



- 1** Triangle ABC has vertices at A(1, 1), B(3, 1) and C(3, 2).
Triangle ABC is enlarged by scale factor 2 with centre (0, 0).
Write down the coordinates of the vertices of the image A', B' and C'.

(2 marks)

Centre (0, 0): multiply each coordinate by 2

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

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

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

$$A'(2, 2) \ B'(6, 2) \ C'(6, 4)$$

- 2** Triangle PQR has vertices at P(1, 2), Q(2, 2) and R(2, 4).
PQR is enlarged by scale factor 3 with centre (0, 0).
Write down the coordinates of P', Q' and R'.

(2 marks)

Multiply each coordinate by 3

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

$$Q(2, 2) \rightarrow (6, 6)$$

$$R(2, 4) \rightarrow (6, 12)$$

$$P'(3, 6) \ Q'(6, 6) \ R'(6, 12)$$

- 3** A triangle has vertices at (1, 2), (2, 2) and (1, 4).
The triangle is enlarged by scale factor 3, centre the origin.
Write down the coordinates of the vertices of the image.

(2 marks)

An enlargement with centre the origin and scale factor 3 maps

$$(x, y) \text{ to } (3x, 3y)$$

$$(1, 2) \text{ maps to } (3, 6); (2, 2) \text{ maps to } (6, 6); (1, 4) \text{ maps to } (3, 12)$$

$$(3, 6), (6, 6), (3, 12)$$

- 4 Triangle DEF has vertices at D(2, 4), E(6, 4) and F(6, 8).

DEF is enlarged by scale factor $\frac{1}{2}$ with centre (0, 0).

Write down the coordinates of D', E' and F'.

(2 marks)

Scale factor $\frac{1}{2}$: halve each coordinate

$$D(2, 4) \rightarrow (1, 2)$$

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

$$F(6, 8) \rightarrow (3, 4)$$

$$D'(1, 2) \ E'(3, 2) \ F'(3, 4)$$

- 5 Triangle ABC is enlarged to give triangle PQR.

AB = 6 cm and PQ = 15 cm. BC = 4 cm.

- Work out the scale factor of the enlargement.
- Work out the length of QR.

(3 marks)

a)

$$\begin{aligned} \text{scale factor} &= \frac{15}{6} \\ &= 2.5 \end{aligned}$$

$$2.5$$

b)

$$QR = 4 \times 2.5 = 10 \text{ cm}$$

$$10 \text{ cm}$$

- 6 A triangle has vertices at (4, 2), (8, 2) and (4, 6).

The triangle is enlarged by scale factor $\frac{1}{2}$, centre the origin.

Write down the coordinates of the vertices of the image.

(2 marks)

An enlargement with centre the origin and scale factor $\frac{1}{2}$ maps

$$(x, y) \text{ to } \left(\frac{x}{2}, \frac{y}{2}\right)$$

(4, 2) maps to (2, 1); (8, 2) maps to (4, 1); (4, 6) maps to (2, 3)

$$(2, 1), (4, 1), (2, 3)$$

- 7 Rectangle ABCD has vertices at A(2, 1), B(6, 1), C(6, 3) and D(2, 3).

ABCD is enlarged by scale factor 1.5 with centre A.

Write down the coordinates of the vertices of the image.

(3 marks)

Centre A(2, 1): A stays where it is

Count from A, then multiply by 1.5

B: 4 across, 0 up $\rightarrow$ 6 across, 0 up

C: 4 across, 2 up $\rightarrow$ 6 across, 3 up

D: 0 across, 2 up $\rightarrow$ 0 across, 3 up

$A'(2, 1)$ $B'(8, 1)$ $C'(8, 4)$ $D'(2, 4)$

- 8 Triangle PQR has vertices at P(2, 1), Q(4, 1) and R(4, 3).

PQR is enlarged by scale factor 2 with centre (1, 1).

Write down the coordinates of P', Q' and R'.

(3 marks)

Centre (1, 1): count from the centre, then double

P: 1 across, 0 up $\rightarrow$ 2 across, 0 up $\rightarrow$ (3, 1)

Q: 3 across, 0 up $\rightarrow$ 6 across, 0 up $\rightarrow$ (7, 1)

R: 3 across, 2 up $\rightarrow$ 6 across, 4 up $\rightarrow$ (7, 5)

$P'(3, 1)$ $Q'(7, 1)$ $R'(7, 5)$

- 9 Rectangle A has vertices at (1, 1), (3, 1), (3, 2) and (1, 2).

Rectangle B has vertices at (2, 2), (6, 2), (6, 4) and (2, 4).

Describe fully the single transformation that maps rectangle A onto rectangle B.

(2 marks)

The sides of B are twice as long as the sides of A, so the scale factor is 2

Every vertex of B is exactly double the matching vertex of A: (1, 1) maps to (2, 2), (3, 1) maps to (6, 2), and so on

So the transformation is an enlargement, scale factor 2, centre the origin (0, 0)

10 Triangle S has vertices at (2, 2), (3, 2) and (2, 4).

Triangle T has vertices at (3, 3), (5, 3) and (3, 7).

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

(3 marks)

Compare lengths: base $1 \rightarrow 2$

Scale factor $= 2 \div 1 = 2$

Join each vertex to its image

(2, 2) to (3, 3) and (3, 2) to (5, 3)

The lines meet at (1, 1): the centre

Enlargement, scale factor 2, centre (1, 1)

11 Triangle A has vertices at (2, 2), (4, 2) and (2, 6).

Triangle B has vertices at (1, 1), (2, 1) and (1, 3).

Triangle C has vertices at (-1, 1), (-2, 1) and (-1, 3).

a. Describe fully the single transformation that maps triangle A onto triangle B.

b. Describe fully the single transformation that maps triangle B onto triangle C.

(4 marks)

Every vertex of B is exactly half the matching vertex of A: (2, 2) maps to (1, 1), (4, 2) maps to (2, 1), (2, 6) maps to (1, 3)

So A to B is an enlargement, scale factor $\frac{1}{2}$, centre the origin (0, 0)

Every vertex of C has the same y-coordinate as the matching vertex of B with the sign of the x-coordinate changed

So B to C is a reflection in the y-axis (the line $x = 0$)