666 rounds to \$2.67 to 2 decimal places (the third decimal digit is 6, so round up). Question 2a: each jar count is rounded to the nearest 10 before the estimate, exactly as the question asks — 45 is exactly halfway and rounds up to 50. Every other answer in 7B is exact: the mean of 39 jars and the mean money of \$448.50 need no rounding.

7B — Fully-worked solutions

Section A (multiple choice)

Question	Answer	Working
1	A	Section 1A fixes the order of the four stages: identify the mathematics, then act on and use the mathematics, then evaluate and reflect, then communicate and report. Option B swaps the first two stages, option C swaps the middle two, and option D puts the last stage first.
2	C	“What do I need to find, and how will I find it?” is the key question of Stage 1, identify the mathematics (Section 1A). Stage 2 asks whether the estimate is done and the working is careful, Stage 3 asks whether the answer passes the checks, and Stage 4 asks whether the answer is clear to someone else — so options A, B and D name the wrong stage.
3	B	Kit has finished her working and is checking her answer against her estimate and against the real world.

Question	Answer	Working
		Both checks belong to Stage 3, evaluate and reflect (Section 1A). Stage 1 plans, Stage 2 does the mathematics, and Stage 4 reports the answer.
4	D	Stage 4, communicate and report, means writing or saying the answer clearly, with units (Section 1A) — a clear sentence with units. Estimating before calculating is a Stage 2 habit, choosing a plan and a tool is Stage 1, and checking against the real world is Stage 3.
5	A	The Stage 2 habit is: estimate first, then do the mathematics carefully, one step per line (Section 1A). Choosing a plan and a tool is Stage 1, checking against the estimate is Stage 3, and writing the answer as a full sentence is Stage 4.
6	C	The Stage 3 rule is: if a check fails, loop back, find the mistake and fix it (Section 1A). Changing the estimate to match the answer (option A) would ruin the check, skipping ahead to Stage 4 (option B) would report an unchecked answer, and a friend's answer (option D) does not find the mistake in Una's own working.
7	B	An estimate is a rough value that is close enough to the real answer to be used for checking (Section 1C). Option A is the exact answer, which is the opposite of an estimate; option C is a Stage 4 report; and option D is a units check.
8	B	$182 \div 15 = 12.13$ (to 2 decimal places), and $182 = 12 \times 15 + 2$, so 12 boxes would leave 2 keyrings unpacked. Every keyring must be packed, so round up: 13 boxes. Option A leaves keyrings behind, option C is not a whole number of boxes, and option D is the number of keyrings each box holds, not the number of boxes needed.
9	D	$\frac{1}{8} = 0.125$ (exact), and $0.125 \times 100 = 12.5\%$. Option A mistakes the denominator for a percent, option B moves the decimal

Question	Answer	Working
		point to the wrong place, and option C cuts 12.5 % down to 12 %, which is not equal to $\frac{1}{8}$.
10	C	$8 \div 3 = 2.666666$ on the calculator. To round to 2 decimal places, look at the third decimal digit: it is 6, so the second decimal digit rounds up, and the price is \$2.67 (to 2 decimal places). Option A cuts the digits off instead of rounding, option B leaves the calculator display with too many decimals, and option D ignores the precision asked for.

Section B (the problem-solving cycle task)

Question 1 — Stage 1, identify the mathematics (3 marks)

- a. Kit must answer the committee’s two questions: first, “What is the mean number of jars delivered each Saturday?”, and second, “What is the mean amount of money collected for one Saturday’s deliveries?”
- b. To find a mean, Kit adds the five jar counts to get the total, and then divides the total by 5. In order: **addition, then division**.
- c. For example, **a basic calculator**. The paper allows pen, paper and a basic calculator, so careful pen-and-paper working is also a full answer.

Question 2 — Stage 2, act on and use the mathematics (7 marks)

- a. Round each number to the nearest 10, as the question asks: 32 rounds to 30; 41 rounds to 40; 37 rounds to 40; 45 is exactly halfway, so it rounds up to 50; 40 stays at 40. Estimated total = $30 + 40 + 40 + 50 + 40 = 200$ jars. Estimated mean $\$ = 200 \div 5 = \$ 40$ jars.
- b. Total $\$ = 32 + 41 + 37 + 45 + 40 = \$ 195$ jars.
- c. Mean = total $\div$ count $\$ = 195 \div 5 = \$ 39$ jars. The mean is exactly 39 — a whole number, so no rounding is needed.
- d. Mean money $\$ = 39 \times \$ 11.50 = \$ 448.50$ (exact to the cent). Check: the total money over the five Saturdays is $195 \times \$ 11.50 = \$ 2242.50$, and $\$ 2242.50 \div 5 = \$ 448.50$ — the same answer by a different route.

Question 3 — Stage 3, evaluate and reflect (4 marks)

- a. **Yes**. Kit’s mean is 39 jars and her estimate is 40 jars. They differ by only 1 jar, so the mean is close to the estimate.
- b. The lowest value is 32 jars (Saturday 1) and the highest is 45 jars (Saturday 4). A mean must sit between the lowest and highest values: $32 < 39 < 45$. **Kit’s mean passes this check**.
- c. Estimate first: about 40 jars at \$11.50 each gives $40 \times \$ 11.50 = \$ 460$. Una’s \$4 485 is about ten times \$460, so it cannot be the mean for one Saturday — **the estimate check shows that Una’s answer is wrong**. (Her value is exactly $10 \times \$ 448.50 = \$ 4485$: the decimal point slipped one place.)

Question 4 — Stage 4, communicate and report (6 marks)

- a. For example, **“The mean number of jars delivered each Saturday is 39 jars.”** — a complete sentence with the number and the units.
- b. Rate shorthand writes the amount per unit with a slash (Section 1D): **\$11.50/jar**.
- c. For example, **“The mean amount of money collected for one Saturday’s deliveries is \$448.50.”** — a complete sentence with the number and the units.
- d. **No.** The mean is 39 jars each Saturday, and 39 is less than 40, so the mean number of jars delivered is not more than 40 each Saturday.

7C — Answers

Section A (multiple choice)

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

Section B (short-answer questions)

Q13. (a) 125 g. (b) 1375 g. (c) 1.375 kg. (d) 125 g.

Q14. (a) $=\text{SUM}(D3:D5)$. (b) \$338.00 (the exact value, to the nearest cent). (c) D5 shows \$156.00 and D6 shows \$377.00. (d) Yes — the estimate is $13 \times 25 = 325$ dollars, which is close to \$338.00; the \$13 gap comes from rounding the rate down by \$1 an hour ($13 \times 1 = 13$), so the total is sensible.

7C — Fully-worked solutions

Section A

Question	Answer	Working
1	D	The waist measurement is a length around a curve. A soft tape measure bends around the body and reads a length in cm — the tailor's tool for exactly this job (Section 1E). A rigid ruler cannot follow the curve; a measuring jug reads capacity and bathroom scales read mass, so both measure the wrong quantity.
2	D	Use the four steps (Section 1E). Step 1: the labels sit every 200 mL. Step 2: one small space $= 200 \div 4 = 50$ mL. Step 3: count up from the smaller label — the level is 3 spaces past 600. Step 4: $600 + 3 \times 50 = 750$ mL. 603 adds the space count as if it were mL; 650 counts down from the 800 label; 720 splits the gap into 5 spaces of 40 mL instead of 4 spaces of 50 mL.
3	C	The minute hand pointing at the 4 means $4 \times 5 = 20$ minutes. The hour hand has passed the 3 but not reached the 4, so the clock reads 3:20 (Section 1E — read the number the hand has passed). The shift is in the afternoon, so it is pm: add 12 to the hour, $3 + 12 = 15$, giving 15:20. 03:20 misses the pm change; 15:04 reads the 4 as 4 minutes; 16:20 reads the number the hour hand is travelling towards.

Question	Answer	Working
4	B	The finest mark on the tape is 1 cm, so an honest record goes to the nearest cm and no finer: 184 cm (Section 1E — the finest mark sets the precision of the record). 184.3 cm invents a mm digit the tape cannot show, 184.32 cm invents two, and 1.8432 m is the same invented digits in metres, because $1.8432 \text{ m} = 184.32 \text{ cm}$.
5	C	The gloves cost $4 \times \$12.50 = \$50.00$, and delivery of \$6.00 is added once, so the bill $= \$50.00 + \$6.00 = \$56.00$. A scientific calculator does multiplication before addition, so $4 \times 12.50 + 6$ gives \$56.00 with no brackets needed (Section 1F). $4 \times (12.50 + 6)$ gives 74.00 — it adds delivery to every pair; $4 + 12.50 \times 6$ gives 79.00 — it multiplies the wrong numbers; $(12.50 + 6) \div 4$ gives 4.625 — it divides instead of multiplies.
6	A	$50 \div 3 = 16.666\dots$ A 2-decimal-place display setting rounds that to 16.67 on the screen — a rounded view, not a rounded value: the calculator still holds the full value inside (Section 1F). So 16.67 is not the exact value of $50 \div 3$; the stored answer is not 16.67, because $3 \times 16.67 = 50.01$, not \$50; and a display setting changes what you see, not what is stored for later steps.
7	B	<code>=SUM (. . .)</code> adds a block of cells (Section 1F). The hours sit in C3 : C9 — rows 3 to 9, one row for each of the 7 volunteers — so <code>=SUM (C3 : C9)</code> adds all 7. <code>=SUM (C3 : C8)</code> stops one row early and misses C9; <code>=AVERAGE (C3 : C9)</code> gives the mean hours per volunteer, not the total; <code>=C3+C9</code> adds only the first and last volunteers.
8	C	Analogue tools need no battery (Section 1E). The dial scale is read from its scale with the four steps, so it keeps working when the digital scale's battery goes flat. A digital scale needs power to show its digits,

Question	Answer	Working
9	C	so the other three statements are wrong: the dial scale does not stop, and the digital scale cannot keep working on a flat battery. To go from cm to mm, multiply by 10 (Section 1E): $45 \times 10 = 450$, so the mm box takes 450. 4.5 divides by 10 — the wrong direction; 45 puts a cm number into a mm box, an input 10 times too small; 4500 multiplies by 100 — the rate for metres to centimetres.
10	D	Times recorded week by week are change over time, and the display for change over time is a line graph (Section 3B) — times dropping show as a line running downhill. A bar chart compares counts across categories; a pie chart shows shares of one whole, and 8 times are not shares of a whole; a table gives accurate look-up numbers but shows no trend.
11	B	Count on from departure to arrival (Section 5D): 15:42 to 16:00 is 18 minutes, and 16:00 to 16:17 is 17 minutes, so the trip takes $18 + 17 = 35$ minutes. 17 is only the arrival minutes; 25 subtracts the minutes as ordinary numbers ($42 - 17$) — time runs in 60s, so that does not work; 85 treats 1 hour and 25 minutes as if time were decimal.
12	A	Pop-ups announcing viruses are traps, not messages, and a travel site has no reason to ask for card details (Section 1F). The safe response is to close the pop-up without entering anything and report it to a teacher or supervisor. A card number without a PIN is still card details typed into a trap; clicking anything inside the pop-up, even “cancel”, engages with the trap; and replying to the site engages with the scammers — the warning is not real, so there is nothing to check.

Section B

Question 13.

- a. The labels sit every 500 g and four small spaces sit between each pair of labels, so one small space $= 500 \div 4 = 125$ g.
- b. Use the four steps (Section 1E): count up from the smaller label. The needle is 3 spaces past 1000, so the reading $= 1000 + 3 \times 125 = 1375$ g.
- c. To go from g to kg, divide by 1000: $1375 \div 1000 = 1.375$ kg.
- d. $1500 - 1375 = 125$, so Gita needs to add 125 g more flour.

Question 14.

- a. A total of a block of cells uses $=\text{SUM}(\dots)$ (Section 1F): $=\text{SUM}(D3:D5)$ covers the Fri, Sat and Sun rows.
- b. $D6 = 91.00 + 130.00 + 117.00 = 338.00$, so the cell shows \$338.00 — the exact value, to the nearest cent. Check: the hours total $3.5 + 5 + 4.5 = 13$, and $13 \times \$26.00 = \$338.00$ — the same, so the total can be trusted.
- c. The formulas use cell references, so when an input changes, every output that depends on it updates itself (Section 1F): $D5 = 6 \times \$26.00 = \$156.00$, and $D6 = \$91.00 + \$130.00 + \$156.00 = \$377.00$.
- d. Yes. The estimate is $13 \times \$25 = \$325$, which is close to the sheet's \$338.00, and the \$13 gap is fully explained: rounding the rate down from \$26 to \$25 an hour takes $13 \times \$1 = \$13$ off the estimate. A computed value that sits close to a careful estimate is sensible — the estimate is the safety net (Section 1F).

End of fully-worked solutions