

Mock Set B – Paper 3

Solutions

For Pearson Edexcel GCSE Mathematics (1MA1)

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 (1 mark)

Write $\frac{17}{50}$ as a percentage.

Make the denominator 100: multiply the top and the bottom by 2.

$$\frac{17}{50} = \frac{34}{100}$$

$$\frac{34}{100} = 34\%$$

Answer: 34%

Tip: Per cent means “out of 100”. Or work out $17 \div 50 \times 100$ on your calculator.

2 (1 mark)

Work out $26 - 3 \times 7$

Multiply before you subtract.

$$3 \times 7 = 21$$

$$26 - 21 = 5$$

Answer: 5

Tip: Working from left to right gives $23 \times 7 = 161$, which is wrong. Multiplication comes before subtraction.

3 (1 mark)

Write down the value of the 6 in the number 31.064

Place values after the decimal point: tenths, hundredths, thousandths.

31.064: the 0 is in the tenths place, the 6 is in the hundredths place.

So the 6 is worth 6 hundredths.

Answer: 6 hundredths $\left(\frac{6}{100} = 0.06 \right)$

Tip: Count the places after the decimal point: 1st tenths, 2nd hundredths, 3rd thousandths. The 0 still takes up a place.

4 (1 mark)

Find $\sqrt{7.29}$

Use the square root key on your calculator.

$$\sqrt{7.29} = 2.7$$

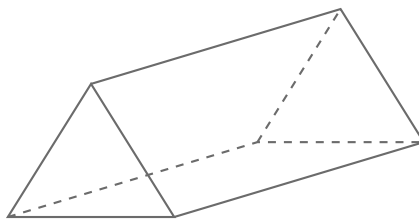
$$\text{Check: } 2.7 \times 2.7 = 7.29$$

Answer: 2.7

Tip: The square root of a number is not half of it: $7.29 \div 2 = 3.645$ is wrong.

5 (1 mark)

Here is a solid.



Write down the mathematical name of this solid.

The two ends are triangles and they are the same.

The other faces are rectangles.

A solid with the same cross-section all the way along is a prism.

Answer: Triangular prism

Tip: Give the full name. “Prism” or “triangle” on its own is not enough; a pyramid comes to a point.

6 (2 marks)

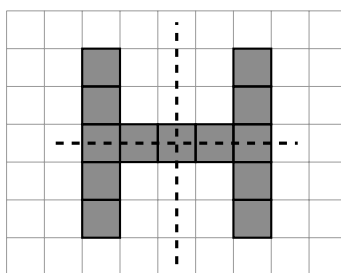
The diagrams show two shapes on square grids.

(a) On the shape below, draw all the lines of symmetry.

Fold the shape in half in your head. A line of symmetry is where the two halves match exactly.

There is a vertical line through the middle and a horizontal line through the middle.

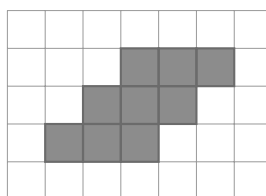
The diagonals are not lines of symmetry: folding along them does not match the halves.



Answer: Two lines: one vertical and one horizontal, through the centre of the shape

Tip: Use a ruler and draw each line all the way across the shape. Check a diagonal by imagining the fold: here it does not work.

(b) Here is a different shape on the grid.



Write down the order of rotational symmetry of this shape.

Turn the shape around its centre.

After a half turn (180°) it looks exactly the same.

After a full turn it is back where it started.

It fits onto itself 2 times in one full turn.

Answer: 2

Tip: Count how many times the shape looks the same in one full turn, including the starting position. Tracing paper helps.

7 (3 marks)

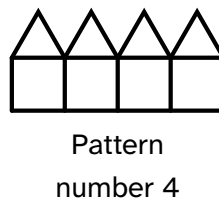
Here are some patterns made from sticks.



- (a) In the space below, draw Pattern number 4

Each new pattern adds one more house on the right.

Pattern number 4 has 4 houses in a row.



Answer: 4 houses joined in a row (21 sticks)

- (b) Complete the table.

The number of sticks goes up by 5 each time: 6, 11, 16

$16 + 5 = 21$ and $21 + 5 = 26$

Pattern number	1	2	3	4	5
Number of sticks	6	11	16	21	26

Answer: 21 and 26

- (c) Will says,
“Pattern number 2 has 11 sticks.
So Pattern number 10 will have $5 \times 11 = 55$ sticks.”

Is Will correct?

You must give a reason for your answer.

Each pattern has 5 more sticks than the one before.

Pattern 1 has 6 sticks, so pattern n has $5n + 1$ sticks.

Pattern number 10 has $5 \times 10 + 1 = 51$ sticks, not 55.

Will is wrong because five copies of Pattern 2 would count the shared walls twice.

Answer: No. Pattern number 10 has $5 \times 10 + 1 = 51$ sticks

Tip: You cannot just multiply a pattern up. Find the rule (add 5 each time, starting from 6) and use it.

8 (3 marks)

Rosa is driving to a port to catch a ferry.

The ferry leaves at 13 05

Rosa must arrive at the port at least 1 hour before the ferry leaves.

Rosa leaves home at 09 10

Her drive to the port takes 145 minutes.

On the way, she also stops for 25 minutes to have lunch
and for 15 minutes to buy fuel.

Does Rosa arrive at the port in time?

You must show how you get your answer.

Latest time Rosa can arrive: 13 05 – 1 hour = 12 05

Total time for the journey: $145 + 25 + 15 = 185$ minutes

185 minutes = 3 hours 5 minutes

09 10 + 3 hours = 12 10, then + 5 minutes = 12 15

12 15 is later than 12 05, so Rosa does **not** arrive in time. She is 10 minutes late.

Answer: No. She arrives at 12 15, but she needs to arrive by 12 05

Tip: There are 60 minutes in an hour, not 100. Change 185 minutes to 3 hours 5 minutes before you add it to the start time.

Marks: 1 mark for adding the times (185 minutes) or finding 12 05. 1 mark for a complete method to find 12 15 and 12 05 (or to compare 185 minutes with 175 minutes). 1 mark for No with correct times.

9 (4 marks)

Here is some information about prices at an outdoor activity centre.

Outdoor Activity Centre: prices	
Day pass (adult)	£24 per day
Day pass (child)	£15 per day
Kayak hire	£9.50 per half hour
Archery	£12 per session

Una and her son spend 3 days at the centre.

They both need a day pass for each of the 3 days.

Una is an adult. Her son is a child.

They hire one kayak for $1\frac{1}{2}$ hours.

Her son has 2 archery sessions.

Una has £175

Show that Una has enough money to pay for all of these.

Day passes: $3 \times £24 = £72$ for Una and $3 \times £15 = £45$ for her son.

Total for day passes: $72 + 45 = £117$

Kayak: $1\frac{1}{2}$ hours = 3 half hours, so $3 \times £9.50 = £28.50$

Archery: $2 \times £12 = £24$

Total cost: $117 + 28.50 + 24 = £169.50$

£169.50 is less than £175, so Una has enough money (with £5.50 left over).

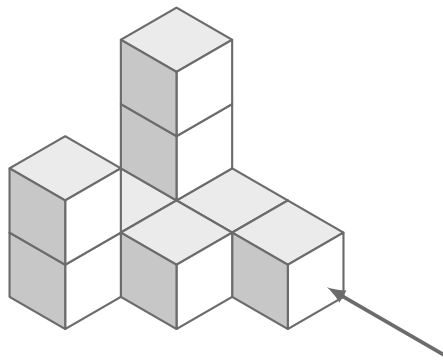
Answer: Total cost £169.50 < £175, so she has enough

Tip: Read the units in a price list carefully. The kayak is priced per *half hour*, so $1\frac{1}{2}$ hours is 3 lots of £9.50.

Marks: 1 mark for the cost of the day passes (£117). 1 mark for the kayak cost (£28.50). 1 mark for the total £169.50. 1 mark for a correct comparison with £175.

10 (2 marks)

The diagram shows a solid made from 9 centimetre cubes.



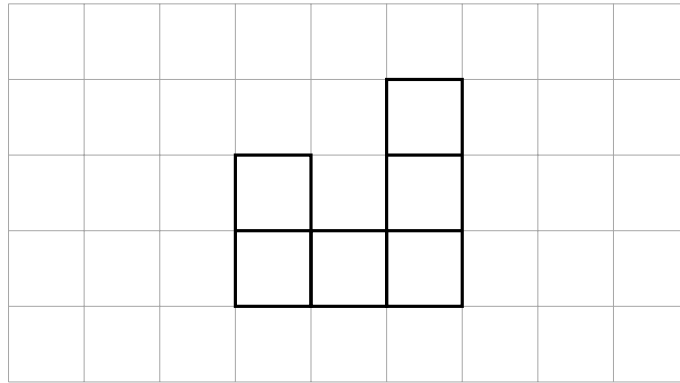
On the centimetre grid, draw the side elevation of the solid from the direction of the arrow.

Look at the solid from the direction of the arrow. You see the right-hand faces.

On the right you see the row with the tower: 3 cubes high.

In the middle the solid is 1 cube high, and on the left it is 2 cubes high.

The cubes hidden behind make no difference: an elevation shows the outline you would see.



Answer: Three columns side by side: from left to right 2 cm, 1 cm and 3 cm high (each 1 cm wide)

Tip: An elevation is a flat 2D view. Do not draw any slanting lines or a 3D picture.

Marks: 2 marks for a fully correct side elevation. 1 mark for a drawing with two of the three columns correct, or for the correct shape reflected.

11 (3 marks)

Here is a list of ingredients for making tomato soup for 6 people.

Tomato soup for 6 people

800 g tomatoes

2 onions

750 ml vegetable stock

150 ml cream

Niamh has

2.2 kg of tomatoes

6 onions

1.5 litres of vegetable stock

350 ml of cream

What is the greatest number of people Niamh can make soup for?

You must show how you get your answer.

Work out how many people each ingredient is enough for.

Tomatoes: $2.2 \text{ kg} = 2200 \text{ g}$, $2200 \div 800 = 2.75$, $2.75 \times 6 = 16.5$ people

Onions: $6 \div 2 = 3$, $3 \times 6 = 18$ people

Stock: $1.5 \text{ litres} = 1500 \text{ ml}$, $1500 \div 750 = 2$, $2 \times 6 = 12 \text{ people}$

Cream: $350 \div 150 = 2.33 \dots$, $2.33 \dots \times 6 = 14 \text{ people}$

The stock runs out first, so the greatest number is 12 people.

Answer: 12 people

Tip: Change kg to g and litres to ml first. The answer is decided by the ingredient that runs out first, not the one you have most of.

Marks: 1 mark for working out how many people one ingredient is enough for (e.g. $1500 \div 750 \times 6 = 12$). 1 mark for doing this for all four ingredients. 1 mark for 12.

12 (3 marks)

- (a) Ida changes £380 into euros.
The exchange rate is $\text{£}1 = \text{€}1.17$
How many euros does Ida get?

Each pound is worth €1.17, so multiply.

$$380 \times 1.17 = 444.6$$

Answer: €444.60

- (b) After her holiday, Ida has €65 left.
She changes the €65 back into pounds.
The exchange rate is now $\text{£}1 = \text{€}1.21$
How much money does Ida get?
Give your answer correct to the nearest penny.

€1.21 is worth £1, so divide the euros by 1.21.

$$65 \div 1.21 = 53.719 \dots$$

To the nearest penny: £53.72

Check: £53.72 is less than €65, which makes sense because each pound buys more than one euro.

Answer: £53.72

Tip: Euros to pounds: divide. Pounds to euros: multiply. Check your answer is sensible: you should get fewer pounds than euros.

Marks: 1 mark for $65 \div 1.21$. 1 mark for £53.72.

13 (4 marks)

A cafe owner asked 30 customers how many hot drinks they had yesterday. The table shows information about the answers.

Number of hot drinks	0	1	2	3	4	5
Frequency	4	7	9	5	3	2

- (a) Write down the mode.

The mode is the number of drinks with the highest frequency.

The highest frequency is 9, for 2 hot drinks.

Answer: 2

Tip: The mode is the value (2 drinks), not the frequency (9).

- (b) Work out the mean number of hot drinks.
Give your answer correct to 1 decimal place.

Multiply each number of drinks by its frequency:

$$0 \times 4 + 1 \times 7 + 2 \times 9 + 3 \times 5 + 4 \times 3 + 5 \times 2$$

$$= 0 + 7 + 18 + 15 + 12 + 10 = 62$$

There are 30 customers.

$$\text{Mean} = 62 \div 30 = 2.066 \dots$$

To 1 decimal place: 2.1

Answer: 2.1

Tip: Divide by the total frequency (30), not by the number of rows (6). $62 \div 6 = 10.3$ cannot be right: nobody had more than 5 drinks.

Marks: 1 mark for finding the products. 1 mark for $62 \div 30$. 1 mark for 2.1.

14 (3 marks)

Solve $6(2x - 5) = 39$

Expand the bracket: $12x - 30 = 39$

Add 30 to both sides: $12x = 69$

Divide both sides by 12: $x = 69 \div 12 = 5.75$

Or divide by 6 first: $2x - 5 = 6.5$, $2x = 11.5$, $x = 5.75$

Check: $6(2 \times 5.75 - 5) = 6 \times 6.5 = 39$

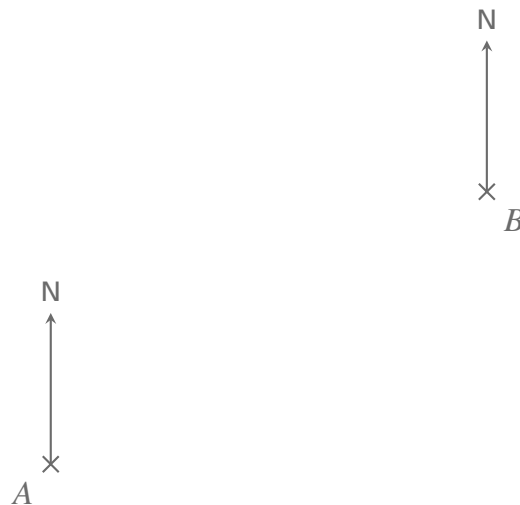
Answer: $x = 5.75$

Tip: When you expand, multiply *both* terms in the bracket by 6. $12x - 5 = 39$ is a common mistake.

Marks: 1 mark for expanding the bracket or dividing both sides by 6. 1 mark for $12x = 69$ or $2x = 11.5$. 1 mark for 5.75.

15 (3 marks)

The accurately drawn map shows the positions of two lighthouses, *A* and *B*.

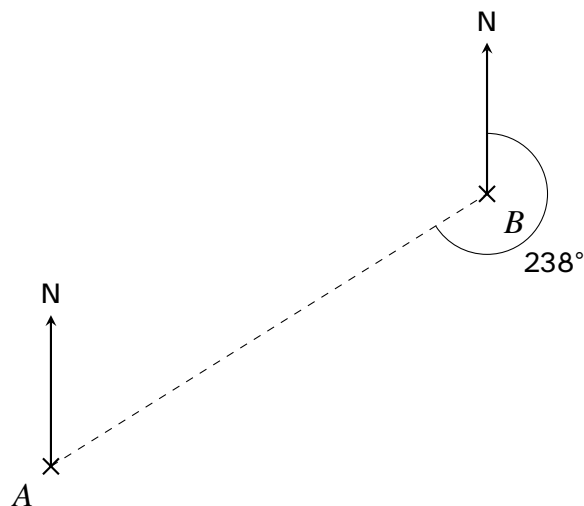


- (a) Find the bearing of lighthouse *A* from lighthouse *B*.

Stand at *B*. Measure clockwise from the North line at *B* to the line *BA*.

The angle from North to *BA* is more than 180° .

Measure 58° (from South round to *BA*) and add 180° : $180 + 58 = 238^\circ$



Or: the bearing of *B* from *A* is 058° , and the back bearing is $058 + 180 = 238^\circ$.

Answer: 238°

Tip: “From *B*” means the North line at *B* is your starting line. A bearing is measured clockwise and written with three figures.

- (b) The scale of the map is 1 cm represents 2.5 km.
Work out the real distance between lighthouse *A* and lighthouse *B*.

Measure *AB* on the map: 6.8 cm

Each cm represents 2.5 km.

$$6.8 \times 2.5 = 17 \text{ km}$$

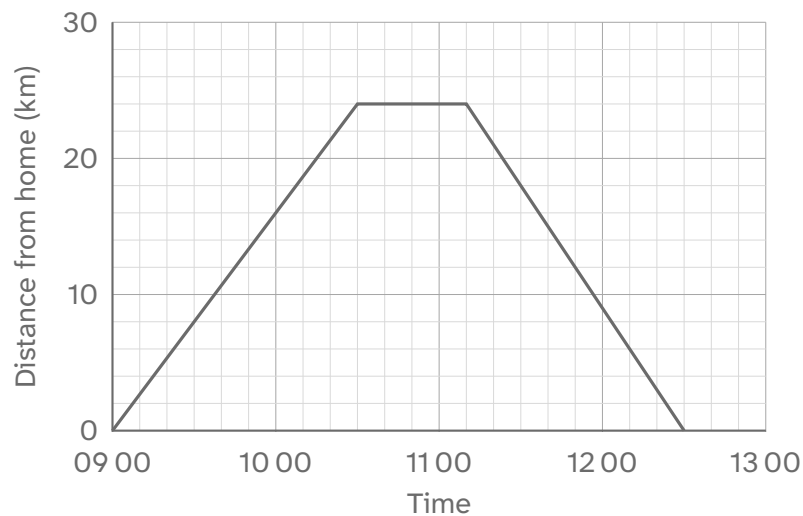
Answer: 17 km (from 16.75 to 17.25)

Tip: Measure from the centre of one cross to the centre of the other, in centimetres, with a ruler.

Marks: 1 mark for measuring 6.8 cm (6.7 to 6.9) and multiplying by 2.5. 1 mark for an answer from 16.75 to 17.25.

16 (4 marks)

Here is the travel graph for Kai's journey.



- (a) For how many minutes did Kai stop at the country park?

The flat part of the graph shows the stop.

It goes from 10 30 to 11 10.

Each small square across is 10 minutes: 4 squares = 40 minutes.

Answer: 40 minutes

- (b) How far from home was Kai at 12 10?

Go up from 12 10 to the graph, then across.

The reading is 6 km.

Answer: 6 km

- (c) Work out Kai's average speed on his way home from the country park.
Give your answer in kilometres per hour.

Kai left the country park at 11 10 and got home at 12 30.

Time: 1 hour 20 minutes = $1\frac{1}{3}$ hours = 80 minutes

Distance: 24 km

Speed = distance $\div$ time = $24 \div 1\frac{1}{3} = 18$ km/h

Or: 24 km in 80 minutes is 3 km every 10 minutes, so 18 km in 60 minutes.

Answer: 18 km/h

Tip: 1 hour 20 minutes is not 1.2 hours. Change it to 80 minutes, then use $24 \div 80 \times 60$.

Marks: 1 mark for $24 \div 1 \text{ h } 20 \text{ min}$ (in a correct form, e.g. $24 \div 80 \times 60$). 1 mark for 18.

17 (2 marks)

A garden centre sells only three types of plant: roses, lavender and ferns.

number of roses : number of lavender plants : number of ferns = 3:5:4

What fraction of the plants are **not** lavender plants?

Total number of parts: $3 + 5 + 4 = 12$

Plants that are not lavender: roses and ferns, $3 + 4 = 7$ parts

$$\text{Fraction not lavender} = \frac{7}{12}$$

Answer: $\frac{7}{12}$

Tip: The fraction uses the *total* number of parts on the bottom. $\frac{7}{5}$ compares the other plants with lavender: that is a ratio, not a fraction.

Marks: 1 mark for 12 as the total number of parts (or 5/12 lavender). 1 mark for 7/12.

18 (3 marks)

There are only lemon sweets and lime sweets in tub *A* and in tub *B*.

In tub *A* there are 15 lemon sweets and 21 lime sweets.

In tub *B*,

number of lemon sweets : number of lime sweets = 2:3

Fatima is going to take at random a sweet from one of the tubs.

She wants a lemon sweet.

Which tub gives Fatima the greater probability of taking a lemon sweet?

You must show how you get your answer.

Tub *A*: $15 + 21 = 36$ sweets, so $P(\text{lemon}) = \frac{15}{36} = 0.4166 \dots$

Tub *B*: $2 + 3 = 5$ parts, so $P(\text{lemon}) = \frac{2}{5} = 0.4$

$0.416 \dots > 0.4$

Tub *A* gives the greater probability.

Answer: Tub *A* $\left(\frac{15}{36} = 0.416 \dots \text{ against } \frac{2}{5} = 0.4 \right)$

Tip: A probability is out of the *total*, so tub *A* is $\frac{15}{36}$, not $\frac{15}{21}$, and tub *B* is $\frac{2}{5}$, not $\frac{2}{3}$.

Marks: 1 mark for 15/36. 1 mark for 2/5. 1 mark for tub *A* with both probabilities in a form that can be compared.

19 (4 marks)

The diagram shows a lawn in a park.
The lawn is in the shape of a trapezium.

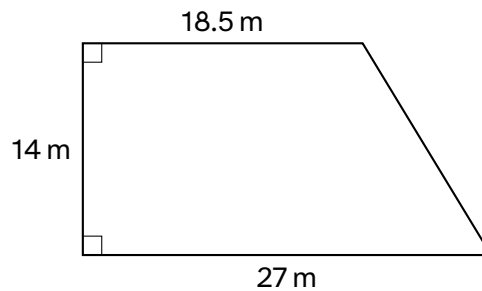


Diagram **NOT** accurately drawn

The lawn needs 35 grams of lawn feed for each m^2
Lawn feed is sold in tubs.
Each tub holds 2.5 kg of lawn feed and costs £8.95
Work out the total cost of the tubs of lawn feed needed for this lawn.

$$\text{Area of the trapezium} = \frac{1}{2}(a + b)h = \frac{1}{2} \times (18.5 + 27) \times 14$$

$$= \frac{1}{2} \times 45.5 \times 14 = 318.5 \text{ m}^2$$

$$\text{Lawn feed needed: } 318.5 \times 35 = 11\,147.5 \text{ g}$$

$$11\,147.5 \text{ g} = 11.1475 \text{ kg}$$

$$\text{Tubs: } 11.1475 \div 2.5 = 4.459, \text{ so 5 tubs are needed (4 tubs is not enough).}$$

$$\text{Cost: } 5 \times \text{£}8.95 = \text{£}44.75$$

Answer: £44.75

Tip: You must buy whole tubs, so round the number of tubs *up*. 4.459 tubs means you need 5.

Marks: 1 mark for the area 318.5 m^2 . 1 mark for the mass of lawn feed (11 147.5 g or 11.1475 kg).
1 mark for 5 tubs $\times$ £8.95. 1 mark for £44.75.

20 (2 marks)

The table shows information about the lengths of time, in minutes, that 40 visitors spent in an art gallery.

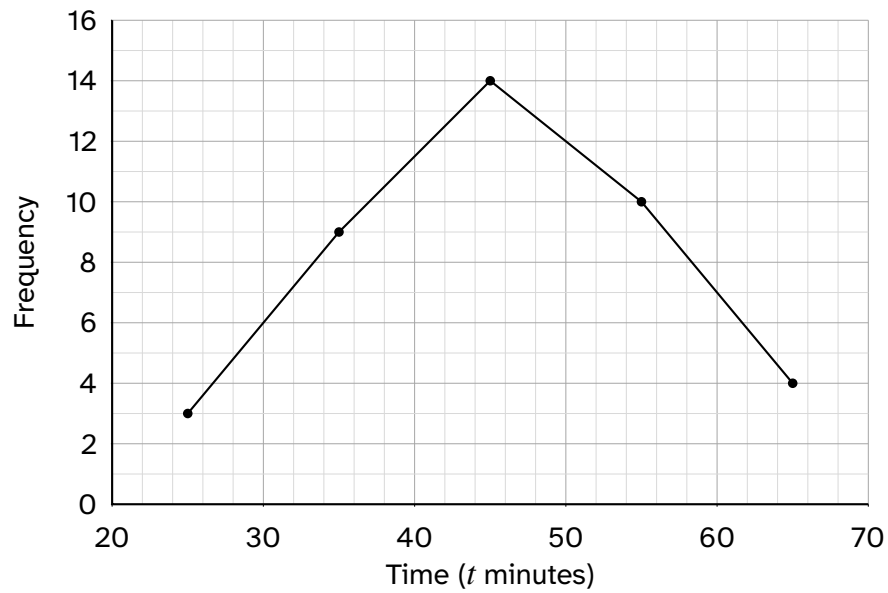
Time (t minutes)	Frequency
$20 < t \leq 30$	3
$30 < t \leq 40$	9
$40 < t \leq 50$	14
$50 < t \leq 60$	10
$60 < t \leq 70$	4

On the grid, draw a frequency polygon for the information in the table.

Plot each frequency at the midpoint of its class: 25, 35, 45, 55, 65

Points: (25, 3), (35, 9), (45, 14), (55, 10), (65, 4)

Join the points with straight lines. Do not join the last point back to the first.



Answer: Points plotted at (25, 3), (35, 9), (45, 14), (55, 10), (65, 4) and joined with straight lines

Tip: Plot at the *midpoints* of the classes (25, not 20 or 30). Do not draw bars and do not close the shape.

Marks: 2 marks for all 5 points at the midpoints, joined with straight lines. 1 mark for all 5 points correct but not joined, or plotted at the class ends consistently, or 4 points correct and joined.

21 (3 marks)

A wooden building block is a solid cube.
Each edge of the cube is 5.5 cm long.
The mass of the cube is 0.12 kg.

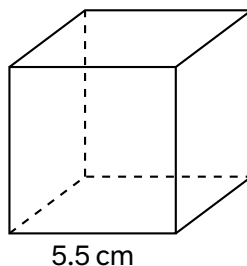


Diagram **NOT** accurately drawn

Work out the density of the wood.
Give your answer in g/cm^3 correct to 2 decimal places.

$$\text{Volume of the cube} = 5.5 \times 5.5 \times 5.5 = 166.375 \text{ cm}^3$$

$$\text{Mass} = 0.12 \text{ kg} = 120 \text{ g}$$

$$\text{Density} = \text{mass} \div \text{volume} = 120 \div 166.375 = 0.7212 \dots$$

$$\text{To 2 decimal places: } 0.72 \text{ g/cm}^3$$

Answer: 0.72 g/cm^3

Tip: The density must be in g/cm^3 , so change the mass to grams first: $0.12 \text{ kg} = 120 \text{ g}$. Then divide mass by volume.

Marks: 1 mark for the volume 166.375. 1 mark for $120 \div 166.375$ (using grams). 1 mark for 0.72.

22 (2 marks)

Here is a line segment AB .

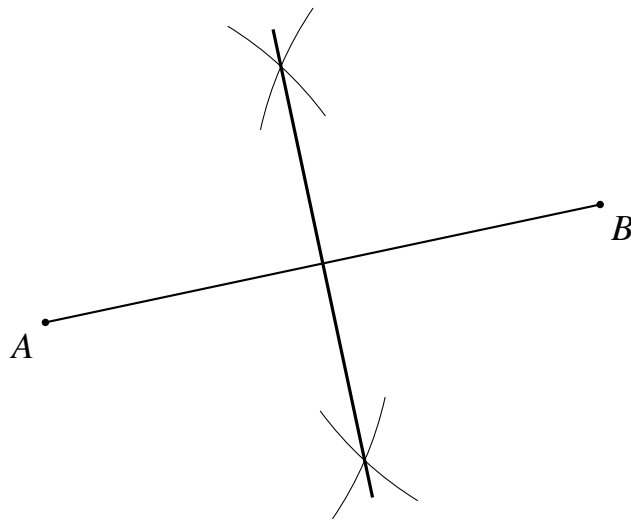
Use ruler and compasses to construct the perpendicular bisector of AB .
You must show all your construction lines.

Open your compasses to more than half of AB (about 4.5 cm).

With the point on A , draw an arc above and below the line.

Keep the same radius. With the point on B , draw arcs that cross the first two.

Draw a straight line through the two points where the arcs cross.



Answer: A line through the two crossing points of equal arcs from A and B , perpendicular to AB through its midpoint

Tip: Keep the compasses the same width for all four arcs and leave the arcs on your drawing.
A line drawn by measuring only scores at most 1 mark.

Marks: 2 marks for a correct perpendicular bisector with all construction arcs shown. 1 mark for the correct arcs from A and B without the line, or a line within tolerance with no (or wrong) arcs.

23 (5 marks)

Jacob, Maria and Tomas collect stickers.

Maria has 14 fewer stickers than Tomas.

Jacob has 3 times as many stickers as Maria.

Jacob also has twice as many stickers as Tomas.

Find the ratio of the numbers of stickers that Jacob, Maria and Tomas have.

Give your ratio in its simplest form, in the order Jacob : Maria : Tomas.

Let Tomas have x stickers.

Maria has $x - 14$ stickers.

Jacob has 3 times as many as Maria: $3(x - 14) = 3x - 42$

Jacob also has twice as many as Tomas: $2x$

So $3x - 42 = 2x$

$$x = 42$$

Tomas 42, Maria $42 - 14 = 28$, Jacob $2 \times 42 = 84$ (check: $3 \times 28 = 84$)

84:28:42. Divide by the HCF, 14: 6:2:3

Answer: 6:2:3

Tip: Write every amount in terms of one person's number. The two facts about Jacob give you two expressions that must be equal. Keep the ratio in the order the question asks for.

Marks: 1 mark for $x - 14$ for Maria. 1 mark for $3(x - 14)$ for Jacob. 1 mark for the equation $3(x - 14) = 2x$. 1 mark for solving to get 84, 28 and 42. 1 mark for 6 : 2 : 3.

24 (3 marks)

The number of visitors to a zoo in July was $\frac{3}{8}$ more than the number of visitors in June. There were 24 750 visitors to the zoo in July.

How many more visitors were there in July than in June?

June is the whole, $\frac{8}{8}$. July is $\frac{8}{8} + \frac{3}{8} = \frac{11}{8}$ of June.

$$\frac{11}{8} \text{ of June} = 24\,750$$

$$\frac{1}{8} \text{ of June} = 24\,750 \div 11 = 2250$$

$$\text{June} = 8 \times 2250 = 18\,000$$

$$\text{Increase} = 24\,750 - 18\,000 = 6750 \text{ (which is } 3 \times 2250\text{)}$$

Answer: 6750

Tip: The $\frac{3}{8}$ is a fraction of the *June* number, not of July. $\frac{3}{8} \times 24\,750$ is the most common wrong method.

Marks: 1 mark for $24\,750 \div 11$ ($= 2250$). 1 mark for 18 000 (or 3×2250). 1 mark for 6750.

25 (4 marks)

The stem and leaf diagram shows the ages of the 21 people at a yoga class.

2	4 7 8
3	1 3 5 5 9
4	0 2 2 4 6 8 8
5	1 3 7
6	0 5 8

Key: 2 | 4 represents 24 years

- (a) Find the median age.

There are 21 ages, so the median is the $\frac{21+1}{2} = 11$ th age.

Count along: 24, 27, 28, 31, 33, 35, 35, 39, 40, 42, 42

The 11th age is 42.

Answer: 42 years

Tip: The middle of 21 values is the 11th, not the 10.5th.

- (b) Work out the range of the ages.

Range = largest – smallest

$$68 - 24 = 44$$

Answer: 44 years

- (c) The median age of the people at a spin class is 34 years.

The range of the ages of these people is 51 years.

Compare the distribution of the ages of the people at the yoga class with the distribution of the ages of the people at the spin class.

Average: the yoga median (42) is higher than the spin median (34),

so on average the people at the yoga class are older.

Spread: the yoga range (44) is smaller than the spin range (51),

so the ages of the people at the spin class are more spread out (more varied).

Answer: On average the yoga class is older (median $42 > 34$). The spin class ages are more spread out (range $51 > 44$)

Tip: Make two comparisons: one about the average (median) and one about the spread (range). Say what each one means for the ages, not just which number is bigger.

Marks: 1 mark for comparing the medians in context. 1 mark for comparing the ranges in context.

26 (4 marks)

The table shows the price of a train ticket for a journey in 2025 and in 2026.

	2025	2026
Peak fare	£32.50	£36.40
Off-peak fare	£18.40	£20.70

(a) Tara says,

“The peak fare went up by more money than the off-peak fare,
so the percentage increase in the peak fare is greater.”

Is Tara correct?

You must show all your working.

Peak: increase = $36.40 - 32.50 = £3.90$

Percentage increase = $\frac{3.90}{32.50} \times 100 = 12\%$

Off-peak: increase = $20.70 - 18.40 = £2.30$

Percentage increase = $\frac{2.30}{18.40} \times 100 = 12.5\%$

12.5% > 12%, so the off-peak fare had the greater percentage increase. Tara is **not** correct.

Answer: No. Peak 12%, off-peak 12.5%

Tip: A bigger increase in pounds does not always mean a bigger percentage increase. Divide each increase by its own *original* fare.

Marks: 1 mark for the percentage increase for one fare. 1 mark for both. 1 mark for No with 12% and 12.5%.

- (b) Tara works out the percentage increase in the off-peak fare like this.

$$\frac{2.30}{20.70} \times 100 = 11.1\%$$

What mistake has Tara made?

For a percentage increase you divide the increase by the **original** value.

The original off-peak fare is £18.40, not £20.70.

Tara divided by the new fare.

Answer: She divided by the new fare (£20.70) instead of the original fare (£18.40)

27 (4 marks)

Ivy takes part in the long jump and the high jump at a sports day.

The probability that she wins the long jump is 0.3

The probability that she wins the high jump is 0.06

The two events are independent.

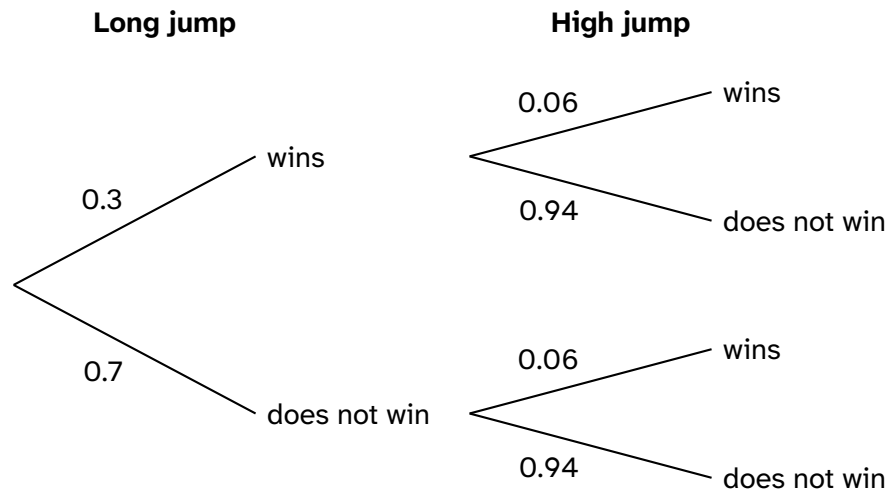
- (a) Complete the probability tree diagram.

Each pair of branches adds up to 1.

Long jump: $P(\text{does not win}) = 1 - 0.3 = 0.7$

High jump: $P(\text{does not win}) = 1 - 0.06 = 0.94$

The high jump does not depend on the long jump, so both pairs of high jump branches are 0.06 and 0.94.



Answer: 0.7 (long jump); 0.94, 0.06, 0.94 (high jump)

Marks: 1 mark for 0.7. 1 mark for 0.94, 0.06, 0.94 in the right places.

- (b) Work out the probability that Ivy wins exactly one of the two events.

“Exactly one” means she wins the long jump but not the high jump, **or** she wins the high jump but not the long jump.

Wins long jump only: $0.3 \times 0.94 = 0.282$

Wins high jump only: $0.7 \times 0.06 = 0.042$

$P(\text{exactly one}) = 0.282 + 0.042 = 0.324$

Answer: 0.324

Tip: Multiply along the branches, then add the two routes that give exactly one win. Do not include the route where she wins both.

Marks: 1 mark for 0.3×0.94 or 0.7×0.06 . 1 mark for 0.324.

28 (2 marks)

The top speed of a racing car is 83 metres per second.

Zac says,

“The top speed of the racing car is faster than 300 kilometres per hour.”

Is Zac correct?

You must show how you get your answer.

In 1 hour the car travels $83 \times 60 \times 60 = 298\,800$ metres.

$298\,800 \div 1000 = 298.8$ km

So $83 \text{ m/s} = 298.8 \text{ km/h}$.

298.8 is less than 300, so Zac is **not** correct.

Or: $300 \text{ km/h} = 300\,000 \div 3600 = 83.3 \dots \text{ m/s}$, which is more than 83 m/s.

Answer: No. $83 \text{ m/s} = 298.8 \text{ km/h}$, which is less than 300 km/h

Tip: Metres to kilometres: $\div 1000$. Per second to per hour: $\times 3600$ (60×60). Multiplying by 60 only once is a common mistake.

Marks: 1 mark for a correct method to change units ($83 \times 3600 \div 1000$ or $300\,000 \div 3600$). 1 mark for No with 298.8 (or 83.3...).

29 (3 marks)

(a) Simplify $(m^3)^5$

A power of a power: multiply the indices.

$$3 \times 5 = 15$$

$$(m^3)^5 = m^{15}$$

Answer: m^{15}

Tip: $(m^3)^5$ means $m^3 \times m^3 \times m^3 \times m^3 \times m^3$, so the indices add to 15. Adding $3 + 5$ gives m^8 , which is wrong.

(b) Simplify $x^4 \times x^9$

Multiplying powers of the same letter: add the indices.

$$4 + 9 = 13$$

$$x^4 \times x^9 = x^{13}$$

Answer: x^{13}

(c) Expand $3p(p^2 - 4)$

Multiply each term in the bracket by $3p$.

$$3p \times p^2 = 3p^3$$

$$3p \times (-4) = -12p$$

$$3p(p^2 - 4) = 3p^3 - 12p$$

Answer: $3p^3 - 12p$

Tip: $p \times p^2 = p^3$ (add the indices: $1 + 2 = 3$). Remember to multiply the -4 as well.
