

VCE VM Numeracy Unit 1

Chapter 6 — Unit 1 numeracy in context

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Theory

Personal numeracy — the maths of your own day.

Numbers follow you around all day. They sit in the ads and catalogues you scroll past, on the price tags at the shops, in the news, in the apps on your phone, in the recipes you cook from and the timetables you catch the bus by. The Study Design calls this **personal numeracy** and describes it in Unit 1, Outcome 1: making sense of the numbers and maths that reach you in many forms and through many kinds of media, and using them for jobs in your own life — in situations you know well or meet often, and in some that are newer to you.

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

In short: personal numeracy is reading the numbers that come at you in daily life — money, time and measures — working out what they mean, and using them to sort out things that matter to you.

Media means anything that carries information to lots of people: newspapers, radio, television, websites, apps, ads and catalogues. Numbers in media usually come with a dollar sign or a percent sign, and there is nearly always a decision hiding in them: is this a good deal? Which pack is cheaper? Will we get there on time?

Numbers in media: an ad sign, a shelf tag, a news item



Where you will see personal numeracy.

The Study Design gives examples of where personal numeracy is used (Unit 1, Outcome 1). Here they are in this book's own words — all of them appear in this section:

- shopping and saving — comparing deals that take different percentages off the price, and working out and using **unit prices**;
- everyday jobs for yourself and your family — sport, travel, cooking and gardening;
- a class excursion or school event — planning the costs and the **logistics**;
- numbers you see in print and on screens, such as money amounts — prices, discounts, receipts, shopping carts and charts in apps;
- planning a family event or a cultural event — a BBQ, a celebration, or a day trip to a place of cultural significance to your family.

Logistics just means the practical planning: who is coming, what you need, what time everyone leaves, and how they get there. An **excursion** is a trip a class takes away from school.

About the data in this section. The prices, timetables and numbers here are **made up** (not real): pretend shops, pretend events 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.

The maths you will use.

This section mixes together maths you already know from this book. Every task here is short — one or two steps — and each one can be run through the four-stage problem-solving cycle from Chapter 1.



Maths you already know

Where you met it

common percentages, decimals and simple proportions	Chapter 2 Number
metric measures, time and durations	Chapter 4 Quantity and measures
rates such as km/hr and per-metre costs, and simple formulae	Chapter 5 Relationships
the four-stage problem-solving cycle	Chapter 1

Every skill below comes with a short refresher, so you will not need to flip back.

Words to know. A **discount** is money taken off a price; the **sale price** is what you pay after the discount. A **unit price** is the cost of one unit — one litre, one kilogram, 100 grams, or one item. The **best buy** is the option with the lowest unit price. **Per person** and **each** both tell you to multiply by the number of people or things. A **budget** is a plan for the money coming in and the money going out.

Skill 1 — Reading money numbers in media.

Money is written as a decimal: \$4.95 means 4 dollars and 95 cents. The two digits after the decimal point are always the cents.

Refresher: comparing money decimals. Compare digit by digit, left to right. \$3.09 and \$3.90 both have 3 dollars, so look at the tenths digit: $0 < 9$, so $\$3.90 > \$3.09$. The number with more digits is not always the bigger one.

Big amounts are grouped in threes. This book writes them with a space — \$2 480. Newspapers and websites often write them with a comma — \$2,480. Same number, different look. News numbers work the same way: “1 250 new trees planted” and “1,250 new trees planted” say the same thing.

Skill 2 — Percentage discounts.

A shop discount takes a percentage off the tag price. “20% OFF” means: find 20% of the tag price, then take it off.

Refresher: common percentages from the 10% block. Divide by 10 to get 10%; every common percentage builds up from there.

What you want	How to get it	On \$80
10%	divide by 10	\$8
5%	halve the 10%	\$4
20%	double the 10%	\$16
25%	divide by 4	\$20
50%	halve the amount	\$40
75%	add 50% + 25%	\$60

Worked model. A jacket tagged \$90 is 20% off.

- 10% of 90 = \$9, so 20% = \$18 — that is the discount.
- Sale price: $90 - 18 = \$72$.

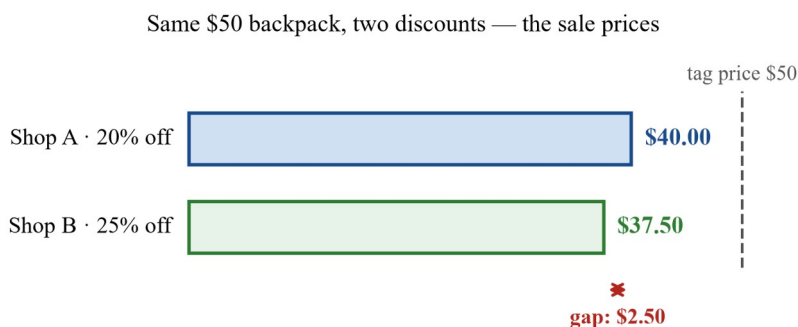
Calculator road: after 20% off you still pay 80% of the price, so $90 \times 0.80 = \$72$ ✓ — same answer.

Comparing two discounts. If two shops discount the *same* tag price, the bigger percentage wins. If the tag prices differ, work out both sale prices before deciding.

Worked model. Two shops sell the same \$50 backpack. Shop A takes 20 % off; Shop B takes 25 % off.

- Shop A: 20 % of 50 = \$10, so the sale price is $50 - 10 = \$40.00$.
- Shop B: 25 % of 50 = \$12.50, so the sale price is $50 - 12.50 = \$37.50$.

Shop B is cheaper, by $40.00 - 37.50 = \$2.50$.



Skill 3 — Unit prices and the best buy.

The **unit price** is the cost of one unit — 1 L, 1 kg, or 100 g. Shelf tags often print it in small letters. You work it out with a division:

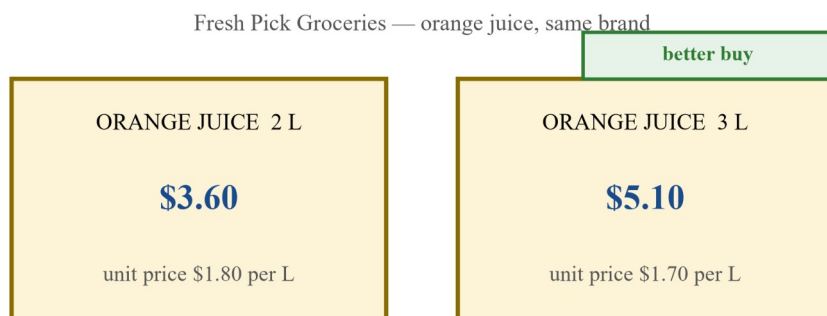
$$\text{unit price} = \text{price} \div \text{amount}$$

Refresher: dividing money. Divide as normal and keep two decimal places for the cents: $5.10 \div 3 = \$1.70$. If the number you are dividing by has a decimal point, multiply both numbers by 10 first: $6.30 \div 1.5$ becomes $63 \div 15 = \$4.20$.

Worked model. Juice comes in a 2 L pack for \$3.60 and a 3 L pack for \$5.10.

- 2 L pack: $3.60 \div 2 = \$1.80$ per litre.
- 3 L pack: $5.10 \div 3 = \$1.70$ per litre.

$\$1.70 < \$1.80$, so the 3 L pack is the better buy — even though its total price (\$5.10) is higher than the 2 L pack's (\$3.60). A bigger pack costs more in total but can cost less per unit. Comparing total prices is the trap; unit prices save you from it.



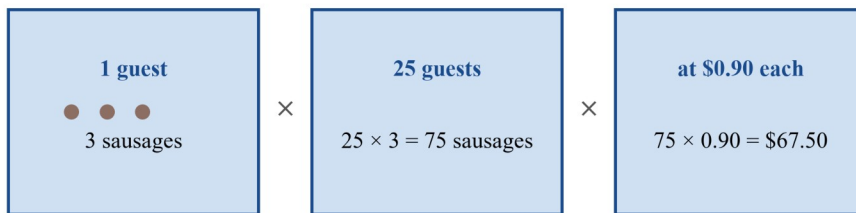
Skill 4 — Planning for people.

Events are planned per person: the amount for one person, multiplied by the number of people.

Refresher: multiplying a decimal by a whole number. Do the multiply with no decimal point, then put the point back. For 75×0.90 : $75 \times 9 = 675$; 0.90 has two decimal places, so the answer keeps two decimal places — \$67.50.

Worked model. At a BBQ each guest eats about 3 sausages, and 25 guests are coming. Sausages cost \$0.90 each.

- Sausages needed: $3 \times 25 = 75$.
- Cost: $75 \times 0.90 = \$67.50$.



Food is sold in packs, and you cannot buy part of a pack. If you need 26 bread rolls and rolls come in packs of 12: $26 \div 12 = 2$ remainder 2. Two packs hold only 24 rolls — not enough — so round up and buy 3 packs.

Skill 5 — Time, travel and timetables.

Refresher: time. 60 min = 1 h. Decimal hours split up like this: 1.5 h = 1 h 30 min; 0.75 h = 45 min; 0.25 h = 15 min. To go from minutes to hours, divide by 60: 30 min = $30 \div 60 = 0.5$ h.

To add a duration to a clock time, jump the hours first, then the minutes: 10:40 am + 1 h 35 min → jump 1 h to 11:40 am, then jump 35 min to 12:15 pm.

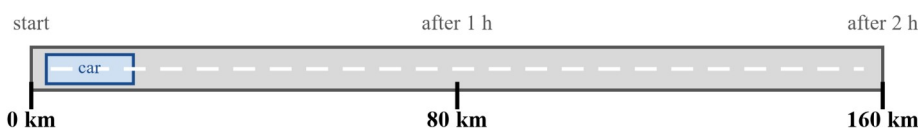
Speeds in this book are in **km/hr** (kilometres per hour). The formula from Chapter 5 works both ways:

$$\text{distance} = \text{speed} \times \text{time}$$

$$\text{time} = \text{distance} \div \text{speed}$$

Worked model. A car travelling at 80 km/hr covers $80 \times 2 = 160$ km in 2 h. A trip of 150 km at 50 km/hr takes $150 \div 50 = 3$ h.

At 80 km/hr, the car covers 80 km every hour



Arrival time = departure time + journey time. A **timetable** lists departure times — to catch a bus or train, find the first departure *after* the time you get there, not just any time on the list.

Skill 6 — Measures for cooking and gardening.

Refresher: metric conversions (one step).

To change	Do this	Example
g → kg	divide by 1000	2500 g = 2.5 kg
kg → g	multiply by 1000	2 kg = 2000 g
mL → L	divide by 1000	3500 mL = 3.5 L
L → mL	multiply by 1000	3.5 L = 3500 mL
m → km	divide by 1000	1200 m = 1.2 km
km → m	multiply by 1000	1.2 km = 1200 m

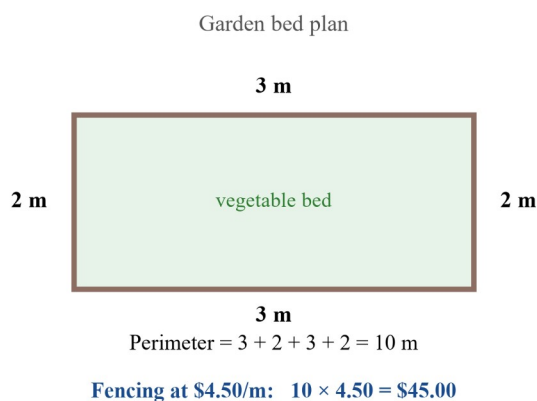
Kitchen measures: scales read in grams (g) and kilograms (kg); jugs read in millilitres (mL) and litres (L). Halving a recipe means halving every amount — 250 g of flour becomes 125 g.

For a rectangular garden bed:

- the **perimeter** is the distance around the edge — add the four sides;
- the **area** is length $\times$ width, measured in square metres (m²).

Fencing goes around the edge, so fencing cost = perimeter $\times$ price per metre. A price per metre is written with a slash: \$4.50/m means \$4.50 for each metre.

Worked model. A garden bed is 3 m long and 2 m wide. Its perimeter is $3 + 2 + 3 + 2 = 10$ m. Fencing at \$4.50/m costs $10 \times 4.50 = \$45.00$.



Ovens are set in degrees Celsius (°C) — a recipe’s “bake at 200 °C” is a number you read off the dial, not one you calculate.

The tools you can use.

You are allowed tools — real life uses them. A calculator does the percentage and division presses; shopping apps and supermarket websites often print the unit price for you; a notes app keeps your shopping list and guest count; a spreadsheet adds up a column of costs for a big order. Every task in this section can also be done with pen, paper and a simple calculator — tools are for checking your working, not for replacing your thinking.

Worked examples

Example 1 — scaffolded

Mila sees her favourite hoodie in a clothing shop’s ad. The tag price is \$75 and the sign says 20% OFF. What is the sale price of the hoodie?



Working

Stage 1 — Identify. This is a percentage discount. Plan: find 20 % of \$75, then take it off.

Stage 2 — Act. 10 % of 75 = $75 \div 10 = \$7.50$, so
20 % = $7.50 \times 2 = \$15.00$.

Sale price: $75 - 15.00 = \$60.00$.

Stage 3 — Evaluate. Add back up:
 $60.00 + 15.00 = \$75.00$ ✓. Calculator road:
 $75 \times 0.80 = \$60.00$ ✓.

Stage 4 — Report. The sale price of the hoodie is \$60.00.

Comment

“20 % off” means the discount is 20 % of the tag price (Skill 2).

Build 20 % from 10 %: divide by 10, then double.

Sale price = tag price – discount.

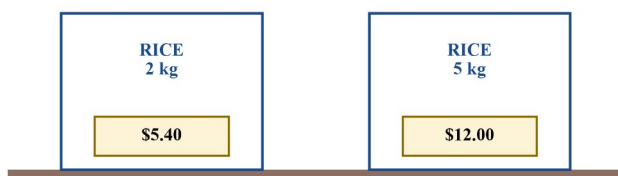
Paying 20 % less is the same as paying 80 % of the price. Two roads agreeing means the answer is trustworthy.

A full sentence, with the dollar unit.

Example 2 — scaffolded

Pia is comparing rice at Fresh Pick Groceries. The shelf shows two bags of the same brand: 2 kg for \$5.40, and 5 kg for \$12.00. Which bag is the better buy per kilogram?

Fresh Pick Groceries — rice, same brand



Working

Stage 1 — Identify. To compare fairly, find the price of 1 kg for each bag. Plan: divide each price by its number of kg.

Stage 2 — Act. 2 kg bag: $5.40 \div 2 = \$2.70$ per kg.
5 kg bag: $12.00 \div 5 = \$2.40$ per kg.

Stage 3 — Evaluate. $\$2.40 < \$2.70$. Check:
 $2.40 \times 5 = \$12.00$ ✓. The 5 kg bag costs more in total but less per kg — the total-price trap.

Stage 4 — Report. The 5 kg bag is the better buy per kilogram.

Comment

Unit price = price $\div$ amount (Skill 3).

Price divided by the number of kg.

Both answers are *per kg*, so comparing them is fair.

The bigger total does not mean the worse buy. Compare unit prices.

The report names the winner and says *per kilogram*.

Example 3 — unscaffolded

Jett is cooking sausages at a family BBQ. There will be 30 guests and he plans 4 sausages per person. The sausages cost \$0.95 each. How much do the sausages cost?

Find the number of sausages first: $30 \times 4 = 120$ sausages.

Now find the cost: $120 \times 0.95 = \$114.00$.

Check with an estimate: 120 sausages at about \$1 each would be about \$120, and \$0.95 is just under \$1 — so \$114.00 is sensible ✓.

∴ the sausages cost \$114.00.

Example 4 — unscaffolded

The excursion bus travels at 80 km/hr on the highway. The class is going to a park 120 km away, and the bus leaves the school at 9:30 am. How long does the trip take, and what time does the bus arrive?

Time = distance $\div$ speed: $120 \div 80 = 1.5$ h.

Write 1.5 h as a duration: the 0.5 h is half of 60 min = 30 min, so the trip takes 1 h 30 min.

Arrival time = departure time + journey time: 9:30 am + 1 h 30 min = 11:00 am.

Check: at 80 km/hr the bus covers $80 \times 1.5 = 120$ km ✓ — speed times time gives the distance back.

$\therefore$ the trip takes 1 h 30 min and the bus arrives at 11:00 am.

Practice questions

Scaffolded

Q1. A clothing ad shows three deals on one jacket tagged \$70: 10% OFF, 20% OFF, and HALF PRICE. (a) For the 10% OFF deal, how many dollars is 10 % of \$70? (b) For the 20% OFF deal, how many dollars is 20 % of \$70? (c) Half price means 50 % off. How many dollars is 50 % of \$70?

Q2. Numbers in media. (a) A catalogue writes a price in words: “six dollars and forty cents”. Write it as a number. (b) Which is dearer, \$3.09 or \$3.90? (c) This book writes thousands with a space: \$2 480. An online newspaper writes thousands with a comma. Write \$2 480 the way the newspaper does.

Q3. A pair of shoes is tagged \$40. The sale sign says 25% OFF. (a) How many dollars is 25 % of \$40? (Hint: 25 % is a quarter.) (b) What is the sale price? (c) Check your answer to (b) by multiplying \$40 by 0.75. Do you get the same sale price?

Q4. At Fresh Pick Groceries, milk is \$4.20 for 3 L. The same brand is \$3.00 for 2 L. (a) Find the price per litre of the 3 L pack, to the nearest cent. (b) Find the price per litre of the 2 L pack, to the nearest cent. (c) Which pack is the better buy per litre?

Q5. There are 8 people at Nell’s movie night. Each person eats 3 slices of pizza and each pizza has 8 slices. (a) How many slices are needed in total? (b) How many pizzas should Nell order? (c) Each pizza costs \$12.50. How much do the pizzas cost?

Q6. Measures for cooking and gardening. (a) A bag of flour is 2500 g. How many kg is that? (b) A watering can holds 3.5 L. How many mL is that? (c) A vegetable plot is 4 m long and 2 m wide. What is its perimeter?

Un scaffolded

Q7. Ziggy is ordering clothes online from Coastal Threads. His cart is shown below.

Coastal Threads — Your cart	
T-shirt	\$18.50
Cap	\$12.00
Socks	\$4.50
Delivery	\$6.00

Made-up data: the shop name and every number in the cart are made up for this section.

- (a) Add up the three items (without delivery). How much do they cost?
- (b) What is the total Ziggy pays, including delivery?
- (c) Ziggy pays with a \$50 gift card. How much is left on the card?

Q8. Both shops have the same earphones tagged at \$60. Soundwave Store’s sign says 25% OFF. BeatBox Electronics’ sign says 30% OFF. (a) How many dollars off are the earphones at Soundwave Store? (b) How many

dollars off are they at BeatBox Electronics? (Hint: $30\% = 3 \times 10\%$.) (c) Find both sale prices. Which shop is cheaper, and by how much?

Q9. Dish soap comes in two pack sizes: 1.5 L for \$7.20, and 2 L for \$8.80. (a) Find the price per litre of the 1.5 L pack, to the nearest cent. (b) Find the price per litre of the 2 L pack, to the nearest cent. (c) Which pack is the better buy? Give a reason.

Q10. A shelf tag shows the price per 100 g. Cereal is \$5.85 for a 750 g box, and \$4.10 for a 500 g box. (a) Find the price per 100 g of the 750 g box, to the nearest cent. (b) Find the price per 100 g of the 500 g box, to the nearest cent. (c) Which box is the better value per 100 g?

Q11. Aunty Fay is hosting a family BBQ. She plans 3 sausages per person and 24 people are coming. (a) How many sausages does she need? (b) Sausages are sold in packs of 12. How many packs does she buy? (c) Each pack costs \$4.80. How much do the sausages cost?

Q12. The Singh family is planning a day trip to a place of cultural significance to their family. The trip is 180 km one way and they travel at 90 km/hr. (a) How long does the drive take? (b) They leave home at 8:20 am. What time do they arrive? (c) There are 6 people and each buys a picnic lunch for \$8.50. How much do the lunches cost?

Q13. Elmwood College is planning a class excursion. 28 students and 4 teachers are going.

Item	Cost
Entry ticket	\$6.50 per person
Bus hire (whole bus)	\$336 total

Made-up data: the college name and every number in the table are made up for this section.

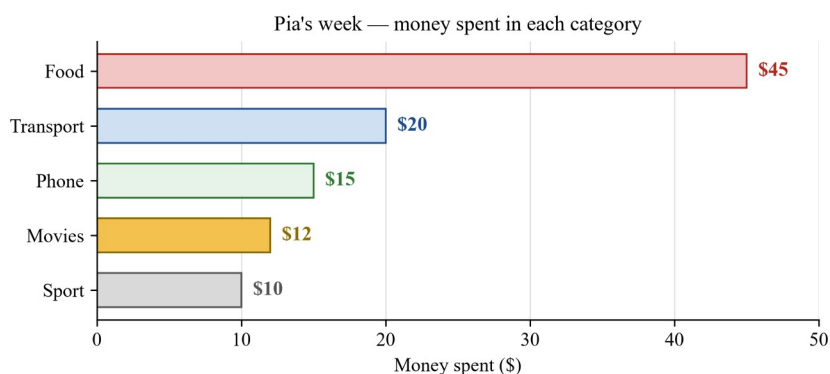
- (a) How many people are going on the excursion?
- (b) How much do the entry tickets cost in total?
- (c) The bus cost is shared equally between all the people going. How much is the bus cost per person?

Q14. Sita's muffin recipe makes 12 muffins, but she only needs 6, so she halves every amount. The oven is set to 200 °C. (a) The recipe uses 250 g of flour. How many grams does Sita use? (b) The recipe uses 300 mL of milk. How many mL does Sita use? (c) The muffins bake for 20 min. Sita puts them in the oven at 3:35 pm. What time should she take them out?

Q15. Nova is building a rectangular vegetable bed 4 m long and 3 m wide. (a) What is the perimeter of the bed? (b) Fencing costs \$6.00 per metre (written \$6.00/m) and Nova fences all the way around the bed. How much does the fencing cost? (c) What is the area of the bed?

Q16. Maeve cycles 9 km to netball training at a steady 15 km/hr. (a) How long does the ride take, in hours, as a decimal? (b) How many minutes is that? (c) Maeve leaves home at 4:15 pm and training starts at 5:00 pm. What time does she arrive, and is she in time?

Q17. Pia's budgeting app drew this chart of the money she spent in one week.



Made-up data: the app and every number in the chart are made up for this section.

- On which category did Pia spend the most?
- How much did she spend on transport?
- How much more did Pia spend on food than on her phone?

Q18. Jett catches the Rivercity Bus Route 42 to work. The timetable is shown below. The journey takes 50 min and a one-way ticket costs \$ 4.60.

Rivercity Bus — Route 42 to the mall	
Departs (morning)	
8:05 am	8:35 am
9:05 am	9:35 am
Journey time: 50 min One-way fare: \$4.60	

Made-up data: the bus company, times and fare are made up for this section.

- Jett misses the 8:35 am bus. What is the next departure time?
- What time does the 9:05 am bus arrive?
- Jett buys 5 one-way tickets for the week. How much do they cost?

Answers

Q1. (a) \$7.00. (b) \$14.00. (c) \$35.00. **Q2.** (a) \$6.40. (b) \$3.90. (c) \$2,480. **Q3.** (a) \$10. (b) \$30. (c) Yes — $40 \times 0.75 = \$30$ ✓. **Q4.** (a) \$1.40 per L (to the nearest cent). (b) \$1.50 per L (to the nearest cent). (c) The 3 L pack. **Q5.** (a) 24 slices. (b) 3 pizzas. (c) \$37.50. **Q6.** (a) 2.5 kg. (b) 3500 mL. (c) 12 m. **Q7.** (a) \$35.00. (b) \$41.00. (c) \$9.00. **Q8.** (a) \$15. (b) \$18. (c) Soundwave \$45, BeatBox \$42; BeatBox is cheaper by \$3. **Q9.** (a) \$4.80 per L (to the nearest cent). (b) \$4.40 per L (to the nearest cent). (c) The 2 L pack — lower price per litre. **Q10.** (a) \$0.78 per 100 g (to the nearest cent). (b) \$0.82 per 100 g (to the nearest cent). (c) The 750 g box. **Q11.** (a) 72 sausages. (b) 6 packs. (c) \$28.80. **Q12.** (a) 2 h. (b) 10:20 am. (c) \$51.00. **Q13.** (a) 32 people. (b) \$208.00. (c) \$10.50. **Q14.** (a) 125 g. (b) 150 mL. (c) 3:55 pm. **Q15.** (a) 14 m. (b) \$84.00. (c) 12 m^2 . **Q16.** (a) 0.6 h. (b) 36 min. (c) 4:51 pm — yes, before 5:00 pm. **Q17.** (a) Food. (b) \$20. (c) \$30. **Q18.** (a) 9:05 am. (b) 9:55 am. (c) \$23.00.

Fully-worked solutions

Q1. (a) $70 \div 10 = \$7.00$. (b) 20% is double 10%: $7.00 \times 2 = \$14.00$. (c) 50% is half: $70 \div 2 = \$35.00$.

Q2. (a) Six dollars and forty cents is \$6.40 — the cents are the two digits after the point. (b) The dollars are equal, so compare the tenths digit: $9 > 0$, so \$3.90 is dearer. (c) \$2 480 with a comma is \$2,480.

Q3. (a) 25% is a quarter: $40 \div 4 = \$10$. (b) $40 - 10 = \$30$. (c) $40 \times 0.75 = \$30$ ✓ — the same sale price as in (b).

Q4. (a) $4.20 \div 3 = \$1.40$ per litre (to the nearest cent). (b) $3.00 \div 2 = \$1.50$ per litre (to the nearest cent). (c) $\$1.40 < \$1.50$, so the 3 L pack is the better buy per litre.

Q5. (a) $8 \times 3 = 24$ slices. (b) $24 \div 8 = 3$ pizzas. (c) $3 \times 12.50 = \$37.50$.

Q6. (a) $2500 \div 1000 = 2.5$ kg. (b) $3.5 \times 1000 = 3500$ mL. (c) $4 + 2 + 4 + 2 = 12$ m.

Q7. (a) $18.50 + 12.00 + 4.50 = \$35.00$. (b) $35.00 + 6.00 = \$41.00$. (c) $50.00 - 41.00 = \$9.00$ left on the card.

Q8. (a) 25% is a quarter: $60 \div 4 = \$15$. (b) 10% of 60 = \$6; 30% = $3 \times 6 = \$18$. (c) Soundwave: $60 - 15 = \$45$. BeatBox: $60 - 18 = \$42$. $45 - 42 = \$3$, so BeatBox Electronics is cheaper by \$3.

Q9. (a) $7.20 \div 1.5$: multiply both by 10 $\rightarrow 72 \div 15 = \$4.80$ per litre (to the nearest cent). (b) $8.80 \div 2 = \$4.40$ per litre (to the nearest cent). (c) $\$4.40 < \$4.80$, so the 2 L pack is the better buy — it costs less per litre.

Q10. (a) 750 g = 7.5×100 g, so $5.85 \div 7.5 = \$0.78$ per 100 g (to the nearest cent). (b) 500 g = 5×100 g, so $4.10 \div 5 = \$0.82$ per 100 g (to the nearest cent). (c) $\$0.78 < \$0.82$, so the 750 g box is the better value per 100 g.

Q11. (a) $24 \times 3 = 72$ sausages. (b) $72 \div 12 = 6$ packs — it divides evenly, so no rounding up needed. (c) $6 \times 4.80 = \$28.80$. Check: $6 \times 12 = 72$ sausages ✓.

Q12. (a) Time = distance $\div$ speed: $180 \div 90 = 2$ h. (b) 8:20 am + 2 h = 10:20 am. (c) $6 \times 8.50 = \$51.00$.

Q13. (a) $28 + 4 = 32$ people. (b) $32 \times 6.50 = \$208.00$. (c) $336 \div 32 = \$10.50$ per person. Check: $10.50 \times 32 = \$336$ ✓.

Q14. (a) $250 \div 2 = 125$ g of flour. (b) $300 \div 2 = 150$ mL of milk. (c) 3:35 pm + 20 min = 3:55 pm.

Q15. (a) $4 + 3 + 4 + 3 = 14$ m. (b) $14 \times 6.00 = \$84.00$. (c) Area = $4 \times 3 = 12 \text{ m}^2$.

Q16. (a) Time = distance $\div$ speed: $9 \div 15 = 0.6$ h. (b) $0.6 \times 60 = 36$ min. (c) 4:15 pm + 36 min = 4:51 pm. Training starts at 5:00 pm and 4:51 pm is before 5:00 pm, so yes, Maeve is in time. Check: $15 \times 0.6 = 9$ km ✓.

Q17. (a) Food has the longest bar (\$45) — Pia spent the most on food. (b) The transport bar reads \$20. (c) Food less phone: $45 - 15 = \$30$ more on food.

Q18. (a) The departures are 8:05 am, 8:35 am, 9:05 am and 9:35 am; the first after 8:35 am is 9:05 am. (b) 9:05 am + 50 min = 9:55 am. (c) $5 \times 4.60 = \$23.00$.

Theory

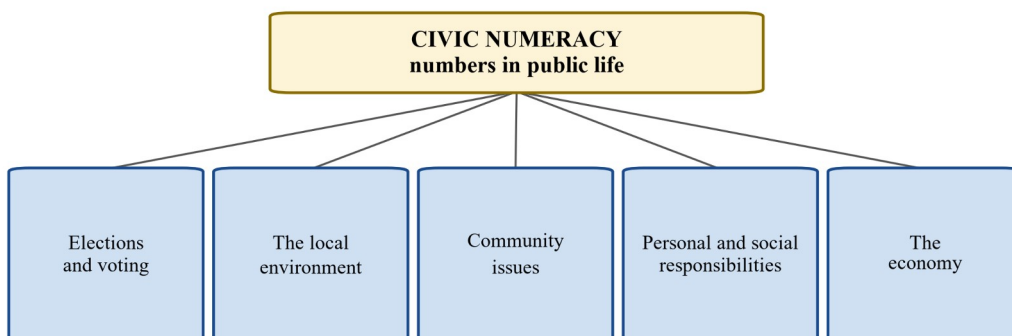
What civic numeracy is. Numbers reach you every day from governments, councils, the news and community groups: how many people voted, what an advertising campaign cost, how many people have jobs, how fast prices are rising. **Civic numeracy** is the skill of reading those numbers and using them to take part in public life. The study design describes civic numeracy as taking part in the life of your community by knowing how to keep up with what is going on, and by making sense of the numbers and facts from government, politics and society, and how they work (Unit 1, Outcome 1).

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

You do not need to be a politics expert. You need the maths in this book — percentages, rates, reading tables and charts — pointed at public-life numbers.

Where civic numbers show up. This section visits the five places civic numbers live:

- **Elections and voting** — people enrolled, people who voted (the **turnout**), and money spent on government advertising campaigns.
- **The local environment** — rubbish collected, metres of riverbank fenced, recycling rates.
- **Community issues** — climate change, human rights, animal welfare, and the care of cultural places.
- **Personal and social responsibilities** — enrolling to vote, volunteering hours, donations.
- **The economy** — unemployment, underemployment, participation, inflation and interest rates.



Rates: a part of a whole. Most civic numbers are a **rate**: one group counted inside a bigger group, written as a percentage. The bigger group is called the **whole**; the group counted is the **part**.

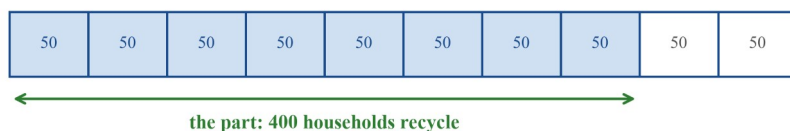
$$\text{rate} = \text{part} \div \text{whole} \times 100$$

A model: a council asks 500 households whether they recycle, and 400 say yes.

$$400 \div 500 = 0.8 \quad 0.8 \times 100 = 80$$

So 80% of the households asked recycle. The picture below shows why: the part fills 8 of the 10 equal blocks of the whole.

The whole: 500 households. Each block is 50 households.



$$\text{Rate} = \text{part} \div \text{whole} \times 100 = 400 \div 500 \times 100 = 80\%$$

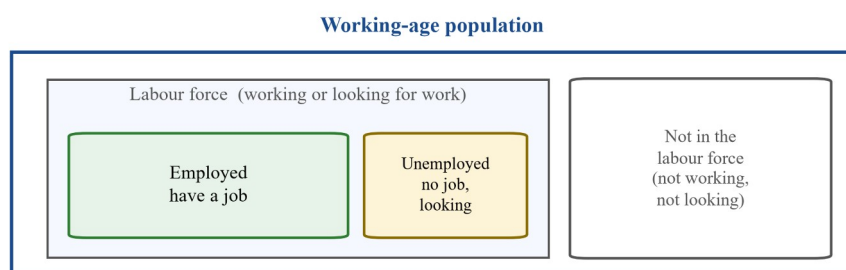
Refresher — decimals and percentages. To turn a decimal into a percentage, multiply by 100: the digits slide two places left, so $0.8 \times 100 = 80$, written 80%. To turn a percentage into a decimal, divide by 100: the digits slide two places right, so $88\% = 88 \div 100 = 0.88$. A percentage is always “out of 100”: 88% means 88 out of every 100.

Refresher — rounding to the nearest whole number. Sometimes the division does not end. Look at the first digit after the decimal point: if it is 4 or less, round down (drop the decimals); if it is 5 or more, round up (add 1 to the whole number). So 69.23... rounds to 69, and 69.5 would round to 70. Always write the words “to the nearest whole number” when you do this, so your reader knows the answer is rounded.

Words of the economy. News about jobs and prices uses a small set of words. Each one is a rate or a percentage you can compute.

Word	What it means
Employed	Has a job.
Unemployed	Has no job and is looking for one.
Labour force	Employed plus unemployed: everyone working or looking for work.
Unemployment rate	Unemployed people as a percentage of the labour force.
Underemployed	Has some work but wants more hours than they get.
Participation rate	The labour force as a percentage of the working-age population.
Inflation rate	How much prices rose in a year, as a percentage.
Interest rate	A percentage of an amount of money, charged for a year on money borrowed (or paid for a year on money saved).

The picture shows how the groups sit inside each other. Notice the whole for the unemployment rate is the **labour force**, not the whole population.



A model: in a small region the labour force is 2 000 people and 100 of them are unemployed, so the unemployment rate is $100 \div 2000 = 0.05$, and $0.05 \times 100 = 5$; the rate is 5%. If the working-age population is 2 500, the participation rate is $2000 \div 2500 = 0.8$, so 80%.

Refresher — comparing two rates: percentage points. To find the gap between two rates, subtract. The gap is counted in **percentage points**. A fall from 6.4% to 4.9% is $6.4 - 4.9 = 1.5$ percentage points. (Subtracting rates is just subtraction of decimals — nothing new.)

Prices going up: inflation and interest rates. When the inflation rate is 5%, things that cost \$100 last year cost \$105 now: the price increased by 5% of itself. An interest rate works the same way on money: 5% interest for a year on \$1 000 borrowed is $0.05 \times 1000 = \$50$ extra to pay back.

Refresher — increasing and decreasing by a percentage. Find the percentage of the amount, then add (increase) or subtract (decrease). Increase by 10%: $\$40 \rightarrow 10\% \text{ of } 40 \text{ is } \$4 \rightarrow 40 + 4 = \$44$. Shortcut: multiply by 1.10, because $40 \times 1.10 = 44$. Decrease by 25%: multiply by 0.75, because $100\% - 25\% = 75\%$ is left. The common percentages are quick by hand: 50% is half, 25% is a quarter, 20% is one fifth, 10% is one tenth, and 5% is half of 10%.

Reading civic displays. Councils and news sites hand you tables, bar charts and line graphs. Before you use any number from a display, check three things: the **title** (what is being counted), the **labels** (what each row, bar or line is), and the **scale** (what each line on the axis is worth). Then read the value you need straight off the display — the end of a bar against the gridlines, or a point on a line graph — and do your maths with that value. Never guess a value between two gridlines if the bar or point does not sit exactly on one.

Refresher — one-step metric conversions. Civic data mixes units: a river length in km or m, rubbish in kg or g, a water tank in L or mL. One step only, each time:

To convert	Multiply or divide	Example
km $\rightarrow$ m	$\times 1000$	3 km = 3 000 m
m $\rightarrow$ cm	$\times 100$	2 m = 200 cm
cm $\rightarrow$ mm	$\times 10$	5 cm = 50 mm
kg $\rightarrow$ g	$\times 1000$	90 kg = 90 000 g
L $\rightarrow$ mL	$\times 1000$	2 L = 2 000 mL

Going the other way (m $\rightarrow$ km, g $\rightarrow$ kg) divides by the same number.

Refresher — time, and the rates you may use. A time duration is the gap between two clock times: 6.00 p.m. to 9.30 p.m. is 3 hours 30 minutes, written 3.5 h (30 minutes is half an hour). Rates in this book: a cost per metre, written \$/m (cost = metres $\times$ dollars per metre); a speed in km/hr (speed = kilometres $\div$ hours); and a cost per hour (cost = hours $\times$ dollars per hour). If you know a speed and a distance, the time is distance $\div$ speed.

The problem-solving cycle on a civic task. Every task in this section runs through the four stages from Chapter 1. Here they are on one civic question: a report claims 3 in every 4 Bellbrook households recycle, and the council's data says 1 800 of its 2 400 households recycle.

Stage	What you do on this task	Why
Stage 1 — Identify: find whether 1 800 of 2 400 is 3 in every 4. Plan: rate = $1\,800 \div 2\,400 \times 100$.	Read the task, pick out the numbers that matter, choose the operation.	
Stage 2 — Act: $1800 \div 2400 = 0.75$; then $0.75 \times 100 = 75$.	Carry out the plan.	
Stage 3 — Evaluate: 75% means 75 of every 100, which is 3 of every 4 — the data matches the report.	Check the answer makes sense and answers the question asked.	
Stage 4 — Report: “The council’s numbers agree with the report: 75% of households recycle, and 75% is 3 in every 4.”	Say in words what the number means.	

Technology. A calculator divides the big numbers quickly, and a spreadsheet can work out a whole column of rates at once — type the rule $\text{part} \div \text{whole} \times 100$ in one cell and fill it down the column. Council reports and news sites publish the charts you read. Nothing in this section needs more than pen, paper and a basic calculator.

About the data in this section. The towns, councils, elections, prices and charts in this section are **made up** (not real): pretend places and pretend numbers, built for this book so you can practise the maths. Nothing here is real data about a real person, place, election or economy.

Worked examples

Example 1 — scaffolded

At the Bellbrook Shire council election:

Bellbrook Shire council election	People
Enrolled (on the electoral roll)	12 000
Votes cast	9 000
Informal votes (papers not filled in correctly, so not counted)	180

Made-up data: the place name and every number in this table are made up for this section.

- What percentage of the enrolled people cast a vote? (This is the turnout.)
- How many enrolled people did not cast a vote?
- What percentage of the votes cast were informal?

Working	Comment
Stage 1 — Identify. For (a): part = 9 000 votes cast, whole = 12 000 enrolled. Plan: rate = $\text{part} \div \text{whole} \times 100$.	Turnout is a rate: votes cast inside enrolled people.
$9\,000 \div 12\,000 = 0.75$	Divide part by whole first.
$0.75 \times 100 = 75$	Decimal to percentage: slide two places.
Stage 4 — Report (a): the turnout was 75%.	75 of every 100 enrolled people voted — see the grid below.
(b) $12\,000 - 9\,000 = 3\,000$	Whole minus part gives the rest.
Report (b): 3 000 enrolled people did not cast a vote.	That is the other 25 squares of the grid.

Working

(c) $180 \div 9\,000 = 0.02$, then $0.02 \times 100 = 2$

Stage 3 — Evaluate (c): 2% is 2 papers in every 100.

Check: $9\,000 \times 0.02 = 180$, which matches the table.

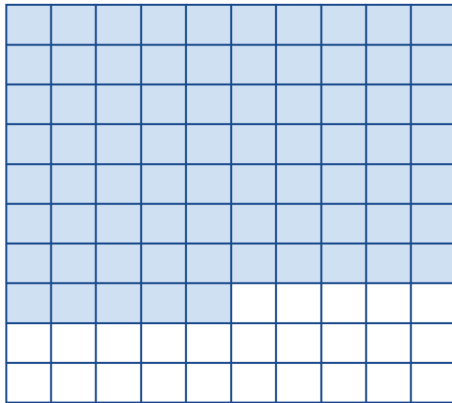
Report (c): 2% of the votes cast were informal.

Comment

New whole here: the 9 000 votes cast, not the 12 000 enrolled.

A check that rebuilds the given number is the safest kind.

Example 1: 9000 of 12 000 enrolled people voted



75 squares of 100 shaded = 75% turnout

Example 2 — scaffolded

Labour force data for the Warrin region:

Warrin region	People
Working-age population	6 500
Labour force	4 500
Unemployed	450

Made-up data: the region name and every number in this table are made up for this section.

- Find the unemployment rate.
- How many people in the labour force are employed?
- Find the participation rate, to the nearest whole number.

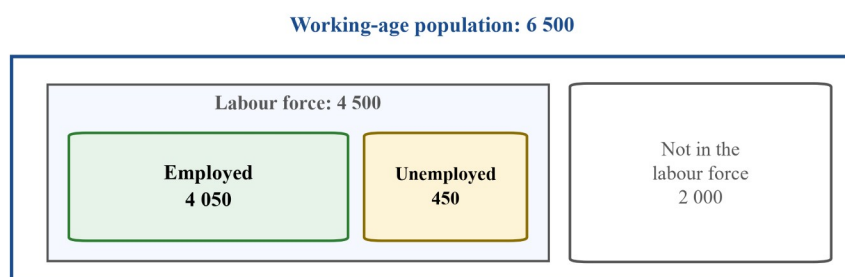
Working

Stage 1 — Identify. Unemployment rate = $\text{unemployed} \div \text{labour force} \times 100$. Part = 450, whole = 4 500.

Comment

Careful: the whole is the labour force, not the whole population.

Working	Comment
(a) $450 \div 4\,500 = 0.1$, then $0.1 \times 100 = 10$	One in every ten of the labour force has no job and wants one.
Report (a): the unemployment rate is 10%.	
(b) $4\,500 - 450 = 4\,050$	Labour force = employed + unemployed, so employed = labour force – unemployed.
Report (b): 4 050 people are employed.	
(c) Participation rate = labour force $\div$ working-age population $\times 100$: $4\,500 \div 6\,500 = 0.6923\dots$	This division does not end — use the rounding refresher from the Theory.
$0.6923\dots \times 100 = 69.23\dots$, and to the nearest whole number this is 69.	First decimal is 2, which is 4 or less, so round down.
Stage 3 — Evaluate. Estimate: 69% is close to 70%, and $0.7 \times 6\,500 = 4\,550$, close to the 4 500 labour force.	An estimate that lands near the given number says the rate is believable.
Report (c): the participation rate is 69%, to the nearest whole number.	



Example 3 — unscaffolded

Last year a Sandy Point family spent \$260 a week on groceries, on average. This year prices have risen by 5% — the inflation rate is 5%. What does the same weekly shopping cost this year?

Solution.

The rise is 5% of \$260:

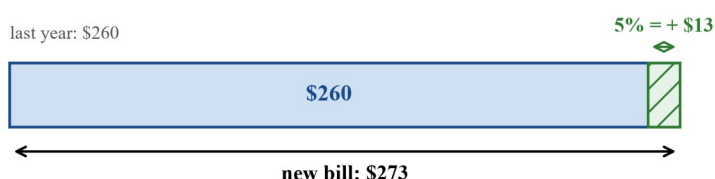
$$0.05 \times 260 = \$13$$

New weekly cost:

$$260 + 13 = \$273$$

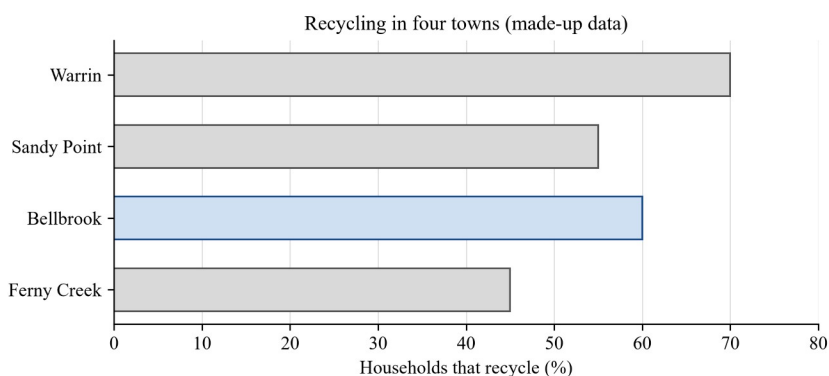
Check by the shortcut: $260 \times 1.05 = 273$, which matches.

$\therefore$ the same weekly shopping costs \$273 this year.



Example 4 — unscaffolded

The bar chart shows the percentage of households that recycle in four towns. Bellbrook has 1 200 households. How many Bellbrook households recycle?



Made-up data: the town names and every percentage in this chart are made up for this section.

Solution.

Read the chart: the Bellbrook bar ends exactly on the 60 gridline, so 60% of Bellbrook households recycle.

Households that recycle:

$$0.60 \times 1\,200 = 720$$

$\therefore$ 720 Bellbrook households recycle.

Practice questions

Scaffolded

Q1. A disability group asked 100 people whether the town hall should build a wheelchair ramp so wheelchair users can reach the front door. 88 people said yes.

- (a) What percentage of the people asked said yes?
- (b) Write that percentage as a decimal.
- (c) How many people did not say yes? What percentage of the 100 is that?

Q2. In the Ferny Creek council election, 4 800 people were enrolled and 3 600 people cast a vote.

- (a) What was the turnout, as a percentage?
- (b) How many enrolled people did not cast a vote?
- (c) Write the turnout as a decimal, and as a fraction in lowest terms.

Q3. A council road-safety advertising campaign buys 4 radio ads at \$350 each.

- (a) What do the 4 radio ads cost altogether?
- (b) The campaign spends 25% of that total on posters. How much is spent on posters?
- (c) How much of the total is left for everything else?

Q4. In one region the labour force is 2 500 people, and 200 of them are unemployed.

- (a) Find the unemployment rate.
- (b) How many people in the labour force are employed?
- (c) Write the unemployment rate as a decimal.

Q5. Volunteers clean 450 kg of rubbish out of a creek.

- (a) 20% of the rubbish was plastic. How many kilograms of plastic were collected?
- (b) Write that plastic weight in grams.
- (c) The walking path beside the creek is 3 km long. Write that length in metres.

Q6. A community group hires the council hall for an enrolment information night, from 6.00 p.m. to 9.30 p.m. The hall costs \$45 per hour.

- (a) How many hours is the hall hired for?
- (b) What does the hire cost?
- (c) Three groups share the cost equally. How much does each group pay?

Unscaffolded

Q7. Results of the Bellbrook council election:

Bellbrook council election	People
Enrolled	4 000
Votes for candidate A	1 650
Votes for candidate B	900
Votes for candidate C	450

Made-up data: the names and every number in this table are made up for this section.

- (a) How many votes were cast altogether?
- (b) What was the turnout, as a percentage of the people enrolled?
- (c) What percentage of the votes cast went to candidate A? Did candidate A get more than half of the votes cast?

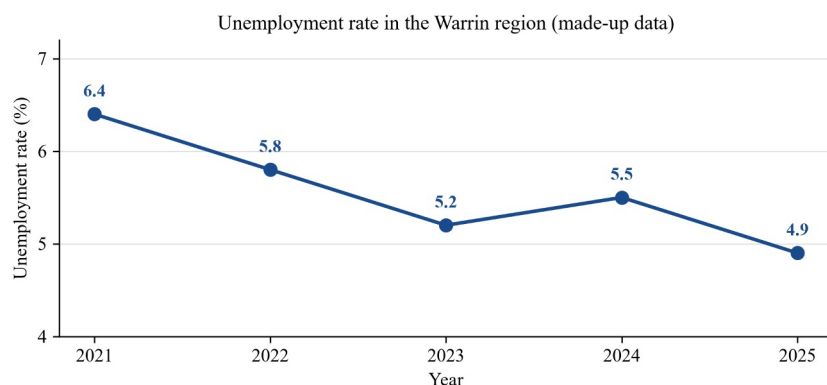
Q8. In one year the inflation rate is 10%.

- (a) A bus fare of \$3.20 rises by 10%. What is the new fare?
- (b) A loaf of bread costing \$2.40 rises by 10%. What is the new price?
- (c) A reporter says the bus fare rose by 32 cents. Was the reporter right? Use your answer to (a).

Q9. A bank charges 5% interest for a year on a loan of \$4 000.

- (a) How much interest is charged for the year?
- (b) What is the total to pay back after one year?
- (c) Write 5% as a decimal.

Q10. The line graph shows the unemployment rate in the Warrin region in each year from 2021 to 2025.



Made-up data: every rate in this graph is made up for this section.

- What was the unemployment rate in 2023?
- In which year was the unemployment rate the highest?
- From 2021 to 2025, how many percentage points did the unemployment rate fall?

Q11. Labour force data for Sandy Point:

Sandy Point	People
Working-age population	8 000
Labour force	5 200
Unemployed	520
Underemployed	260

Made-up data: the place name and every number in this table are made up for this section.

- Find the participation rate.
- Find the unemployment rate.
- What percentage of the labour force is underemployed?

Q12. Average January temperature at a district weather station:

Year	2020	2021	2022	2023
Average January temperature	21.4 °C	22.1 °C	21.8 °C	22.6 °C

Made-up data: every temperature in this table is made up for this section.

- Which year had the hottest average January temperature?
- How much higher was the 2023 average than the 2020 average?
- A news report says the average January temperature rose by more than 1 °C across these four years. Was the report right? Use your answer to (b).

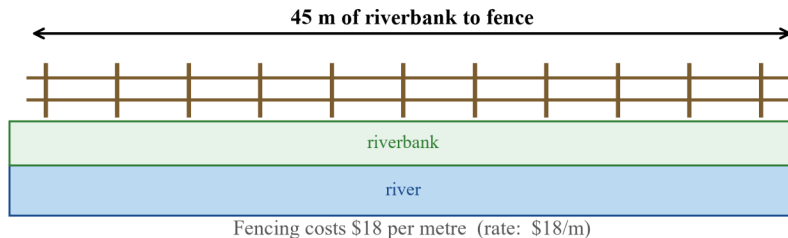
Q13. A council's pet registration list holds 1 180 dogs and 820 cats. The council uses the list to plan animal welfare checks.

- How many pets are registered altogether?
- What percentage of the registered pets are dogs?
- What percentage of the registered pets are cats? Check that your answers to (b) and (c) add to 100%.

Q14. A local cultural place is open to visitors 5 days a week. On each open day, about 250 people visit.

- How many people visit in one week?
- Entry costs \$4 a person. How much entry money is taken on one open day?
- On one open day, 20% of the visitors were school students. How many school students visited that day?

Q15. A river care group fences 45 m of riverbank to keep dogs out of a bird nesting area. Fencing costs \$18 per metre.



- What does the fencing cost before any discount?
- The supplier gives community groups 25% off. How much is the discount?
- How much does the group pay?

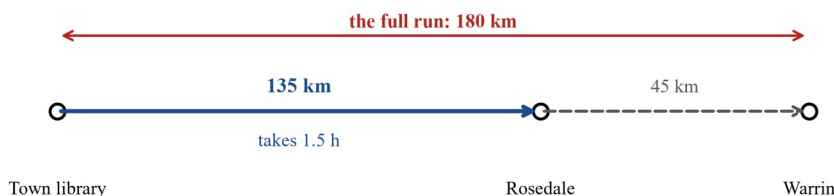
Q16. Jin earns \$680 a week and gives 5% of it to a housing charity.

- How much does Jin give each week?
- How much does Jin give over 4 weeks?
- Jin's friend earns the same \$680 a week and gives \$50 a week to the same charity. Who gives more each week, and by how much?

Q17. In the Sandy Point council election, 2 700 people were enrolled and 2 160 people cast a vote.

- Show that the turnout was 80%.
- How many enrolled people did not cast a vote?
- What percentage of the enrolled people did not cast a vote? Check that your answer and the 80% turnout add to 100%.

Q18. A council mobile library bus drives 135 km from the town library to Rosedale in 1.5 hours.



- What was the average speed of the bus, in km/hr?
- At the same average speed, how long does a 180 km run take?
- The bus leaves the town library at 9.15 a.m. for a 180 km run at the same average speed. What time does it arrive?

Answers

Q1. (a) 88% (b) 0.88 (c) 12 people; 12%

Q2. (a) 75% (b) 1 200 (c) 0.75; $\frac{3}{4}$

Q3. (a) \$1 400 (b) \$350 (c) \$1 050

Q4. (a) 8% (b) 2 300 (c) 0.08

Q5. (a) 90 kg (b) 90 000 g (c) 3 000 m

Q6. (a) 3.5 h (b) \$157.50 (c) \$52.50 each

Q7. (a) 3 000 (b) 75% (c) 55%; yes, more than half

Q8. (a) \$3.52 (b) \$2.64 (c) yes — $\$3.52 - \$3.20 = \$0.32$, which is 32 cents

Q9. (a) \$200 (b) \$4 200 (c) 0.05

Q10. (a) 5.2% (b) 2021 (c) 1.5 percentage points

Q11. (a) 65% (b) 10% (c) 5%

Q12. (a) 2023 (b) 1.2°C (c) yes — 1.2°C is more than 1°C

Q13. (a) 2 000 (b) 59% (c) 41%; and $59\% + 41\% = 100\%$

Q14. (a) 1 250 (b) \$1 000 (c) 50

Q15. (a) \$810 (b) \$202.50 (c) \$607.50

Q16. (a) \$34 (b) \$136 (c) the friend, by \$16 a week

Q17. (a) $2160 \div 2700 = 0.8$ and $0.8 \times 100 = 80$ (b) 540 (c) 20%; and $80\% + 20\% = 100\%$

Q18. (a) 90 km/hr (b) 2 h (c) 11.15 a.m.

Fully-worked solutions

Q1. (a) 88 of the 100 people said yes, and a percentage is out of 100, so 88%. (b) $88 \div 100 = 0.88$. (c) $100 - 88 = 12$ people; 12 of 100 is 12%.

Q2. (a) $\text{Rate} = \text{part} \div \text{whole} \times 100 = 3600 \div 4800 \times 100$. $3600 \div 4800 = 0.75$ and $0.75 \times 100 = 75$: the turnout was 75%. (b) $4800 - 3600 = 1200$ people. (c) 0.75; as a fraction $3600 / 4800 = \frac{3}{4}$ in lowest terms.

Q3. (a) $4 \times 350 = \$1400$. (b) 25% is a quarter: $1400 \div 4 = \$350$. (c) $1400 - 350 = \$1050$.

Q4. (a) $200 \div 2500 = 0.08$; $0.08 \times 100 = 8$: the unemployment rate is 8%. (b) $2500 - 200 = 2300$ people. (c) 0.08.

Q5. (a) 20% of 450 kg: $0.20 \times 450 = 90$ kg. (b) kg $\rightarrow$ g multiplies by 1000: $90 \times 1000 = 90\,000$ g. (c) km $\rightarrow$ m multiplies by 1000: $3 \times 1000 = 3000$ m.

Q6. (a) 6.00 p.m. to 9.30 p.m. is 3 hours 30 minutes = 3.5 h. (b) Cost = hours $\times$ dollars per hour = $3.5 \times 45 = \$157.50$. (c) $157.50 \div 3 = \$52.50$ each.

Q7. (a) $1650 + 900 + 450 = 3000$ votes cast. (b) $3000 \div 4000 = 0.75$; $0.75 \times 100 = 75$: the turnout was 75%. (c) $1650 \div 3000 = 0.55$; $0.55 \times 100 = 55$: candidate A got 55% of the votes cast. Half is 50%, and 55% is more than 50%, so yes, candidate A got more than half.

Q8. (a) 10% of \$3.20 is \$0.32; new fare = $3.20 + 0.32 = \$3.52$. (b) 10% of \$2.40 is \$0.24; new price = $2.40 + 0.24 = \$2.64$. (c) The rise is $3.52 - 3.20 = \$0.32$, which is 32 cents, so yes, the reporter was right.

Q9. (a) $0.05 \times 4\,000 = \$200$. (b) $4\,000 + 200 = \$4\,200$. (c) $5 \div 100 = 0.05$.

Q10. (a) Read the point above 2023: 5.2%. (b) The highest point is above 2021 (6.4%). (c) $6.4 - 4.9 = 1.5$: the rate fell by 1.5 percentage points.

Q11. (a) Participation rate $= 5\,200 \div 8\,000 = 0.65$; $0.65 \times 100 = 65$: 65%. (b) Unemployment rate $= 520 \div 5\,200 = 0.1$; $0.1 \times 100 = 10$: 10%. (c) $260 \div 5\,200 = 0.05$; $0.05 \times 100 = 5$: 5% of the labour force is underemployed.

Q12. (a) 22.6 °C is the largest number in the table: 2023. (b) $22.6 - 21.4 = 1.2$ °C higher. (c) Yes: 1.2 °C is more than 1 °C, so the report was right.

Q13. (a) $1\,180 + 820 = 2\,000$ pets. (b) $1\,180 \div 2\,000 = 0.59$; $0.59 \times 100 = 59$: 59% are dogs. (c) $820 \div 2\,000 = 0.41$; $0.41 \times 100 = 41$: 41% are cats. Check: 59% + 41% = 100%, which is the whole list.

Q14. (a) $250 \times 5 = 1\,250$ people in a week. (b) $250 \times 4 = \$1\,000$ on one open day. (c) 20% is one fifth: $250 \div 5 = 50$ school students.

Q15. (a) Cost = metres $\times$ dollars per metre $= 45 \times 18 = \$810$. (b) 25% off: $0.25 \times 810 = \$202.50$. (c) $810 - 202.50 = \$607.50$. (Check: $810 \times 0.75 = 607.50$.)

Q16. (a) $0.05 \times 680 = \$34$ a week. (b) $34 \times 4 = \$136$. (c) The friend gives \$50 and Jin gives \$34; $50 - 34 = \$16$, so the friend gives \$16 more each week.

Q17. (a) Turnout = votes cast $\div$ people enrolled

$$= 2\,160 \div 2\,700$$

$$= 0.8$$

$$0.8 \times 100 = 80$$

so the turnout was 80%, as required. (b) $2\,700 - 2\,160 = 540$ people. (c) $540 \div 2\,700 = 0.2$; $0.2 \times 100 = 20$: 20%. Check: 80% + 20% = 100%, the whole enrolment.

Q18. (a) Speed = distance $\div$ time $= 135 \div 1.5 = 90$ km/hr. (b) Time = distance $\div$ speed $= 180 \div 90 = 2$ h. (c) 9.15 a.m. plus 2 h is 11.15 a.m., so the bus arrives at 11.15 a.m.

Chapter 6 Unit 1 numeracy in context — 6C Financial numeracy

About the data in this section. Every pay rate, price, plan, bill and loan in this section is made up (not real). They were written for this book so the numbers stay friendly while you learn the skills. Real tax, super, student-loan and interest numbers depend on the person and change over time, so every question tells you the exact numbers to use. One fact here is real: GST in Australia is 10% of the price before GST — and each question still writes it in, so you can see it working.

Theory

The study design describes financial numeracy as understanding money as it moves in and out, making those moves yourself, and choosing how to spend and look after your money once you know the facts (Unit 1, Outcome 1).

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

That is the whole section in one sentence: money moves, you watch it move, and you make choices about it. Every topic below is one of those moves.

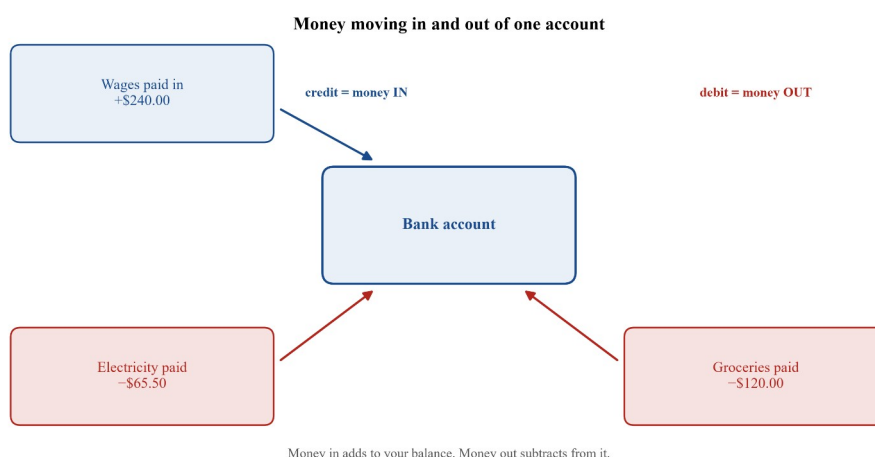
Money in, money out: your account. A **transaction** is any time money moves in or out of your account. Money in is a **credit** (your pay, a refund, a gift). Money out is a **debit** (rent, groceries, a bill). Your **balance** is what is in the account right now: credits add to it, debits subtract from it. Watching your credits and debits as they happen is called **monitoring** your account, and it is the single most useful money habit there is.

Here is one small account for one week:

Day	Details	Money in (+)	Money out (−)	Balance
Mon	Opening balance			\$150.00
Tue	Wages	\$240.00		\$390.00
Wed	Electricity		\$65.50	\$324.50
Fri	Groceries		\$120.00	\$204.50

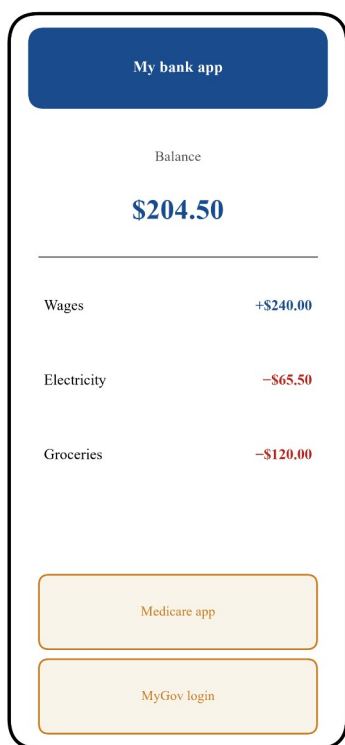
Made-up data: one pretend week in one pretend account, so you can watch the balance move.

Start at \$150.00. The wages are a credit, so add: $150.00 + 240.00 = 390.00$, so \$390.00. The electricity is a debit, so subtract: $390.00 - 65.50 = 324.50$, so \$324.50. Then $324.50 - 120.00 = 204.50$, so the week closes at \$204.50.



Two arrows into and out of a bank account box: money in is a credit and adds to the balance, money out is a debit and subtracts from it.

Same account, in your pocket



Banking, Medicare and MyGov all work like this — website or app, your choice.

A phone running a bank app, showing a balance of \$204.50 and the same three transactions as the table, plus buttons for the Medicare app and MyGov login.

Refresher 1 — Adding and subtracting money. Money amounts always keep two decimal places (the cents). Line the decimal points up under each other, add or subtract as if they were whole numbers, then put the decimal point back in the same place.

$240.50 + 63.25 = 303.75$ — line up the points and the cents look after themselves.

$303.75 - 88.40 = 215.35$ — same rule for subtracting.

If an amount looks like a whole number of dollars, give it cents anyway: \$60 means \$60.00. It keeps every column lined up.

Banking, Medicare and MyGov online. Most money moves happen on a screen now: your bank's app or website, **Medicare** (Australia's public health care), and **MyGov** (one login that reaches government services, including Medicare and your tax). The numeracy is the same as on paper — read the amount, check it is what you expected, then confirm. Three safety habits belong with it: type the website address yourself or use your saved app instead of clicking a link in a message; never share a password or a one-off code, because banks and government services will not ask for them by text; and check the balance after a payment lands, not just before.

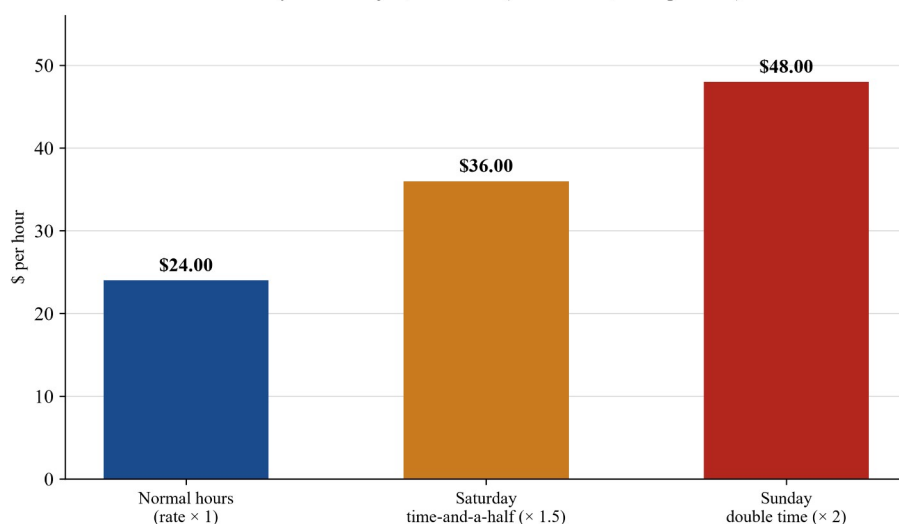
Work income 1: penalty rates. Your **rate** is your pay per hour. Many jobs pay extra for unpopular hours — nights, Saturdays, Sundays, public holidays. That extra is a **penalty rate**, and it is a multiple of your normal rate: *time-and-a-half* means $\text{rate} \times 1.5$, *double time* means $\text{rate} \times 2$.

Say your normal rate is \$24.00 per hour:

- Saturday, time-and-a-half: $24.00 \times 1.5 = 36.00$, so \$36.00 per hour. Three Saturday hours pay $36.00 \times 3 = 108.00$, so \$108.00.

- Sunday, double time: $24.00 \times 2 = 48.00$, so \$48.00 per hour.

Penalty rates: one job, three rates (normal rate \$24.00 per hour)



Bar chart of the hourly rate \$24.00 at normal hours, \$36.00 at time-and-a-half and \$48.00 at double time.

Refresher 2 — Time as a decimal number of hours. Pay is rate $\times$ hours, so hours need to be one number, not “3 hours 45 minutes”. Minutes become a decimal by dividing by 60: a quarter of an hour (15 minutes) is $15 \div 60 = 0.25$ of an hour.

Time	As decimal hours
15 minutes	0.25
30 minutes	0.5
45 minutes	0.75
1 hour 15 minutes	1.25
2 hours 30 minutes	2.5

Going back the other way, $0.5 \times 60 = 30$, so 0.5 of an hour is 30 minutes.

Work income 2: commission. Some jobs pay by results. A **commission** is a percentage of the money your sales bring in. A salesperson might get a small fixed amount each week (a **retainer**) plus commission on top. Say the commission is 5% of sales and the retainer is \$150.00: on \$1 400 of sales the commission is $1400 \times 0.05 = 70$, so \$70.00, and the week’s pay is $150.00 + 70.00 = 220.00$, so \$220.00.

Pay: tax, GST, super and student loans. Four names appear on pay and prices, so meet them together.

- **Tax** is money the government takes from your pay. The pay before tax is your **gross pay**; what lands in your account after tax is your **take-home pay**. On a gross pay of \$800.00 with 20% taken as tax: tax is $800.00 \times 0.20 = 160.00$, and take-home pay is $800.00 - 160.00 = 640.00$.
- **GST** (goods and services tax) is added to most prices in Australia at 10%. A job quoted at \$80.00 before GST costs $80.00 + 8.00 = 88.00$ once GST is added.
- **Superannuation** (say *super*) is money for your retirement. Your employer pays it into your super fund **on top** of your pay — it is not taken out of it. At 10% of a \$800.00 gross pay, that is \$80.00 into the fund.
- A **student loan** is repaid slowly out of your pay once you are earning: a percentage of each pay goes to the loan instead of to you. In this book we always tell you the percentage; on a \$900.00 pay at 5%, that is $900.00 \times 0.05 = 45.00$, so \$45.00.



Take-home pay = gross pay - tax.

A pay slip showing gross pay \$800.00, tax taken out \$160.00 and take-home pay \$640.00, beside a dashed box showing super of \$80.00 paid on top by the employer.

Refresher 3 — Common percentages, built from 10%. You rarely need a calculator for the percentages in this book, because they are all built from 10%. Find 10% first (that is one-tenth: move the digits one place down), then double it, halve it, or add blocks together.

On \$320.00:

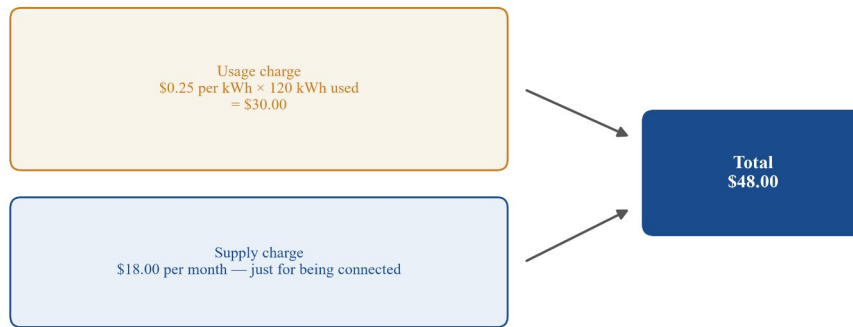
Percentage	How	Answer
10%	one-tenth of 320	\$32.00
5%	half of the 10% block	\$16.00
20%	two 10% blocks	\$64.00
25%	two 10% blocks + one 5% block	\$80.00
50%	half of 320	\$160.00

The same trick reads the other way: 15% is a 10% block plus a 5% block.

Allowances for work. An **allowance** is money given for one specific purpose, on top of pay. A **travel or vehicle allowance** pays you back for using your own car for work, as a rate per kilometre: at \$0.85 per km, driving 40 km for work gives $0.85 \times 40 = 34.00$, so \$34.00. A **uniform allowance** is a set amount per year towards work clothes. The rule to remember is the rate pattern you met in Section 5B: total = rate $\times$ how many.

Bills and comparing providers. A power or phone bill usually has two parts: a **supply charge** (a set amount each month just for being connected) and a **usage charge** (a rate for each unit you use). Electricity is measured in kilowatt-hours (**kWh**). A bill with a \$18.00 supply charge and a \$0.25 per kWh usage charge, after using 120 kWh, is $18.00 + (0.25 \times 120) = 18.00 + 30.00 = 48.00$, so \$48.00. Different providers charge different supply and usage amounts, so the cheapest plan depends on how much you use — which is exactly what Example 3 and Question 13 compare.

One electricity bill, two parts



kWh = kilowatt-hour — the unit your electricity use is measured in.

One electricity bill split into its two parts: a supply charge of \$18.00 and a usage charge of \$0.25 per kWh times 120 kWh, totalling \$48.00.

Borrowing money: loans, interest, buy now pay later, store credit. When you **borrow** money you always pay back more than you took. The extra is **interest**. Say you borrow \$1 500 and the interest over the loan is 20% of what you borrowed: interest is $1500 \times 0.20 = 300$, so \$300.00, and you repay $1500 + 300 = 1800$ in total — here as 12 equal monthly payments of $1800 \div 12 = 150$, so \$150.00 each.

What a loan really costs



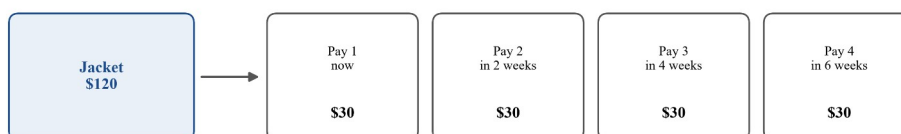
Repaid as 12 equal monthly repayments of \$150 each.

You always repay more than you borrowed — the extra is the interest.

A horizontal bar: borrowed \$1 500 plus interest \$300 equals \$1 800 to repay, paid as 12 equal monthly repayments of \$150.

- **Buy now, pay later (BNPL)** splits one price into a few equal payments over some weeks, with no interest if every payment is on time. A \$120 jacket becomes 4 payments of $120 \div 4 = 30$, so \$30.00 each. A late payment adds a fee — that is how BNPL makes its money.
- **Store credit** (a store card or “pay later” account) lets you owe the store and pay it off over time. Each month there is a **minimum repayment**, often a small percentage of what you still owe. On \$400.00 still owed with a 5% minimum, the minimum is $400.00 \times 0.05 = 20.00$, and you would still owe $400.00 - 20.00 = 380.00$. Paying only the minimum keeps you owing for a long time.

Buy now, pay later: a \$120 jacket split into 4



No interest if every payment is on time — a late payment adds a fee.

A \$120 jacket split into four equal payments of \$30: now, in 2 weeks, in 4 weeks and in 6 weeks.

An app or an online interest calculator can do any of this arithmetic for you, and checking with one is a good habit — but every question here is small enough for paper and a basic calculator, so the choice is always yours.

Safe transacting and scams. A **scam** is a trick to get your money or your details. Scams often arrive as a text or email that looks like a bill, a bank, or a delivery. Before you pay anything from a message, stop and check it against what you know.

Got a message asking for money? Stop and check.

-  Is the amount the same as your real bill or app?
-  Do you actually know the sender?
-  Are they rushing you or threatening you?
-  Do they want you to click a link or pay an odd way?

If anything fails the check: don't click, don't pay.
Contact the company yourself, using a number you find — then delete the message.

A checklist titled “Got a message asking for money? Stop and check”: does the amount match your real bill or app, do you know the sender, are they rushing or threatening you, do they want you to click a link or pay an odd way — with a warning box: if anything fails the check, don’t click and don’t pay.

The cheapest move in money numeracy is the one you do not make: if a message fails the check, do not click and do not pay. Open your own app, or ring the company on a number you found yourself, and ask. Then delete the message.

Specials and discounts. A **special** takes a percentage off the tag price. That is a percentage *decrease*, and the next refresher is the tool for it.

Refresher 4 — Increasing and decreasing by a percentage. To increase by a percentage, find the percentage and add it. To decrease, find it and subtract.

Increase \$40.00 by 10%: 10% of 40 is \$4.00, so $40.00 + 4.00 = 44.00$. (Shortcut: $40 \times 1.10 = 44$.)

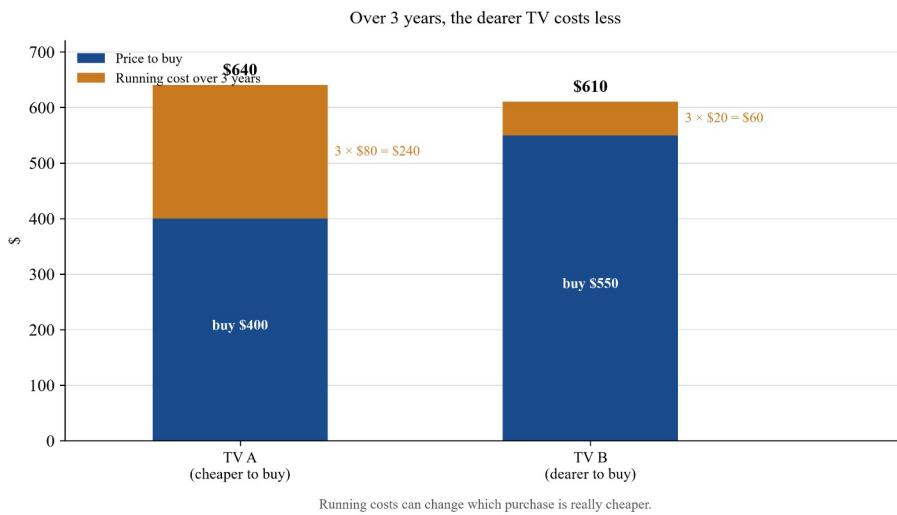
Decrease \$40.00 by 25%: 25% of 40 is \$10.00, so $40.00 - 10.00 = 30.00$. (Shortcut: $40 \times 0.75 = 30$.)

A 20% discount on a \$150.00 tag takes $150.00 \times 0.20 = 30.00$ off, so the sale price is $150.00 - 30.00 = 120.00$.

Buying now or later: short-term and long-term cost. The tag price is the **short-term** cost. The **long-term** cost adds what the thing costs to keep going — its **running cost**, like the electricity a machine uses each year. Two televisions:

- TV A: \$400.00 to buy, \$80.00 a year to run. Over 3 years: $400 + (3 \times 80) = 400 + 240 = 640$, so \$640.00.
- TV B: \$550.00 to buy, \$20.00 a year to run. Over 3 years: $550 + (3 \times 20) = 550 + 60 = 610$, so \$610.00.

TV A is cheaper to buy, but over 3 years TV B costs $640.00 - 610.00 = 30.00$ less in total. Running costs can flip the answer — and a machine that uses less power is also lighter on the planet, which is a bonus worth noticing.



Stacked bar chart over 3 years: TV A costs \$400 to buy plus \$240 to run, total \$640; TV B costs \$550 to buy plus \$60 to run, total \$610.

A habit for every money question. Work the same four steps each time. **Plan:** read twice and write down what the question is asking, in your own words. **Solve:** one step per line, keeping dollars and cents lined up. **Check:** estimate first or work backwards afterwards — if the estimate and the answer disagree, one of them is wrong. **Communicate:** finish with a sentence that says what the number means, with the dollars in it. A calculator or an app is welcome at the solve step; the plan and the check are yours.

Worked examples

Example 1 — scaffolded

Casey's bank account opens the week at \$320.45. The week's transactions are:

Day	Details	Money in (+)	Money out (−)
Tue	Wages	\$612.80	
Wed	Rent		\$410.00
Fri	Groceries		\$58.25

Made-up data: a pretend week in Casey's pretend account.

- Find the balance after the wages are credited.
- Find the balance after the rent is paid.
- Find the closing balance, and say which transactions are credits and which are debits.

Working	Comment
$320.45 + 612.80 = 933.25$	(a) a credit adds to the balance
$933.25 - 410.00 = 523.25$	(b) a debit subtracts from it
$523.25 - 58.25 = 465.00$	(c) the last debit gives the closing balance

Wages = credit; rent and groceries = debits

naming the rows

Check by working backwards from the closing balance: $465.00 + 58.25 + 410.00 - 612.80 = 320.45$, which is exactly the opening balance — so the three steps agree.

Casey's bank app — activity			
Details	In (+)	Out (–)	Balance
Opening balance			\$320.45
Tue Wages	+\$612.80		\$933.25
Wed Rent		–\$410.00	\$523.25
Fri Groceries		–\$58.25	\$465.00
Closing balance			\$465.00

Every row shows the new balance — money in adds, money out subtracts.

Casey's bank app after the week: opening balance \$320.45, wages +\$612.80 giving \$933.25, rent –\$410.00 giving \$523.25, groceries –\$58.25 giving a closing balance of \$465.00.

Example 2 — scaffolded

Dylan earns \$25.00 per hour at a café. Saturday hours are paid at time-and-a-half. This week Dylan works 4 hours on weekdays and 3 hours on Saturday.

Dylan's week at the café	
Mon and Tue: 4 hours total	— normal rate \$25.00 per hour
Saturday: 3 hours	— time-and-a-half
time-and-a-half = normal rate $\times$ 1.5	

Different hours, different rates — work out each part, then add.

Dylan's roster card: Monday and Tuesday, 4 hours total at the normal rate of \$25.00 per hour; Saturday, 3 hours at time-and-a-half.

- Find Dylan's Saturday hourly rate.
- Find Dylan's pay for the 3 Saturday hours.
- Find Dylan's total pay for the week.

$$25.00 \times 1.5 = 37.50$$

$$37.50 \times 3 = 112.50$$

$$25.00 \times 4 = 100.00$$

$$100.00 + 112.50 = 212.50$$

(a) time-and-a-half means rate $\times$ 1.5

(b) 3 Saturday hours at the penalty rate
the weekday hours at the normal rate

(c) add the two parts of the week

Working	Comment
7 hours at the normal rate would be \$175.00	check: \$212.50 is above it, as some hours earn a penalty — reasonable

Example 3 — unscaffolded

Fatima uses about 30 GB of home internet data each month. Two providers offer these made-up plans:

Plan	Set charge each month	Charge per GB
NetFast	\$20.00	\$1.50
FibreSave	\$40.00	\$0.50

Made-up data: pretend providers and pretend prices, written for this example.

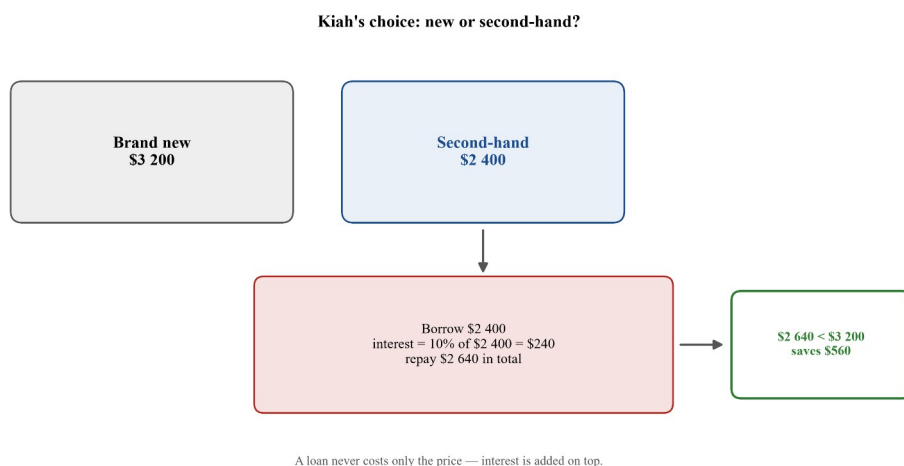
- Find the monthly cost of NetFast for 30 GB.
- Find the monthly cost of FibreSave for 30 GB.
- Which plan is cheaper for Fatima, and by how much each month?

Each plan costs its set charge plus its rate times the GB used. NetFast: $20.00 + (1.50 \times 30) = 20.00 + 45.00 = 65.00$, so \$65.00 a month. FibreSave: $40.00 + (0.50 \times 30) = 40.00 + 15.00 = 55.00$, so \$55.00 a month. The difference is $65.00 - 55.00 = 10.00$.

$\therefore$ FibreSave is cheaper for Fatima's 30 GB, by \$10.00 each month — the dearer set charge is beaten by the cheaper rate per GB.

Example 4 — unscaffolded

Kiah wants a scooter. A brand-new one costs \$3 200.00. A second-hand one costs \$2 400.00, and Kiah can borrow exactly \$2 400.00 to buy it; the loan adds interest equal to 10% of the amount borrowed.



Two price tags, brand new \$3 200 and second-hand \$2 400; borrowing the \$2 400 adds interest of 10%, which is \$240, so \$2 640 is repaid in total — still \$560 less than the new price.

- Find the interest on the loan.
- Find the total amount Kiah repays on the loan.
- How much cheaper is buying second-hand with the loan than buying new?

Interest is 10% of the amount borrowed: one-tenth of \$2 400.00 is \$240.00. The total repaid is the borrowed money plus the interest: $2400.00 + 240.00 = 2640.00$, so \$2 640.00. Compared with the new price, $3200.00 - 2640.00 = 560.00$.

∴ Buying second-hand with the loan costs \$560.00 less than buying new: the loan's interest makes the second-hand route dearer than \$2 400.00, but not dearer than \$3 200.00.

Practice questions

Scaffolded

Q1. Paige's bank account opens the day at \$180.20. That day, Paige's wages of \$340.00 are credited, then Paige buys petrol with the debit card for \$65.30.

- (a) Say which transaction is the credit and which is the debit.
- (b) Find the balance after the wages are credited.
- (c) Find the balance at the end of the day.

Q2. Find each amount.

- (a) GST of 10% on a repair quoted at \$70.00 before GST.
- (b) Quinn's student loan takes 5% of each pay. Quinn's pay this week is \$900.00. How much goes to the loan?
- (c) Vera's employer pays super of 10% of Vera's gross pay into Vera's super fund. Vera's gross pay is \$500.00. How much goes into the fund?

Q3. Wyatt's normal rate at a bakery is \$22.00 per hour. Sunday hours are paid at double time.

- (a) Find Wyatt's Sunday hourly rate.
- (b) Find Wyatt's pay for 4 Sunday hours.
- (c) Wyatt also works 6 hours at the normal rate that week. Find Wyatt's total pay for the week.

Q4. Billie owes \$250.00 on a store card. The minimum repayment each month is 10% of the amount still owed.

- (a) Find this month's minimum repayment.
- (b) Find how much Billie still owes after paying only the minimum.
- (c) Billie pays \$75.00 instead. Find how much Billie still owes then, and say in one sentence why paying more than the minimum helps.

Q5. Cooper buys a \$240.00 jacket using buy now, pay later: 4 equal payments, one every two weeks, with no interest if every payment is on time.

- (a) Find the size of each payment.
- (b) Find the total Cooper pays if every payment is on time.
- (c) One payment is late and the service adds a \$9.00 late fee. Find the total Cooper pays then.

Q6. A shoe store has a special: 25% off every tag price. Evie chooses boots tagged at \$90.00.

- (a) Find the amount taken off the tag price.
- (b) Find the sale price of the boots.
- (c) Evie pays with a \$100.00 note. Find the change.

Unscaffolded

Q7. Hamish's bank statement for a week is shown below. Find (a) the balance after the groceries, (b) the balance after the wages, and (c) the closing balance.

Day	Details	Money in (+)	Money out (–)
—	Opening balance:		
	\$245.60		
Mon	Groceries		\$76.35
Tue	Wages	\$520.00	
Wed	Cash from ATM		\$80.00
Thu	Mobile bill		\$45.25

Made-up data: a pretend week in Hamish's pretend account.

Q8. Indi's rate at a garden centre is \$23.50 per hour. In one week Indi works 26 hours at the normal rate, 4 hours on Saturday at time-and-a-half, and 3 hours on Sunday at double time. Find (a) Indi's Saturday hourly rate, (b) Indi's Sunday hourly rate, and (c) Indi's total pay for the week.

Q9. Kirra is choosing between two sales jobs. Job A pays a flat \$500.00 per week. Job B pays \$200.00 per week plus commission of 10% of Kirra's sales, and Kirra expects to sell \$4 000.00 worth of goods in a week. Find (a) the commission Job B would pay for that week, (b) Job B's total pay for that week, and (c) which job pays more for that week, and by how much.

Q10. A gardener quotes Levi \$450.00 for a job, before GST. GST of 10% is added to the quote. Find (a) the GST amount, (b) the total bill, and (c) the change if Levi pays with \$500.00 in cash.

Q11. Olive's pay slip shows a gross pay of \$860.00. Tax of 15% is taken out of the gross pay. Olive's employer also pays super of 10% of the gross pay into Olive's super fund, on top of the pay. Find (a) the tax taken out, (b) Olive's take-home pay, and (c) the super payment into Olive's fund.

Q12. Piper uses her own car for work. Her employer pays a travel allowance of \$0.78 per km for work trips, and this week Piper drove 150 km for work. Piper also gets a uniform allowance of \$280.00 a year, and has spent \$243.60 of it on work clothes. Find (a) this week's travel allowance, (b) whether it covers Piper's \$96.50 fuel cost for those kilometres, and by how much, and (c) how much of the uniform allowance is left for the year.

Q13. Remy's household uses about 250 kWh of electricity each month. Two providers offer these made-up plans:

Provider	Supply charge each month	Usage charge per kWh
Riverland Power	\$22.00	\$0.28
Coastline Energy	\$35.00	\$0.20

Made-up data: pretend providers and pretend prices, written for this question.

Find (a) Riverland Power's monthly cost for 250 kWh, (b) Coastline Energy's monthly cost for 250 kWh, and (c) which provider is cheaper for Remy's household, and by how much each month.

Q14. Wren borrows \$12 000 as a car loan. The total interest over the whole loan is \$1 800.00, and the loan is repaid in 45 equal monthly repayments. Find (a) the total amount Wren repays, and (b) the size of each monthly repayment, to the nearest cent. (c) Wren checks part (b) on an online interest calculator by multiplying back:
 $45 \times 306.67 = 13\,800.15$. Explain in one sentence why that total is a little more than your answer to (a).

Q15. Skye needs \$300 in a hurry. A payday loan company charges a fee of \$24 for every \$100 borrowed, all repaid in two weeks. Skye's bank would lend the same \$300 for \$6.00 total interest. Find (a) the payday company's fee on \$300, (b) the total Skye repays the payday company, and (c) how much more the payday loan costs than the bank loan.

Q16. Yasmin is buying a \$360.00 tablet. Shop A offers buy now, pay later: 4 equal payments, no interest if all on time. Shop B offers 5% off the price if Yasmin pays cash on the day. Find (a) the size of each Shop A payment, (b) the cash price at Shop B, and (c) which shop costs Yasmin less if every Shop A payment is on time, and by how much.

Q17. Vince receives this text message from an unknown number, and then opens his phone provider's app to check.

Same phone, two very different numbers

From: unknown number

URGENT: Your phone bill of \$186.40 is overdue. Pay now or your service will be cut off. Click here: [secure-payments-bill.link](#)

My provider's app

Current bill

\$86.40

Not due until next week.
No overdue notice.

The amounts do not match: \$186.40 vs \$86.40 — a difference of \$100.00.
Real companies don't threaten you with a link.

A text message claiming an overdue bill of \$186.40 with a link and a threat to cut off the service, beside Vince's own provider app showing a current bill of \$86.40 that is not due yet — the amounts differ by \$100.00.

- (a) How much more does the message claim than Vince's real bill?
- (b) Give two signs that the message is a scam.
- (c) Say what Vince should do instead of clicking the link.

Q18. A family is choosing between two washing machines. The new machine costs \$780.00 and uses about \$90.00 of electricity a year. The second-hand machine costs \$300.00 and uses about \$150.00 of electricity a year. Find (a) the total cost of the new machine over 4 years, buying price included, (b) the total cost of the second-hand machine over 4 years, buying price included, and (c) which machine costs less over the 4 years, and by how much.

Answers

Scaffolded

1.
(a) wages = credit, petrol = debit (b) \$520.20 (c) \$454.90
2.
(a) \$7.00 (b) \$45.00 (c) \$50.00
3.
(a) \$44.00 (b) \$176.00 (c) \$308.00
4.
(a) \$25.00 (b) \$225.00 (c) \$175.00 — the amount still owed shrinks faster, so it is cleared sooner
5.
(a) \$60.00 (b) \$240.00 (c) \$249.00
6.
(a) \$22.50 (b) \$67.50 (c) \$32.50

Unscaffolded

7.
(a) \$169.25 (b) \$689.25 (c) \$564.00
8.
(a) \$35.25 (b) \$47.00 (c) \$893.00
9.
(a) \$400.00 (b) \$600.00 (c) Job B, by \$100.00
10.
(a) \$45.00 (b) \$495.00 (c) \$5.00
11.
(a) \$129.00 (b) \$731.00 (c) \$86.00
12.
(a) \$117.00 (b) yes — it covers the fuel with \$20.50 left over (c) \$36.40
13.
(a) usage \$70.00, total \$92.00 (b) \$85.00 (c) Coastline Energy, by \$7.00 a month
14.
(a) \$13 800.00 (b) \$306.67 (c) each repayment was rounded up to the nearest cent, so 45 of them add up to \$13 800.15 — 15 cents more than the exact total
15.
(a) \$72.00 (b) \$372.00 (c) \$66.00 more
16.
(a) \$90.00 (b) \$342.00 (c) Shop B's cash price, by \$18.00
17.
(a) \$100.00 (b) any two of: the amount does not match Vince's own app; the sender is an unknown number with a link; the message rushes and threatens him (c) do not click or pay; check his own app or ring the provider on a number he finds himself; then delete and report the message
18.
(a) \$1 140.00 (b) \$900.00 (c) the second-hand machine, by \$240.00

Fully-worked solutions

Q1. (b) The wages credit adds: $180.20 + 340.00 = 520.20$. (c) The petrol debit subtracts: $520.20 - 65.30 = 454.90$. $\therefore$ The balance is \$520.20 after the wages and \$454.90 at the end of the day; the wages are the credit and the petrol is the debit.

Q2. (a) $70.00 \times 0.10 = 7.00$. (b) $900.00 \times 0.05 = 45.00$. (c) $500.00 \times 0.10 = 50.00$. $\therefore$ The GST is \$7.00, the loan repayment is \$45.00, and the super payment is \$50.00.

Q3. (a) Double time: $22.00 \times 2 = 44.00$. (b) $44.00 \times 4 = 176.00$. (c) Normal hours: $22.00 \times 6 = 132.00$; total: $176.00 + 132.00 = 308.00$. $\therefore$ Wyatt earns \$44.00 per Sunday hour, \$176.00 for the four Sunday hours, and \$308.00 for the week.

Q4. (a) $250.00 \times 0.10 = 25.00$. (b) $250.00 - 25.00 = 225.00$. (c) $250.00 - 75.00 = 175.00$. $\therefore$ The minimum is \$25.00, leaving \$225.00 owed; paying \$75.00 leaves \$175.00 owed, and paying more than the minimum shrinks the amount owed faster, so the card is cleared sooner and costs less in the long run.

Q5. (a) $240.00 \div 4 = 60.00$. (b) On time, the payments total the price: $4 \times 60.00 = 240.00$. (c) With the fee: $240.00 + 9.00 = 249.00$. $\therefore$ Each payment is \$60.00; on time Cooper pays exactly \$240.00, and one late payment makes it \$249.00.

Q6. (a) 25% of \$90.00: $90.00 \times 0.25 = 22.50$. (b) $90.00 - 22.50 = 67.50$. (c) $100.00 - 67.50 = 32.50$. $\therefore$ The special takes \$22.50 off, the boots cost \$67.50, and Evie's change is \$32.50.

Q7. (a) $245.60 - 76.35 = 169.25$. (b) $169.25 + 520.00 = 689.25$. Then $689.25 - 80.00 = 609.25$, and (c) $609.25 - 45.25 = 564.00$. $\therefore$ The balance is \$169.25 after the groceries, \$689.25 after the wages, and the week closes at \$564.00.

Q8. (a) $23.50 \times 1.5 = 35.25$. (b) $23.50 \times 2 = 47.00$. (c) Normal: $23.50 \times 26 = 611.00$; Saturday: $35.25 \times 4 = 141.00$; Sunday: $47.00 \times 3 = 141.00$; total: $611.00 + 141.00 + 141.00 = 893.00$. $\therefore$ Indi's penalty rates are \$35.25 and \$47.00 per hour, and the week's pay is \$893.00.

Q9. (a) $4000.00 \times 0.10 = 400.00$. (b) $200.00 + 400.00 = 600.00$. (c) $600.00 - 500.00 = 100.00$. $\therefore$ For a \$4 000 sales week, Job B pays \$600.00 against Job A's \$500.00 — Job B pays \$100.00 more.

Q10. (a) $450.00 \times 0.10 = 45.00$. (b) $450.00 + 45.00 = 495.00$. (c) $500.00 - 495.00 = 5.00$. $\therefore$ The GST is \$45.00, the total bill is \$495.00, and the change from \$500.00 is \$5.00.

Q11. (a) $860.00 \times 0.15 = 129.00$. (b) $860.00 - 129.00 = 731.00$. (c) $860.00 \times 0.10 = 86.00$. $\therefore$ The tax is \$129.00, Olive's take-home pay is \$731.00, and \$86.00 goes into the super fund on top.

Q12. (a) $0.78 \times 150 = 117.00$. (b) $117.00 - 96.50 = 20.50$, so yes, the allowance covers the fuel. (c) $280.00 - 243.60 = 36.40$. $\therefore$ The travel allowance is \$117.00 — enough for the \$96.50 fuel with \$20.50 to spare — and \$36.40 of the uniform allowance is left.

Q13. (a) Usage: $0.28 \times 250 = 70.00$; total: $22.00 + 70.00 = 92.00$. (b) Usage: $0.20 \times 250 = 50.00$; total: $35.00 + 50.00 = 85.00$. (c) $92.00 - 85.00 = 7.00$. $\therefore$ Coastline Energy is cheaper for 250 kWh a month, by \$7.00 — its dearer supply charge is beaten by its cheaper usage charge at this level of use.

Q14. (a) $12\,000 + 1800.00 = 13\,800.00$. (b) $13\,800.00 \div 45 = 306.666\dots$, which rounds to \$306.67 to the nearest cent. (c) $45 \times 306.67 = 13\,800.15$: each monthly repayment was rounded up by a fraction of a cent, so 45 of them together come to 15 cents more than the exact total. $\therefore$ Wren repays \$13 800.00 in total, as 45 repayments of \$306.67 to the nearest cent — and the tiny overshoot is just the rounding, which is why a calculator check can differ by cents.

Q15. (a) \$300 is three lots of \$100, so the fee is $3 \times 24 = 72.00$. (b) $300.00 + 72.00 = 372.00$. (c) $72.00 - 6.00 = 66.00$. $\therefore$ The payday loan costs \$72.00 in fees and \$372.00 to repay — \$66.00 more than the bank's \$6.00, which is what "quick" money really costs.

Q16. (a) $360.00 \div 4 = 90.00$. (b) 5% of \$360.00 is $360.00 \times 0.05 = 18.00$; cash price: $360.00 - 18.00 = 342.00$. (c) On time, Shop A totals $4 \times 90.00 = 360.00$; $360.00 - 342.00 = 18.00$. $\therefore$ Each Shop A payment is \$90.00, the Shop B cash price is \$342.00, and paying cash at Shop B costs \$18.00 less.

Q17. (a) $186.40 - 86.40 = 100.00$. (b) Any two of: the claimed amount does not match the bill in Vince's own app; the message comes from an unknown number and pushes a link; the message rushes and threatens him instead of informing him; the app shows nothing overdue at all. (c) Vince should not click the link or pay from the message; he

should pay only through his own app, or ring the provider on a number he finds himself, then delete the message and report it. $\therefore$ The message claims \$100.00 more than the real bill and fails the scam check, so the safe move is to ignore the link and deal with the provider directly.

Q18. (a) Running: $4 \times 90.00 = 360.00$; total: $780.00 + 360.00 = 1140.00$. (b) Running: $4 \times 150.00 = 600.00$; total: $300.00 + 600.00 = 900.00$. (c) $1140.00 - 900.00 = 240.00$. $\therefore$ Over 4 years the second-hand machine costs \$900.00 against \$1 140.00 for the new one — \$240.00 less — even though it uses more power each year; the new machine's lower running cost does not catch up inside 4 years.

Theory

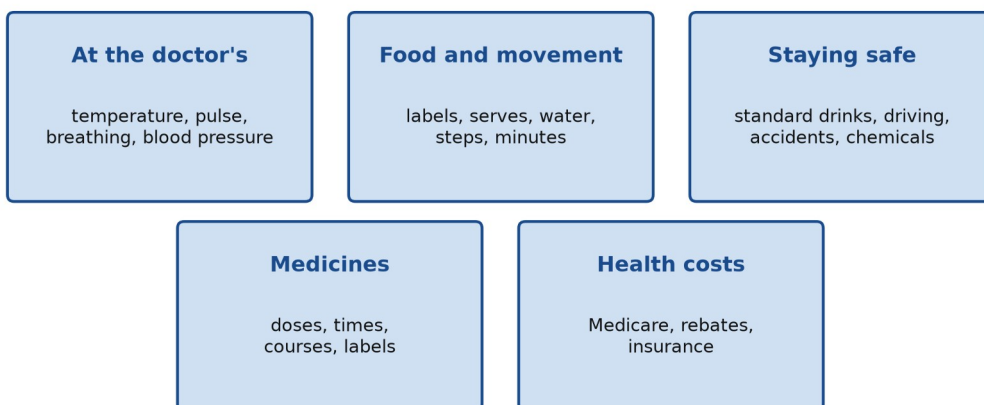
The study design describes this numeracy in one line: finding facts and figures, making sense of them, and using them to choose and act in ways that are good for your own health and wellbeing, and for your community's (Unit 1, Outcome 1). This section puts that line to work, from the thermometer at the clinic to the bill at the doctor's door.

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

About the data in this section. The clinics, medicines, labels, workplaces and numbers here are **made up** (not real): pretend clinics, pretend products and pretend numbers, built for this book so you can practise the maths. Nothing here is real data about a real person, medicine, business or place — and nothing here is medical advice. For real health questions, follow your doctor, your pharmacist and the label on your own medicine.

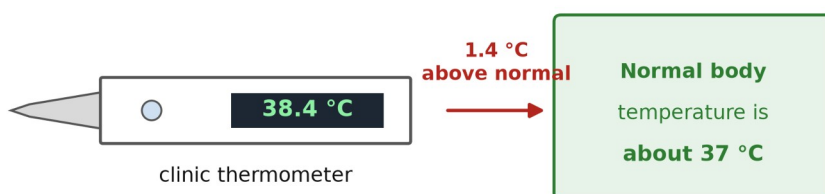
Where health numeracy shows up. Health numbers arrive in five everyday places: the doctor's room, the food and movement choices of an ordinary week, the safety rules at home and at work, the medicine cabinet, and the cost of care itself.

Health numeracy shows up in five everyday places



The problem-solving cycle, as always. Every task in this section walks the four stages from Chapter 1: identify the mathematics; act on and use the mathematics; evaluate and reflect; communicate and report. The worked examples label the stages so you can see them working.

At the doctor's: body temperature. Body temperature is how hot your body is, measured in °C. Section 4E keeps two landmarks for it: normal body temperature is about 37 °C, and a fever starts at 38 °C or above. A clinic thermometer shows the number on a digital display. The display below reads 38.4 °C.

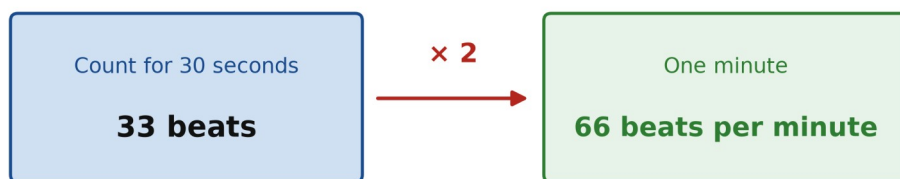


To see how far above normal that is, take the smaller number from the bigger one: $38.4 - 37 = 1.4$, so the reading is 1.4 °C above normal. And because $38.4 \geq 38$, this person has a fever.

Refresher: subtracting decimals. Line the decimal points up under each other, then subtract as with whole numbers. A whole number such as 37 is 37.0 when you line it up.

Bigger	Smaller	Difference
38.4	37.0	1.4
38.6	37.9	0.7
3.0	2.0	1.0

Pulse and breathing. Your **pulse**, also called your **heart rate**, is the number of times your heart beats in one minute; it is counted in *beats per minute*. Your **respiration rate** is the number of breaths you take in one minute, counted in *breaths per minute*. Nurses often count for 30 seconds and double the count, because one minute is two lots of 30 seconds — the same simple proportion as Section 2F.



one minute = two lots of 30 seconds

A count of 33 beats in 30 seconds becomes $33 \times 2 = 66$ beats per minute. A count of 8 breaths in 30 seconds becomes $8 \times 2 = 16$ breaths per minute.

Refresher: doubling a 30-second count. Doubling means $\times 2$.

Count in 30 seconds	$\times 2$	In one minute
9	9×2	18
14	14×2	28
16	16×2	32
33	33×2	66
38	38×2	76

Blood pressure. Blood pressure is the push of your blood against your blood vessels. It is written as two numbers, one above the other, and spoken as “126 over 78”. The **top number** is the push while the heart beats; the **bottom number** is the push while the heart rests between beats. A monitor labels them SYS and DIA, and shows your pulse as well.

clinic blood-pressure monitor



On this monitor the top number is 126. The handout below says a typical top number is about 120 or below, so this reading is $126 - 120 = 6$ above that. The bottom number, 78, sits at or below the handout’s 80.

Typical adult numbers. A handout at our made-up clinic gives these typical adult values. They are the numbers to check a reading against.

Measurement	Typical adult value
Body temperature	between 36.5 and 37.5 °C
Pulse (heart rate)	between 60 and 100 beats per minute
Respiration rate	between 12 and 20 breaths per minute
Blood pressure	top number about 120 or below, bottom about 80 or below

Made-up data: this handout table is made up for this section. Follow your own doctor's advice about your own numbers.

If a reading lands far outside its line of the table, check the reading first — the same habit as checking a fridge reading against Section 4E's landmarks.

Eating well: food labels. Food energy in Australia is measured in **kilojoules**, written **kJ**. Every packaged food carries a nutrition panel. A **serve** is the amount the label counts as one serving; the panel gives the energy in one serve and the number of serves in the packet.

Nutrition Information	
<i>Oat Snap bar (made-up label)</i>	
Serves per package	2
Serving size	40 g
Energy, per serve	780 kJ
Energy, per 100 g	1950 kJ
Whole packet: $780 \times 2 = 1560$ kJ	

The whole packet holds 2 serves of 780 kJ each:

$$780 \times 2 = 1560 \text{ kJ}$$

and 2 serves of 40 g each, so the packet weighs $2 \times 40 = 80$ g. Public health advice about healthy eating uses the same reading skills: one made-up handout suggests 5 serves of vegetables a day, so a day with 3 serves is $5 - 3 = 2$ serves short.

Weight and waist. Public health advice also talks about weight. **Obesity** means carrying much more body fat than is healthy, and handouts link it to diseases such as heart disease and type 2 diabetes — one of the lifestyle-and-disease relationships this numeracy covers. Doctors often check a tape measure around the waist instead of a scale. Ruby measures 88 cm and her handout's guide says stay under 90 cm, so Ruby sits inside her guide.

Drinking water. The made-up clinic handout suggests 8 cups of water a day, and one cup holds 200 mL:

$$8 \times 200 = 1600 \text{ mL}$$

There are 1000 mL in 1 L, so 1600 mL is 1.6 L.

Refresher: one-step metric conversions (mL and L). Multiply by 1000 to go from L to mL; divide by 1000 to go from mL to L. One step only, as in Section 4A.

Start	Convert	Result
3 L	$\times 1000$	3000 mL
250 mL	$\div 1000$	0.25 L
1.5 L	$\times 1000$	1500 mL
2000 mL	$\div 1000$	2 L

Moving more. The same handout suggests at least 30 minutes of activity on 5 days each week. That goal is

$$30 \times 5 = 150 \text{ minutes a week}$$

which is the kind of fitness goal setting this numeracy names. Step counters and phone trackers turn a walk into a number of steps, and a bar chart of the week shows which days met the goal. Handouts link these everyday habits — what you eat and drink, how much you move, how much you sleep — to long-term health; the maths is how you see the habits as numbers.

Staying safe: alcohol and driving. A **standard drink** is a measure of how much alcohol a drink holds: the same amount of alcohol whatever the can, glass or bottle. Labels and menus often give the number for you. Two cans labelled 1.2 standard drinks hold $2 \times 1.2 = 2.4$ standard drinks between them — the kind of counting that lets a person see what they have actually drunk.

Safe driving has its own numbers. Our made-up driver-education handout says learner and P-plate drivers must have no alcohol at all before driving — zero means zero — and that the safe choice for any driver who has been drinking is not to drive. Counting standard drinks, and comparing the count with a limit, is the numeracy behind following that advice.

Medicines safety. A **prescription medicine** is one a doctor writes for a named person; an **over-the-counter** medicine is one you can buy straight from a pharmacy shelf. Public health advice about medicines is plain: take a medicine only as the label or the doctor directs, never take more than the label's maximum doses in 24 hours, and never drive after a medicine that says it may make you drowsy. A label saying “one dose every 6 hours” allows $24 \div 6 = 4$ doses in 24 hours — no more.

Medicines: doses, times and courses. A **dose** is one lot of a medicine; a **course** is the whole time you take it. A label saying “1 tablet three times a day” means $1 \times 3 = 3$ tablets a day. A syrup label saying “dose: 5 mL, four times a day” means

$$5 \times 4 = 20 \text{ mL a day}$$

so a 100 mL bottle lasts $100 \div 20 = 5$ days.

Sometimes a bottle does not divide exactly. A 200 mL bottle with a 15 mL dose gives $200 \div 15 = 13$ full doses with 5 mL left over, because $13 \times 15 = 195$ and $200 - 195 = 5$. The leftover is not a dose: a part dose is not a dose.

Refresher: what a remainder tells you. The whole-number answer of a division counts the *full* lots. The remainder is what is left after those full lots — too little for one more full lot. Whether you keep the remainder, ignore it, or add one more lot depends on the question: full doses from a bottle ignore it; packs to buy add one.

Medicine times on the clock. A label saying “every 6 hours” spreads the doses evenly across the day: $24 \div 6 = 4$ doses. Starting at 7 am, each next dose is 6 hours later on the 12-hour clock: 7 am, then 1 pm, then 7 pm, then 1 am. The jump from 7 pm crosses midnight, which is where clock arithmetic bites.

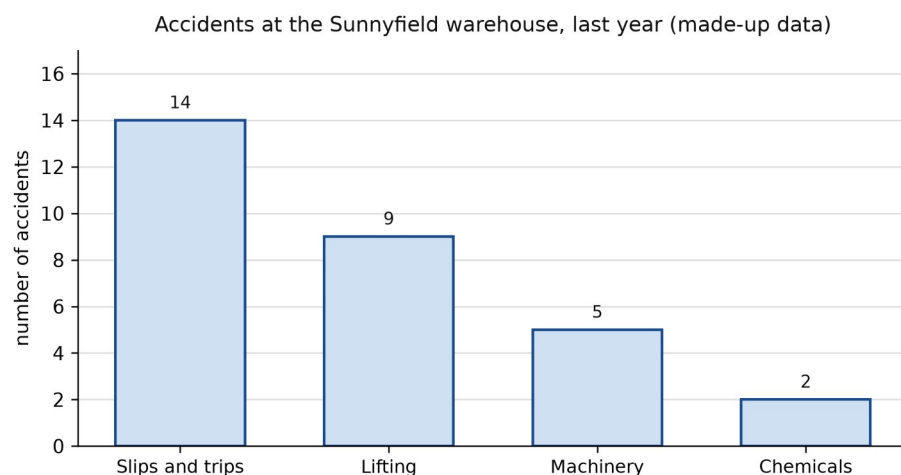
Refresher: the 12-hour clock, adding hours. Add the hours, and when the count passes 12 noon or 12 midnight the am/pm flips, exactly as in Section 4D.

Start	Add	New time
7 am	6 hr	1 pm
1 pm	6 hr	7 pm
7 pm	6 hr	1 am

Start	Add	New time
10 am	8 hr	6 pm
6 pm	8 hr	2 am

Workplace health and safety. Workplaces keep records of accidents so safety officers can see what is causing them. An **audit** is a careful check of every item on a list: a chemical audit lists every chemical in a workplace — bleach, detergent, a **disinfectant** (a cleaner that kills germs on surfaces), a **solvent** (a strong liquid cleaner that dissolves grease) — and ticks where each one is also found at home. Both records are read, not guessed, and both are usually drawn as a bar chart or a tick sheet.

Refresher: reading a bar chart. Three moves, in order. Read the **title** (what was counted, and where). Read the **axis labels** (categories along the bottom, counts up the side). Then read each **bar**: follow its top across to the count, or read the number printed above it. The tallest bar is the category with the most; the shortest bar the least.

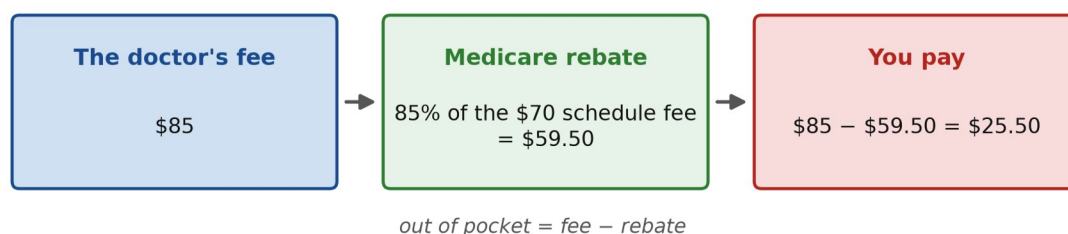


On this made-up chart the tallest bar is slips and trips, at 14 accidents, and the shortest is chemicals, at 2. Chemicals also carry a temperature: the sheet says store bleach below 25 °C, so a storeroom at 31 °C is not following the sheet — a temperature comparison of the kind Section 4E built.

Health costs: Medicare. Medicare is Australia's public health system: it pays part of the cost of seeing a doctor. If a clinic **bulk bills**, it bills Medicare directly and you pay \$0. Otherwise the doctor charges a **fee**, Medicare pays back a **rebate**, and you pay what is left, called the **out-of-pocket** cost. The rebate is worked out as a percentage of a set price called the **schedule fee**: our made-up handout says Medicare pays 85 % of the schedule fee.

With a schedule fee of \$70, the rebate is $0.85 \times 70 = \$59.50$. If the doctor's fee is \$85, the out-of-pocket cost is

$$85 - 59.50 = \$25.50$$



Refresher: common percentages of an amount. As in Section 2E: write the percentage as a decimal and multiply, or build it from 10 %. $85\% = 0.85$, $1\% = 0.01$, and 1 % of an amount is the amount divided by 100.

Percentage	Of	Working	Answer
85 %	\$ 60	0.85×60	\$ 51
1 %	\$ 70 000	$70\,000 \div 100$	\$ 700

Percentage	Of	Working	Answer
10 %	\$ 45	$45 \div 10$	\$ 4.50
25 %	\$ 48	0.25×48	\$ 12

The Medicare Levy Surcharge. The **Medicare Levy Surcharge** is extra tax for people who earn over an income limit and do not have private hospital cover. Our made-up handout keeps it to one step: the surcharge is 1 % of your income. On an income of \$ 90 000 that is $90\,000 \div 100 = \$ 900$.

Private health insurance. **Private health insurance** is cover you buy from a private fund. **Hospital cover** helps with hospital costs (and is what avoids the surcharge above); **extras cover** helps with things like dental and glasses. The price you pay the fund each month is the **premium**. Comparing two policies usually means comparing a year of premiums: a premium of \$ 105.30 a month costs

$$105.30 \times 12 = \$ 1263.60 \text{ a year}$$

and the difference between two yearly figures is the true price of the extra cover.

Public health advice. Health advice reaches you in many forms: posters about healthy eating, handouts about activity and sleep, news stories about disease outbreaks, and the leaflet inside a medicine pack. All of it carries numbers — serves a day, minutes a week, doses a day, degrees of storage — and health numeracy is the habit of reading those numbers and checking them against your own situation.

Technology. Fitness trackers, medicine reminder apps, pharmacy websites and online Medicare claims all handle health numbers for you, and a calculator will do the arithmetic. Good to know: pen, paper and the steps in this section are always enough. Every reading and every calculation here can be done by hand.

Key ideas.

- Health numeracy is reading and using health numbers to make decisions: temperatures, pulses, serves, doses, dates and dollars.
- Check a reading against a landmark or a handout value — about 37 °C for a body, 120 or below for a top blood-pressure number.
- A 30-second count doubles to a one-minute count; a difference is always the bigger number minus the smaller one.
- Labels carry the maths: serves per packet, kJ per serve, mL per dose, doses per day, standard drinks per can.
- Medicine times are clock arithmetic: “every 6 hours” is 4 doses a day, crossing noon and midnight on the 12-hour clock.
- Out-of-pocket cost is fee minus rebate; a rebate of 85 % is 0.85 times the schedule fee.
- Every chart in this section is read, never summarised: title, axes, bars.

Worked examples

Example 1 — scaffolded

Jin feels unwell and visits the clinic. The picture shows the nurse’s two digital thermometer readings.

Jin's temperature at the clinic



first reading



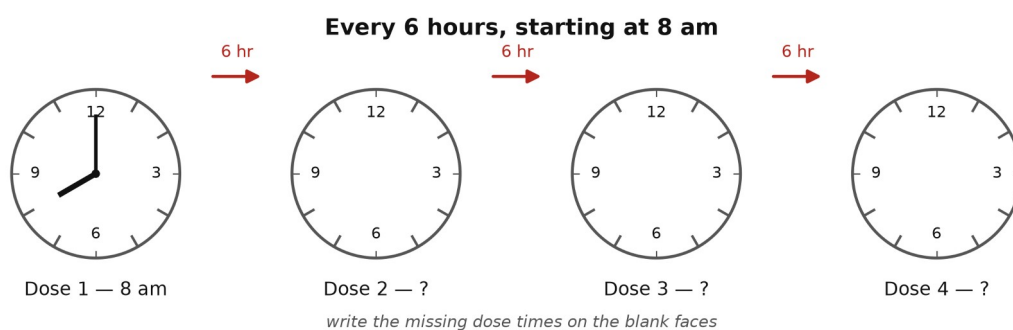
one hour later

- (a) How far above the normal 37°C is Jin's first reading?
- (b) Does Jin have a fever? (A fever starts at 38°C or above.)
- (c) How much did Jin's temperature fall in the hour between readings?

Working	Comment
First reading: 38.6°C	Stage 1 — the display gives the number
$38.6 - 37 = 1.6$	Stage 2 — decimals lined up, bigger minus smaller
$38.6 \geq 38$, so yes, a fever	Stage 2 — compare with the fever landmark
$38.6 - 37.9 = 0.7$	Stage 2 — the fall between the two readings
1.6°C above normal; yes, a fever; fell 0.7°C	Stages 3–4 — check against the landmarks, then report

Example 2 — scaffolded

A pharmacist's label says: take 2 tablets every 6 hours. The first dose is at 8 am.



- (a) How many doses are there in 24 hours?
- (b) Write the four dose times on the 12-hour clock.
- (c) How many tablets are taken in 24 hours?

Working	Comment
$24 \div 6 = 4$ doses	Stage 2 — the 6-hour gap shared across the day
8 am, then + 6 hr each time: 2 pm, 8 pm, 2 am	Stage 2 — clock jumps; 8 pm crosses midnight
$4 \times 2 = 8$ tablets	Stage 2 — 2 tablets in every dose
Check: 4 doses $\times$ 6 hr = 24 hr, the day exactly	Stage 3 — evaluate
4 doses at 8 am, 2 pm, 8 pm and 2 am; 8 tablets	Stage 4 — report in words

Example 3 — unscaffolded

Dr Whitlam charges a fee of \$95 for a visit. The schedule fee for this visit is \$80, and Medicare pays 85% of the schedule fee. Find the Medicare rebate, find what Ava pays out of pocket, and say what Ava would pay at a clinic that bulk bills.

The rebate is 85% of the schedule fee: $0.85 \times 80 = 68$, so Medicare pays \$68. Ava's out-of-pocket cost is the fee minus the rebate: $95 - 68 = 27$, so Ava pays \$27. A bulk-billing clinic bills Medicare directly, so a patient there pays \$0.

$\therefore$ The rebate is \$68, Ava pays \$27 out of pocket, and at a bulk-billing clinic she would pay \$0.

Example 4 — unscaffolded

Sam rests for five minutes, then counts his pulse for 30 seconds: 34 beats. After a soccer training run he rests and counts again for 30 seconds: 52 beats. Turn each count into beats per minute, and check each one against the handout's typical adult pulse of between 60 and 100 beats per minute.

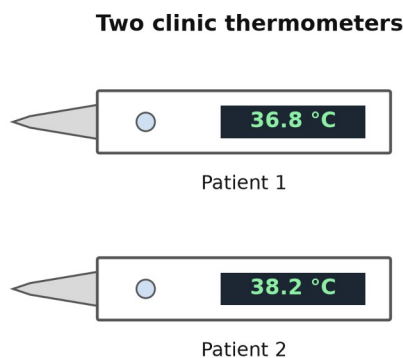
One minute is two lots of 30 seconds, so each count doubles. At rest: $34 \times 2 = 68$ beats per minute, and 68 sits between 60 and 100, so Sam's resting pulse is typical. After soccer: $52 \times 2 = 104$ beats per minute, and 104 is above 100 — higher than the typical resting numbers, which is exactly what exercise does.

$\therefore$ Sam's resting pulse is 68 beats per minute, inside the typical 60 to 100; after soccer it is 104 beats per minute, above it.

Practice questions

Scaffolded

Q1. Two clinic thermometers are shown.



- Read patient 1's temperature.
- Read patient 2's temperature, then round it to the nearest whole degree.
- A fever starts at 38°C or above. Which patient has a fever?

Q2. A nurse counts a patient's breathing for 30 seconds: 9 breaths.

- Write the calculation that turns the 30-second count into a one-minute count. (One minute is two lots of 30 seconds.)
- What is the respiration rate in breaths per minute?
- The handout's typical adult value is between 12 and 20 breaths per minute. Is this reading typical?

Q3. A cereal box carries this made-up nutrition panel.

Crispy Rice cereal

Serves per package	3
Serving size	45 g
Energy per serve	900 kJ

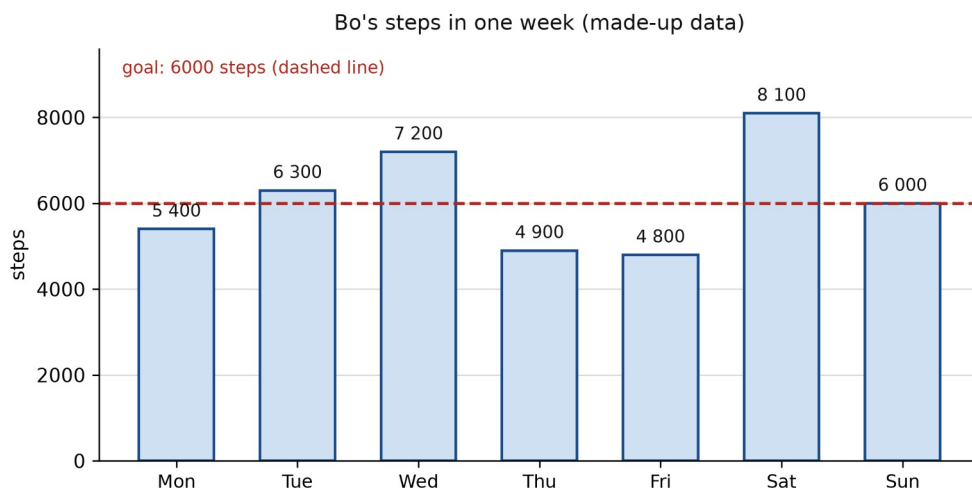
Made-up data: this label is made up for this section.

- How much energy, in kJ, is in the whole package?
- A handout says a typical adult takes in about 8700 kJ a day. How many kJ less than that is the whole package?
- What does the whole package weigh, in grams?

Q4. A clinic handout suggests 8 cups of water a day. Mei's cup holds 250 mL.

- (a) How many mL of water is the daily goal?
- (b) Write that goal in litres.
- (c) By 3 pm Mei has drunk 1.5 L. How many more mL does she need to reach the goal? (Hint: write 1.5 L in mL first.)

Q5. The bar chart shows Bo's steps for one week, against a goal of 6000 steps a day.



- (a) How many steps did Bo walk on Wednesday?
- (b) How many steps short of the goal was Bo on Friday?
- (c) On how many days did Bo reach or beat the goal?

Q6. A medicine label says: take 1 tablet twice a day for 5 days.

- (a) How many tablets are taken each day?
- (b) How many tablets are taken over the whole course?
- (c) The pharmacy sells this medicine in packs of 10 tablets. Is one pack enough for the whole course?

Un scaffolded

Q7. The monitor shows Mr Tran's blood-pressure reading.

Mr Tran's blood-pressure reading



- (a) Write down the top number.
- (b) The handout's typical top number is about 120 or below. How far above 120 is Mr Tran's top number?
- (c) The nurse rests Mr Tran for five minutes and retakes the reading: 118 over 76. Is the new top number at or below 120?

Q8. Priya counts her pulse for 30 seconds while resting: 36 beats. Her brother’s resting pulse is 54 beats per minute.

- (a) What is Priya’s pulse in beats per minute?
- (b) The handout’s typical adult resting pulse is between 60 and 100 beats per minute. Is Priya’s resting pulse typical?
- (c) Is her brother’s resting pulse inside those typical numbers?

Q9. A cough syrup label says: dose 10 mL, take three times a day. The bottle holds 120 mL.

- (a) How many mL of syrup are taken each day?
- (b) How many full 10 mL doses does the bottle hold?
- (c) How many days will the bottle last?

Q10. A capsule label says: take one capsule every 8 hours. The first dose is at 6 am. The course runs for 7 days.

- (a) How many doses are there in 24 hours?
- (b) Write the three dose times on the 12-hour clock.
- (c) How many doses are taken over the whole course?

Q11. An antibiotic label says: take 2 capsules three times a day for 7 days. The pharmacy sells this antibiotic in packs of 30 capsules.

- (a) How many capsules are taken each day?
- (b) How many capsules are taken over the whole course?
- (c) How many packs must be bought? (Packs are sold whole.)

Q12. A made-up handout lists standard drinks for three common servings, and advises no more than 2.0 standard drinks on a night out. The handout also says: if you have been drinking, do not drive.

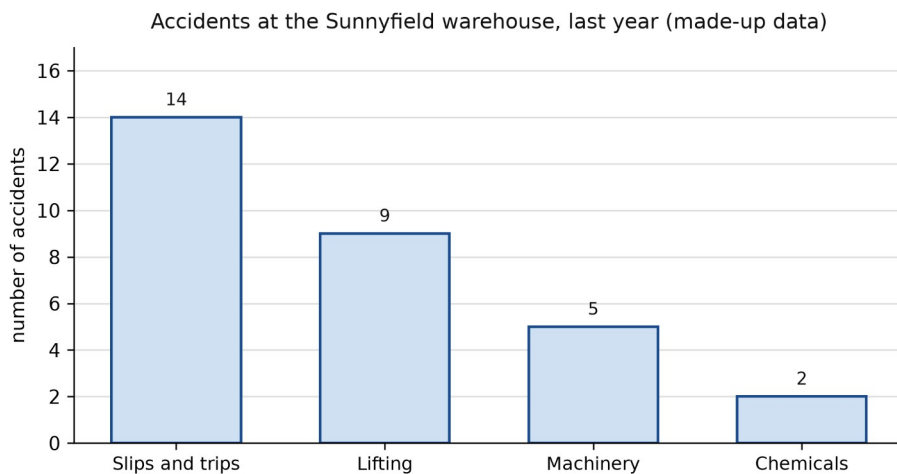
Drink	Standard drinks
Small can of beer	1.2
Glass of wine	1.5
Shot of spirits	1.0

Made-up data: these standard-drink values are made up for this section; real labels vary, so always read the label.

Dana has two glasses of wine at a dinner.

- (a) How many standard drinks has Dana had?
- (b) Has Dana stayed within the handout’s 2.0 limit for the night?
- (c) If not, how many standard drinks over the limit is she?

Q13. The bar chart shows last year’s accidents at the Sunnyfield warehouse.



- How many lifting accidents were there?
- How many more slips-and-trips accidents were there than lifting accidents?
- The year before, there were 8 machinery accidents. Did machinery accidents rise or fall last year, and by how many?

Q14. The tick sheet shows the Sunnyfield warehouse chemical audit, with the same chemicals checked at home.

Chemical audit — Sunnyfield Warehouse		
Chemical	At work?	At home?
Bleach	✓	✓
Detergent	✓	✓
Disinfectant	✓	✓
Solvent	✓	✗
Bleach label says: store below 25 °C		

made-up data

- How many chemicals are on the workplace audit?
- Which chemical is kept at work but not at home?
- The bleach label says: store below 25 °C. The home cupboard holding the bleach reads 31 °C. Is the bleach stored as the label says?

Q15. Dr Okafor charges a fee of \$58 for a visit. The schedule fee is \$50, and Medicare pays 85 % of the schedule fee.

- Find the Medicare rebate.
- Find the patient’s out-of-pocket cost.
- Round the rebate to the nearest dollar.

Q16. A made-up handout simplifies the Medicare Levy Surcharge: a person who earns over the income limit and has no private hospital cover pays an extra 1 % of their income. Jack earns \$ 95 000 and has no private hospital cover.

- (a) What is Jack's surcharge?
- (b) Jack's partner earns \$ 88 500 and has private hospital cover. What surcharge does the partner pay? Who pays more surcharge, and by how much?
- (c) Jack prices private hospital cover at a premium of \$ 72.25 a month. What is one year of that premium? Is one year of premium less than Jack's surcharge?

Q17. Two made-up private health policies are compared.

Policy	Premium each month	What it covers
HealthyCare	\$ 110.50	hospital, plus dental and glasses
FairDeal	\$ 98.20	dental only

Made-up data: these policies and premiums are made up for this section.

- (a) Which policy covers glasses?
- (b) Find the cost of one year of each policy.
- (c) Find the difference between the two yearly costs, rounded to the nearest dollar.

Q18. Zoe's handout sets a fitness goal of 150 minutes of activity a week. This week Zoe walks 30 minutes on each of 4 days, and swims once for 20 minutes.

- (a) How many minutes of walking is that?
- (b) How many minutes of activity is that altogether?
- (c) How many minutes short of her goal is Zoe? Write your answer as a full sentence Zoe could put in her diary.

Answers

Q1. (a) 36.8°C (b) 38.2°C , or 38°C to the nearest whole degree (c) patient 2, because $38.2 \geq 38$ **Q2.** (a) 9×2 (b) 18 breaths per minute (c) yes, 18 sits between 12 and 20 **Q3.** (a) 2700 kJ (b) 6000 kJ (c) 135 g **Q4.** (a) 2000 mL (b) 2 L (c) 500 mL **Q5.** (a) 7200 steps (b) 1200 steps (c) 4 days **Q6.** (a) 2 tablets (b) 10 tablets (c) yes — exactly 10 tablets, with none spare **Q7.** (a) 132 (b) 12 (c) yes, $118 \leq 120$ **Q8.** (a) 72 beats per minute (b) yes, inside 60 to 100 (c) no, 54 is below 60 **Q9.** (a) 30 mL (b) 12 full doses (c) 4 days **Q10.** (a) 3 doses (b) 6 am, 2 pm and 10 pm (c) 21 doses **Q11.** (a) 6 capsules (b) 42 capsules (c) 2 packs **Q12.** (a) 3.0 standard drinks (b) no (c) 1.0 standard drink over **Q13.** (a) 9 (b) 5 more (c) fell, by 3 **Q14.** (a) 4 chemicals (b) solvent (c) no — 31°C is not below 25°C **Q15.** (a) \$42.50 (b) \$15.50 (c) \$43, to the nearest dollar **Q16.** (a) \$950 (b) the partner pays \$0; Jack pays more, by \$950 (c) \$867.00; yes, less than \$950 **Q17.** (a) HealthyCare (b) FairDeal \$1178.40, HealthyCare \$1326.00 (c) \$148, to the nearest dollar **Q18.** (a) 120 minutes (b) 140 minutes (c) 10 minutes; “I am 10 minutes short of my 150-minute goal this week.”

Fully-worked solutions

Q1. (a) Patient 1’s display reads 36.8°C . (b) Patient 2’s display reads 38.2°C ; the tenths digit is 2, which is 4 or less, so to the nearest whole degree it is 38°C . (c) A fever starts at 38°C or above: patient 2 at 38.2°C has a fever, and patient 1 at 36.8°C does not.

Q2. (a) One minute is two lots of 30 seconds, so the count doubles: 9×2 . (b) $9 \times 2 = 18$ breaths per minute. (c) The typical adult value is between 12 and 20 breaths per minute, and 18 sits between those, so yes, the reading is typical.

Q3. (a) The package holds 3 serves of 900 kJ: $900 \times 3 = 2700$ kJ. (b) $8700 - 2700 = 6000$, so the whole package is 6000 kJ less than the daily guide. (c) 3 serves of 45 g: $45 \times 3 = 135$ g.

Q4. (a) 8 cups of 250 mL: $8 \times 250 = 2000$ mL. (b) $2000 \div 1000 = 2$, so the goal is 2 L. (c) 1.5 L is $1.5 \times 1000 = 1500$ mL; the goal is 2000 mL, so Mei needs $2000 - 1500 = 500$ mL more.

Q5. (a) The Wednesday bar reads 7200 steps. (b) The Friday bar reads 4800 steps, so Bo was $6000 - 4800 = 1200$ steps short. (c) Reading each bar against the 6000 goal line: Tue (6300), Wed (7200), Sat (8100) and Sun (6000) reach or beat it — 4 days.

Q6. (a) 1 tablet twice a day is $1 \times 2 = 2$ tablets a day. (b) Over 5 days: $2 \times 5 = 10$ tablets. (c) The course needs exactly 10 tablets and a pack holds 10, so yes, one pack is enough — with none spare.

Q7. (a) The top number (SYS) is 132. (b) $132 - 120 = 12$, so the top number is 12 above the typical 120. (c) The retake’s top number is 118, and $118 \leq 120$, so yes, it is at or below 120.

Q8. (a) The 30-second count doubles: $36 \times 2 = 72$ beats per minute. (b) 72 sits between 60 and 100, so yes, Priya’s resting pulse is typical. (c) No: 54 is below 60, so her brother’s resting pulse sits below the handout’s typical numbers — worth mentioning to a doctor, but the handout’s numbers are only a guide.

Q9. (a) 10 mL three times a day: $10 \times 3 = 30$ mL a day. (b) $120 \div 10 = 12$ full doses. (c) At 30 mL a day: $120 \div 30 = 4$ days.

Q10. (a) $24 \div 8 = 3$ doses in 24 hours. (b) Starting at 6 am and adding 8 hours each time: 6 am, 2 pm, 10 pm. (c) 3 doses a day for 7 days: $3 \times 7 = 21$ doses.

Q11. (a) 2 capsules three times a day: $2 \times 3 = 6$ capsules a day. (b) Over 7 days: $6 \times 7 = 42$ capsules. (c) $42 \div 30 = 1$ pack with 12 capsules still needed, and packs are sold whole, so $1 + 1 = 2$ packs must be bought.

Q12. (a) Two glasses of wine at 1.5 each: $2 \times 1.5 = 3.0$ standard drinks. (b) No: 3.0 is more than the handout’s 2.0 limit. (c) $3.0 - 2.0 = 1.0$, so Dana is 1.0 standard drink over the limit — and the handout’s driving advice applies either way.

Q13. (a) The lifting bar reads 9 accidents. (b) Slips and trips: 14; lifting: 9; the difference is $14 - 9 = 5$ more slips-and-trips accidents. (c) Machinery fell from 8 to 5: $8 - 5 = 3$, so machinery accidents fell by 3.

Q14. (a) Four chemicals are ticked at work: bleach, detergent, disinfectant and solvent. (b) Solvent is ticked at work and crossed at home, so solvent is kept at work but not at home. (c) No: the label says store below 25 °C and the cupboard reads 31 °C, and 31 is not below 25.

Q15. (a) The rebate is 85 % of the \$ 50 schedule fee: $0.85 \times 50 = 42.50$, so \$ 42.50. (b) Out of pocket is fee minus rebate: $58 - 42.50 = 15.50$, so \$ 15.50. (c) \$ 42.50 has a tenths-and-cents part of .50, so rounding up to the nearest dollar gives \$ 43.

Q16. (a) The surcharge is 1 % of income: $95\,000 \div 100 = 950$, so \$ 950. (b) The partner has private hospital cover, so the partner's surcharge is \$ 0; Jack pays more, by $950 - 0 = \$ 950$. (c) One year of premium is $72.25 \times 12 = 867.00$, so \$ 867.00; and \$ 867.00 is less than the \$ 950 surcharge, so yes.

Q17. (a) HealthyCare covers hospital, dental and glasses, so HealthyCare covers glasses. (b) FairDeal: $98.20 \times 12 = 1178.40$, so \$ 1178.40 a year. HealthyCare: $110.50 \times 12 = 1326.00$, so \$ 1326.00 a year. (c) The difference is $1326.00 - 1178.40 = 147.60$; the tenths digit is 6, so rounding to the nearest dollar gives \$ 148.

Q18. (a) 30 minutes on each of 4 days: $30 \times 4 = 120$ minutes. (b) Adding the swim: $120 + 20 = 140$ minutes altogether. (c) The goal is 150 minutes, so Zoe is $150 - 140 = 10$ minutes short. As a full sentence: "I am 10 minutes short of my 150-minute goal this week."

Chapter 6 Unit 1 numeracy in context — 6E Vocational numeracy

Theory

The study design describes vocational numeracy as playing your part well at work, and coping with what a job, or training for a job, asks of you (Unit 1, Outcome 1).

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

Work is full of numbers. A job card tells you who to call and when to start. A mixing label tells you how much product goes in the bucket. A sign tells you the heaviest load you may lift. A safety sheet tells you how hot or cold the store room must be. This section is about reading those numbers, acting on them and checking your work — the same four steps as the problem-solving cycle from Chapter 1: work out what is asked, do the maths, check it makes sense, then report the answer.

About the data in this section. The businesses, job cards, signs and times below are **made up** (not real): 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.

Job cards and phone numbers. Most trades and warehouses hand each job out on a **job card** — a short card (paper or on a phone app) that says what the job is, where to go, when to start, who to call and what safety gear to wear. The two numbers you will see most are a landline, written like (03) 5472 8890 with an area code in brackets, and a **mobile**, which in Australia always starts with 04 and has **10 digits** in total: 0427 556 118.

QUAYSIDE WAREHOUSE — JOB CARD 214	
Job:	Deliver 12 boxes to GreenPatch Garden Centre
Start time:	08:30
Site office:	(03) 5472 8890
Supervisor:	Marta — mobile 0427 556 118
PPE:	steel-cap boots, hi-vis vest

Mobile numbers start with 04 and have 10 digits. Read every number back to check it.

Phone numbers on a job card must be copied exactly — one wrong digit and your call reaches a stranger. The habit that catches mistakes is **reading back**: say the number out loud to the person who gave it to you, group by group, and let them check it.

Worked model. A card reads 0427 556 118. A worker writes 0427 556 181 in their notes. Reading the last group back — “one eight one” against the card’s “one one eight” — shows the last two digits were swapped. The worker crosses it out and writes 0427 556 118.

Task times then and now. The same job used to take longer on paper than it takes on a phone or a computer, and it used to take more effort as well: three clipboards and a filing tray instead of one phone in a pocket. Here is one made-up warehouse, before and after going digital:

Task	Paper (before)	App (now)
Record 30 delivery times	40 min	20 min
Write up 6 job cards	1 h 20 min	50 min

Made-up data: pretend times for a pretend warehouse.

Read the first row: the task went from 40 min down to 20 min, so it saved $40 - 20 = 20$ min. 20 min is half of 40 min, and half is 50%, so the app takes 50% less time on that task. The second row needs the times in minutes first.

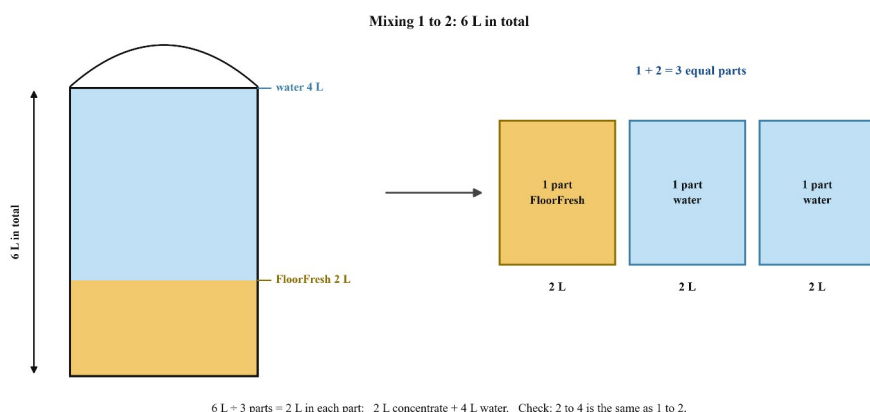
Refresher: time. On the 24-hour clock the morning starts at 00:00 and midday is 12:00, so 8 am is written 08:00 and 1:10 in the afternoon is 13:10. There are 60 min in 1 h, so $1\text{ h } 20\text{ min} = 60 + 20 = 80\text{ min}$. Half an hour is written 0.5 h, because $0.5\text{ h} = 30\text{ min}$. To find how long something took, count on from the start time to the finish time.

So writing up the job cards went from 80 min down to 50 min: $80 - 50 = 30\text{ min}$ saved.

Mixing instructions. Cleaning products, sealers and fertilisers are usually sold as a **concentrate** — the strong liquid, straight from the bottle — and the label tells you how to **dilute** it (water it down) before use. A label that says **mix 1 to 2** means 1 part concentrate to 2 parts water. Other labels skip the ratio and say how much product goes with each litre or each bucket, for example “add 50 mL to each litre of water”. Both kinds are instructions you can follow with the maths you already have.

Refresher: the parts method (for 1-to-2 mixes). To split a total in the ratio 1 to 2: **ADD** the ratio numbers ($1 + 2 = 3$ parts in all), **DIVIDE** the total by that many parts to find 1 part, **MULTIPLY** 1 part by each ratio number, then **CHECK** the shares add back to the total.

Worked model. A bucket holds 6 L of mix at 1 to 2. There are $1 + 2 = 3$ equal parts, and $6 \div 3 = 2\text{ L}$ in each part. So the bucket needs $1 \times 2 = 2\text{ L}$ of concentrate and $2 \times 2 = 4\text{ L}$ of water. Check: $2 + 4 = 6\text{ L}$, and 2-to-4 is the same ratio as 1-to-2.



Refresher: “to every 1” proportions. When an instruction says how much for **each** litre (or each bucket), find the amount for 1 first, then multiply by how many you have. If the amount for 1 is already given, just multiply — and for half a litre, take half the amount.

Worked model. A label says add 50 mL of product to each litre of water. For 4 L of water: $50 \times 4 = 200\text{ mL}$ of product. For 0.5 L (half a litre): half of 50 mL = 25 mL.

Getting a mix wrong has real consequences. A mix that is **too strong** (too much concentrate) wastes product, can damage the surface and can hurt skin; a mix that is **too weak** (too much water) simply does not clean. That is why the label’s numbers are worth checking twice.

Safety sheets. A chemical that can hurt people — by burning skin, poisoning, catching fire or giving off fumes — is called **hazardous**. Every hazardous product at a workplace must come with a **safety sheet**: a standard sheet listing the dangers, the protective gear to wear, how to store it, how to mix it and what to do in an emergency. Older sheets are called **MSDS** (Material Safety Data Sheet); current ones are called **SDS** (Safety Data Sheet). Same sheet, newer name. Read the sheet *before* you open the container, not after something goes wrong.

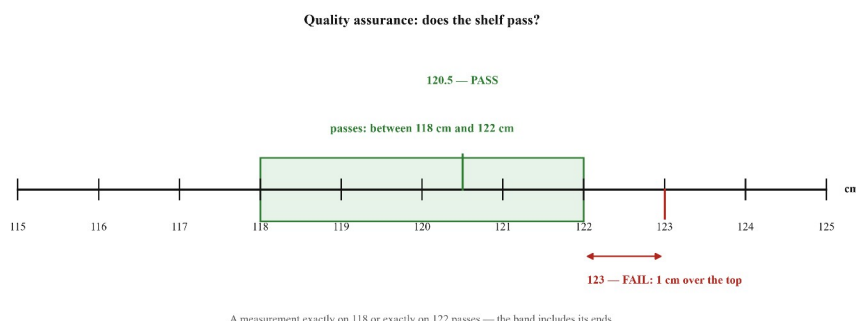
 SAFETY DATA SHEET — FloorFresh Concentrate	
Hazards	skin and eye irritant — avoid contact
Protective equipment	wear gloves and goggles
Storage	store between 5 °C and 25 °C
Mixing	mix 1 to 2 — 1 part product to 2 parts water
First aid	rinse skin or eyes with water for 15 minutes
Read the sheet before you open the container.	

The numbers on a safety sheet are instructions too. The sheet above says: wear gloves and goggles; store the product between 5 °C and 25 °C; mix 1 to 2; and if it touches skin or eyes, rinse with water for 15 minutes. Each of those is a number you may be asked to use or check at work.

OHS and quality assurance. OHS (occupational health and safety) is the set of rules that keeps people safe at work. Much of OHS is numbers on signs: a maximum load, a speed limit, a space to keep clear. **Quality assurance**, or **QA**, is the checking side of a job: the workplace writes down a **specification** — the size, weight or strength a product must have — and workers measure the product against it. Real making is never perfect, so a specification usually allows a **tolerance**: a small amount of difference that is still acceptable. In this book the acceptable band is always given to you directly, as “between X and Y”.



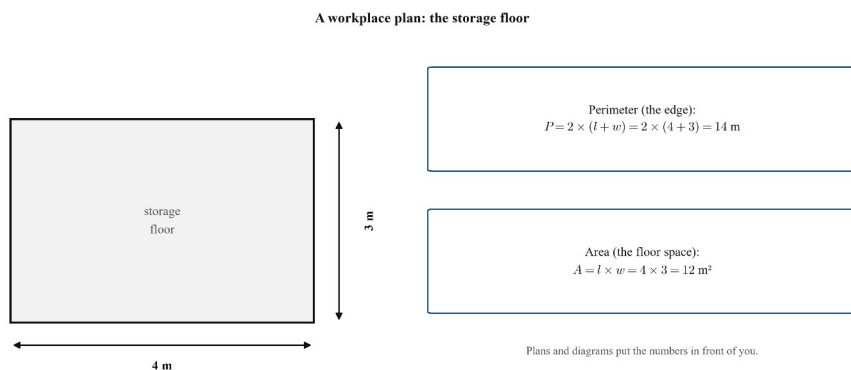
Worked model. Hilltop Cabinets specifies that a shelf board must be between 118 cm and 122 cm wide. A board measuring 120.5 cm sits inside the band, so it passes. A board measuring 123 cm is $123 - 122 = 1$ cm over the top of the band, so it fails and goes back. A board measuring exactly 118 cm or exactly 122 cm **passes** — the band includes its ends.



Plans, diagrams, formulas and rates. Workplace plans and diagrams put the measurements in front of you so you can cost a job before starting it. The shapes on a workplace plan are usually rectangles, so two formulas do most of the work, and two money formulas cost the job.

Refresher: rectangle and cost formulas. For a rectangle of length l and width w : perimeter $P = 2 \times (l + w)$ (the distance around the edge) and area $A = l \times w$ (the space inside). For money: a hire costing r dollars for every hour h costs $C = h \times r$; with a fixed call-out fee f as well, $C = f + h \times r$.

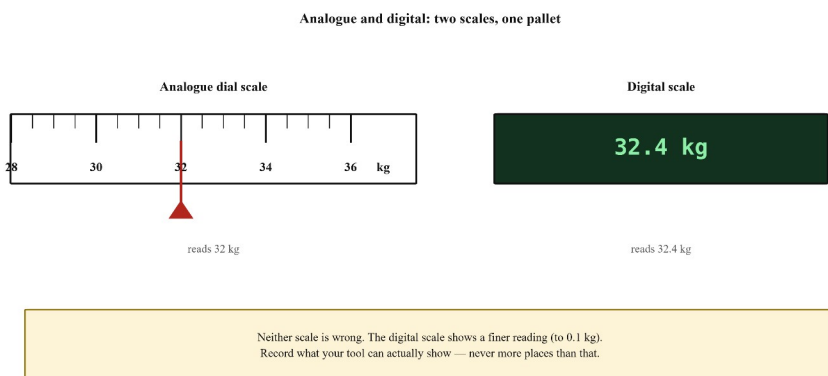
Worked model. A storage floor measures 4 m by 3 m. Its perimeter is $2 \times (4 + 3) = 14$ m and its area is $4 \times 3 = 12$ m². Edging strip for the floor costs \$4.50 per metre, so the edge costs $14 \times 4.50 = \$63.00$.



Refresher: rates. A **rate** is an amount for each one of something. This book uses two: dollars per metre (\$/m) and kilometres per hour (km/hr). Rate $\times$ how many = total, so \$4.50 per metre for 14 m is $4.50 \times 14 = \$63.00$, and a van travelling at 60 km/hr for 2 h covers $60 \times 2 = 120$ km.

Refresher: enlarging a plan or diagram. Enlarging by a scale factor means multiplying **every** length by the same number. A sign 8 cm by 5 cm enlarged by a factor of 3 becomes $8 \times 3 = 24$ cm by $5 \times 3 = 15$ cm. Plans work the same way: on a plan where 1 cm represents 2 m, every length you measure on the plan is multiplied by 2 to get the real length.

Analogue and digital devices. An **analogue** device shows a measurement with a needle against a marked scale (a dial scale, a tape, a dial thermometer). A **digital** device shows digits on a screen. Digital devices usually show finer readings — more decimal places — but finer is not the same as better: the right device is the one that is fine enough for the job and big enough to reach.



The two scales above are weighing the same pallet. The dial's labels sit every 2 kg with 4 spaces between labels, and the needle sits exactly on a label: 32 kg. The digital scale shows 32.4 kg. Neither is wrong — the digital scale simply reads to 0.1 kg. To the nearest kg they agree.

Refresher: reading a dial in four steps. 1) Read **two labels** next to each other. 2) Find the **gap** between them. 3) **Divide** the gap by the number of spaces between the labels — that is the value of one small mark. 4) **Count on** from the nearest label to the needle.

Worked model. On a dial with labels every 2 kg and 4 spaces between labels, one space is $2 \div 4 = 0.5$ kg. A needle 3 spaces past the 24 label reads $24 + 3 \times 0.5 = 25.5$ kg.

Refresher: how many decimal places? Record a measurement to the accuracy of the tool, never more. A tape marked in whole cm gives whole cm (153 cm, not 152.64 cm). A digital scale showing two decimal places reads to the nearest 0.01 kg. When a question asks you to round, it will say to what — nearest whole number, nearest 0.1, nearest cent.

Choosing the tool is part of the job:

What you measure	Tool	Unit you record
Mass of a pallet	platform scale	kg
250 mL of cleaner	measuring jug	mL
Length of a trench	tape measure	m
Temperature of a cool room	digital thermometer	°C

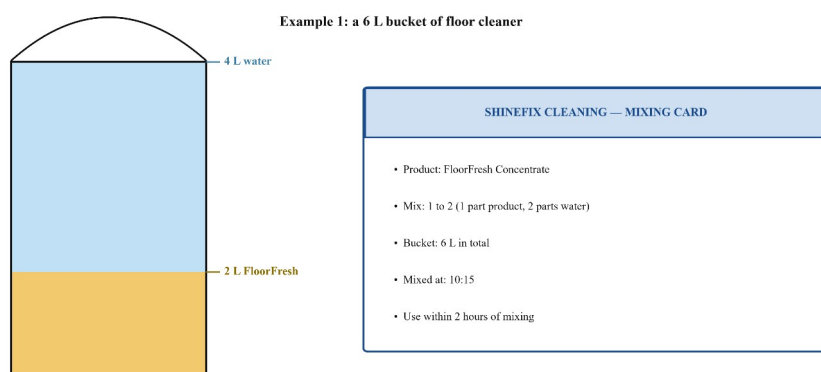
Key ideas.

- A job card carries the job's numbers: start time, phone numbers, site details. Mobiles start with 04 and have 10 digits; read numbers back to check them.
- Digital tools usually save time and effort on the same task; compare times in minutes before comparing them in hours and minutes.
- "Mix 1 to 2" means 1 part concentrate to 2 parts water — use the parts method: add the ratio numbers, divide the total, multiply, check.
- "Add X mL to each litre" is a proportion: find the amount for 1, then multiply by how many you have.
- A safety sheet (SDS/MSDS) tells you the dangers, the protective gear, the storage band, the mix and the first aid — read it before opening the container.
- OHS signs carry limits (max load, speed, clear space). QA checks a product against a specification, and a tolerance is the band of difference that still passes — the band includes its ends.
- Plans and diagrams give you the lengths; rectangle formulas ($P = 2 \times (l + w)$, $A = l \times w$) and money formulas ($C = h \times r$, $C = f + h \times r$) do the rest. Enlarging multiplies every length by the same factor.
- Analogue devices use a needle and a scale; digital devices show digits. Read a dial in four steps (two labels, gap, gap ÷ spaces, count on) and record only as many decimal places as the tool can show.

Worked examples

Example 1 — scaffolded

Shinefix Cleaning mixes FloorFresh Concentrate at 1 to 2 for hard floors. The mixing card is in the figure: a 6 L bucket, mixed at 10:15, to be used within 2 hours of mixing.



(a) How many equal parts are in a 1-to-2 mix? **(b)** How many litres of concentrate and how many litres of water fill the 6 L bucket? **(c)** The bucket is mixed at 10:15. By what time must it be used?

Working	Comment
(a) $1 + 2 = 3$ parts	add the two ratio numbers
(b) $6 \div 3 = 2$ L in 1 part	divide the total by the number of parts
concentrate: $1 \times 2 = 2$ L	1 part of product
water: $2 \times 2 = 4$ L	2 parts of water
(c) $10:15 + 2 \text{ h} = 12:15$	count on 2 hours on the 24-hour clock
Check: $2 + 4 = 6$ L, and 2-to-4 is 1-to-2	the shares add back to the bucket

So a 1-to-2 mix has 3 equal parts; the 6 L bucket takes 2 L of FloorFresh and 4 L of water; and a bucket mixed at 10:15 must be used by 12:15.

Example 2 — scaffolded

Quayside Warehouse counted all its stock (a stocktake) twice: once on paper last year and once with a scanner app this year. Both started at 08:00. The paper stocktake finished at 10:30 and the app stocktake finished at 09:05.

(a) How long did the paper stocktake take? **(b)** How long did the app stocktake take? **(c)** How much time did the app save? Give your answer in hours and minutes.

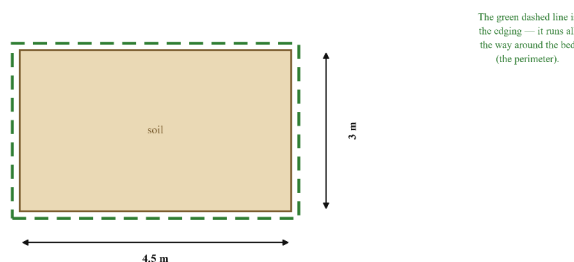
Working	Comment
(a) $08:00 \rightarrow 10:30$ is 2 h 30 min	count on: 2 hours, then 30 minutes
$2 \text{ h } 30 \text{ min} = 120 + 30 = 150 \text{ min}$	$1 \text{ h} = 60 \text{ min}$
(b) $08:00 \rightarrow 09:05$ is 1 h 5 min	count on: 1 hour, then 5 minutes
$1 \text{ h } 5 \text{ min} = 60 + 5 = 65 \text{ min}$	same conversion
(c) $150 - 65 = 85 \text{ min saved}$	compare in minutes
$85 \text{ min} = 60 + 25 = 1 \text{ h } 25 \text{ min}$	turn minutes back into hours and minutes
Check: $65 \text{ min} + 85 \text{ min} = 150 \text{ min}$	the pieces add back to the paper time

The paper stocktake took 2 h 30 min, the app took 1 h 5 min, and the app saved 1 h 25 min — and it saved the effort of re-checking hundreds of handwritten lines as well.

Example 3 — unscaffolded

GreenPatch Garden Centre is building a rectangular garden bed 4.5 m long and 3 m wide. A strip of plastic edging runs all the way around the bed, and the edging costs \$12 per metre.

Example 3: the garden bed at GreenPatch



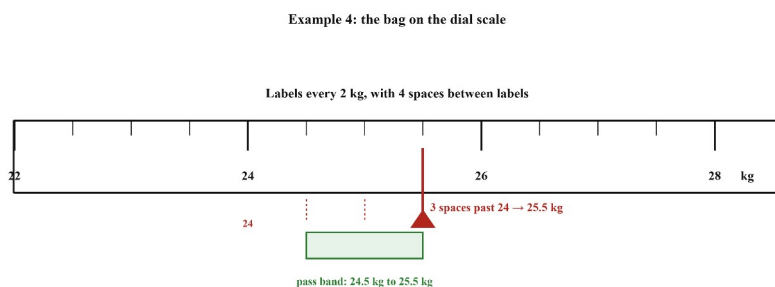
Find the length of edging needed, the cost of the edging, and the area of soil in the bed.

Solution. The edging runs around the edge, so its length is the perimeter: $P = 2 \times (l + w) = 2 \times (4.5 + 3) = 2 \times 7.5 = 15$ m. The cost is the length times the rate per metre: $15 \times 12 = \$180.00$. The soil area is length times width: $A = 4.5 \times 3 = 13.5 \text{ m}^2$.

∴ the bed needs 15 m of edging, the edging costs \$180.00, and the soil area is 13.5 m².

Example 4 — unscaffolded

GreenPatch fills 25 kg bags of potting mix. Quality assurance passes a bag whose mass is between 24.5 kg and 25.5 kg. One bag sits on a dial scale whose labels read every 2 kg with 4 spaces between labels; the needle stands 3 spaces past the 24 label.



Each space is $2 \div 4 = 0.5$ kg. The reading sits exactly on 25.5 kg — on the limit, so it passes.

(a) What mass does one small space on the dial stand for? **(b)** What mass does the dial show for the bag? **(c)** Does the bag pass quality assurance?

Solution. **(a)** The gap between labels is 2 kg over 4 spaces, so one space is $2 \div 4 = 0.5$ kg. **(b)** The needle is 3 spaces past 24, so the dial shows $24 + 3 \times 0.5 = 24 + 1.5 = 25.5$ kg. **(c)** The pass band is between 24.5 kg and 25.5 kg, and the band includes its ends. 25.5 kg is exactly on the top end of the band, so the bag passes.

∴ one space is 0.5 kg, the bag reads 25.5 kg, and the bag passes (it sits exactly on the limit).

Practice questions

Scaffolded

Q1. The job card in the Theory figure shows a supervisor's mobile: 0427 556 118.

- **(a)** Give two reasons why you know this number is a mobile and not a landline.
- **(b)** Bill copies the number into his phone as 0427 565 118. Which group of digits is wrong?
- **(c)** Write the number correctly, in groups of four.

Q2. A Shinefix label says: add 50 mL of FloorFresh to each litre of water. How much FloorFresh is needed for:

- **(a)** 1 L of water?
- **(b)** 4 L of water?
- **(c)** 0.5 L of water?

Q3. Quayside Warehouse timed two tasks on paper and on the app:

Task	Paper	App
Log 8 truck arrivals	45 min	15 min
Type up 10 work orders	90 min	45 min

Made-up data: pretend times for a pretend warehouse.

- **(a)** How many minutes did the app save on logging truck arrivals?
- **(b)** Show that the app time for logging truck arrivals (15 min) is one third of the paper time (45 min).
- **(c)** How many minutes did the app save on typing work orders?

Q4. A sign above a storage rack reads MAX LOAD 250 kg. A worker puts a 180 kg pallet on the rack, then stacks 10 boxes of 8 kg each onto the pallet.

- (a) What is the total mass of the 10 boxes?
- (b) What is the total mass on the rack (pallet plus boxes)?
- (c) Is the rack over its maximum load? If so, by how many kilograms?

Q5. Choose the better tool and read the display.

- (a) Which tool from the Theory table would you use to find the mass of a loaded pallet, and in what unit?
- (b) Which tool would you use to measure out 250 mL of cleaner, and in what unit?
- (c) A digital platform scale displays 24.75 kg. To what accuracy (how many decimal places) does this scale read?

Q6. Hilltop Cabinets passes a shelf board whose width is between 118 cm and 122 cm. Say whether each board passes or fails, and by how much it misses the band if it fails.

- (a) A board measuring 120.5 cm.
- (b) A board measuring 123 cm.
- (c) A board measuring 117.5 cm.

Unscaffolded

Q7. A tin of concrete sealer says: mix 1 to 2 (1 part sealer to 2 parts water).

- (a) A worker mixes a 9 L bucket of sealer mix. How many litres of sealer and how many litres of water are in it?
- (b) Another worker pours 4 L of sealer and 5 L of water into a drum. Is the mix right? If not, is it too strong or too weak, and how many litres of water should 4 L of sealer have?

Q8. The safety sheet for a milk product says: store between 5 °C and 25 °C. At 7 am the cool room's digital thermometer shows 4 °C.

Q8: the cool room in the morning

The number on the door display is the reading to act on.

- (a) Is 4 °C inside the storage band?
- (b) By how many degrees is it outside the band?
- (c) What should the worker do? (Use the habit from this section: follow the sheet and report it.)

Q9. A concreter pours a rectangular slab 3.6 m long and 2.5 m wide. Sealer for the slab is sold in bags, and one bag covers 3 m².

- (a) What is the area of the slab?
- (b) How many bags of sealer are needed to cover it?
- (c) Formwork runs around the edge of the slab. What length of formwork is needed?

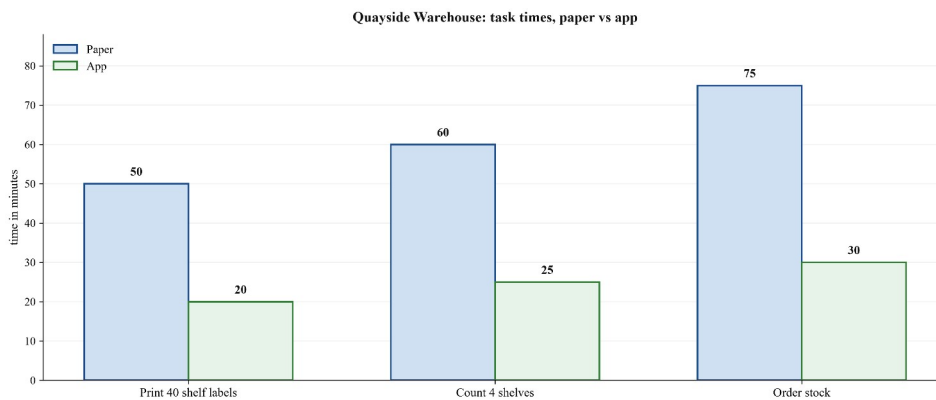
Q10. A plumber charges a \$60 call-out fee plus \$45 per hour of work. A job takes 2.5 hours.

- (a) What does the 2.5 hours of work cost?
- (b) What is the total bill (call-out fee plus hours), to the nearest cent?
- (c) The customer pays with a \$200 note. What change is owed?

Q11. A QuickDrop delivery van travels at 60 km/hr on a 45 km run.

- (a) How long does the run take? Give your answer in hours (as a decimal) and in minutes.
- (b) The van leaves the depot at 13:10. At what time does it arrive?

Q12. The chart shows how long three Quayside Warehouse tasks took on paper and on the app.



Made-up data: pretend times for a pretend warehouse.

- (a) How many minutes did “Count 4 shelves” take on the app?
- (b) Which task took the longest on paper, and how many minutes did it take?
- (c) How many minutes did the app save on “Print 40 shelf labels”?

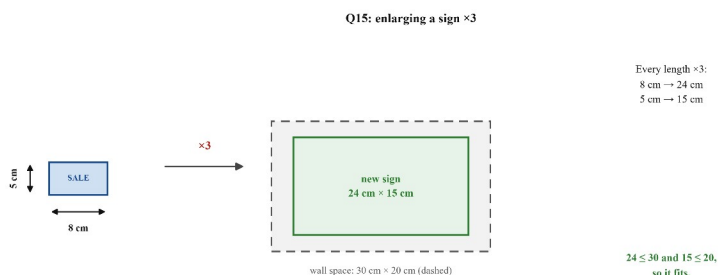
Q13. A paper method for checking a delivery takes 80 min.

- (a) A barcode scanner does the same check in 50% of that time. How many minutes does the scanner take?
- (b) A newer app takes 25% less time than a 60 min task. How many minutes does the app take?

Q14. A fertiliser label says: add 200 mL of fertiliser to each 10 L bucket of water.

- (a) How much fertiliser is needed for 2 full buckets?
- (b) A worker adds 300 mL to one 10 L bucket. Is the mix too strong or too weak, and by how many millilitres?

Q15. A shop sign measures 8 cm by 5 cm. The owner enlarges it by a scale factor of 3 to put on a wall, and the clear wall space is 30 cm by 20 cm.



- (a) What are the dimensions of the enlarged sign?
- (b) Does the enlarged sign fit the wall space? Explain with two comparisons.

Q16. A site office answerphone says: “Call the office on oh three, five four seven two, eight eight nine oh.”

- (a) Write the number in digits, in the usual landline form.
- (b) How many digits does the full number (including the area code) have?
- (c) A worker reads the number back as “... eight nine eight oh”. Is the read-back correct? What should the last group be?

Q17. A tape measure marked in whole centimetres is held against a bench, and the end of the bench lines up closest to the 153 mark.

- (a) What should the worker record?
- (b) A note in the job file says the bench is 152.64 cm long. Could that reading have come from this tape? Explain.
- (c) Write 153 cm in metres.

Q18. GreenPatch Garden Centre is fitting out a rectangular display bed 4 m long and 2 m wide. Edging costs \$9.50 per metre, and a liquid fertiliser is applied at 25 mL to each litre of water in a 6 L watering can.

- (a) What length of edging runs around the bed?
- (b) What does the edging cost, to the nearest cent?
- (c) What is the area of the bed?
- (d) How much fertiliser goes into one full 6 L watering can?

Answers

Q1 (a) it starts with 04; it has 10 digits (b) the middle group — 565 should be 556 (c) 0427 556 118 **Q2** (a) 50 mL (b) 200 mL (c) 25 mL **Q3** (a) 30 min (b) $45 \div 3 = 15$ min (c) 45 min **Q4** (a) 80 kg (b) 260 kg (c) yes, over by 10 kg **Q5** (a) platform scale, kg (b) measuring jug, mL (c) nearest 0.01 kg (2 decimal places) **Q6** (a) passes (b) fails, 1 cm over the top (c) fails, 0.5 cm under the bottom **Q7** (a) 3 L sealer + 6 L water (b) not right — too strong; 4 L of sealer needs 8 L of water (5 L is 3 L short) **Q8** (a) no, below the band (b) 1°C below the 5°C end (c) follow the sheet: report it and check the product **Q9** (a) 9 m^2 (b) 3 bags (c) 12.2 m **Q10** (a) \$112.50 (b) \$172.50 (c) \$27.50 **Q11** (a) $0.75\text{ h} = 45\text{ min}$ (b) 13:55 **Q12** (a) 25 min (b) Order stock, 75 min (c) 30 min **Q13** (a) 40 min (b) 45 min **Q14** (a) 400 mL (b) too strong by 100 mL **Q15** (a) 24 cm by 15 cm (b) yes — $24 \leq 30$ and $15 \leq 20$ **Q16** (a) (03) 5472 8890 (b) 10 digits (c) no — the last group should be 8890 (“eight eight nine oh”) **Q17** (a) 153 cm (b) no — a cm tape gives whole cm only (c) 1.53 m **Q18** (a) 12 m (b) \$114.00 (c) 8 m^2 (d) 150 mL

Fully-worked solutions

Q1 (a) The number starts with 04, which is how Australian mobiles begin, and it has 10 digits (0, 4, 2, 7, 5, 5, 6, 1, 1, 8) — landlines in this area start with an area code in brackets, (03). (b) Comparing group by group: 0427 matches, 118 matches, but the middle group is written 565 against the card’s 556 — the 5 and the 6 are swapped. (c) The correct number is 0427 556 118.

Q2 The label gives the amount for each 1 L: 50 mL. (a) 1 L needs $50 \times 1 = 50$ mL. (b) 4 L needs $50 \times 4 = 200$ mL. (c) 0.5 L is half a litre, so it needs half of 50 mL, which is 25 mL.

Q3 (a) Paper 45 min, app 15 min: saved $45 - 15 = 30$ min. (b) One third of 45 min means $45 \div 3 = 15$ min, which is exactly the app time — so 15 min is one third of 45 min. (c) Paper 90 min, app 45 min: saved $90 - 45 = 45$ min.

Q4 (a) 10 boxes of 8 kg: $10 \times 8 = 80$ kg. (b) Pallet plus boxes: $180 + 80 = 260$ kg. (c) The sign allows 250 kg, and 260 kg is more than that, so the rack is over by $260 - 250 = 10$ kg. Some boxes must come off before the rack is used.

Q5 (a) The mass of a loaded pallet is a job for the platform scale, recorded in kg. (b) 250 mL of cleaner is measured with a measuring jug, recorded in mL. (c) The display 24.75 kg has two decimal places, so the scale reads to the nearest 0.01 kg — and 0.01 kg is the smallest change it can show.

Q6 The band is between 118 cm and 122 cm, and it includes its ends. (a) 120.5 cm sits between 118 and 122, so the board passes. (b) 123 cm is above the top of the band: $123 - 122 = 1$ cm over, so it fails. (c) 117.5 cm is below the bottom of the band: $118 - 117.5 = 0.5$ cm under, so it fails.

Q7 (a) A 1-to-2 mix has $1 + 2 = 3$ parts; $9 \div 3 = 3$ L in each part; so 3 L of sealer and $2 \times 3 = 6$ L of water. Check: $3 + 6 = 9$ L. (b) For 4 L of sealer the ratio needs $4 \times 2 = 8$ L of water. The drum has only 5 L of water, so there is too little water for the sealer — the mix is too strong. It is short by $8 - 5 = 3$ L of water.

Q8 (a) The band is between 5°C and 25°C . 4°C is less than 5°C , so it is not inside the band. (b) It is $5 - 4 = 1^\circ\text{C}$ below the bottom of the band. (c) The worker should not just note it: follow the sheet’s storage rule — report the cool room to the supervisor straight away and check whether the product is still safe to use.

Q9 (a) $A = l \times w = 3.6 \times 2.5 = 9\text{ m}^2$. (b) One bag covers 3 m^2 , so $9 \div 3 = 3$ bags. (c) The formwork runs around the edge: $P = 2 \times (3.6 + 2.5) = 2 \times 6.1 = 12.2\text{ m}$.

Q10 (a) Hours cost: $C = h \times r = 2.5 \times 45 = \$112.50$. (b) Total with the call-out fee:
 $C = f + h \times r = 60 + 112.50 = \$172.50$. (c) Change from \$200: $200 - 172.50 = \$27.50$.

Q11 (a) Time = distance $\div$ speed = $45 \div 60 = 0.75\text{ h}$. In minutes: $0.75 \times 60 = 45\text{ min}$. (b) Leaving at 13:10 and travelling 45 min: $13:10 + 45\text{ min} = 13:55$.

Q12 Read the chart bars directly. (a) The app bar for “Count 4 shelves” reaches 25, so 25 min. (b) The paper bars are 50, 60 and 75 min; the tallest is “Order stock” at 75 min. (c) “Print 40 shelf labels”: paper 50 min, app 20 min, so the app saved $50 - 20 = 30$ min.

Q13 (a) 50% is a half, so the scanner takes half of 80 min: $80 \div 2 = 40$ min. (b) 25% is a quarter; a quarter of 60 min is $60 \div 4 = 15$ min; 25% less than 60 min is $60 - 15 = 45$ min.

Q14 (a) Each 10 L bucket takes 200 mL, so 2 buckets take $200 \times 2 = 400$ mL. (b) One 10 L bucket should take 200 mL; 300 mL is more than that, so the mix is too strong, by $300 - 200 = 100$ mL of fertiliser.

Q15 (a) Enlarging by 3 multiplies every length by 3: $8 \times 3 = 24$ cm and $5 \times 3 = 15$ cm. (b) The wall space is 30 cm by 20 cm. The sign's 24 cm fits the 30 cm side ($24 \leq 30$) and its 15 cm fits the 20 cm side ($15 \leq 20$), so yes, the enlarged sign fits.

Q16 (a) “oh three” is the area code 03, then 5472, then 8890: (03) 5472 8890. (b) With the area code: 0, 3, 5, 4, 7, 2, 8, 8, 9, 0 — 10 digits. (c) The message ends “eight eight nine oh” (8890) but the worker said “eight nine eight oh” (8980), so the read-back is wrong; the last group should be 8890.

Q17 (a) The tape is marked in whole cm and the end lines up closest to 153, so record 153 cm. (b) No. 152.64 cm claims an accuracy of hundredths of a cm, far finer than a tape marked in whole cm can show — the tape can only give a whole number of cm. (c) There are 100 cm in 1 m, so $153 \div 100 = 1.53$ m.

Q18 (a) $P = 2 \times (4 + 2) = 2 \times 6 = 12$ m of edging. (b) Cost = length $\times$ rate per metre = $12 \times 9.50 = \$114.00$. (c) $A = 4 \times 2 = 8$ m². (d) The can holds 6 L and each litre takes 25 mL, so $25 \times 6 = 150$ mL of fertiliser.

Chapter 6 Unit 1 numeracy in context — 6F Recreational numeracy

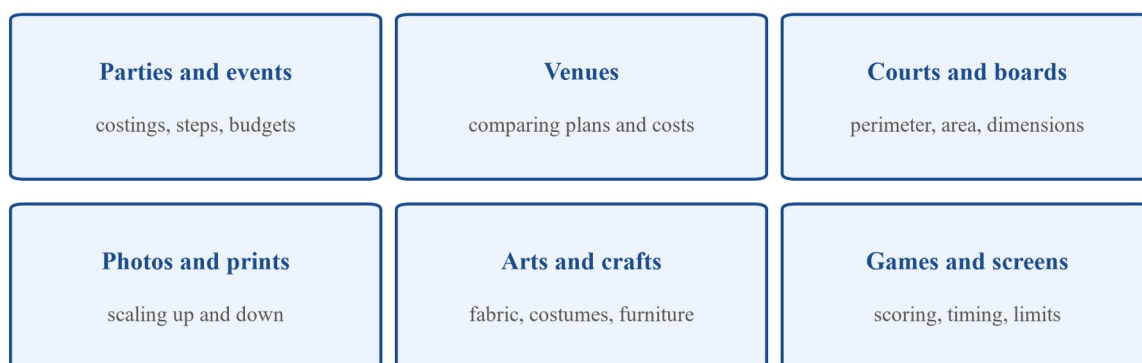
About the data in this section. The clubs, venues, prices, timetables and measurements here are **made up** (not real): pretend parties, pretend clubs and pretend numbers, built for this book so you can practise the maths. Nothing here is real data about a real club, venue, person or place.

Theory

Where the maths hides in recreation.

Recreation is what you do in your free time — sport, games, parties, music, craft, photos, screens. Nearly every recreation plan runs into the same maths: how many people, what each item costs, what everything adds up to, whether it fits the money, the room, the wall or the day. A **venue** is the place an event happens (a hall, a function room, a court). A **budget** is the amount of money you have decided to spend. A **costing** is a list of the items a plan needs, with a price against each one and a total at the end.

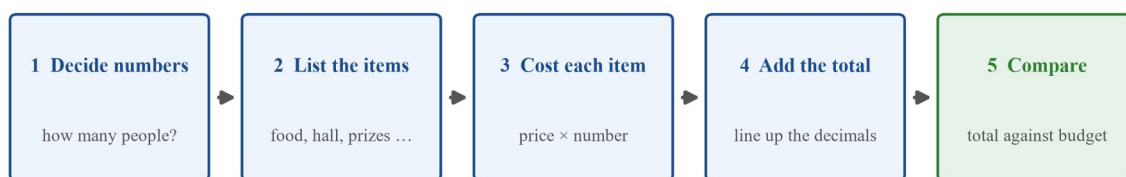
Where the maths hides in recreation



Six panels showing where maths appears in recreation: parties and events (costings, steps, budgets), venues (comparing plans and costs), courts and boards (perimeter, area, dimensions), photos and prints (scaling up and down), arts and crafts (fabric, costumes, furniture), and games and screens (scoring, timing, limits).

Costing an activity or event.

Every costing runs through the same five steps. Miss one and the total is wrong: guess the numbers and you cater for the wrong crowd; skip an item and the money runs out halfway through.



Five-step costing flow: 1 decide numbers (how many people?), 2 list the items (food, hall, prizes), 3 cost each item (price × number), 4 add the total (line up the decimals), 5 compare (total against budget).

Refresher: money arithmetic. Money is just decimals with two places. To add or subtract money, line up the decimal points so cents sit under cents: $\$4.50 + \$2.75 = \$7.25$. To cost a number of the same item, multiply the price by how many: $4 \times \$2.75 = \$11.00$. Keep the two decimal places in your answer even when the cents are zero, because that is how money is written.

Worked model. A club morning tea for 20 people:

Item	Cost
Hall hire (flat — paid once)	\$35

Item	Cost
Food: 20 people $\times$ \$4.50 each	\$90
Prizes (flat)	\$25
Total	\$150

Made-up data: a pretend morning tea for this book.

The budget is \$180. The total, \$150, is under the budget, and $180 - 150 = 30$, so \$30 of the budget is left over. Under budget means the plan can go ahead; over budget means something has to change.

Comparing venues: one formula for both charging styles.

Venues charge in two common styles. Some charge a **flat hire fee** plus a price for each person. Others charge one **all-in** price per person that covers everything. Both styles fit one formula:

$$C = f + p \times n$$

where C is the total cost in dollars, f is the flat hire fee (paid once, whatever the numbers), p is the price for each person and n is the number of people. An all-in venue is just the same formula with $f = 0$.

One formula for a venue that charges both ways

$$C = f + p \times n$$

C — total cost (dollars)

f — flat hire fee — paid once, whatever the numbers

p — price for each person

n — number of people

$\times (100 + 8) \times 15$
 $= 1620$ — charges the fee
15 times over

$f = \$100, p = \$8, n = 15$
 $C = 100 + 8 \times 15 = 100 + 120 = \$220$

Multiply first, then add (order of operations, Section 2D).

Formula card for $C = f + p \times n$ with the four letters explained, a worked substitution $f = \$100, p = \$8, n = 15$ giving $C = 100 + 8 \times 15 = 100 + 120 = \$220$, and a crossed-out trap $(100 + 8) \times 15 = 1620$ that charges the flat fee 15 times over.

Refresher: order of operations (Section 2D). In $f + p \times n$ the multiply happens **before** the add. With $f = 100, p = 8, n = 15$: first $8 \times 15 = 120$, then $100 + 120 = 220$, so $C = \$220$. Working left to right instead — $(100 + 8) \times 15 = 1620$ — charges the flat fee once for every person, fifteen times over. The same rule fixes any mixed calculation: in $3 \times 6 + 2 \times 5$ do both multiplies first (18 and 10), then add: $18 + 10 = 28$, not $(3 \times 6 + 2) \times 5 = 100$.

Two more things a costing never checks for you. **Capacity** — how many people a venue seats or holds: the cheaper venue is no use if your guests do not fit. And **what is included** — an all-in price can beat a per-person price once you count the extras it covers.

Courts, boards and dimensions.

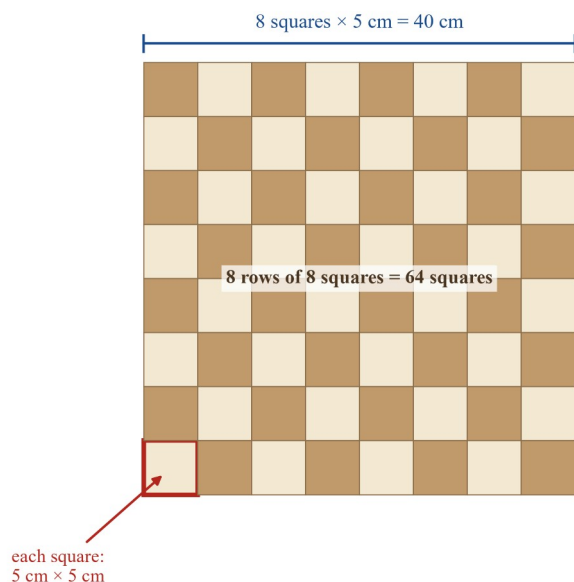
Clubs look after their own spaces: repainting the lines around a court, laying a new surface, marking out a board game. Around the outside is a **perimeter**; covering the surface is an **area** (Section 4B).

Refresher: perimeter and area of rectangles. For a rectangle of length l and width w :

$$P = 2 \times (l + w) \quad A = l \times w$$

Perimeter keeps the units of the sides (m); area is in square units (m²). A court 20 m by 10 m has $P = 2 \times (20 + 10) = 60$ m of edge line and $A = 20 \times 10 = 200$ m² of surface.

A chessboard is a square made of 8 rows of 8 small squares — 64 squares in all. If each small square is 5 cm by 5 cm, one side of the board is $8 \times 5 = 40$ cm, and the board's area is $40 \times 40 = 1600$ cm². Check it the other way: 64 squares of $5 \times 5 = 25$ cm² each gives $64 \times 25 = 1600$ cm² ✓ — the same answer, so the counting and the formula agree.



An 8 by 8 chessboard of alternating light and dark squares with one corner square outlined and labelled 5 cm × 5 cm, and a dimension line across the top reading 8 squares × 5 cm = 40 cm.

Refresher: one-step metric conversions (Section 4A). Neighbouring units are one step apart: multiply to go to a smaller unit, divide to go to a bigger one.

Change	Do this	Example
m → cm	× 100	1.2 m = 120 cm; 2.5 m = 250 cm
cm → m	÷ 100	45 cm = 0.45 m; 175 cm = 1.75 m

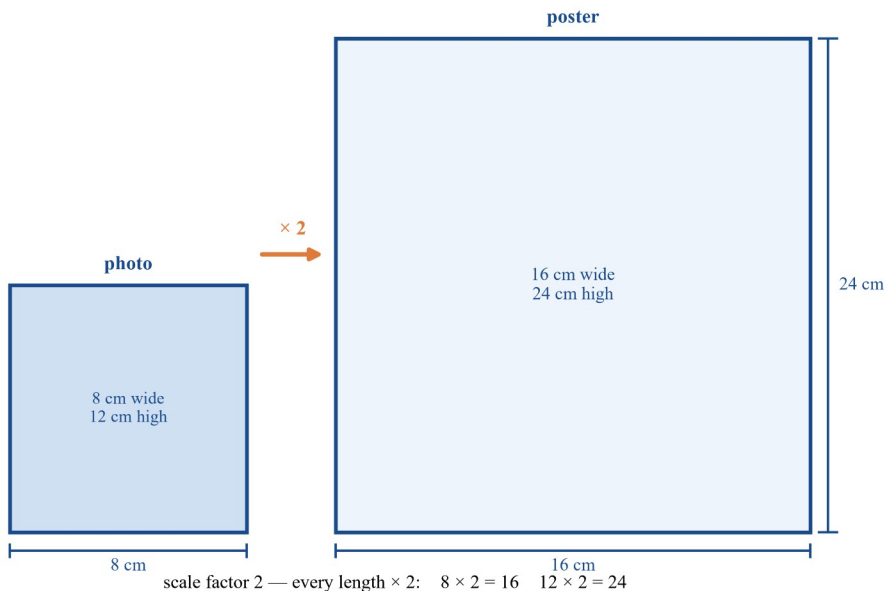
Making things: photos, costumes, furniture.

Recreation plans make things: prints blown up for a display, costumes for a show, a games corner at home. All three are measuring jobs.

Refresher: scale factor (Section 3E). A **scale factor** is the number every length is multiplied by:

$$\text{new length} = \text{original length} \times \text{scale factor}$$

A scale factor bigger than 1 is an **enlargement**; smaller than 1 is a **reduction**. An 8 cm by 12 cm photo printed at scale factor 2 becomes $8 \times 2 = 16$ cm wide and $12 \times 2 = 24$ cm high — both lengths double, so the picture keeps its shape.



An 8 cm by 12 cm photo beside a 16 cm by 24 cm poster of the same picture, with an orange arrow between them labelled $\times 2$ and the caption scale factor 2 — every length $\times 2$: $8 \times 2 = 16$, $12 \times 2 = 24$.

Costume and craft fabric is sold by the metre, but patterns are often measured in centimetres: a body piece of 140 cm plus 35 cm of trim is $140 + 35 = 175$ cm, and $175 \div 100 = 1.75$, so 1.75 m of fabric. Furniture is a fitting job: a 1.85 m shelf through a 2 m doorway leaves $2 - 1.85 = 0.15$ m of clearance, and $0.15 \times 100 = 15$, so 15 cm to spare — it fits.

Games: scoring, penalties, fines and timing.

Club games often score with a formula: a number of points for one kind of hit and another number for another. Writing the rule with letters lets you score any round by **substitution** — replacing each letter with its number.

Refresher: substitution (Section 5B). Replace the letters with their numbers, then follow order of operations (multiply before add).

Club game — scoring card

GOAL = 3 points

BONUS = 1 point

With letters: $P = 3g + b$

P = total points, g = number of goals, b = number of bonuses

Substitute $g = 7$ and $b = 4$:

$P = 3 \times 7 + 4 = 21 + 4 = 25$ points

Scoring card for a club game: GOAL = 3 points, BONUS = 1 point, written with letters as $P = 3g + b$ where P is total points, g is goals and b is bonuses, with the substitution $g = 7$ and $b = 4$ giving $P = 3 \times 7 + 4 = 21 + 4 = 25$ points.

With goals worth 3 points and bonuses worth 1: $P = 3g + b$. A player with $g = 7$ goals and $b = 4$ bonuses scores $3 \times 7 + 4 = 21 + 4 = 25$ points.

Games also run on **fines** (money paid for breaking a club rule, such as \$10 for a missed training night: 3 misses cost $3 \times \$10 = \$30$) and **penalties** (time served off the court: 6 penalties of 2 minutes each is $6 \times 2 = 12$ minutes).

Refresher: time calculations (Section 4D). A match's length is its playing time **plus** its breaks. Four 10-minute quarters with three 3-minute breaks is $4 \times 10 = 40$ minutes of play and $3 \times 3 = 9$ minutes of breaks: $40 + 9 = 49$

minutes in all. To find the finish, count the minutes on from the start: 2:00 pm + 49 min is 2:49 pm. Minutes and hours convert one step at a time too: 60 min = 1 h, so 90 min = 1 h 30 min. On a 24-hour clock, 14:00 is 2 pm.

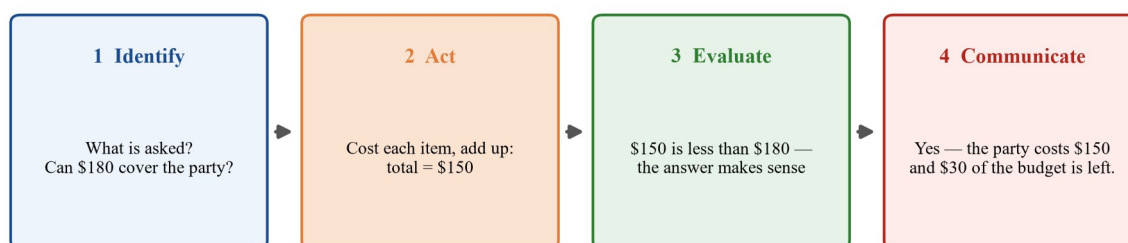
Use and overuse.

Recreation is good for you, and too much of one thing can stop being good. Screen time is the usual example: a common health guideline is at most 2 h of recreational screen time a day for young people, and $2 \times 60 = 120$, so the guideline is 120 minutes. A day of 135 minutes is $135 - 120 = 15$ minutes over. Three 90-minute gaming sessions is $3 \times 90 = 270$ minutes, and $270 \text{ min} = 4 \text{ h } 30 \text{ min}$ — more than three and a half times the daily guideline in one sitting.

Reading a bar chart is a measuring skill: read each bar against the scale, then compare the values with the limit line. Charts and tables in this section are for **reading** — you are never asked to summarise a whole set of data with a single number.

Running a recreation job through the problem-solving cycle.

Every task in this section works the same four stages (the problem-solving cycle): **identify** what is actually asked; **act** by doing the maths; **evaluate** by checking the answer makes sense (estimate, units, does it fit?); **communicate** by answering the question in words. The cycle catches the classic recreation mistake — a correct calculation that answers the wrong question, like booking the cheaper venue that does not seat your guests.



Four-stage problem-solving cycle strip on a party budget: 1 Identify — what is asked, can \$180 cover the party?; 2 Act — cost each item and add up, total = \$150; 3 Evaluate — \$150 is less than \$180, the answer makes sense; 4 Communicate — yes, the party costs \$150 and \$30 of the budget is left.

Your tools for this section are the ones the cycle names: a tape measure or ruler for dimensions (Section 1E), and a calculator or spreadsheet for checking long adds (Section 1F). Every task here can also be done with pen and paper — the tool is a check, not a shortcut.

Key ideas.

- A costing lists every item, prices each one ($\text{price} \times \text{number}$), adds the total and compares it with the budget.
- A venue that charges a flat fee plus a per-person price costs $C = f + p \times n$; multiply before you add.
- Cheapest is not always bookable: check capacity and what is included.
- Around the outside is perimeter, $P = 2 \times (l + w)$; covering the surface is area, $A = l \times w$.
- A scale factor multiplies **every** length: bigger than 1 enlarges, smaller than 1 reduces.
- Score with a formula by substituting the numbers, then following order of operations.
- Match length = playing time + breaks; count on from the start to get the finish.
- Limits and guidelines (budgets, capacities, screen time) are checked by reading values from a table or chart and comparing.
- Run every job through the cycle: identify, act, evaluate, communicate.

Worked examples

Example 1 — scaffolded

The Willow Street Netball Club is planning its end-of-season party for 40 people. The committee's budget is \$500. Their costing sheet lists four items:

Item	Charge
Hall hire	\$ 80 (flat)
Food	\$ 6.50 per person
Drinks	\$ 25 (flat)
Trophies and ribbons	\$ 55 (flat)

Made-up data: a pretend club party for this book.

- Find the cost of the food.
- Find the total cost of the party.
- Does the party fit the budget? If so, how much of the budget is left over?

Working	Comment
$\$6.50 \times 40 = \$260$	Act — price per person $\times$ number of people
$80 + 260 + 25 + 55 = \$420$	Act — add the flat charges and the food; line up the decimals
estimate: $80 + 260 + 25 + 55 \approx 80 + 260 + 80 = 420$ ✓	Evaluate — the estimate matches the exact total
$420 \leq 500$, and $500 - 420 = \$80$	Evaluate — total under budget; the gap is what is left
Yes — the party fits, with \$ 80 left over	Communicate — answer both halves of the question

Example 2 — scaffolded

Priya is organising an 18th birthday party for 30 guests. Two venues quote:

Venue	Charge	Seats
A — Riverdale Community Hall	\$ 120 hire + \$ 6 per person	45
B — Lakeside Function Room	\$ 9 per person, all-in	25

Made-up data: pretend venues and quotes for this book.

- Find the cost of Venue A for 30 guests.
- Find the cost of Venue B for 30 guests.
- Venue B is cheaper. Should Priya book Venue B? Explain your answer.

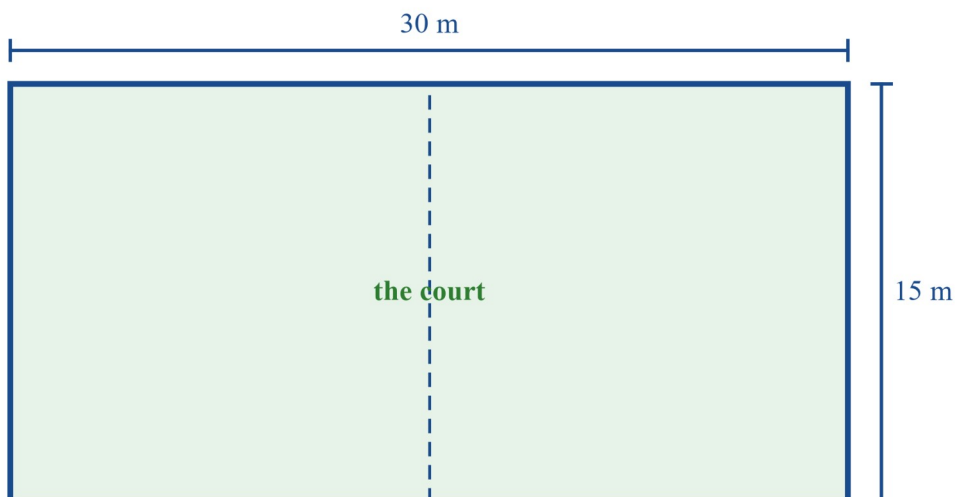
Working	Comment
A: $6 \times 30 = 180$; $120 + 180 = \$300$	Act — per-person charge first, then add the flat fee (order of operations)
B: $9 \times 30 = \$270$	Act — all-in price $\times$ number of guests
$270 < 300$: B is \$ 30 cheaper	Evaluate — compare the two costs
B seats 25; $30 > 25$ — the guests do not fit	Evaluate — check capacity, not just cost
Book Venue A, at \$ 300	Communicate — the cheaper venue that actually fits

Example 3 — unscaffolded

The Fairview Community Court is a rectangle 30 m long and 15 m wide. The club repaints the line marking around the outside edge of the court, paying \$ 3 per metre of line, then lays a new playing surface over the whole court.

- What length of line marking is repainted?
- What does the line marking cost?

(c) What area of new surface is laid?



line marking runs around the outside; a new surface covers the court

Plan of the Fairview Community Court, a rectangle 30 m by 15 m with a dashed centre line, showing the 30 m and 15 m dimensions.

Line marking runs around the outside, so its length is the perimeter.

$$30 + 15 = 45$$

$$P = 2 \times 45 = 90$$

$\therefore$ 90 m of line marking is repainted.

The cost is the length times the price per metre:

$$90 \times \$3 = \$270$$

$\therefore$ the line marking costs \$270.

The new surface covers the court, so its size is the area.

$$A = 30 \times 15 = 450$$

$\therefore$ 450 m² of new surface is laid.

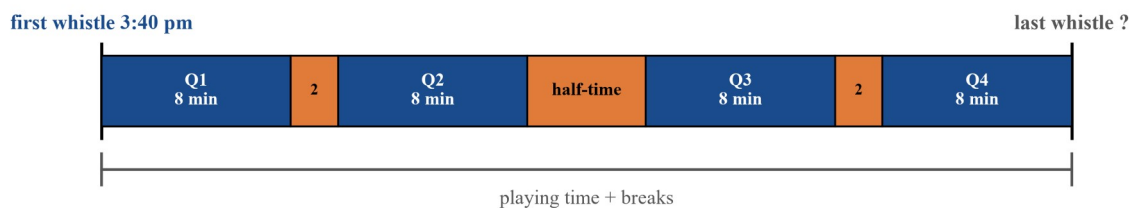
Example 4 — unscaffolded

A community basketball-style match runs four quarters of 8 minutes each, with breaks of 2 minutes, 5 minutes (half-time) and 2 minutes between the quarters. The first whistle is at 3:40 pm. Jackson scores 6 two-point shots and 3 three-point shots in the match.

(a) How many minutes long is the match, from first whistle to last?

(b) What time does the match finish?

(c) How many points does Jackson score?



Timeline of the match from the first whistle at 3:40 pm: segments Q1 8 min, break 2 min, Q2 8 min, half-time 5 min, Q3 8 min, break 2 min, Q4 8 min, with the last whistle left open for the reader to find.

(a) The match is playing time plus breaks. Playing time: $4 \times 8 = 32$ minutes. Breaks: $2 + 5 + 2 = 9$ minutes. Total: $32 + 9 = 41$ minutes.

$\therefore$ the match runs for 41 minutes.

(b) Count 41 minutes on from 3:40 pm: 20 minutes reaches 4:00 pm, and 21 more reaches 4:21 pm.

$\therefore$ the match finishes at 4:21 pm.

(c) Two-point shots: $2 \times 6 = 12$ points. Three-point shots: $3 \times 3 = 9$ points. Total: $12 + 9 = 21$ points.

$\therefore$ Jackson scores 21 points.

Practice questions

Scaffolded

Q1. Marcus takes 12 friends to a movie afternoon. Tickets cost \$11.50 each and every person gets a popcorn box at \$4.25 each.

- (a) Find the cost of the 12 tickets.
- (b) Find the cost of the 12 popcorn boxes.
- (c) Find the total cost of the afternoon.

Q2. A team thank-you party costs: gifts \$64.90, party supplies \$58.35, and a cake \$45.00. The organisers' budget is \$200.

- (a) Find the total spent.
- (b) How much of the budget is left over?
- (c) Four organisers split the cost of the gifts equally. How much does each pay, correct to the nearest cent?

Q3. A community hall advertises its hire charge with the formula $C = 50 + 8n$, where C is the total cost in dollars and n is the number of people.

- (a) Find C when $n = 15$.
- (b) Find C when $n = 25$.
- (c) Explain in words what the 50 in the formula stands for.

Q4. A club chessboard is made of 8 rows of 8 squares, and each small square is 6 cm by 6 cm.

- (a) Find the length of one side of the board, in cm.
- (b) Find the area of one small square.
- (c) Find the area of the whole board, then check it a second way using the number of squares.

Q5. Emma has a photo 10 cm wide and 15 cm long. She prints a poster of the same photo using a scale factor of 3.

- (a) Find the length of the poster.
- (b) Find the width of the poster.
- (c) Is this an enlargement or a reduction? How do you know?

Q6. A netball match has four quarters of 12 minutes each. The breaks between quarters add up to 9 minutes. The match starts at 10:30 am.

- (a) Find the playing time in minutes.
- (b) Find the total length of the match, including breaks.
- (c) What time does the match finish?

Un scaffolded

Q7. The Pine Street Disco fundraiser costs the committee: hall hire \$95, a DJ \$150, and snacks \$85.50. They sell 60 tickets at \$6.50 each. (**Profit** is the money left after all the costs are paid.)

- (a) Find the total cost of running the disco.
- (b) Find the money taken from ticket sales.
- (c) Find the profit.

Q8. A club celebration dinner is being priced at two venues. Venue A charges \$80 hire plus \$7 per person. Venue B charges \$12 per person, all-in.

- (a) Find the cost of each venue for 10 people.
- (b) Which venue is cheaper for 10 people, and by how much?
- (c) Repeat the comparison for 30 people. Does the cheaper venue change?

Q9. At the club's target toss, a bag in the hole scores 5 points and a bag on the board scores 2 points. Maya throws 4 bags into the hole and 7 onto the board. The winning score is 42 points.

- (a) How many points does Maya score from the hole?
- (b) How many points does Maya score in total?
- (c) How many points behind the winning score is Maya?

Q10. A football club fines late players \$15 each, and each on-court penalty sends a player off for 2 minutes.

- (a) Find the total fines for 4 late players.
- (b) Find the total penalty time for 6 penalties.
- (c) One round's fines total \$105. How many players were late?

Q11. The Riverside multipurpose court is a rectangle 24 m long and 11 m wide. The club replaces the fence around the outside edge, paying \$12.50 per metre of fencing.

- (a) Find the perimeter of the court.
- (b) Find the cost of the fencing.
- (c) Find the area of the court.

Q12. Jesse is setting up a games corner along a wall 3.6 m long. The sofa is 2.35 m long and the armchair is 0.95 m long, and both go along that wall.

- (a) Find the total length of the two pieces of furniture.
- (b) Do they both fit along the wall? Show how you know.
- (c) Find the gap left along the wall, in centimetres.

Q13. A photo 24 cm wide and 18 cm high is reduced to fit a program cover, using a scale factor of 0.5.

- (a) Find the width of the reduced photo.
- (b) Find the height of the reduced photo.
- (c) Find the area of the reduced photo.

Q14. A show society sews 3 identical costumes. Each costume needs 1.2 m of body fabric and 0.55 m of trim. The fabric shop sells the material at \$8.40 per metre, in whole metres only, and members get 10% off the price (Section 2E).

- (a) Find the length of material one costume needs.
- (b) Find the length three costumes need, and the number of whole metres the society must buy (round up to the next whole metre).
- (c) Find the member price of the material bought.

Q15. A training session runs: warm-up 15 minutes, then 3 drills of 12 minutes each, then a cool-down of 10 minutes. Training starts at 4:45 pm.

- (a) Find the length of the session in minutes.
- (b) Write this length in hours and minutes.
- (c) What time does training finish?

Q16. A match starts at 13:50 and finishes at 15:05 (24-hour clock). The match has two halves of 25 minutes each.

- (a) Find the time from start to finish, in minutes.
- (b) Write this time in hours and minutes.
- (c) Find the total time taken by breaks (between the halves and at either end).

Q17. Sam's coach keeps a record of one training week:

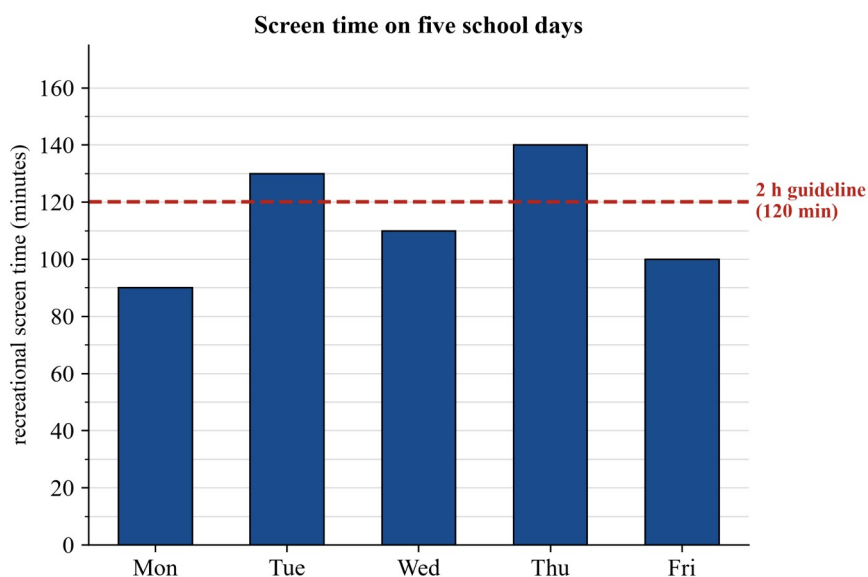
Session	Minutes
Monday training	90
Wednesday training	90
Friday training	90
Saturday match	105

Made-up data: a pretend training week for this book.

The coach's limit for the week is 8 hours.

- (a) Find Sam's total time for the week, in minutes.
- (b) Write this total in hours and minutes.
- (c) Is Sam under or over the coach's limit, and by how much? Give your answer in hours and minutes.

Q18. The chart shows one student's recreational screen time on five school days, with the 2 h (120 min) daily guideline marked.



Bar chart of recreational screen time in minutes on five school days: Monday, Tuesday, Wednesday, Thursday, Friday. The bar values are not printed; the scale runs to 160 minutes with gridlines every 10 minutes, and a dashed red line at 120 minutes marks the 2 h guideline. Tuesday and Thursday stand above the guideline.

- Read the screen time for Tuesday and for Thursday off the chart.
- On which days is the screen time over the guideline?
- On the day furthest over the guideline, how many minutes over is it?

Answers

Q1. (a) \$ 138.00. (b) \$ 51.00. (c) \$ 189.00.

Q2. (a) \$ 168.25. (b) \$ 31.75. (c) \$ 16.23 each (to the nearest cent).

Q3. (a) \$ 170. (b) \$ 250. (c) the flat hire fee, paid once whatever the number of people.

Q4. (a) 48 cm. (b) 36 cm^2 . (c) $2\,304 \text{ cm}^2$; check $64 \times 36 = 2\,304 \text{ cm}^2$ ✓.

Q5. (a) 45 cm. (b) 30 cm. (c) an enlargement — the scale factor 3 is bigger than 1.

Q6. (a) 48 min. (b) 57 min. (c) 11:27 am.

Q7. (a) \$ 330.50. (b) \$ 390.00. (c) \$ 59.50.

Q8. (a) A: \$ 150; B: \$ 120. (b) Venue B, by \$ 30. (c) A: \$ 290; B: \$ 360 — yes, the cheaper venue changes to A.

Q9. (a) 20. (b) 34. (c) 8 points.

Q10. (a) \$ 60.00. (b) 12 min. (c) 7 players.

Q11. (a) 70 m. (b) \$ 875.00. (c) 264 m^2 .

Q12. (a) 3.30 m. (b) yes — 3.30 m is less than 3.60 m. (c) 30 cm.

Q13. (a) 12 cm. (b) 9 cm. (c) 108 cm^2 .

Q14. (a) 1.75 m. (b) 5.25 m needed, so 6 m bought (rounded up to the next whole metre). (c) \$ 45.36.

Q15. (a) 61 min. (b) 1 h 1 min. (c) 5:46 pm.

Q16. (a) 75 min. (b) 1 h 15 min. (c) 25 min.

Q17. (a) 375 min. (b) 6 h 15 min. (c) under the limit, by 1 h 45 min (105 min).

Q18. (a) Tue 130 min; Thu 140 min. (b) Tuesday and Thursday. (c) 20 min (Thursday).

Fully-worked solutions

Q1. Each line is a price $\times$ number; the total adds the two lines.

(a) $12 \times \$ 11.50 = \$ 138.00$.

(b) $12 \times \$ 4.25 = \$ 51.00$.

(c) $138.00 + 51.00 = \$ 189.00$.

Q2. (a) Add the three costs, lining up the decimal points: $64.90 + 58.35 + 45.00 = \$ 168.25$.

(b) Evaluate against the budget: $168.25 < 200$, so it fits, and $200 - 168.25 = \$ 31.75$ is left over.

(c) $64.90 \div 4 = 16.225$. To the nearest cent, look at the third decimal place (5): round the cents up, so each organiser pays \$ 16.23.

Q3. Substitute, multiplying before adding.

(a) $n = 15$: $8 \times 15 = 120$, then $50 + 120 = \$ 170$.

(b) $n = 25$: $8 \times 25 = 200$, then $50 + 200 = \$ 250$.

(c) The 50 is the flat hire fee: it is paid once, whatever the number of people, while the $8n$ part grows with the crowd.

Q4. (a) One side is 8 squares of 6 cm: $8 \times 6 = 48$ cm.

(b) One small square: $6 \times 6 = 36$ cm².

(c) The board is a square of side 48 cm: $48 \times 48 = 2\,304$ cm². Check: 64 squares $\times$ 36 cm² each = 2 304 cm² ✓
— same answer both ways.

Q5. A scale factor multiplies every length.

(a) Length: $15 \times 3 = 45$ cm.

(b) Width: $10 \times 3 = 30$ cm.

(c) An enlargement: the scale factor 3 is bigger than 1, so every length grows.

Q6. (a) Playing time: $4 \times 12 = 48$ min.

(b) Add the breaks: $48 + 9 = 57$ min.

(c) Count on from 10:30 am: 30 min reaches 11:00 am, 27 more reaches 11:27 am.

Q7. Identify: profit means money in, minus costs out.

(a) Costs: $95 + 150 + 85.50 = \$330.50$.

(b) Ticket money: $60 \times \$6.50 = \$390.00$.

(c) Profit: $390.00 - 330.50 = \$59.50$. Evaluate: the takings are bigger than the costs, so a profit (not a loss) is the right kind of answer.

Q8. (a) For 10 people — A: $7 \times 10 = 70$, $80 + 70 = \$150$; B: $12 \times 10 = \$120$.

(b) Venue B is cheaper: $150 - 120 = \$30$ cheaper.

(c) For 30 people — A: $7 \times 30 = 210$, $80 + 210 = \$290$; B: $12 \times 30 = \$360$. Now A is cheaper, so yes — the cheaper venue changes. Evaluate: B's all-in price grows faster per person, so it wins only for small groups.

Q9. (a) Hole: $4 \times 5 = 20$ points.

(b) Board: $7 \times 2 = 14$ points; total $20 + 14 = 34$ points.

(c) Behind the winner: $42 - 34 = 8$ points.

Q10. (a) Fines: $4 \times \$15 = \$60.00$.

(b) Penalty time: $6 \times 2 = 12$ min.

(c) Work backwards: $105 \div 15 = 7$, so 7 players were late. Evaluate: $7 \times \$15 = \$105$ ✓.

Q11. (a) Around the outside: $24 + 11 = 35$, $P = 2 \times 35 = 70$ m.

(b) Fencing: $70 \times \$12.50 = \$875.00$.

(c) Covering the surface: $A = 24 \times 11 = 264$ m².

Q12. (a) $2.35 + 0.95 = 3.30$ m.

(b) Compare with the wall: 3.30 m is less than 3.60 m, so yes, both fit.

(c) Gap: $3.60 - 3.30 = 0.30$ m, and $0.30 \times 100 = 30$, so 30 cm.

Q13. A scale factor of 0.5 halves every length.

(a) Width: $24 \times 0.5 = 12$ cm.

(b) Height: $18 \times 0.5 = 9$ cm.

(c) Area of the reduced photo: $12 \times 9 = 108$ cm².

Q14. (a) One costume: $1.2 + 0.55 = 1.75$ m.

(b) Three costumes: $3 \times 1.75 = 5.25$ m. Material is sold in whole metres and 5 m would be short, so round up to the next whole metre: buy 6 m.

(c) Full price: $6 \times \$8.40 = \$50.40$. Member discount: 10 % of $50.40 = \$5.04$. Member price: $50.40 - 5.04 = \$45.36$.

Q15. (a) $15 + 3 \times 12 + 10 = 15 + 36 + 10 = 61$ min (multiplies first).

(b) 61 min = 1 h 1 min.

(c) Count on from 4:45 pm: 15 min reaches 5:00 pm, 46 more reaches 5:46 pm.

Q16. (a) From 13:50 to 14:00 is 10 min; from 14:00 to 15:00 is 60 min; from 15:00 to 15:05 is 5 min. Total: $10 + 60 + 5 = 75$ min.

(b) 75 min = 1 h 15 min.

(c) Playing time: $2 \times 25 = 50$ min. Breaks: $75 - 50 = 25$ min.

Q17. (a) Add the sessions: $90 + 90 + 90 + 105 = 375$ min.

(b) 375 min = 6 h 15 min.

(c) The limit in minutes: $8 \times 60 = 480$ min. $375 < 480$, so Sam is under the limit by $480 - 375 = 105$ min, which is 1 h 45 min.

Q18. Identify: read each named bar against the minute scale, then compare with the 120 min guideline.

(a) Tuesday's bar reaches 130 min; Thursday's bar reaches 140 min.

(b) The bars above the dashed guideline are Tuesday (130) and Thursday (140). Monday (90), Wednesday (110) and Friday (100) are under it.

(c) The day furthest over is Thursday: $140 - 120 = 20$ min over the guideline.

Chapter 06 — Test A (multiple choice)

Chapter 6 (Unit 1 numeracy in context), sections 6A to 6F. Materials: pen, paper; a calculator may be used. Test A: 12 multiple-choice questions (12 marks). Approximate time: 20 minutes.

About the data in this test. 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.

Choose the response that is correct for the question.

Question 1

A jacket marked \$85 is on sale with 30% off. How much money is saved?

- A. \$25.50
- B. \$55
- C. \$59.50
- D. \$110.50

Question 2

A supermarket sells the same juice in a 2 L bottle for \$3.60 and in a 3 L bottle for \$5.10. Which statement is correct?

- A. The 2 L bottle is the better buy, because \$3.60 is less than \$5.10.
- B. The 2 L bottle is the better buy, at \$1.80 per litre.
- C. The 3 L bottle is the better buy, at \$15.30 per litre.
- D. The 3 L bottle is the better buy, at \$1.70 per litre.

Question 3

In a council election, 2870 of the 3500 enrolled voters cast a vote. The voter turnout, as a percentage, is

- A. 82%
- B. 8.2%
- C. 18%
- D. 122%

Question 4

The unemployment rate in a town fell from 7.2% to 5.8%. By how many percentage points did the rate fall?

- A. 0.19
- B. 1.4
- C. 13.0
- D. 19.4

Question 5

A worker is paid \$24 per hour. On Saturdays she is paid time-and-a-half. Her hourly rate on Saturday is

- A. \$12
- B. \$25.50
- C. \$36
- D. \$48

Question 6

An electricity bill has a fixed supply charge of \$90, plus \$0.25 for each kilowatt-hour (kWh) used. A household used 400 kWh. The total bill is

- A. \$100
- B. \$190
- C. \$490
- D. \$36100

Question 7

A doctor charges \$80 for a visit. The Medicare schedule fee for this visit is \$60, and Medicare rebates 85% of the schedule fee. The patient's out-of-pocket cost is

- A. \$0
- B. \$9
- C. \$12
- D. \$29

Question 8

A first-aid officer counts 38 heartbeats in 30 seconds. The pulse rate, in beats per minute, is

- A. 19
- B. 38
- C. 76
- D. 114

Question 9

A spray is mixed in the ratio 1 part concentrate to 2 parts water. How much concentrate is in 3 L of the finished mix?

- A. 1.5 L
- B. 1 L
- C. 2 L
- D. 3 L

Question 10

A dial scale has labels every 5 kg, with 5 spaces between two labels. The needle sits 2 spaces past the 30 kg label. The reading on the dial is

- A. 32 kg
- B. 30 kg
- C. 31 kg
- D. 40 kg

Question 11

A hall uses the formula $C = 75 + 6n$ to charge for a party, where C is the total cost in dollars and n is the number of guests. The cost for 30 guests is

- A. \$81
- B. \$180
- C. \$255
- D. \$2430

Question 12

A match has 4 quarters of 9 minutes each and 3 breaks of 5 minutes each. The match starts at 11:35 am. At what time does the match finish?

- A. 12:11 pm
- B. 12:21 pm
- C. 12:26 pm
- D. 12:31 pm

End of Test A

Test A — Answers

Que stion	1	2	3	4	5	6	7	8	9	10	11	12
Ans wer	A	D	A	B	C	B	D	C	B	A	C	C

Test A — Fully-worked solutions

Question	Answer	Working
1	A	The money saved is the discount: $30\% = 0.30$, so $0.30 \times 85 = \$25.50$. Check: the sale price would be $85 - 25.50 = \$59.50$. Option B takes \$30 off instead of 30% ($85 - 30 = \$55$), which is a price, not the saving. Option C is the sale price, not the money saved. Option D adds the discount on instead of taking it off ($85 + 25.50 = \$110.50$).
2	D	Find the price of one litre. 2 L bottle: $3.60 \div 2 = \$1.80$ per litre. 3 L bottle: $5.10 \div 3 = \$1.70$ per litre. \$1.70 is less than \$1.80, so the 3 L bottle is the better buy, at \$1.70 per litre. Option A compares the total prices, not the price of one litre. Option B has the working right but picks the dearer bottle. Option C multiplies instead of dividing ($5.10 \times 3 = \$15.30$).
3	A	Turnout = votes cast $\div$ enrolled voters $\times 100$: $2870 \div 3500 = 0.82$, and $0.82 \times 100 = 82\%$. Option B slides the decimal point one place. Option C is the share who did not vote ($100 - 82 = 18\%$). Option D flips the division ($3500 \div 2870 = 1.22$, or about 122%), which cannot be right — there cannot be more votes than voters.
4	B	Percentage points are found by subtraction: $7.2 - 5.8 = 1.4$ percentage points. Option A is the fraction $1.4 \div 7.2 = 0.19$, left as a decimal instead of turned into a percentage. Option C adds the two rates ($7.2 + 5.8 = 13.0$). Option D is the relative fall: $1.4 \div 7.2 \times 100 = 19.4\%$ (to 1 decimal place), which is a per cent change, not a change in percentage points.
5	C	Time-and-a-half means the rate is multiplied by 1.5:

Question	Answer	Working
		$24 \times 1.5 = \$36$ per hour. (Or: half of \$24 is \$12, and $24 + 12 = 36$.) Option A is only the half, not the extra half on top. Option B adds \$1.50 instead of multiplying by 1.5. Option D is the double-time rate ($24 \times 2 = \$48$).
6	B	Multiply first, then add. Usage charge: $0.25 \times 400 = \$100$. Total: $90 + 100 = \$190$. Option A is the usage charge on its own, with no supply charge. Option C adds the kWh count to the dollars ($90 + 400 = 490$). Option D is the order-of-operations trap: $(90 + 0.25) \times 400 = \$36\,100$.
7	D	Rebate = 85 % of the schedule fee = $0.85 \times 60 = \$51$. Out-of-pocket cost = fee charged – rebate = $80 - 51 = \$29$. Option A assumes the visit is bulk-billed, but the doctor's fee (\$80) is above the schedule fee (\$60). Option B takes 15 % of the schedule fee ($0.15 \times 60 = \$9$), which is neither the rebate nor the gap. Option C rebates 85 % of the doctor's fee instead of the schedule fee ($0.85 \times 80 = \$68$, so $80 - 68 = \$12$).
8	C	30 seconds is half a minute, so double the count: $38 \times 2 = 76$ beats per minute. Option A halves the count instead of doubling it. Option B reports the 30-second count as if it were already per minute. Option D multiplies by 3, which would suit a 20-second count, not a 30-second count.
9	B	Add the parts: $1 + 2 = 3$ equal parts. Divide the total: $3 \div 3 = 1$ L a part. The concentrate is 1 part, so there is 1 L of concentrate (and 2 L of water). Check: $1 + 2 = 3$ L. Option A divides the total by 2, the number of water parts. Option C is the amount of water, not the concentrate. Option D is the total volume of the mix.

Question	Answer	Working
10	A	Value of one space = $5 \div 5 = 1$ kg. Reading = $30 + 2 \times 1 = 32$ kg. Option B just reads the label under the needle and ignores the spaces. Option C assumes each space is 0.5 kg. Option D assumes each space is a whole label (5 kg), giving $30 + 2 \times 5 = 40$ kg.
11	C	Substitute $n = 30$: $C = 75 + 6 \times 30$. Multiply first: $6 \times 30 = 180$. Add: $75 + 180 = \\$255$. Option A adds $75 + 6$ and never multiplies by n. Option B is the per-guest part on its own, with no fixed charge. Option D is the order-of-operations trap: $(75 + 6) \times 30 = \\$2430$.
12	C	Playing time: $4 \times 9 = 36$ min. Breaks: $3 \times 5 = 15$ min. Total: $36 + 15 = 51$ min. From 11:35 am, 25 minutes brings the clock to 12:00 pm, and the other 26 minutes gives 12:26 pm. Option A counts only the playing time (36 min). Option B counts only two breaks ($36 + 10 = 46$ min). Option D counts four breaks ($36 + 20 = 56$ min).

Chapter 06 — Test B (written response)

Chapter 6 (Unit 1 numeracy in context), sections 6A to 6F. Materials: pen, paper; a calculator may be used. Test B: 8 questions (40 marks). Approximate time: 50 minutes.

Answer all questions in the spaces provided. Only round when a question tells you to, and round to the precision it states. Where more than one mark is available, show your working.

About the data in this test. 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.

Question 1 (5 marks)

The Bayview Community Centre runs a breakfast club. These questions are about the shopping for it.

- a. A box of cereal is marked \$ 8.40 and is sold with 20 % off. Find the discount, in dollars. 1 mark

- b. Find the sale price of the box of cereal. 1 mark

- c. A bag of oats costs \$ 6.30 for 900 g. Find the price per 100 g. 1 mark

- d. The club needs 50 muffins. Muffins are sold in packs of 8. How many packs must the club buy? 2 marks

Question 2 (5 marks)

In the Fernvale district council election, 8 500 people were enrolled to vote. Of these, 7 140 cast a vote, and 210 of the votes cast were informal.

- a. Find the voter turnout as a percentage of the enrolled voters. 2 marks

- b. Find the informal votes as a percentage of the votes cast. Round your answer to 1 decimal place. 2 marks

- c. The turnout at the previous election was 87.5 %. Find the change in turnout, in percentage points, and say whether the turnout rose or fell. 1 mark

Question 3 (5 marks)

Tessa works in a shop. Her normal rate is \$26.00 per hour. On Saturdays she is paid time-and-a-half. Last Saturday she worked 6.5 hours. Tax of 16 % is taken out of her Saturday pay.

a. Find Tessa's hourly rate on Saturday. 1 mark

b. Find Tessa's pay for the Saturday shift, before tax. 2 marks

c. Find the tax taken out of her Saturday pay. 1 mark

d. Find Tessa's take-home pay for the shift. 1 mark

Question 4 (5 marks)

These questions are about health checks at a sports club.

a. During a first-aid check, an officer counts 11 breaths in 30 seconds for a player. Find the breathing rate in breaths per minute. 1 mark

b. A typical adult breathing rate is between 12 and 20 breaths per minute. Is the player's rate typical? Give a reason for your answer. 1 mark

c. A patient takes 3 tablets four times a day. Find the total number of tablets the patient takes in one day. 1 mark

d. The tablets come in a bottle of 100. How many full days of doses will the bottle cover? 2 marks

Question 5 (5 marks)

These questions are about measuring and mixing at work.

- a.** A garden fertiliser label says: “Add 45 mL to each litre of water.” How much fertiliser is needed for a 4 L watering can? 1 mark

- b.** Using the same label, how much fertiliser is needed for half a litre of water? 1 mark

- c.** A machine part must be between 95 mm and 105 mm long, and both ends are included in the band. A part measures 94.8 mm. Does the part pass or fail? Give a reason for your answer. 1 mark

- d.** A repair business uses the cost formula $C = 80 + 55h$, where C is the total cost in dollars and h is the number of hours. Find the cost of a repair that takes 3.5 hours. 2 marks

Question 6 (5 marks)

The Oakdale Sports Club is holding a dinner for 25 people and is looking at two venues.

Venue	Cost	Seats
Venue A	\$85 hire fee, plus \$8 per person	40
Venue B	\$11 per person, with no hire fee	20

Made-up data: the venues, the quotes and every number in the table are made up for this test.

- a.** Find the cost of booking Venue A for 25 people. 2 marks

- b.** Find the cost of booking Venue B for 25 people. 1 mark

- c.** Which venue should the club book? Use cost and capacity to explain your answer. 2 marks

Question 7 (5 marks)

The club's Saturday match is timed on the 24-hour clock. The match starts at 14:15 and finishes at 15:02.

- a.** Find how long the match ran, in minutes. 2 marks

- b.** The match had two halves of 20 minutes each. Find the total break time. 1 mark

- c.** Write the finishing time on the 12-hour clock. 1 mark

- d.** The next game starts 45 minutes after the match finishes. Write its start time on the 24-hour clock. 1 mark

Question 8 (5 marks)

The club is putting a new fence around its rectangular multi-purpose court, which is 26 m long and 13 m wide. The fencing costs \$8.50 per metre.

- a.** Find the perimeter of the court. 1 mark

- b.** Find the cost of the fencing. 2 marks

- c.** Find the area of the court. 1 mark

- d.** For the club poster, a photo of the court measuring 14 cm by 9 cm is enlarged with a scale factor of 3. Find the width and the height of the enlarged photo. 1 mark

End of Test B

Test B — Answers

Q1. a. \$1.68 **b.** \$6.72 **c.** \$0.70 per 100 g **d.** 7 packs

Q2. a. 84 % **b.** 2.9 % **c.** fell by 3.5 percentage points

Q3. a. \$39.00 **b.** \$253.50 **c.** \$40.56 **d.** \$212.94

Q4. a. 22 breaths per minute **b.** no — 22 is above the typical band of 12 to 20 **c.** 12 tablets **d.** 8 full days

Q5. a. 180 mL **b.** 22.5 mL **c.** fails — 94.8 mm is 0.2 mm below the bottom end of the band **d.** \$272.50

Q6. a. \$285 **b.** \$275 **c.** Venue A — Venue B is \$10 cheaper, but it seats only 20 people, so the 25 guests do not fit; Venue A seats 40

Q7. a. 47 minutes **b.** 7 minutes **c.** 3:02 pm **d.** 15:47

Q8. a. 78 m **b.** \$663.00 **c.** 338 m² **d.** 42 cm by 27 cm

Test B — Fully-worked solutions

Question 1.

- a. $20\% = 0.20$, so the discount is $0.20 \times 8.40 = \$1.68$. **Answer: \$1.68**
- b. Sale price = $8.40 - 1.68 = \$6.72$. Check: 20% off leaves 80% , and $0.80 \times 8.40 = \$6.72$. **Answer: \$6.72**
- c. 900 g is nine lots of 100 g , so divide the price by 9: $6.30 \div 9 = \$0.70$. **Answer: \$0.70 per 100 g**
- d. $50 \div 8 = 6$ remainder 2. Six packs hold only $6 \times 8 = 48$ muffins, and the 2 muffins left over still need a pack, so the club buys $6 + 1 = 7$ packs. **Answer: 7 packs**

Question 2.

- a. Turnout = votes cast $\div$ enrolled voters $\times 100 = 7\,140 \div 8\,500 \times 100$. $7\,140 \div 8\,500 = 0.84$, and $0.84 \times 100 = 84\%$. **Answer: 84%**
- b. Informal share = $210 \div 7\,140 = 0.029411\dots$, so as a percentage it is $2.9411\dots\%$. The question asks for 1 decimal place: keep the tenths digit (9); the decider is 4, which is less than 5, so round down: 2.9% . **Answer: 2.9%**
- c. Subtract the two rates: $87.5 - 84 = 3.5$. The new rate is the smaller one, so the turnout fell by 3.5 percentage points. **Answer: fell by 3.5 percentage points**

Question 3.

- a. Time-and-a-half means the rate is multiplied by 1.5: $26.00 \times 1.5 = \$39.00$ per hour. **Answer: \$39.00 per hour**
- b. Pay before tax = rate $\times$ hours = $39.00 \times 6.5 = \$253.50$. **Answer: \$253.50**
- c. Tax = $16\% = 0.16$, so $0.16 \times 253.50 = \$40.56$. **Answer: \$40.56**
- d. Take-home pay = $253.50 - 40.56 = \$212.94$. **Answer: \$212.94**

Question 4.

- a. 30 seconds is half a minute, so double the count: $11 \times 2 = 22$ breaths per minute. **Answer: 22 breaths per minute**
- b. The typical band is 12 to 20 breaths per minute. 22 is above 20, so the player's rate is not typical — it is on the high side. **Answer: no — 22 is above the typical band of 12 to 20**
- c. Tablets per day = tablets each time $\times$ times a day = $3 \times 4 = 12$. **Answer: 12 tablets**
- d. $100 \div 12 = 8$ remainder 4. Eight full days use $8 \times 12 = 96$ tablets, and the 4 left over are not a full day, so the bottle covers 8 full days. **Answer: 8 full days**

Question 5.

- a. Each litre takes 45 mL, so 4 L takes $45 \times 4 = 180$ mL. **Answer: 180 mL**
- b. Half a litre takes half the amount: $45 \div 2 = 22.5$ mL. **Answer: 22.5 mL**
- c. The band runs from 95 mm to 105 mm, with both ends included. 94.8 is less than 95, so the part fails — it is $95 - 94.8 = 0.2$ mm below the bottom end of the band. **Answer: fails — 94.8 mm is 0.2 mm below the bottom end of the band**
- d. Substitute $h = 3.5$: $C = 80 + 55 \times 3.5$. Multiply first: $55 \times 3.5 = 192.50$. Add: $80 + 192.50 = \$272.50$. **Answer: \$272.50**

Question 6.

- a. Per-person part: $8 \times 25 = \$200$. Total: $85 + 200 = \$285$. **Answer: \$ 285**
- b. All the cost is per person: $11 \times 25 = \$275$. **Answer: \$ 275**
- c. On cost, Venue B is cheaper: $285 - 275 = \$10$ less. But capacity matters too: Venue B seats only 20 people, and 25 guests will not fit. Venue A seats 40, so all 25 guests fit. The club should book Venue A. **Answer: Venue A — it seats 40, so the 25 guests fit; Venue B is \$ 10 cheaper but seats only 20**

Question 7.

- a. From 14:15 to 15:00 is 45 minutes, and from 15:00 to 15:02 is 2 more minutes: $45 + 2 = 47$ minutes. **Answer: 47 minutes**
- b. Playing time = $2 \times 20 = 40$ minutes. Break time = $47 - 40 = 7$ minutes. **Answer: 7 minutes**
- c. 15:02 is after midday, so subtract 12 from the hour: $15 - 12 = 3$. On the 12-hour clock the finishing time is 3:02 pm. **Answer: 3:02 pm**
- d. Add 45 minutes to 15:02: $2 + 45 = 47$, so the time is 47 minutes past 15, which is 15:47. **Answer: 15:47**

Question 8.

- a. Perimeter = $2 \times (26 + 13) = 2 \times 39 = 78$ m. **Answer: 78 m**
- b. Cost = perimeter $\times$ price per metre = $78 \times 8.50 = \$663.00$. **Answer: \$ 663.00**
- c. Area = length $\times$ width = $26 \times 13 = 338$ m². **Answer: 338 m²**
- d. Multiply each side by the scale factor: width = $14 \times 3 = 42$ cm, height = $9 \times 3 = 27$ cm. The enlarged photo is 42 cm by 27 cm. **Answer: 42 cm by 27 cm**