

Mock Set A – Paper 3

Solutions

For AQA GCSE Mathematics (8300)

Foundation tier • Paper 3 (Calculator)

Each question is shown in grey, followed by the working, one step per line. The final answer is in a box. *Marks* shows how the marks are usually given in the exam, and **Tip** points out a common mistake.

1 (3 marks)

Here is some information about a music festival.

Number of people at the festival on Friday	6847
Distance from the car park to the main stage	1.258 km
Total number of people at the festival over the weekend	23 961

(a) Round the number of people on Friday to the nearest hundred.

6847 is between 6800 and 6900.

The tens digit is 4, which is less than 5, so round down.

Answer: 6800

(b) Round the distance from the car park to the main stage to 1 decimal place.

1.258 is between 1.2 and 1.3.

The second decimal place is 5, so round up.

Answer: 1.3 km

Tip: Only look at the digit straight after the 1st decimal place. Here it is 5, so round up.

(c) Round the total number of people over the weekend to 2 significant figures.

The first two significant figures are 2 and 3.

The next digit is 9, so round up: 23 becomes 24.

Keep the place value by filling with zeros.

Answer: 24 000

Tip: Fill the other places with zeros. Writing 24 is not the same size as 23 961.

2 (2 marks)

- (a) Work out $\frac{5}{8}$ of 344

$$344 \div 8 = 43$$

$$43 \times 5 = 215$$

Answer: 215

- (b) Write 0.84 as a fraction in its simplest form.

$$0.84 = \frac{84}{100}$$

Divide the top and bottom by 4: $\frac{84}{100} = \frac{21}{25}$

Answer: $\frac{21}{25}$

3 (2 marks)

Work out $2.4^3 - \sqrt{12.25}$

Write down all the numbers on your calculator display.

$$2.4^3 = 2.4 \times 2.4 \times 2.4 = 13.824$$

$$\sqrt{12.25} = 3.5$$

$$13.824 - 3.5 = 10.324$$

Answer: 10.324

Tip: 2.4^3 means $2.4 \times 2.4 \times 2.4$, not 2.4×3 .

Marks: 1 mark for working out 13.824 or 3.5. 1 mark for 10.324.

4 (3 marks)

(a) Solve $\frac{y}{8} = 7$

Multiply both sides by 8.

$$y = 7 \times 8 = 56$$

Answer: $y = 56$

(b) Solve $6w - 11 = 37$

Add 11 to both sides: $6w = 48$

Divide both sides by 6: $w = 8$

Answer: $w = 8$

Tip: Undo the -11 first by adding 11, then divide by 6.

Marks: 1 mark for $6w = 48$. 1 mark for $w = 8$.

5 (4 marks)

Ayesha is making muffins for a school bake sale.
Here is her recipe.

Muffins (makes 12)

270 g plain flour

120 g sugar

180 ml milk

- (a) Work out the amount of plain flour she needs to make 20 muffins.

Flour for 1 muffin: $270 \div 12 = 22.5$ g

Flour for 20 muffins: $22.5 \times 20 = 450$ g

Answer: 450 g

Marks: 1 mark for finding the flour for 1 muffin (or another useful amount, like 4 muffins).
1 mark for 450 g.

- (b) Ayesha has 500 ml of milk.
She has plenty of the other ingredients.
Work out the greatest number of muffins she can make.

Milk for 1 muffin: $180 \div 12 = 15$ ml

$500 \div 15 = 33.33 \dots$

She cannot make part of a muffin, so round down.

Answer: 33

Tip: The answer is a number of whole muffins. She does not have enough milk for 34, so round down.

Marks: 1 mark for $500 \div 15$ (or 33.3). 1 mark for 33.

6 (3 marks)

A café sells a meal deal.

Each meal deal is one main and one side.

Main	Side
Burger (B)	Chips (C)
Wrap (W)	Salad (S)
Jacket potato (J)	Onion rings (O)

- (a) List all the possible meal deals. One has been done for you: BC

Work through each main in turn.

Burger: BC, BS, BO

Wrap: WC, WS, WO

Jacket potato: JC, JS, JO

There are $3 \times 3 = 9$ meal deals.

Answer: BC, BS, BO, WC, WS, WO, JC, JS, JO

Tip: Be systematic: keep the main the same and go through every side, then move on to the next main.

Marks: 2 marks for all 9 with no repeats or extras. 1 mark for at least 5 correct.

- (b) What fraction of the possible meal deals include Chips?

Meal deals with Chips: BC, WC, JC, so 3 out of 9.

$$\frac{3}{9} = \frac{1}{3}$$

Answer: $\frac{3}{9}$ or $\frac{1}{3}$

7 (4 marks)

Here is some information about Olu's electricity bill.

Meter reading at the start	24 318 units
Meter reading at the end	24 968 units
Number of days	91
Standing charge	48p per day
Price of electricity	26p per unit

VAT at 5% is added to the total of the standing charge and the cost of the electricity used.

Work out Olu's total bill.

Units used: $24\,968 - 24\,318 = 650$

Cost of electricity: $650 \times 26 = 16\,900\text{p} = \text{£}169.00$

Standing charge: $91 \times 48 = 4368\text{p} = \text{£}43.68$

Total before VAT: $169.00 + 43.68 = \text{£}212.68$

Add 5% VAT: $212.68 \times 1.05 = 223.314$

Round to the nearest penny: $\text{£}223.31$

Answer: $\text{£}223.31$

Tip: Use the units used (650), not a meter reading. Change pence to pounds by dividing by 100.

Marks: 1 mark for the cost of the units (£169). 1 mark for the standing charge (£43.68). 1 mark for adding 5% to your total. 1 mark for £223.31.

8 (2 marks)

Shape A is drawn on a coordinate grid.

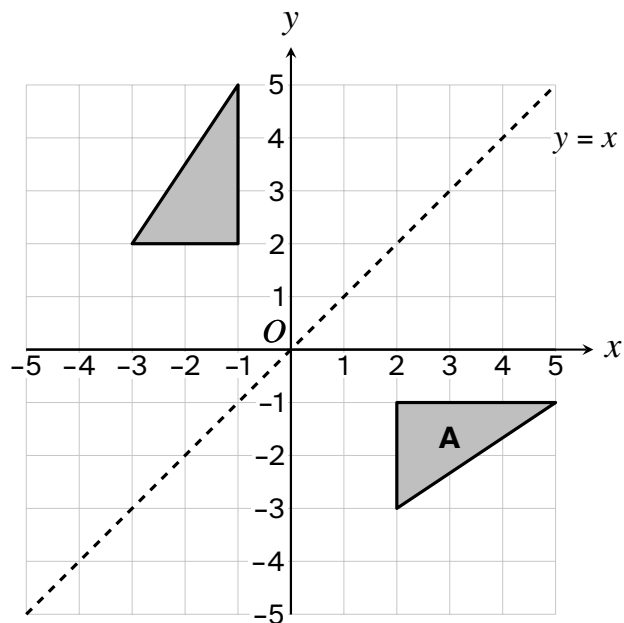
Reflect shape A in the line $y = x$

Reflecting in $y = x$ swaps the coordinates of each vertex.

$(2, -1) \rightarrow (-1, 2)$

$$(5, -1) \rightarrow (-1, 5)$$

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



Answer: Image with vertices $(-1, 2)$, $(-1, 5)$, $(-3, 2)$

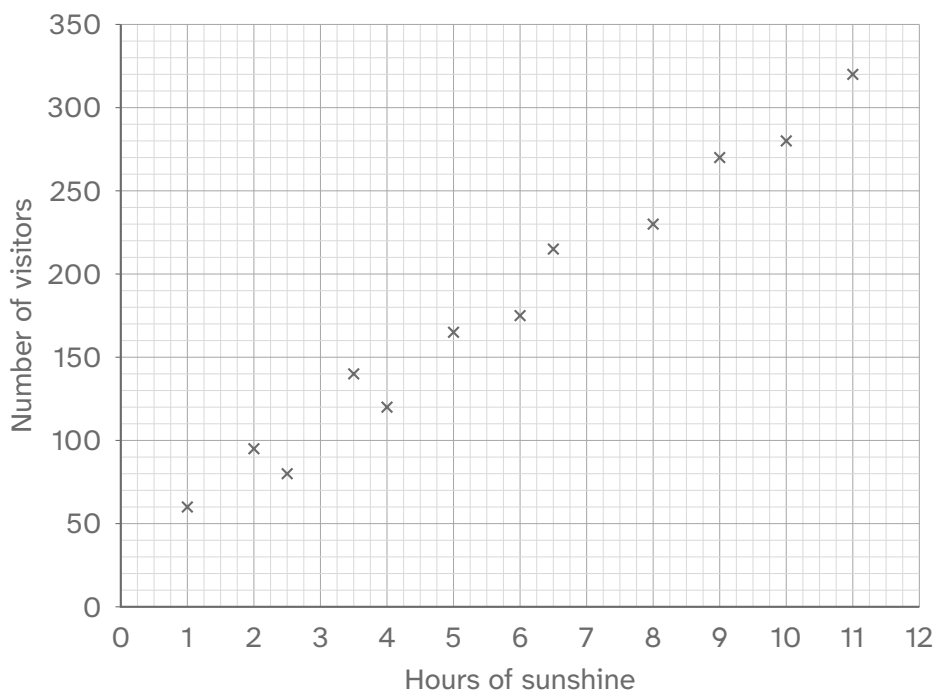
Tip: Check each vertex is the same distance from the mirror line, measured at right angles to it. Tracing paper helps.

Marks: 2 marks for a correct reflection. 1 mark for two vertices correct, or a reflection in another line.

9 (4 marks)

A lido is an outdoor swimming pool.

The scatter graph shows the number of hours of sunshine and the number of visitors to a lido on 12 days.



- (a) Describe the type of correlation shown.

The points go uphill from left to right.

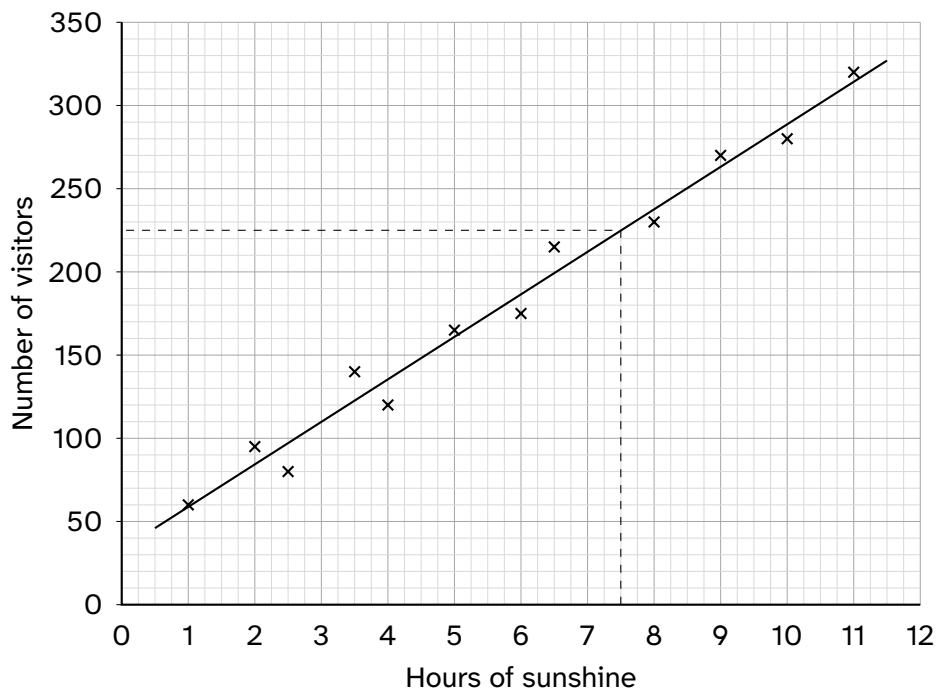
On sunnier days there tend to be more visitors.

Answer: Positive

- (b) On a day with 7.5 hours of sunshine, the lido did not record the number of visitors. By drawing a line of best fit, estimate the number of visitors on this day.

Draw a straight line through the middle of the points, with about as many points above it as below.

Go up from 7.5 hours to the line, then across to the vertical axis.



This gives about 225 visitors. Any answer from 205 to 245 is fine.

Answer: About 225 (accept 205 to 245)

Tip: Each small square on the vertical axis is 10 visitors. Check the scale before you read off.

Marks: 1 mark for a sensible line of best fit. 1 mark for reading from your line at 7.5 hours.

- (c) Femi uses the line of best fit to estimate the number of visitors on a day with 16 hours of sunshine.

Why might his estimate not be reliable?

The data only goes up to 11 hours of sunshine.

16 hours is outside the range of the data.

We do not know that the pattern carries on, so the estimate may not be reliable.

Answer: 16 hours is outside the range of the data (it only goes up to 11 hours).

10 (4 marks)

The exchange rate is £1 = €1.16

- (a) Lucy changes £250 into euros.
How many euros does she get?

Each pound is worth 1.16 euros.

$$250 \times 1.16 = 290$$

Answer: €290

- (b) At the end of her holiday in Italy, Lucy has €145 left. She changes the €145 into US dollars (\$). The exchange rate is £1 = \$1.27. How many dollars does she get?

There is no rate between euros and dollars, so go through pounds.

Euros to pounds (divide by 1.16): $145 \div 1.16 = 125$, so €145 is £125

Pounds to dollars (multiply by 1.27): $125 \times 1.27 = 158.75$

Answer: \$158.75

Tip: Use pounds as a stepping stone. Euros → pounds: divide by 1.16. Pounds → dollars: multiply by 1.27. $145 \times 1.16 \times 1.27$ goes the wrong way at the first step.

Marks: 1 mark for changing €145 into pounds ($145 \div 1.16 = 125$). 1 mark for multiplying your pounds by 1.27. 1 mark for \$158.75

11 (3 marks)

- (a) On Saturday, Ella spends 45 minutes on homework and 2 hours gaming.
Write the ratio time on homework : time gaming in its simplest form.

Write both times in minutes: 2 hours = 120 minutes.

$$45:120$$

Divide both parts by 15 (the HCF): 3: 8

Answer: 3: 8

Tip: Change both times to the same units first. 45:2 is not correct.

Marks: 1 mark for 45:120 (both in the same units). 1 mark for 3: 8.

- (b) On Sunday, the ratio time on homework : time gaming is 5 : 17. Ella says, 'On Sunday I spent more than three times as long gaming as on homework.' Is Ella correct? Give a reason for your answer.

Write the ratio in the form 1: n : divide both parts by 5.

$$5:17 = 1:3.4$$

So gaming was 3.4 times as long as homework, and 3.4 is more than 3.

Yes, Ella is correct.

Answer: Yes. $5:17 = 1:3.4$, and $3.4 > 3$

Tip: Compare like with like: three times 5 is 15, and 17 is more than 15. Or write the ratio as 1: n and compare n with 3.

12 (2 marks)

Here is a formula used in science.

$$v = u + at$$

Kai uses the formula to work out v when $u = 12.5$, $a = -3.2$ and $t = 2.5$

Here is his working.

$$\begin{aligned} v &= 12.5 + (-3.2) \times 2.5 \\ &= 9.3 \times 2.5 \\ &= 23.25 \end{aligned}$$

- (a) What mistake has Kai made?

Kai added 12.5 and -3.2 first: $12.5 + (-3.2) = 9.3$

But at means $a \times t$, and you multiply before you add.

He should have worked out -3.2×2.5 first.

Answer: He added before multiplying: he should work out -3.2×2.5 first.

Tip: Say exactly what he did wrong: he added before multiplying. “He used the wrong order” on its own is not enough.

(b) Work out the correct value of v

$$v = 12.5 + (-3.2) \times 2.5$$

$$\text{Multiply first: } -3.2 \times 2.5 = -8$$

$$v = 12.5 - 8 = 4.5$$

Answer: $v = 4.5$

Tip: $12.5 + (-8)$ is the same as $12.5 - 8$.

13 (5 marks)

140 students in Year 10 and Year 11 each choose one after-school club: Art, Coding or Sport.

64 of the students are in Year 10.

$\frac{3}{8}$ of the Year 10 students choose Art.

38 students altogether choose Art.

Some more information is shown in the table.

(a) Complete the two-way table.

$$\frac{3}{8} \text{ of } 64: 64 \div 8 \times 3 = 24 \text{ (Year 10, Art)}$$

$$\text{Year 11, Art: } 38 - 24 = 14$$

$$\text{Year 10, Coding: } 64 - 24 - 21 = 19$$

$$\text{Year 11 total: } 140 - 64 = 76$$

$$\text{Year 11, Sport: } 76 - 14 - 30 = 32$$

$$\text{Coding total: } 19 + 30 = 49 \quad \text{Sport total: } 21 + 32 = 53$$

	Art	Coding	Sport	Total
Year 10	24	19	21	64
Year 11	14	30	32	76
Total	38	49	53	140

Answer: Year 10: 24, 19, 21, 64; Year 11: 14, 30, 32, 76; Totals: 38, 49, 53, 140

Tip: Put the facts you are given into the table first, then use the totals to fill the gaps one at a time.

Marks: 3 marks for a fully correct table. 2 marks for at least 6 correct new entries. 1 mark for at least 3.

- (b) One of the 140 students is chosen at random. Ravi says, 'There are three clubs, so the probability that the student chose Coding is $\frac{1}{3}$ '. Is Ravi correct? Show working to support your answer.

From the table, 49 of the 140 students chose Coding.

$$P(\text{Coding}) = \frac{49}{140} = \frac{7}{20} = 0.35$$

$$\frac{1}{3} = 0.333 \dots, \text{ which is not } 0.35$$

The three clubs were not chosen by equal numbers of students, so they are not equally likely.

No, Ravi is not correct.

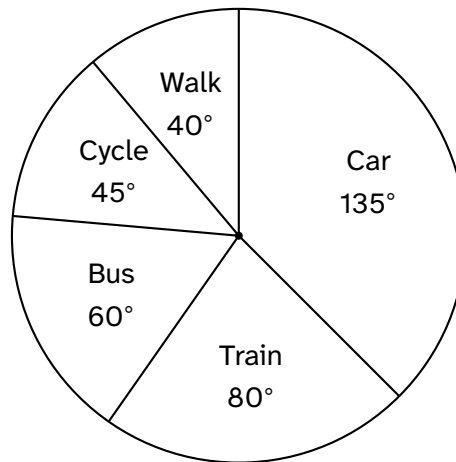
Answer: No. $P(\text{Coding}) = \frac{49}{140} = 0.35$, not $\frac{1}{3}$

Tip: Three outcomes are only equally likely if each has the same chance. Here the clubs have different numbers of students, so use the table.

Marks: 1 mark for $\frac{49}{140}$ (or 0.35). 1 mark for No, comparing 0.35 with $\frac{1}{3}$ (or saying the clubs were not equally popular).

14 (3 marks)

Some people were asked how they travel to work.
The pie chart shows the results.



Not drawn accurately

27 people cycle.

How many people travel to work by car or by train?

Cycle has an angle of 45° , which stands for 27 people.

Each degree stands for $27 \div 45 = 0.6$ people.

Car and train together: $135^\circ + 80^\circ = 215^\circ$

$215 \times 0.6 = 129$

Answer: 129

Tip: Find how many people one degree stands for first. Do not just read the angles as numbers of people: 215 is an angle, not an answer.

Marks: 1 mark for $27 \div 45$ (or for the total, 216). 1 mark for 215×0.6 (or for 81 and 48). 1 mark for 129.

15 (5 marks)

Maya wants to cover a rectangular kitchen floor with square tiles.
Each tile is 30 cm by 30 cm.
Tiles are sold in boxes of 10
Each box costs £22.40

15% off the total price when you buy more than 12 boxes



Not drawn accurately

Work out the total cost of the tiles Maya needs.
You must show your working.

Tiles along the 4.2 m side: $420 \div 30 = 14$

Tiles along the 3.6 m side: $360 \div 30 = 12$

Number of tiles: $14 \times 12 = 168$

Boxes: $168 \div 10 = 16.8$, so she needs 17 boxes.

17 is more than 12, so she gets the discount.

Cost before discount: $17 \times 22.40 = \text{£}380.80$

After 15% off: $380.80 \times 0.85 = \text{£}323.68$

Answer: £323.68

Tip: Work in the same units. $15.12 \div (30 \times 30)$ mixes m^2 and cm^2 : change 4.2 m and 3.6 m into cm first. Boxes must be rounded up.

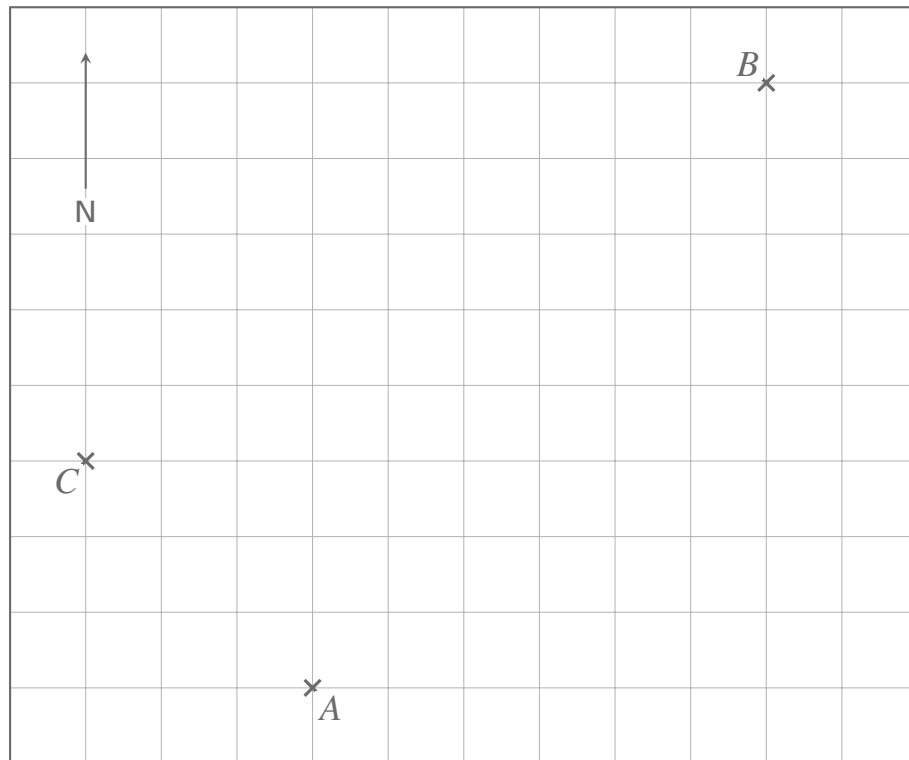
Marks: 1 mark for 14 and 12 (or the areas 15.12 m^2 and 0.09 m^2). 1 mark for 168 tiles. 1 mark for 17 boxes. 1 mark for taking 15% off the cost. 1 mark for £323.68.

16 (4 marks)

Here is a map on a centimetre grid.

It shows two villages, *A* and *B*, and a church, *C*.

Scale 1 : 25 000



- (a) Work out the real distance from village *A* to village *B*.
Give your answer in kilometres.

Measure *AB* on the map with a ruler: 10 cm.

Real distance: $10 \times 25\,000 = 250\,000$ cm

$250\,000 \text{ cm} \div 100 = 2500$ m

$2500 \text{ m} \div 1000 = 2.5$ km

Answer: 2.5 km

Tip: Divide by 100 000 to change centimetres into kilometres (100 cm in a metre, 1000 m in a kilometre).

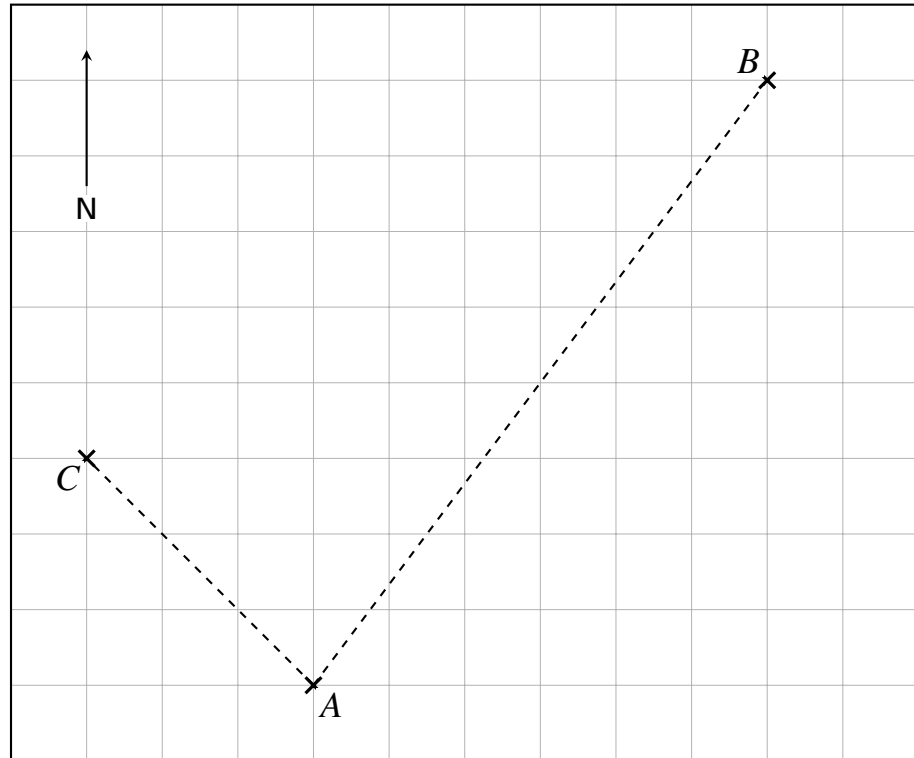
Marks: 1 mark for measuring 10 cm. 1 mark for multiplying by 25 000. 1 mark for 2.5 km.

- (b) Lena walks in a straight line from village *A* to the church, *C*.

In which compass direction does she walk?

From *A*, the church is 3 cm to the left (West) and 3 cm up (North).

Equal amounts West and North give North-West.



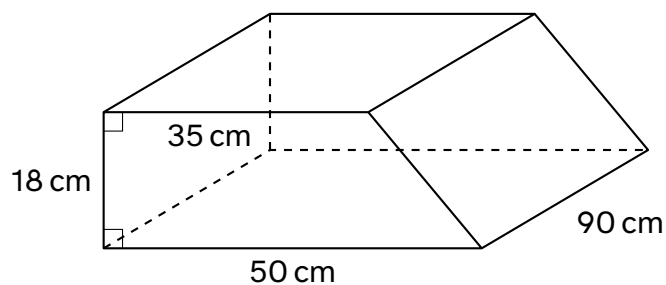
Answer: North-West

Tip: Start at *A* and look at where *C* is. Up the page is North.

17 (4 marks)

A concrete step is a prism.

The cross-section of the step is a trapezium.



Not drawn accurately

Show that the volume of the step is less than 0.07 m^3

The cross-section is a trapezium.

$$\text{Area: } \frac{1}{2} \times (35 + 50) \times 18 = 765 \text{ cm}^2$$

Volume = area of cross-section $\times$ length

$$765 \times 90 = 68\,850 \text{ cm}^3$$

$$1 \text{ m}^3 = 100 \times 100 \times 100 = 1\,000\,000 \text{ cm}^3$$

$$68\,850 \div 1\,000\,000 = 0.068\,85 \text{ m}^3$$

0.068 85 is less than 0.07, so the volume is less than 0.07 m^3 .

Answer: $68\,850 \text{ cm}^3 = 0.068\,85 \text{ m}^3$, which is less than 0.07 m^3

Tip: 1 m^3 is $1\,000\,000 \text{ cm}^3$, not 100 cm^3 : there are 100 cm in a metre in each of the three directions. Or change every length into metres before you start.

Marks: 1 mark for the trapezium area method. 1 mark for multiplying your area by 90. 1 mark for a correct conversion between cm^3 and m^3 (or for changing the lengths into metres first). 1 mark for $0.068\,85 \text{ m}^3$ (or $68\,850 \text{ cm}^3$ and $70\,000 \text{ cm}^3$) with a conclusion.

18 (4 marks)

Callum makes $2\frac{3}{4}$ litres of smoothie.

He pours the smoothie into glasses.

Each glass holds $\frac{1}{3}$ of a litre.

He fills as many glasses as he can.

How many glasses does he fill, and how much smoothie is left over?

Give the amount left over as a fraction of a litre.

$$2\frac{3}{4} = \frac{11}{4}$$

$$\frac{11}{4} \div \frac{1}{3} = \frac{11}{4} \times 3 = \frac{33}{4} = 8\frac{1}{4}$$

So he fills 8 glasses.

$$8 \text{ glasses use } 8 \times \frac{1}{3} = \frac{8}{3} \text{ litres.}$$

$$\text{Left over: } \frac{11}{4} - \frac{8}{3} = \frac{33}{12} - \frac{32}{12} = \frac{1}{12} \text{ litre}$$

Answer: 8 glasses, $\frac{1}{12}$ litre left over

Tip: The $\frac{1}{4}$ in $8\frac{1}{4}$ is a quarter of a **glass**, not a quarter of a litre. A quarter of $\frac{1}{3}$ litre is $\frac{1}{12}$ litre.

Marks: 1 mark for $2\frac{3}{4} \div \frac{1}{3}$. 1 mark for 8 glasses. 1 mark for a method for the amount left. 1 mark for $\frac{1}{12}$ litre.

19 (4 marks)

There are only white, red and black cars in a car park.

$\frac{2}{5}$ of the cars are white.

The rest of the cars are red or black.

red cars : black cars = 4 : 5

There are 45 black cars.

How many white cars are there?

Black is 5 parts, so one part is $45 \div 5 = 9$ cars.

Red cars: $4 \times 9 = 36$

Red and black cars: $36 + 45 = 81$

White is $\frac{2}{5}$, so red and black is $\frac{3}{5}$ of the cars.

$\frac{3}{5}$ of the cars = 81, so $\frac{1}{5} = 81 \div 3 = 27$

White cars: $\frac{2}{5} = 2 \times 27 = 54$

Answer: 54

Tip: 81 cars are **not** white, so 81 is $\frac{3}{5}$ of the total, not $\frac{2}{5}$.

Marks: 1 mark for 36 red cars (or 9 for one part). 1 mark for 81. 1 mark for $81 \div 3$ (one fifth of all the cars). 1 mark for 54.

20 (3 marks)

The table shows the number of members of a park-run club each year from 2019 to 2024.

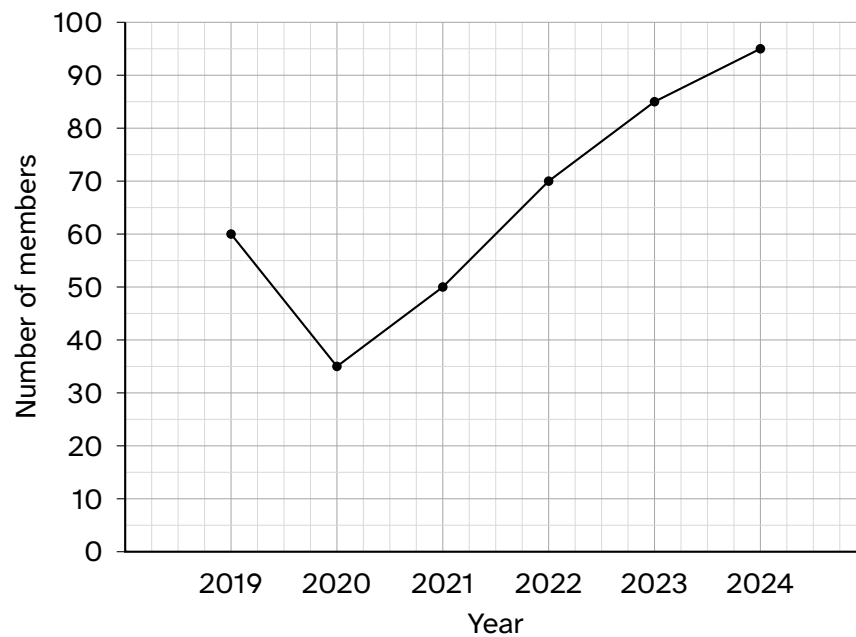
Year	2019	2020	2021	2022	2023	2024
Number of members	60	35	50	70	85	95

(a) Complete the time-series graph.

The missing year is 2024, with 95 members.

Each small square on the vertical axis is 5 members.

Plot 95 above 2024 and join it to the 2023 point with a straight line.



Answer: Point at (2024, 95) plotted and joined to (2023, 85)

Tip: Join the points with straight lines using a ruler. Do not draw a line of best fit.

Marks: 1 mark for plotting the point. 1 mark for joining it with a straight line.

(b) Describe the trend in the number of members from 2020 to 2024.

From 2020 the graph goes up every year.

So the number of members is increasing.

Answer: The number of members increased.

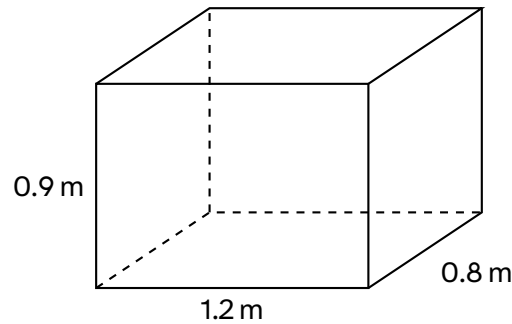
21 (2 marks)

A crate is a cuboid.

It rests on a floor as shown.

The crate exerts a force of 1800 newtons (N) on the floor.

$$\text{pressure} = \frac{\text{force}}{\text{area}}$$



Not drawn accurately

Work out the pressure on the floor.

Give your answer in N/m^2

The crate rests on its 1.2 m by 0.8 m face.

Area: $1.2 \times 0.8 = 0.96 \text{ m}^2$

Pressure = $\frac{1800}{0.96} = 1875 \text{ N/m}^2$

The height, 0.9 m, is not needed.

Answer: 1875 N/m^2

Tip: Only the face touching the floor counts. Do not use the volume.

Marks: 1 mark for the area 0.96 m^2 . 1 mark for 1875.

22 (3 marks)

Solve the simultaneous equations

$$6x + 5y = 19$$

$$2x + 5y = 3$$

The y terms are the same, so subtract the equations.

$$(6x + 5y) - (2x + 5y) = 19 - 3$$

$$4x = 16, \text{ so } x = 4$$

$$\text{Substitute into } 2x + 5y = 3: 8 + 5y = 3$$

$$5y = -5, \text{ so } y = -1$$

$$\text{Check: } 6(4) + 5(-1) = 24 - 5 = 19 \quad \checkmark$$

Answer: $x = 4, y = -1$

Tip: Same signs: subtract. Be careful with $8 + 5y = 3$: $5y = -5$, so y is negative.

Marks: 1 mark for subtracting to eliminate y . 1 mark for $x = 4$. 1 mark for $y = -1$.

23 (4 marks)

A farmer uses combine harvesters to harvest a field of wheat.

All the harvesters work at the same rate.

5 harvesters would take 12 hours to harvest the whole field.

The farmer starts harvesting at 7 am with 5 harvesters.

At 9 am, 3 more harvesters join them.

At what time will the field be finished?

5 harvesters take 12 hours, so the whole field is $5 \times 12 = 60$ harvester-hours of work.

From 7 am to 9 am, 5 harvesters do $5 \times 2 = 10$ harvester-hours.

Work left: $60 - 10 = 50$ harvester-hours.

From 9 am there are $5 + 3 = 8$ harvesters: $50 \div 8 = 6.25$ hours.

0.25 hours = $0.25 \times 60 = 15$ minutes, so 6.25 hours is 6 hours 15 minutes.

$$9 \text{ am} + 6 \text{ hours } 15 \text{ minutes} = 3.15 \text{ pm}$$

Answer: 3.15 pm (15:15)

Tip: 6.25 hours is 6 hours 15 minutes, not 6 hours 25 minutes. And remember the first 2 hours: the 8 harvesters only do the work that is left.

Marks: 1 mark for $5 \times 12 = 60$ (or $\frac{2}{12}$ of the field done by 9 am). 1 mark for $60 - 10 = 50$ (or $\frac{10}{12}$ of the field left). 1 mark for $50 \div 8 = 6.25$ hours. 1 mark for 3.15 pm.

24 (3 marks)

In a sequence, you find the next term by adding together the two terms before it.

The 3rd term is 2

The 4th term is -5

Work out the 1st term.

Call the terms a , b , 2, -5.

4th term = 2nd + 3rd: $b + 2 = -5$, so $b = -7$

3rd term = 1st + 2nd: $a + (-7) = 2$, so $a = 9$

Check: 9, -7, 2, -5 ($9 - 7 = 2$, $-7 + 2 = -5$) ✓

Answer: 9

Tip: Work backwards: each term minus the term before it gives the term before that. Take care with $-5 - 2 = -7$.

Marks: 1 mark for a method for the 2nd term. 1 mark for the 2nd term -7 (or a correct method for the 1st term). 1 mark for 9.
