

Enlargements

Solutions

For AQA GCSE Mathematics (8300) • Foundation tier

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)

A rectangle measures 3 cm by 2 cm.
It is enlarged to give a rectangle 12 cm by 8 cm.
Write down the scale factor of the enlargement.

Scale factor = new length $\div$ old length

$$12 \div 3 = 4$$

Check with the other side: $8 \div 2 = 4$ ✓

Answer: 4

2 (1 mark)

A shape is enlarged by scale factor $\frac{1}{3}$
Tick the true statement.

Every length is multiplied by $\frac{1}{3}$, which is the same as dividing by 3.

A scale factor between 0 and 1 makes the shape smaller.

Answer: The image is smaller

Tip: An “enlargement” with a fraction scale factor makes the shape **smaller**. Scale factor $\frac{1}{3}$ does not mean 3 times bigger.

3 (2 marks)

On the grid, enlarge shape *A* by scale factor 2

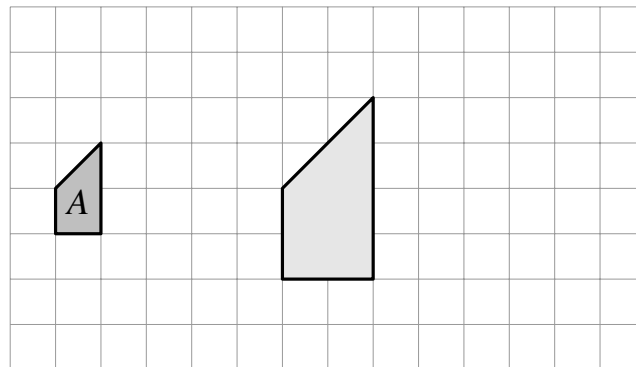
Multiply every length by 2.

The bottom side goes from 1 square to 2 squares.

The vertical sides go from 2 and 1 squares to 4 and 2 squares.

The sloping side goes from 1 across, 1 up to 2 across, 2 up.

No centre is given, so it can go anywhere on the grid, the same way round as *A*.



Answer: Correct enlargement anywhere on the grid

Marks: 2 marks for a correct enlargement. 1 mark for two sides correctly doubled.

4 (2 marks)

On the grid, enlarge the shaded trapezium by scale factor $\frac{1}{2}$

Multiply every length by $\frac{1}{2}$ (halve it).

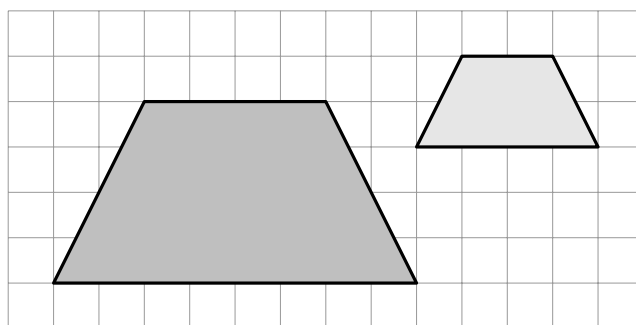
Bottom side: 8 squares $\rightarrow$ 4 squares

Top side: 4 squares $\rightarrow$ 2 squares

Height: 4 squares $\rightarrow$ 2 squares

The top side is still in the middle, so it starts 1 square in from each end of the bottom side.

No centre is given, so it can go anywhere on the grid.



Answer: Trapezium with bottom 4 squares, top 2 squares and height 2 squares

Tip: Halve **every** length, including the height. Check the image has the same shape: the top side should still be half the length of the bottom side.

Marks: 2 marks for a correct trapezium. 1 mark for two sides correctly halved.

5 (2 marks)

Enlarge triangle *B* by scale factor 2, centre (1, 6)

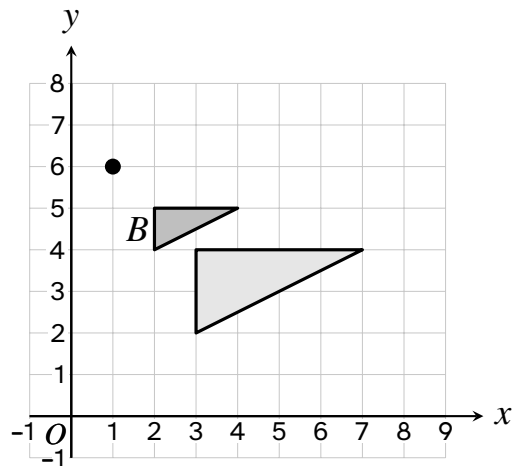
Measure how far each vertex is from the centre (1, 6), then double it.

(4, 5) is 3 right and 1 down from the centre.

Doubled: 6 right and 2 down from the centre, which is (7, 4)

(2, 5) is 1 right and 1 down, so it goes to 2 right and 2 down: (3, 4)

The image has vertices (3, 4), (7, 4), (3, 2)



Answer: (3, 4), (7, 4), (3, 2)

Tip: Measure from the centre of enlargement every time. Drawing the right size in the wrong place is the most common way to lose a mark.

Marks: 2 marks for the correct image. 1 mark for the correct size in the wrong position.

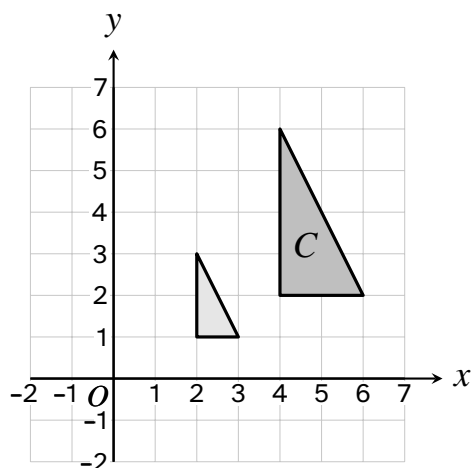
6 (2 marks)

Enlarge triangle *C* by scale factor $\frac{1}{2}$, centre (0, 0)

The centre is the origin, so the distance from the centre is just the coordinates.

Halve the coordinates of each vertex.

$(4, 2) \rightarrow (2, 1)$, $(6, 2) \rightarrow (3, 1)$, $(4, 6) \rightarrow (2, 3)$



Answer: (2, 1), (3, 1), (2, 3)

Marks: 2 marks for the correct image. 1 mark for the correct size in the wrong position.

7 (2 marks)

Enlarge triangle *D* by scale factor 3, centre (1,1)

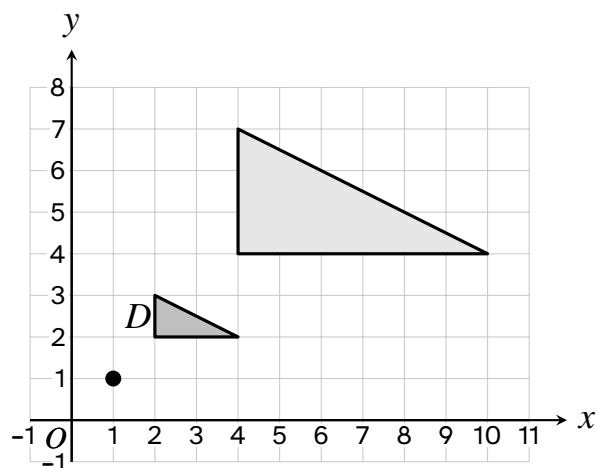
Multiply the distances from (1,1) by 3.

(4,2) is 3 right and 1 up from the centre.

Times 3: 9 right and 3 up from the centre, which is (10,4)

(2,2) is 1 right and 1 up, so it goes to 3 right and 3 up: (4,4)

The image has vertices (4, 4), (10, 4), (4, 7)

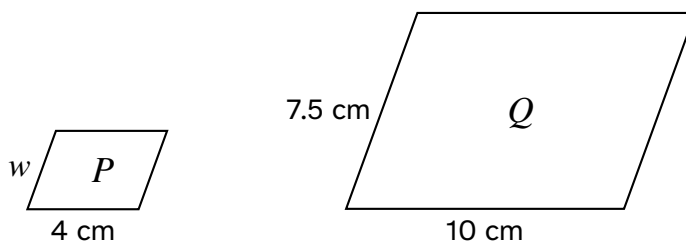


Answer: (4, 4), (10, 4), (4, 7)

Marks: 2 marks for the correct image. 1 mark for the correct size in the wrong position, or two vertices correct.

8 (3 marks)

Parallelogram Q is an enlargement of parallelogram P .



Not drawn accurately

(a) Work out the scale factor of the enlargement.

The 4 cm side of P matches the 10 cm side of Q .

Scale factor = new length $\div$ old length = $10 \div 4 = 2.5$

Answer: 2.5

Tip: Divide the new length by the old length. $10 - 4 = 6$ is not the scale factor: enlargements multiply, they do not add.

- (b) Work out the value of w .

w in P matches the 7.5 cm side in Q .

P is the smaller shape, so divide by the scale factor.

$$w = 7.5 \div 2.5 = 3$$

Answer: 3 cm

Tip: Going from the big shape to the small shape, divide by the scale factor. Check: w should be smaller than 7.5.

- (c) Work out the perimeter of Q .

Q has two sides of 10 cm and two sides of 7.5 cm.

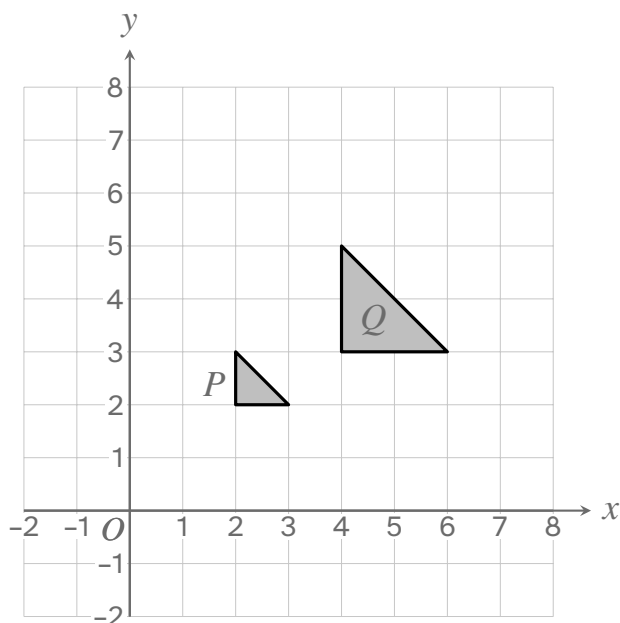
$$\text{Perimeter} = 10 + 7.5 + 10 + 7.5 = 35$$

(Or: perimeter of $P = 4 + 3 + 4 + 3 = 14$, and $14 \times 2.5 = 35$.)

Answer: 35 cm

9 (3 marks)

Describe fully the single transformation that maps triangle P onto triangle Q .



Q is the same shape as P but bigger, so it is an enlargement.

The base of P is 1 square and the base of Q is 2 squares.

Scale factor = $2 \div 1 = 2$

To find the centre, join matching vertices of P and Q with straight lines and extend them back.

For example, (4, 3) to (2, 2) and (4, 5) to (2, 3).

The lines meet at (0, 1).

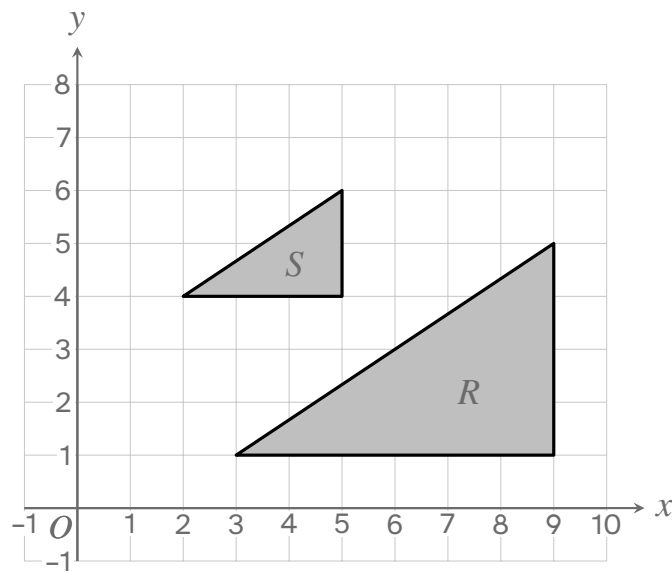
Answer: Enlargement, scale factor 2, centre (0, 1)

Tip: You need three things: the word “enlargement”, the scale factor and the centre. Many students leave out the centre.

Marks: 1 mark for enlargement. 1 mark for scale factor 2. 1 mark for the centre (0, 1).

10 (3 marks)

Describe fully the single transformation that maps triangle R onto triangle S .



S is the same shape as R but smaller.

This is still called an enlargement.

The base of S is 3 squares and the base of R is 6 squares.

$$\text{Scale factor} = \text{new} \div \text{old} = 3 \div 6 = \frac{1}{2}$$

Draw lines through matching vertices, for example $(3, 1)$ to $(2, 4)$ and $(9, 5)$ to $(5, 6)$.

Extend the lines. They meet at the centre, $(1, 7)$.

Answer: Enlargement, scale factor $\frac{1}{2}$, centre $(1, 7)$

Tip: Say “enlargement”, not “reduction” or “shrink”. The scale factor is $\frac{1}{2}$ (new $\div$ old), not 2.

Marks: 1 mark for enlargement. 1 mark for scale factor $\frac{1}{2}$. 1 mark for the centre $(1, 7)$. Giving two transformations loses the first mark.