

Mock Set B – Paper 1

Solutions

For AQA GCSE Mathematics (8300)

Foundation tier • Paper 1 (Non-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)

- (a) Work out the value of 4^3

4^3 means $4 \times 4 \times 4$.

$4 \times 4 = 16$, and $16 \times 4 = 64$

Answer: 64

Tip: 4^3 is not $4 \times 3 = 12$. The small 3 tells you how many 4s to multiply together.

- (b) Write down the value of $\sqrt{121}$

$11 \times 11 = 121$

So $\sqrt{121} = 11$

Answer: 11

- (c) Write one million as a power of 10

One million = 1 000 000

That is a 1 followed by six zeros, so it is $10 \times 10 \times 10 \times 10 \times 10 \times 10$.

$$1\,000\,000 = 10^6$$

Answer: 10^6

Tip: Count the zeros: one million has 6 zeros, so it is 10^6 .

2 (2 marks)

- (a) Complete the statement: 386 centimetres = _____ metres

$$100 \text{ centimetres} = 1 \text{ metre}$$

$$386 \div 100 = 3.86$$

Answer: 3.86 metres

Tip: Dividing by 100 moves every digit two places to the right: $386 \rightarrow 3.86$.

- (b) Complete the statement: $2\frac{3}{4}$ hours = _____ minutes

$$2 \text{ hours} = 2 \times 60 = 120 \text{ minutes}$$

$$\frac{3}{4} \text{ of an hour} = \frac{3}{4} \times 60 = 45 \text{ minutes}$$

$$120 + 45 = 165 \text{ minutes}$$

Answer: 165 minutes

Tip: There are 60 minutes in an hour, not 100. $2\frac{3}{4}$ hours is not 2 hours 75 minutes or 275 minutes.

3 (2 marks)

Points $A(-2, 4)$, $B(3, 4)$ and $C(3, -1)$ are shown on a grid.

- (a) Write down the coordinates of A .

Start at the origin. Go 2 to the **left** (so $x = -2$), then 4 up (so $y = 4$).

Answer: $(-2, 4)$

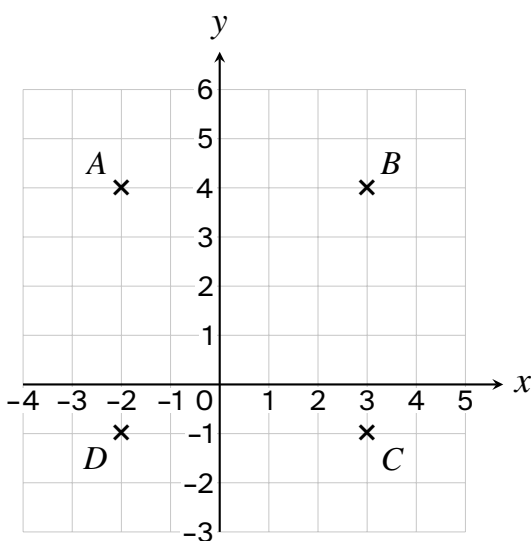
Tip: The x -coordinate (across) comes first. Points to the left of the y -axis have a negative x -coordinate.

- (b) $ABCD$ is a square. Plot the point D on the grid.

AB goes 5 squares across. BC goes 5 squares down.

So D is 5 squares below A (and 5 squares to the left of C).

D is at $(-2, -1)$.



Answer: D plotted at $(-2, -1)$

4 (2 marks)

- (a) Work out -8×5

$$8 \times 5 = 40$$

A negative number times a positive number is negative.

$$-8 \times 5 = -40$$

Answer: -40

(b) Work out $-3 - (-9)$

Subtracting a negative number is the same as adding.

$$-3 - (-9) = -3 + 9$$

$$-3 + 9 = 6$$

Answer: 6

Tip: Two minus signs next to each other make a plus: $-(-9) = +9$. Start at -3 and go up 9.

5 (3 marks)

38 people go on a drama club trip. Each ticket costs £24. The coach costs £165 altogether. Work out the total cost of the trip.

Cost of the tickets: 38×24

$$38 \times 20 = 760 \text{ and } 38 \times 4 = 152$$

$$760 + 152 = 912, \text{ so the tickets cost } £912$$

$$\text{Add the coach: } 912 + 165 = 1077$$

Answer: £1077

Tip: Use a method you trust for 38×24 (grid, column or partitioning) and check the size: $40 \times 24 = 960$, so 912 is sensible. Remember to add the coach.

Marks: 1 mark for a correct method for 38×24 . 1 mark for 912. 1 mark for £1077.

6 (4 marks)

180 people visit a county show.

- $\frac{2}{5}$ of the people come by car.
- 75 people in total stay for the evening.

Some information is shown on the frequency tree.

(a) Complete the frequency tree.

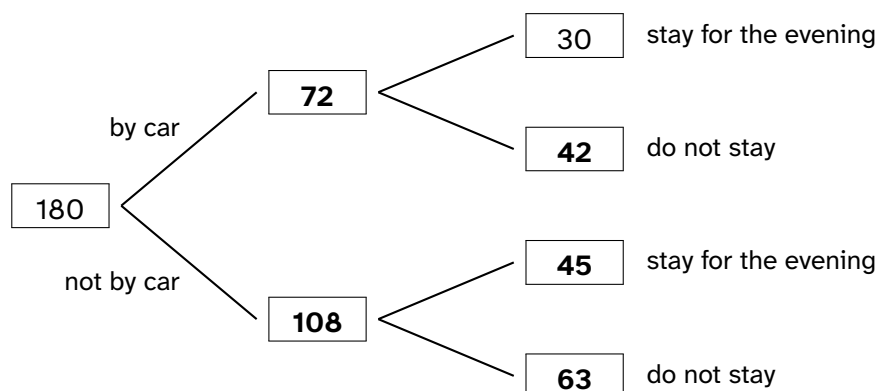
By car: $\frac{2}{5}$ of 180 = $180 \div 5 \times 2 = 72$

Not by car: $180 - 72 = 108$

By car and do not stay: $72 - 30 = 42$

75 people stay in total, so not by car and stay: $75 - 30 = 45$

Not by car and do not stay: $108 - 45 = 63$



Answer: 72, 108; 42; 45, 63

Tip: Each pair of branches must add up to the number in the box they come from:
 $30 + 42 = 72$ and $45 + 63 = 108$. The 75 is a total for two boxes (car and not by car).

Marks: 2 marks for all five boxes correct. 1 mark for at least two correct.

(b) What fraction of the people who come by car stay for the evening?
Give your answer in its simplest form.

72 people come by car. 30 of them stay for the evening.

$$\frac{30}{72}$$

Divide the top and bottom by 6: $\frac{30}{72} = \frac{5}{12}$

Answer: $\frac{5}{12}$

Tip: The fraction is out of the people who come **by car** (72), not out of everyone (180).

Marks: 1 mark for $\frac{30}{72}$. 1 mark for $\frac{5}{12}$.

7 (3 marks)

- (a) Three angles on a straight line are 81° , x and 46° . Work out the value of x .

Angles on a straight line add up to 180° .

$$81 + 46 = 127$$

$$x = 180 - 127 = 53$$

Answer: $x = 53^\circ$

- (b) An isosceles triangle has its two equal sides meeting at the angle y . One of the other angles is 64° . Work out the value of y .

The marks show the two equal sides. They meet at the angle y .

So the two angles at the bottom are equal: both are 64° .

Angles in a triangle add up to 180° .

$$y = 180 - 64 - 64 = 52$$

Answer: $y = 52^\circ$

Tip: Look at the marks on the sides. The equal angles are opposite the equal sides, so they are the two angles at the ends of the third side, not the angle y .

Marks: 1 mark for seeing the other base angle is 64° . 1 mark for 52.

8 (3 marks)

You are given that $34 \times 56 = 1904$

Use this to answer the questions.

- (a) Work out 3.4×56

3.4 is $34 \div 10$.

So $3.4 \times 56 = 1904 \div 10 = 190.4$

Answer: 190.4

- (b) Work out $1904 \div 56$

Division is the inverse of multiplication.

$34 \times 56 = 1904$, so $1904 \div 56 = 34$

Answer: 34

- (c) Jenna says $3.4 \times 0.56 = 19.04$. Is Jenna correct? Give a reason.

$3.4 = 34 \div 10$ and $0.56 = 56 \div 100$

So $3.4 \times 0.56 = 1904 \div 10 \div 100 = 1904 \div 1000 = 1.904$

Check with an estimate: $3 \times 0.5 = 1.5$, so the answer is about 1.5, not about 19.

Answer: No: $3.4 \times 0.56 = 1.904$ (it should be about $3 \times 0.5 = 1.5$)

Tip: Count the decimal places: 3.4 has one and 0.56 has two, so the answer has three: 1.904. An estimate is a quick way to spot a mistake.

9 (3 marks)

Alfie and Eilidh play darts at a youth club.

Here are Alfie's scores for 7 turns.

Alfie's scores	45	60	26	81	57	60	38
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- (a) Work out the median and the range of Alfie's scores.

Put the scores in order: 26, 38, 45, 57, 60, 60, 81

There are 7 scores, so the median is the 4th one: median = 57

Range = highest – lowest = $81 - 26 = 55$

Answer: Median = 57, range = 55

Tip: Put the scores in order before finding the median. The middle of the list as it is printed (81) is not the median.

Marks: 1 mark for the median, 57. 1 mark for the range, 55.

- (b) Eilidh's scores have median 52 and range 31. She says her scores were more consistent than Alfie's. Is Eilidh correct? Give a reason.

Consistency is about how spread out the scores are, so compare the ranges.

Eilidh's range is 31. Alfie's range is 55.

A smaller range means the scores are closer together, so Eilidh's scores were more consistent.

Answer: Yes: Eilidh's range (31) is smaller than Alfie's range (55)

Tip: Use the range (the spread) to judge consistency, not the median. The median tells you who scored higher on average.

10 (3 marks)

A gym charges £6.50 per visit (pay as you go), or £20 per month plus £3 per visit (monthly plan).

Pay as you go: £6.50 per visit. Monthly plan: £20 per month plus £3 per visit. Next month Dmitri goes twice a week for 4 weeks. Which is cheaper?

Number of visits: $2 \times 4 = 8$

Pay as you go: $8 \times £6.50 = £52$

Monthly plan: $£20 + 8 \times £3 = £20 + £24 = £44$

£44 is less than £52, so the monthly plan is cheaper.

Answer: Monthly plan: £44 compared with £52 for pay as you go

Tip: Read the question carefully: twice a week for 4 weeks is 8 visits, not 2 or 4. Remember the £20 is paid once, but the £3 is paid for every visit.

Marks: 1 mark for the pay as you go cost (£52). 1 mark for the monthly plan cost (£44). 1 mark for choosing the monthly plan with both costs.

11 (4 marks)

(a) Expand $7(2p - 3)$

Multiply each term in the bracket by 7.

$$7 \times 2p = 14p \text{ and } 7 \times (-3) = -21$$

$$7(2p - 3) = 14p - 21$$

Answer: $14p - 21$

(b) Factorise fully $12y + 18$

The highest common factor of 12 and 18 is 6.

$$12y = 6 \times 2y \text{ and } 18 = 6 \times 3$$

$$12y + 18 = 6(2y + 3)$$

Answer: $6(2y + 3)$

Tip: “Fully” means use the **highest** common factor. $2(6y + 9)$ and $3(4y + 6)$ are not fully factorised.

- (c) Expand and simplify $5(x + 3) + 2(x - 4)$

Expand each bracket:

$$5(x + 3) = 5x + 15$$

$$2(x - 4) = 2x - 8$$

$$\text{Add: } 5x + 15 + 2x - 8$$

$$\text{Collect like terms: } 7x + 7$$

Answer: $7x + 7$

Tip: $2(x - 4)$ gives -8 , not $+8$ or -4 . Collect the x terms and the numbers separately, and do not combine $7x + 7$ into $14x$.

Marks: 1 mark for expanding one bracket correctly. 1 mark for $7x + 7$.

12 (2 marks)

- (a) A hanging basket has 15 red, 24 white and 9 purple flowers. Write the ratio red : white : purple in its simplest form.

$$\text{red : white : purple} = 15:24:9$$

The highest common factor of 15, 24 and 9 is 3.

$$\text{Divide each number by 3: } 5:8:3$$

Answer: $5:8:3$

Tip: Divide all three numbers by the same number. Keep going until no number (other than 1) divides into all of them.

- (b) In a different basket, trailing plants : upright plants = 4:7. What fraction of the plants are trailing?

There are $4 + 7 = 11$ parts altogether.

4 of the 11 parts are trailing plants.

$$\text{Fraction} = \frac{4}{11}$$

Answer: $\frac{4}{11}$

Tip: The fraction is out of the total number of parts ($4 + 7 = 11$), so it is not $\frac{4}{7}$.

13 (3 marks)

A biased spinner lands on red with probability 0.35 and blue with probability 0.11.

Red 0.35, blue 0.11. The probability of yellow is twice the probability of green.
Complete the table.

The probabilities add up to 1.

$$\text{Red and blue: } 0.35 + 0.11 = 0.46$$

$$\text{Green and yellow together: } 1 - 0.46 = 0.54$$

Yellow is twice green, so split 0.54 into 3 equal parts: one part for green and two parts for yellow.

$$0.54 \div 3 = 0.18$$

$$\text{Green} = 0.18 \text{ and yellow} = 2 \times 0.18 = 0.36$$

$$\text{Check: } 0.35 + 0.11 + 0.18 + 0.36 = 1 \quad \checkmark$$

Colour	Red	Blue	Green	Yellow
Probability	0.35	0.11	0.18	0.36

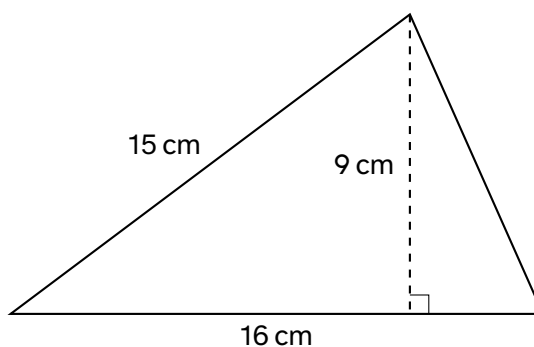
Answer: Green 0.18, Yellow 0.36

Tip: Do not just halve 0.54. If yellow is twice green, there are three equal shares: green gets one and yellow gets two.

Marks: 1 mark for $1 - 0.46 = 0.54$. 1 mark for dividing 0.54 by 3. 1 mark for both probabilities correct.

14 (4 marks)

Here is a triangle.



Not drawn accurately

(a) Work out the area of the triangle.

Area of a triangle = $\frac{1}{2} \times \text{base} \times \text{perpendicular height}$

The perpendicular height is 9 cm (it meets the base at a right angle). The 15 cm side is not needed.

$$\frac{1}{2} \times 16 \times 9 = 8 \times 9 = 72$$

Answer: 72 cm²

Tip: Use the height that is at right angles to the base, not the sloping side.

$\frac{1}{2} \times 16 \times 15 = 120$ is a common wrong answer.

Marks: 1 mark for $\frac{1}{2} \times 16 \times 9$. 1 mark for 72.

- (b) A rectangle has the same area as the triangle.

The width of the rectangle is 6 cm.

Work out the perimeter of the rectangle.

Area of rectangle = length $\times$ width, so length = $72 \div 6 = 12$ cm

Perimeter = $12 + 6 + 12 + 6 = 36$ cm

Answer: 36 cm

Tip: The perimeter is the distance all the way round, so add all four sides: two lengths and two widths.

Marks: 1 mark for the length of the rectangle (12 cm). 1 mark for 36.

15 (3 marks)

In a choir, children : adults = 7:4. 15 more adults join, and now there are the same number of children and adults. How many people were in the choir before?

After the 15 adults join, the numbers are equal, so there were 15 more children than adults before.

Difference in parts: $7 - 4 = 3$ parts

3 parts = 15, so 1 part = $15 \div 3 = 5$

Children: $7 \times 5 = 35$ Adults: $4 \times 5 = 20$

Total before: $35 + 20 = 55$

Check: $20 + 15 = 35$ adults now, the same as the 35 children ✓

Answer: 55

Tip: The 15 adults close the gap between children and adults, so 15 is the **difference**, which is $7 - 4 = 3$ parts. The question asks for the number **before** they joined.

Marks: 1 mark for seeing that 3 parts = 15. 1 mark for one part = 5, or 35 children, or 20 adults. 1 mark for 55.

16 (3 marks)

Bikes are reduced by 25% in a sale. On Saturday the sale prices are reduced by a further 10%. A bike costs £560 originally. Stefan says that on Saturday the price is 35% less than the original price. Is he correct?

$$25\% \text{ of } £560 = 560 \div 4 = £140$$

$$\text{Sale price: } £560 - £140 = £420$$

$$10\% \text{ of } £420 = £42$$

$$\text{Saturday price: } £420 - £42 = £378$$

$$35\% \text{ off the original price: } 10\% \text{ of } 560 \text{ is } 56, \text{ so } 35\% \text{ is } 3 \times 56 + 28 = 196, \text{ and } 560 - 196 = £364$$

£378 is not £364, so Stefan is **not** correct.

(The second 10% is taken from the smaller sale price, so it takes off less than 10% of the original price.)

Answer: No: the Saturday price is £378, but 35% off £560 would be £364

Tip: Percentage reductions one after the other do not add up: the 10% is 10% of the **new** price, £420, not of £560.

Marks: 1 mark for the sale price (£420). 1 mark for the Saturday price (£378). 1 mark for No with £378 and £364 (or the reductions £182 and £196).

17 (4 marks)

Carys changes £320 into euros at £1 = €1.15. She spends €283. She changes the euros she has left back into pounds at £1 = €1.25. How many pounds does she get?

Pounds to euros: multiply by 1.15

$$320 \times 1.15 = 320 + 320 \times 0.15 = 320 + 48 = €368$$

$$\text{Euros left: } 368 - 283 = €85$$

Euros to pounds: divide by 1.25

$$85 \div 1.25: \text{ multiply both by 4 to get } 340 \div 5 = 68$$

She gets £68

Answer: £68

Tip: When you change euros back into pounds, divide by the rate (you get fewer pounds than euros). Multiplying 85 by 1.25 gives 106.25, which is too many.

Marks: 1 mark for 368 euros. 1 mark for 85 euros left. 1 mark for dividing their 85 by 1.25. 1 mark for £68.

18 (3 marks)

(a) Solve $4x - 3 \leq 7$

Add 3 to both sides: $4x \leq 10$

Divide both sides by 4: $x \leq 2.5$

Answer: $x \leq 2.5$

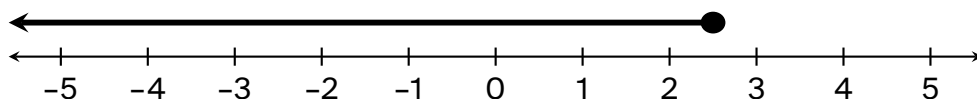
Tip: Solve it like an equation, but keep the inequality sign all the way through. Your answer must have x and the sign in it, not just 2.5

Marks: 1 mark for $4x \leq 10$. 1 mark for $x \leq 2.5$.

(b) Show your answer to part (a) on the number line.

$x \leq 2.5$ includes 2.5, so draw a **filled** circle at 2.5.

x is less than 2.5, so draw an arrow to the **left**.



Answer: Filled circle at 2.5 with an arrow to the left

Tip: A filled circle means the number is included ($\leq$ or $\geq$). An open circle means it is not included ($<$ or $>$).

19 (4 marks)

Here are the first four terms of a linear sequence.

53 47 41 35

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

The terms go down by 6 each time, so the n th term includes $-6n$.

When $n = 1$: $-6 \times 1 = -6$, and the 1st term is 53.

$53 - (-6) = 59$, so add 59.

n th term = $59 - 6n$

Check: $n = 2$ gives $59 - 12 = 47$ ✓

Answer: $59 - 6n$

Tip: The sequence is going down, so the number in front of n is negative: $-6n$, not $6n$.

Marks: 2 marks for $59 - 6n$. 1 mark for $-6n$ with a different number.

- (b) Is -94 a term in the sequence? Show your working.

Set the n th term equal to -94 : $59 - 6n = -94$

Add $6n$ and add 94: $6n = 153$

$n = 153 \div 6 = 25.5$

n must be a whole number, so -94 is **not** a term.

Another way: every term is odd (59 take away an even number), but -94 is even.

Answer: No: $59 - 6n = -94$ gives $n = 25.5$, which is not a whole number

Tip: Form an equation using your n th term and solve it. If n is not a whole number, the number is not in the sequence.

Marks: 1 mark for setting up $59 - 6n = -94$ (or for continuing the sequence near -94). 1 mark for No with $n = 25.5$ (or -91 and -97 shown).

20 (3 marks)

Paige has $9\frac{1}{2}$ metres of fabric. She cuts it into strips, each $1\frac{1}{4}$ metres long. Work out the greatest number of strips she can cut.

Change to improper fractions: $9\frac{1}{2} = \frac{19}{2}$ and $1\frac{1}{4} = \frac{5}{4}$

$$\frac{19}{2} \div \frac{5}{4} = \frac{19}{2} \times \frac{4}{5} = \frac{76}{10} = 7.6$$

She cannot cut part of a strip, so she can cut 7 strips.

Check: 7 strips use $7 \times 1\frac{1}{4} = 8\frac{3}{4}$ m. 8 strips would need 10 m, which is too much.

Answer: 7

Tip: To divide by a fraction, flip the second fraction and multiply. Then think about the context: 7.6 strips means 7 whole strips.

Marks: 1 mark for writing both as improper fractions (or as quarters). 1 mark for $19/2 \times 4/5 = 7.6$ (or $38 \div 5$). 1 mark for 7.

21 (2 marks)

$$\mathbf{a} = \begin{pmatrix} -2 \\ 5 \end{pmatrix} \quad \mathbf{b} = \begin{pmatrix} 4 \\ -3 \end{pmatrix}$$

Work out $3\mathbf{a} + 2\mathbf{b}$ as a column vector.

$$3\mathbf{a} = 3 \times \begin{pmatrix} -2 \\ 5 \end{pmatrix} = \begin{pmatrix} -6 \\ 15 \end{pmatrix}$$

$$2\mathbf{b} = 2 \times \begin{pmatrix} 4 \\ -3 \end{pmatrix} = \begin{pmatrix} 8 \\ -6 \end{pmatrix}$$

Add the top numbers and the bottom numbers: $\begin{pmatrix} -6 + 8 \\ 15 + (-6) \end{pmatrix} = \begin{pmatrix} 2 \\ 9 \end{pmatrix}$

Answer: $\begin{pmatrix} 2 \\ 9 \end{pmatrix}$

Tip: Multiply both numbers in each vector, then add top to top and bottom to bottom. Take care with $15 + (-6) = 9$.

Marks: 1 mark for 3a or 2b correct, or one component correct. 1 mark for the correct vector.

22 (1 mark)

Write down the value of $\sin 30^\circ$

This is one of the exact values you need to learn.

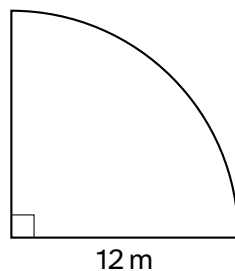
$$\sin 30^\circ = \frac{1}{2}$$

Answer: $\frac{1}{2}$

Tip: Learn the table of exact values: $\sin 0^\circ = 0$, $\sin 30^\circ = \frac{1}{2}$, $\sin 45^\circ = \frac{\sqrt{2}}{2}$, $\sin 60^\circ = \frac{\sqrt{3}}{2}$, $\sin 90^\circ = 1$.

23 (4 marks)

A flower bed is a quarter of a circle with radius 12 m.



Not drawn accurately

- (a) Work out the area of the flower bed.
Give your answer in terms of π .

$$\text{Area of a whole circle} = \pi r^2 = \pi \times 12^2 = 144\pi$$

$$\text{A quarter circle: } 144\pi \div 4 = 36\pi$$

Answer: $36\pi \text{ m}^2$

Tip: In terms of π means leave π in your answer. Square the radius before you divide by 4: $12^2 = 144$, not 24.

Marks: 1 mark for $\pi \times 12^2$ (144π) or $\frac{1}{4} \times \pi \times 144$. 1 mark for 36π .

- (b) Shona wants to put edging all the way around the flower bed. She has 41 m of edging. Does she have enough?

$$\text{Curved edge: a quarter of the circumference: } \frac{1}{4} \times 2 \times \pi \times 12 = 6\pi$$

$$\text{The two straight edges are both radii: } 12 + 12 = 24 \text{ m}$$

$$\text{Perimeter} = 6\pi + 24$$

π is more than 3, so 6π is more than 18 (using $\pi \approx 3.14$, $6\pi \approx 18.84$).

$$\text{Perimeter} \approx 18.84 + 24 = 42.84 \text{ m, which is more than 41 m.}$$

So she does **not** have enough edging.

Answer: No: the perimeter is $6\pi + 24 \approx 42.8$ m, which is more than 41 m

Tip: The perimeter of a quarter circle is the curved edge **plus** two radii. Students often forget the two straight sides.

Marks: 1 mark for the perimeter, $6\pi + 24$. 1 mark for No with a value of about 42.8 m (or showing $6\pi + 24$ is more than 41).

24 (3 marks)

- (a) Simplify $x^5 \times x^4$

When multiplying powers of the same letter, add the powers.

$$x^5 \times x^4 = x^{5+4} = x^9$$

Answer: x^9

- (b) Simplify $(y^3)^4$

A power of a power: multiply the powers.

$$(y^3)^4 = y^{3 \times 4} = y^{12}$$

Answer: y^{12}

Tip: $(y^3)^4$ means $y^3 \times y^3 \times y^3 \times y^3$, so the answer is y^{12} , not y^7 .

- (c) Sami says $w^{10} \div w^2 = w^5$. Is Sami correct? Give a reason.

When dividing powers of the same letter, subtract the powers.

$$w^{10} \div w^2 = w^{10-2} = w^8$$

Sami has divided the powers instead of subtracting them.

Answer: No: $w^{10} \div w^2 = w^8$ (subtract the powers)

Tip: Divide the letters by **subtracting** the powers. Only the numbers in front (if there are any) are divided.

25 (4 marks)

- (a) Write 792 as a product of prime factors.
Give your answer in index form.

Divide by primes: $792 \div 2 = 396$

$396 \div 2 = 198$

$198 \div 2 = 99$

$99 \div 3 = 33$

$33 \div 3 = 11$, and 11 is prime

$792 = 2 \times 2 \times 2 \times 3 \times 3 \times 11 = 2^3 \times 3^2 \times 11$

Answer: $2^3 \times 3^2 \times 11$

Tip: Index form means use powers for repeated factors: $2 \times 2 \times 2 = 2^3$ and $3 \times 3 = 3^2$.
Check by multiplying back: $8 \times 9 \times 11 = 792$.

Marks: 1 mark for a correct method that finds at least two prime factors. 1 mark for $2^3 \times 3^2 \times 11$.

- (b) Work out the highest common factor (HCF) of 792 and 180

$180 = 2 \times 2 \times 3 \times 3 \times 5 = 2^2 \times 3^2 \times 5$

$792 = 2 \times 2 \times 2 \times 3 \times 3 \times 11 = 2^3 \times 3^2 \times 11$

The prime factors in **both** numbers are two 2s and two 3s.

$\text{HCF} = 2 \times 2 \times 3 \times 3 = 36$

Check: $792 \div 36 = 22$ and $180 \div 36 = 5$ ✓

Answer: 36

Tip: The HCF is a **factor** of both numbers, so it cannot be bigger than 180. Multiply only the primes that appear in both lists, using the smaller power each time.

Marks: 1 mark for 180 written as a product of primes (or a correct method such as listing factors). 1 mark for 36.

26 (2 marks)

Wei expands and simplifies $(x - 4)(x + 9)$

Here is his working.

$$\begin{aligned}(x - 4)(x + 9) &= x^2 + 9x - 4x + 36 \\ &= x^2 + 5x + 36\end{aligned}$$

Wei's working has one mistake. Describe his mistake and write down the correct answer.

Multiply every term in the first bracket by every term in the second:

$$x \times x = x^2, \quad x \times 9 = 9x, \quad -4 \times x = -4x, \quad -4 \times 9 = -36$$

Wei wrote +36, but a negative times a positive is negative: $-4 \times 9 = -36$.

$$(x - 4)(x + 9) = x^2 + 9x - 4x - 36 = x^2 + 5x - 36$$

Answer: He worked out -4×9 as +36; it should be -36. The correct answer is $x^2 + 5x - 36$

Tip: Check the sign of every product. A negative times a positive is negative, so $-4 \times 9 = -36$. Expanding in a grid helps you keep track of the signs.

Marks: 1 mark for saying the last term should be -36 (-4×9 is negative). 1 mark for $x^2 + 5x - 36$.

27 (3 marks)

A team of 8 volunteers can paint a fence in 9 hours.
All the volunteers work at the same rate.

- (a) The fence needs to be painted in 6 hours.

How many **more** volunteers are needed?

Total work: 8 volunteers for 9 hours = $8 \times 9 = 72$ volunteer-hours.

To finish in 6 hours: $72 \div 6 = 12$ volunteers are needed.

There are already 8 volunteers, so $12 - 8 = 4$ more are needed.

Check: more people means less time, so the answer must be more than 8 volunteers in total ✓

Answer: 4

Tip: Fewer hours need more people, so this is inverse proportion: multiply 8×9 , then divide by 6. Read the question again: it asks how many **more**.

Marks: 1 mark for $8 \times 9 = 72$ (or for 12 volunteers in total). 1 mark for 4.

- (b) In fact, the extra volunteers each work more slowly than the original 8 volunteers.
What does this mean about the number of extra volunteers needed?

In part (a) each extra volunteer was assumed to do as much as one of the original volunteers.

If each extra volunteer does less, the 4 extra volunteers will not get the fence finished in 6 hours.

So more extra volunteers are needed.

Answer: It is more than the answer to part (a)

Tip: Think about what the assumption did. Slower workers do less each, so you need more of them to do the same job in the same time.