

Mock Set A – Paper 2

Solutions

For AQA GCSE Mathematics (8300)

Foundation tier • Paper 2 (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 (2 marks)

The table shows the temperature at midday in five cities on one day in January.

City	Oslo	Warsaw	Dublin	Vienna	Lisbon
Temperature (°C)	−7	−3	5	−1	12

(a) Which city was the coldest?

The coldest city has the lowest temperature.

The lowest temperature is -7°C , in Oslo.

Answer: Oslo

Tip: -7 is colder than -3 : the further below zero, the colder it is.

(b) Work out the difference between the highest temperature and the lowest temperature.

Highest: 12°C (Lisbon). Lowest: -7°C (Oslo).

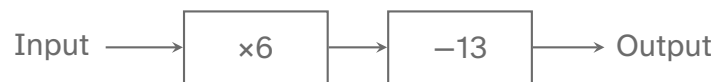
Difference: $12 - (-7) = 12 + 7 = 19$

Answer: 19°C

Tip: From -7 up to 0 is 7 degrees, then 0 up to 12 is 12 more. The answer is not $12 - 7 = 5$

2 (3 marks)

Here is a number machine.



- (a) Work out the output when the input is 7

$$7 \times 6 = 42$$

$$42 - 13 = 29$$

Answer: 29

- (b) Work out the input when the output is 59

Work backwards and use the inverse operations.

The inverse of -13 is $+13$: $59 + 13 = 72$

The inverse of $\times 6$ is $\div 6$: $72 \div 6 = 12$

Answer: 12

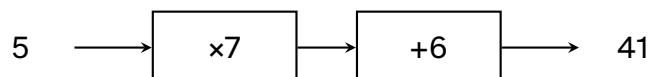
Tip: Undo the operations in reverse order: add 13 first, then divide by 6

- (c) A different number machine has input 5 and output 41. The second operation is $+6$. Write the missing first operation.

Work backwards from the output: $41 - 6 = 35$

The first box turns 5 into 35

$5 \times 7 = 35$, so the missing operation is $\times 7$

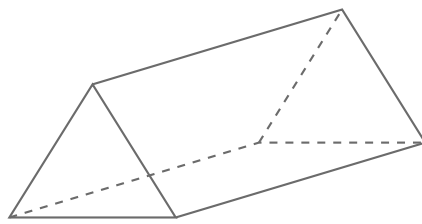


($+30$ also turns 5 into 35, so it is also correct.)

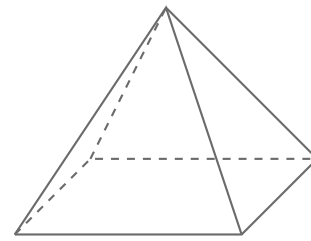
Answer: $\times 7$ (or $+30$)

3 (3 marks)

Here are two solids.



Solid A



Solid B

- (a) How many edges does solid A have?

Solid A is a triangular prism.

Each triangular end has 3 edges: $3 + 3 = 6$

There are 3 more edges joining the two ends.

$$6 + 3 = 9$$

Answer: 9

- (b) How many vertices does solid B have?

Solid B is a square-based pyramid.

There are 4 vertices (corners) round the square base and 1 at the top.

$$4 + 1 = 5$$

Answer: 5

- (c) Rhys says, "Solid A and solid B have the same number of faces." Is Rhys correct? Give a reason for your answer.

Solid A: 2 triangles + 3 rectangles = 5 faces.

Solid B: 1 square + 4 triangles = 5 faces.

Both solids have 5 faces, so Rhys is correct.

✓ Yes

☐ No

Answer: Yes, because both solids have 5 faces.

Tip: Count the faces you cannot see too: the back of the prism and the base of the pyramid.

4 (2 marks)

(a) Work out $\sqrt{14.8} + \frac{9.1}{3.2 + 1.75}$

Write down all the figures on your calculator display.

Work out the bottom of the fraction first: $3.2 + 1.75 = 4.95$

$$9.1 \div 4.95 = 1.838383 \dots$$

$$\sqrt{14.8} = 3.847076 \dots$$

$$3.847076 \dots + 1.838383 \dots = 5.685460 \dots$$

Answer: 5.685460651

Tip: Put brackets round $3.2 + 1.75$ on your calculator, or use the fraction button.
 $9.1 \div 3.2 + 1.75$ gives the wrong answer.

(b) Write your answer to part (a) correct to 1 decimal place.

5.68 ...: the digit after the first decimal place is 8

8 is 5 or more, so round the 6 up to 7

Answer: 5.7

5 (4 marks)

Some students were asked how they travel to a weekend sports club.
The tally chart shows the results.

Way of travelling	Tally	Frequency
Walk		
Bicycle		
Car		
Bus		
Train		

(a) Complete the frequency column.

Count the tallies. Each gate of five counts as 5

Walk: $5 + 5 + 4 = 14$

Bicycle: $5 + 4 = 9$

Car: $5 + 5 + 5 + 2 = 17$

Bus: $5 + 1 = 6$

Train: $5 + 5 + 1 = 11$

Way of travelling	Tally	Frequency
Walk		14
Bicycle		9
Car		17
Bus		6
Train		11

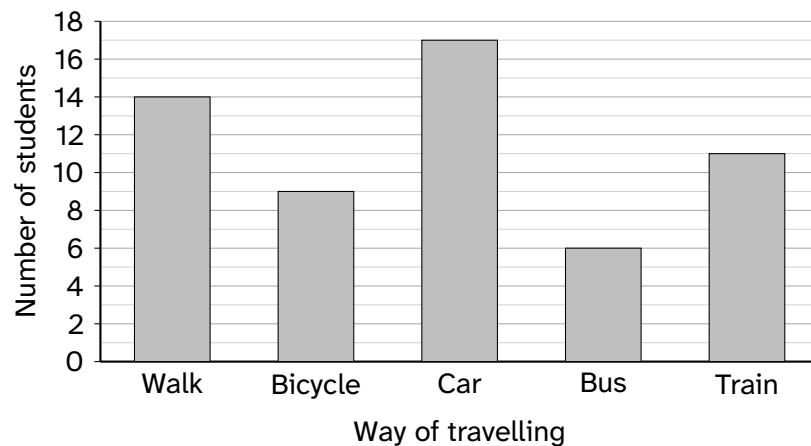
Answer: 14, 9, 17, 6, 11

(b) Draw a bar chart to show the information in the table.

Choose a scale for the vertical axis that fits the largest frequency, 17

Going up in 2s from 0 to 18 fits on the grid.

Draw five bars of the same width, with gaps, and label each bar.



Answer: Linear scale from 0; five labelled bars of equal width with heights 14, 9, 17, 6, 11

Tip: The steps on the scale must be equal. Label the bars, or the chart cannot be read.

Marks: 1 mark for a sensible scale going up in equal steps from 0. 1 mark for five labelled bars of the same width. 1 mark for all five bars the correct height.

6 (2 marks)

Write these numbers in order of size.

Start with the smallest number.

32%

0.33

$\frac{13}{40}$

0.3

Write each number as a decimal.

$$32\% = 32 \div 100 = 0.32$$

$$\frac{13}{40} = 13 \div 40 = 0.325$$

So the numbers are 0.32, 0.33, 0.325, 0.3

In order: 0.3, 0.32, 0.325, 0.33

Answer: 0.3, 32%, $\frac{13}{40}$, 0.33

Tip: 0.3 is the same as 0.30, so it is smaller than 0.32. Fill in zeros so every decimal has the same number of places.

Marks: 2 marks for all four in the correct order. 1 mark for writing them all in the same form (e.g. all as decimals), or for three in the correct order.

7 (3 marks)

Decorative pebbles: small bag 9 kg for £5.49, large bag 25 kg for £15.75. Which bag is better value for money?

Work out the cost of 1 kg for each bag.

Small: $£5.49 \div 9 = £0.61$ per kg

Large: $£15.75 \div 25 = £0.63$ per kg

1 kg costs less in the small bag, so the small bag is better value.

☒ Small bag ☐ Large bag

Answer: Small bag (61p per kg compared with 63p per kg)

Tip: Do not assume the bigger bag is always the better buy: work it out. Compare like with like, e.g. the cost of 1 kg in both bags.

Marks: 1 mark for working out a cost per kg (or kg per pound) for one bag. 1 mark for both. 1 mark for ticking the small bag with correct values.

8 (4 marks)

A farm packs eggs into boxes.

Each box holds 6 eggs.

Only full boxes are sent to shops.

The full boxes are packed into crates.

Each crate holds 24 boxes.

One week the farm has 2000 eggs.

Work out

the number of crates needed for all the full boxes

the number of empty spaces for boxes in the last crate.

Number of full boxes: $2000 \div 6 = 333.33 \dots$

So there are 333 full boxes (and 2 eggs left over).

Number of crates: $333 \div 24 = 13.875$

13 crates are not enough, so 14 crates are needed.

13 full crates hold $13 \times 24 = 312$ boxes.

Boxes in the last crate: $333 - 312 = 21$

Empty spaces in the last crate: $24 - 21 = 3$

Answer: 14 crates, 3 empty spaces

Tip: Think about what the decimal means. 333.3 boxes means 333 **full** boxes. 13.875 crates means you need 14 crates.

Marks: 1 mark for $2000 \div 6$. 1 mark for dividing the number of boxes by 24. 1 mark for 14 crates. 1 mark for 3 empty spaces.

9 (3 marks)

An electrician charges

a fixed charge of £45 for each job

£38 for each hour the job takes.

(a) Write a formula for the total cost, £ C , for a job that takes h hours.

The fixed charge is £45

Each hour costs £38, so h hours cost $38 \times h = 38h$

Total cost: $C = 45 + 38h$

Answer: $C = 45 + 38h$

Tip: A formula needs “ $C =$ ” at the start. $45 + 38h$ on its own is an expression.

Marks: 2 marks for a correct formula starting $C =$. 1 mark for the expression $45 + 38h$ without $C =$ (or $C = 38h +$ a number other than 45).

- (b) Use your formula to work out the cost of a job that takes $3\frac{1}{2}$ hours.

$3\frac{1}{2}$ hours is $h = 3.5$

$$C = 45 + 38 \times 3.5$$

$$C = 45 + 133 = 178$$

Answer: £178

10 (2 marks)

There are 840 students at a sixth-form college.

273 of these students walk to the college.

What percentage of the students walk to the college?

Write it as a fraction of the total: $\frac{273}{840}$

$$273 \div 840 = 0.325$$

$$0.325 \times 100 = 32.5\%$$

Answer: 32.5%

Tip: Divide the part by the total: $273 \div 840$, not $840 \div 273$

Marks: 1 mark for $273 \div 840$. 1 mark for 32.5.

11 (3 marks)

In a warehouse, two robots load parcels onto a lorry.

Robot *A* loads a parcel every 40 seconds.

Robot *B* loads a parcel every 1 minute 15 seconds.

Both robots load a parcel at exactly 2 pm.

At what time will both robots next load a parcel at the same time?

Use the same units for both: 1 minute 15 seconds = $60 + 15 = 75$ seconds.

Find the lowest common multiple (LCM) of 40 and 75

Multiples of 75: 75, 150, 225, 300, 375, 450, 525, 600

600 is the first that is also a multiple of 40 ($40 \times 15 = 600$)

So they next load a parcel together after 600 seconds.

$600 \div 60 = 10$ minutes

2 pm + 10 minutes = 2:10 pm

Answer: 2:10 pm

Tip: Change 1 minute 15 seconds to 75 seconds first, not 115 or 1.15. At the end, 600 seconds is 10 minutes, not 6 minutes.

Marks: 1 mark for changing 1 minute 15 seconds to 75 seconds. 1 mark for finding 600 seconds (or 10 minutes) as the LCM. 1 mark for 2:10 pm.

12 (3 marks)

A games club tests a six-sided dice.
The dice is rolled 250 times.
The table shows the results.

Score	1	2	3	4	5	6
Frequency	30	37	28	34	36	85

- (a) Mia is going to roll the dice 600 times.

Use the results in the table to estimate how many times she will roll a 6

Relative frequency of a 6: $\frac{85}{250} = 0.34$

Estimate = relative frequency $\times$ number of rolls

$$0.34 \times 600 = 204$$

Answer: 204

Tip: Use the relative frequency from the table, $\frac{85}{250}$, not $\frac{1}{6}$. The question says use the results in the table.

Marks: 1 mark for $85/250 \times 600$ (or 0.34×600). 1 mark for 204.

- (b) Jake says, "The dice is fair." Do the results suggest that Jake is correct? Give a reason for your answer.

For a fair dice, each score should come up about $\frac{1}{6}$ of the time.

$250 \div 6 \approx 42$, so we would expect about 42 sixes.

There were 85 sixes, about twice as many as expected.

So the dice looks biased towards 6

☐ Yes ✓ No

Answer: No. A fair dice would give about 42 sixes in 250 rolls, but there were 85 (relative frequency 0.34 is much more than $\frac{1}{6}$).

Tip: The other scores are all close to 42. It is the 6 that is far too high.

13 (4 marks)

Shop: normal price £85, sale 15% off. Online: £61.50 plus VAT at 20%. Hamza says, "The drill is cheaper online." Is Hamza correct?

Shop: 15% of £85 = $0.15 \times 85 = £12.75$

Sale price: $£85 - £12.75 = £72.25$

Online: 20% of £61.50 = $0.2 \times 61.50 = £12.30$

Price with VAT: $£61.50 + £12.30 = £73.80$

£72.25 is less than £73.80, so the drill is cheaper in the shop.

Hamza is not correct.

☐ Yes ✓ No

Answer: No. The shop price is £72.25 and the online price is £73.80, so the shop is cheaper.

Tip: Use a multiplier to save time: 85×0.85 takes off 15% and 61.50×1.2 adds on 20%. The online price looks cheaper until you add the VAT.

Marks: 1 mark for working towards the shop price. 1 mark for working towards the online price. 1 mark for both prices correct (£72.25 and £73.80). 1 mark for ticking No with both correct prices.

14 (2 marks)

The length of a lizard is 23.6 cm, correct to 1 decimal place.

Complete the error interval for the length of the lizard.

To 1 decimal place, the length is rounded to the nearest 0.1 cm.

Half of 0.1 is 0.05

Smallest length: $23.6 - 0.05 = 23.55$ cm

Upper limit: $23.6 + 0.05 = 23.65$ cm

$23.55 \leq \text{length} < 23.65$

Answer: $23.55 \leq \text{length} < 23.65$

Tip: The upper value is 23.65, not 23.64: 23.65 itself would round up to 23.7, which is why the sign is <

Marks: 1 mark for each value in the correct place.

15 (3 marks)

Here are the first five terms of a linear sequence.

4 11 18 25 32

(a) Work out an expression for the n th term of the sequence.

The terms go up by 7 each time, so the n th term starts with $7n$

$7n$ gives 7, 14, 21, 28, ...

Each term of the sequence is 3 less than this, so subtract 3

n th term = $7n - 3$

Answer: $7n - 3$

Tip: Check your rule with $n = 1$: $7 \times 1 - 3 = 4$, which is the first term. The answer is not $n + 7$

Marks: 1 mark for $7n$. 1 mark for $7n - 3$.

(b) Is 375 a term in this sequence? Give a reason for your answer.

Solve $7n - 3 = 375$

$7n = 378$

$n = 378 \div 7 = 54$

54 is a whole number, so 375 is the 54th term.

✓ Yes

☐ No

Answer: Yes, because $7 \times 54 - 3 = 375$ (it is the 54th term).

16 (3 marks)

The wheel of a unicycle has a diameter of 61 cm.

Tomasz rides the unicycle in a straight line for 1.5 km.

How many complete turns does the wheel make?

In one turn, the wheel moves forward one circumference.

Circumference = $\pi \times \text{diameter} = \pi \times 61 = 191.63 \dots \text{ cm}$

Change 1.5 km to cm: $1.5 \times 1000 \times 100 = 150\,000 \text{ cm}$

Number of turns: $150\,000 \div 191.63 \dots = 782.7 \dots$

The question asks for complete turns, so round down.

Answer: 782

Tip: Use the circumference (πd), not the area. Make sure both lengths are in the same unit before dividing.

Marks: 1 mark for the circumference (191.6...). 1 mark for dividing 150 000 by it (both in cm, or both in m). 1 mark for 782.

17 (2 marks)

Rearrange $w = 3v - 11$ to make v the subject.

Add 11 to both sides: $w + 11 = 3v$

Divide both sides by 3: $\frac{w + 11}{3} = v$

Answer: $v = \frac{w + 11}{3}$

Tip: Undo the operations in reverse order: deal with the -11 first, then the $\times 3$. Divide all of $w + 11$ by 3, not just the 11

Marks: 1 mark for adding 11 to both sides. 1 mark for the final answer.

18 (4 marks)

Ellie plays two games at a fair, hook-a-duck and a coconut shy.

The probability that she wins at hook-a-duck is 0.35

The probability that she wins at the coconut shy is 0.2

The two games are independent.

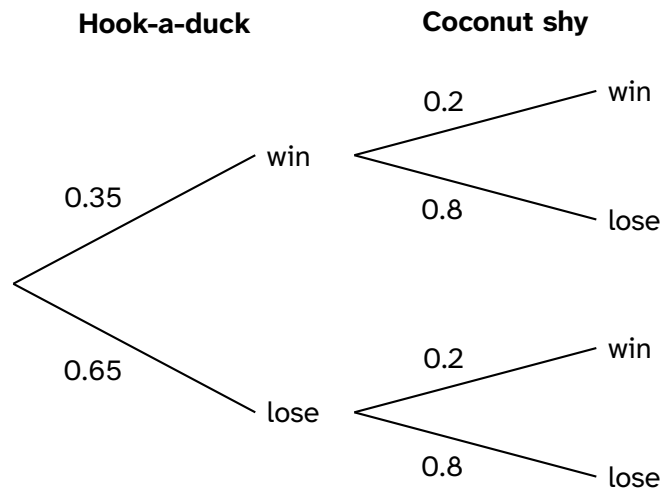
(a) Complete the tree diagram.

Each pair of branches adds up to 1

Hook-a-duck lose: $1 - 0.35 = 0.65$

Coconut shy lose: $1 - 0.2 = 0.8$

The two games do not affect each other, so the coconut shy probabilities are the same on both pairs of branches.



Answer: 0.65; 0.8; 0.2, 0.8

Tip: The coconut shy branches are the same whether Ellie wins hook-a-duck or not, because the games are independent.

Marks: 1 mark for 0.65. 1 mark for the coconut shy branches all correct.

- (b) Work out the probability that Ellie wins at least one of the two games.

At least one win means every outcome except (lose, lose).

$$P(\text{lose, lose}) = 0.65 \times 0.8 = 0.52$$

$$P(\text{at least one win}) = 1 - 0.52 = 0.48$$

(Or add the three routes:

$$0.35 \times 0.2 + 0.35 \times 0.8 + 0.65 \times 0.2 = 0.07 + 0.28 + 0.13 = 0.48)$$

Answer: 0.48

Tip: Winning both games counts too. Find $P(\text{loses both games})$ and take it away from 1. Do not add $0.35 + 0.2$: that ignores the chance of winning both.

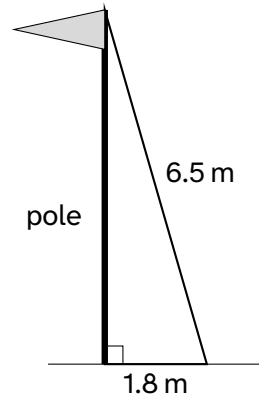
Marks: 1 mark for 0.65×0.8 (or for adding the three routes with at least one win). 1 mark for 0.48.

19 (3 marks)

A vertical pole stands on horizontal ground.

A straight wire joins the top of the pole to the ground, 1.8 m from the bottom of the pole.

The wire is 6.5 m long.



Not drawn accurately

Use Pythagoras' theorem to show that the height of the pole is 6.2 m, correct to 1 decimal place.

The wire is the hypotenuse (the longest side): 6.5 m.

$$h^2 = 6.5^2 - 1.8^2$$

$$h^2 = 42.25 - 3.24 = 39.01$$

$$h = \sqrt{39.01} = 6.2458 \dots$$

6.2458 ... = 6.2 m to 1 decimal place.

Answer: $\sqrt{6.5^2 - 1.8^2} = \sqrt{39.01} = 6.2458 \dots = 6.2 \text{ m (1 dp)}$

Tip: In a “show that” question you must write down the full calculator value (6.245 ...) before you round it.

Marks: 1 mark for $6.5^2 - 1.8^2$. 1 mark for the square root of 39.01. 1 mark for showing 6.2458... before rounding to 6.2.

20 (3 marks)

In 2025, a museum had 30 450 visitors. This was 16% fewer visitors than in 2024. Priya says, "The museum had 35 322 visitors in 2024." Is Priya correct?

The 2025 number is $100\% - 16\% = 84\%$ of the 2024 number.

84% is 30 450

1% is $30\,450 \div 84 = 362.5$

100% is $362.5 \times 100 = 36\,250$

The museum had 36 250 visitors in 2024, not 35 322

(Priya added 16% of 30 450: $30\,450 \times 1.16 = 35\,322$. But the 16% is a percentage of the 2024 number.)

☐

Yes

✓ No

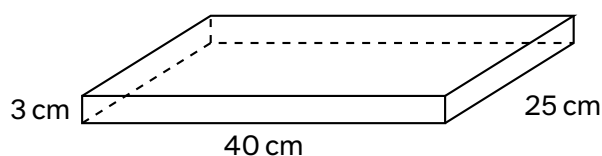
Answer: No. $30\,450 \div 0.84 = 36\,250$ visitors in 2024.

Tip: In a reverse percentage, the 16% is a percentage of the **original** (2024) number. So 30 450 is 84%: divide by 0.84. Do not add 16% of 30 450

Marks: 1 mark for 84% (or 0.84). 1 mark for $30\,450 \div 0.84$ (or $\div 84 \times 100$). 1 mark for No with 36 250.

21 (3 marks)

A chopping board is a solid cuboid made of wood.



Not drawn accurately

The chopping board is a 40 cm by 25 cm by 3 cm cuboid with mass 2.04 kg. Densities: walnut 0.64, ash 0.68, beech 0.72, oak 0.75 g/cm³. Which type of wood is it made of?

Volume of the cuboid: $40 \times 25 \times 3 = 3000 \text{ cm}^3$

The densities are in g/cm³, so change the mass to grams: $2.04 \times 1000 = 2040 \text{ g}$

$$\text{Density} = \frac{\text{mass}}{\text{volume}} = \frac{2040}{3000} = 0.68 \text{ g/cm}^3$$

0.68 g/cm^3 is the density of ash.

Answer: Ash (density = $2040 \div 3000 = 0.68 \text{ g/cm}^3$)

Tip: The units must match: the density is in g/cm^3 , so use the mass in grams (2040 g), not kilograms. $2.04 \div 3000 = 0.00068$ is not in the table.

Marks: 1 mark for the volume (3000). 1 mark for $2040 \div 3000$ (mass in grams). 1 mark for Ash with 0.68.

22 (3 marks)

(a) Which inequality is shown on the number line?



Circle your answer.

Options: $-2 < x \leq 3$, $-2 \leq x < 3$, $-2 < x < 3$, $-2 \leq x \leq 3$

An empty (open) circle at -2 means -2 is not included: $-2 < x$

A filled circle at 3 means 3 is included: $x \leq 3$

Answer: $-2 < x \leq 3$

Tip: Filled circle: the number is included ($\leq$). Empty circle: it is not ($<$).

(b) n is an integer.

$$-4 \leq n < 2$$

Write down all the possible values of n .

$-4 \leq n$ means -4 is included.

$n < 2$ means 2 is **not** included.

The integers are $-4, -3, -2, -1, 0, 1$

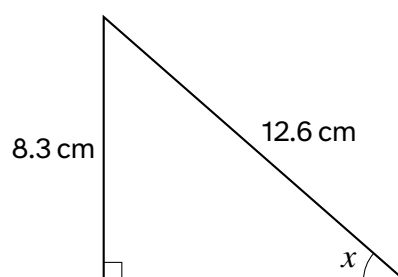
Answer: $-4, -3, -2, -1, 0, 1$

Tip: Do not forget 0: it is an integer.

Marks: 2 marks for all six values and no others. 1 mark for five correct values, or six correct values with one extra.

23 (3 marks)

Here is a right-angled triangle.



Not drawn accurately

Work out the size of angle x .

Give your answer to 1 decimal place.

Label the sides from angle x : 8.3 is opposite and 12.6 is the hypotenuse.

Use sine: $\sin x = \frac{\text{opposite}}{\text{hypotenuse}} = \frac{8.3}{12.6}$

$$x = \sin^{-1}\left(\frac{8.3}{12.6}\right)$$

$$x = 41.203\dots^\circ$$

$$x = 41.2^\circ \text{ to 1 decimal place.}$$

Answer: 41.2°

Tip: Check your calculator is in degrees. If you get 0.7 ... you have used radians.

Marks: 1 mark for $\sin x = 8.3/12.6$. 1 mark for using inverse sine. 1 mark for 41.2.

24 (4 marks)

Zainab needs £3500. She puts £3200 into an account paying compound interest at 2.5% per year for the first 2 years and 2% per year after that. Will she have enough after 4 years?

First 2 years: multiply by 1.025 each year.

$$3200 \times 1.025^2 = £3362$$

Next 2 years: multiply by 1.02 each year.

$$3362 \times 1.02^2 = 3497.8248$$

After 4 years she has £3497.82

£3497.82 is less than £3500 (by £2.18).

So she will **not** have enough money.

Answer: No. She will have £3497.82, which is less than £3500

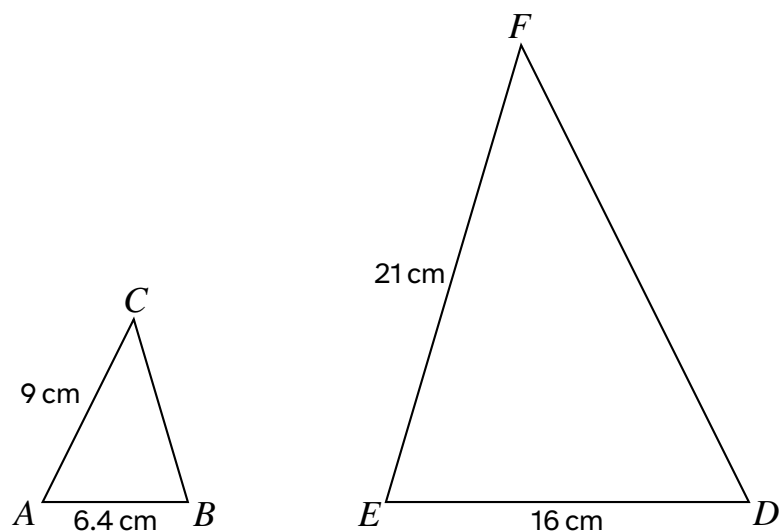
Tip: Use the right rate for each year: 1.025 twice, then 1.02 twice. Do not round until the end: the answer is only £2.18 short of £3500. $3200 \times 1.025^4 = £3532.20$ uses the wrong rate for the last two years.

Marks: 1 mark for using 1.025 (or 2.5% interest, £80, for the first year). 1 mark for 3362 after 2 years. 1 mark for multiplying by 1.02 twice (£3497.82). 1 mark for No with £3497.82 (or £3497.8) compared with £3500.

25 (4 marks)

Triangle ABC and triangle DEF are mathematically similar.

A corresponds to D , B corresponds to E and C corresponds to F .



Not drawn accurately

Work out the perimeter of triangle ABC .

DE corresponds to AB , so the scale factor from ABC to DEF is $16 \div 6.4 = 2.5$

EF corresponds to BC . BC is in the smaller triangle, so divide by the scale factor.

$$BC = 21 \div 2.5 = 8.4 \text{ cm}$$

$$\text{Perimeter of } ABC = 6.4 + 8.4 + 9 = 23.8 \text{ cm}$$

Answer: 23.8 cm

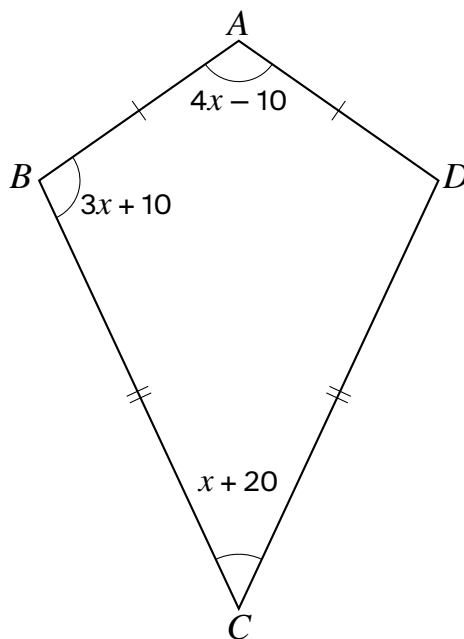
Tip: Triangle DEF is drawn the other way round, so match the sides using the letters: EF goes with BC . BC is in the smaller triangle, so it must be less than 21 cm.

Marks: 1 mark for the scale factor 2.5 ($16 \div 6.4$). 1 mark for $BC = 21 \div 2.5$. 1 mark for adding 6.4, 9 and your BC . 1 mark for 23.8.

26 (5 marks)

$ABCD$ is a kite.

The angles are given in degrees.



Not drawn accurately

Work out the size of the largest angle of the kite.

In a kite, the two angles between the pairs of unequal sides are equal.

So angle $ADC = \text{angle } ABC = 3x + 10$

The angles in a quadrilateral add up to 360°

$$(4x - 10) + (3x + 10) + (x + 20) + (3x + 10) = 360$$

Collect like terms: $11x + 30 = 360$

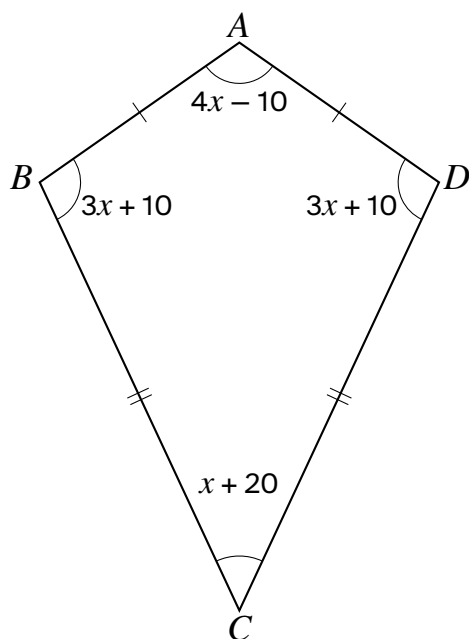
Subtract 30: $11x = 330$

Divide by 11: $x = 30$

Angles: $A = 4 \times 30 - 10 = 110^\circ$, $B = D = 3 \times 30 + 10 = 100^\circ$, $C = 30 + 20 = 50^\circ$

Check: $110 + 100 + 50 + 100 = 360 \checkmark$

The largest angle is 110°



Answer: 110°

Tip: Only three angles have expressions on the diagram. Use the kite's symmetry to find the fourth one before you use 360° . Then substitute $x = 30$ back in: x is not the answer.

Marks: 1 mark for angle $ADC = 3x + 10$. 1 mark for adding all four angles and putting them equal to 360. 1 mark for $11x = 330$ (or a correct step to solve your equation). 1 mark for $x = 30$. 1 mark for 110.