HIGHER

6.9 Enlarging with Negative Scale Factors: 30-minute Pack

Total Marks

EDEXCEL 1MA1 · Calculator allowed · about 30 minutes

Name: _____ Date: ____ / ____ / _____

Answer ALL questions. Show all your working.

1 A shape is enlarged by scale factor -4. State (i) the effect on the length of each side of the shape (ii) the effect on the orientation of the shape.

(Total for Question 1 is 2 marks)

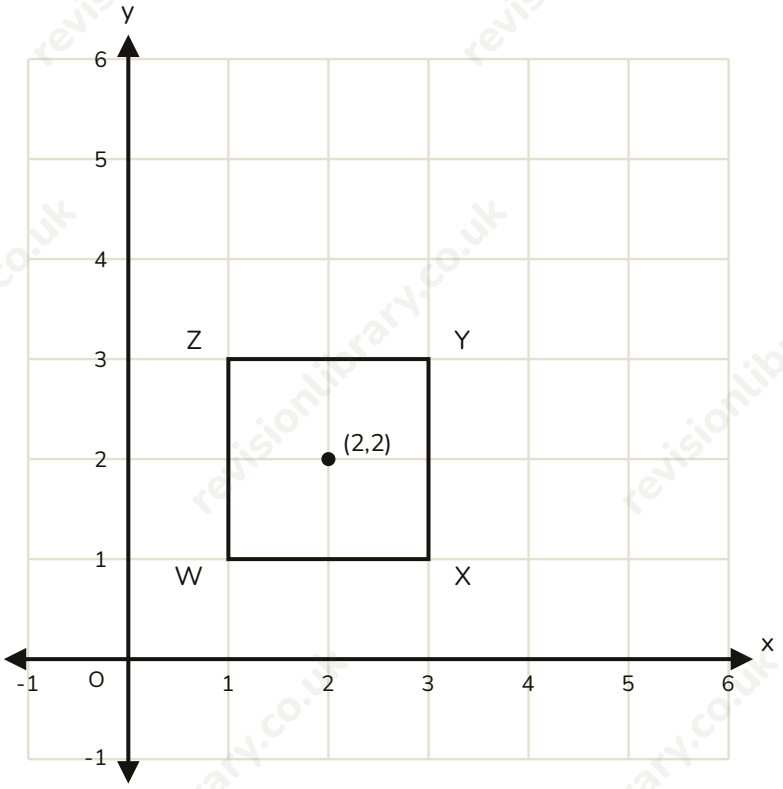
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2 Show that enlarging a shape by scale factor -1 about a centre C has exactly the same effect as rotating the shape by 180 degrees about the same centre C.

(Total for Question 2 is 3 marks)

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3 A square WXYZ has vertices W(1,1), X(3,1), Y(3,3) and Z(1,3). The square is enlarged by scale factor -2, using the centre of the square, (2,2), as the centre of enlargement, to form square W'X'Y'Z'.



(a) Find the coordinates of W', X', Y' and Z'. **(4)**

(b) The area of square WXYZ is 4 cm². Use the scale factor of the enlargement to work out the area of square W'X'Y'Z'. Give a reason for your answer. **(2)**

(Total for Question 3 is 6 marks)

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4 The point P is (4, 4). P is enlarged by scale factor -1/2 with centre (2, 2). Find the coordinates of the image of P.

(Total for Question 4 is 3 marks)

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5 Triangle T has a side from A(-2, 4) to B(1, 4). Under a single enlargement, A maps to A'(0, -10) and B maps to B'(-3, -10). Describe fully the enlargement.

(Total for Question 5 is 3 marks)

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6 The point P is (3, 5). P is enlarged by scale factor -3 with centre (0, 0). Write down the coordinates of the image of P.

(Total for Question 6 is 2 marks)

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7 A shape has area 4 cm^2. It is enlarged by scale factor -3. Work out the area of the image.

(Total for Question 7 is 2 marks)

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8 Shape P has an area of 8 cm^2. Shape P is enlarged by scale factor -2 to form shape Q. Work out the area of shape Q.

(Total for Question 8 is 2 marks)

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Mark scheme · 6.9 Enlarging with Negative Scale Factors: 30-minute Pack

Question 1

each side is 4 times as long (the image is 4 times the size) oe **B1**

the image is rotated 180 degrees relative to the object (upside down and back-to-front) oe **B1**

Answer: (i) Each side becomes 4 times as long. (ii) The image is rotated 180 degrees compared with the object.

Question 2

correct general image formula for enlargement with k = -1: P' = C + (-1)(P - C) = 2C - P **M1**

correct general image formula for a 180 degree rotation about C: P' = 2C - P **M1**

both expressions are identical, so the two transformations are the same cso **A1**

Answer: Both transformations map any point P to 2C - P, so an enlargement of scale factor -1 about C is identical to a rotation of 180 degrees about C.

Question 3

(a) W'(4,4) **B1**

(a) X'(0,4) **B1**

(a) Y'(0,0) **B1**

(a) Z'(4,0) cao **B1**

(a) Answer: W'(4,4), X'(0,4), Y'(0,0), Z'(4,0)

(b) area scale factor = $(-2)^2 = 4$ **M1**

(b) 16 cm² cao, with reason that area scale factor is the square of the length scale factor **A1**

(b) Answer: 16 cm^2

Question 4

vector from centre to P = (2, 2) **M1**

multiplies by -1/2 and adds the centre **M1**

(1, 1) cao **A1**

Answer: (1, 1)

Question 5

enlargement **B1**

scale factor -1 **B1**

centre (-1, -3) **B1**

Answer: Enlargement, scale factor -1, centre (-1, -3)

Question 6

multiplies both coordinates by -3 **M1**

(-9, -15) cao **A1**

Answer: (-9, -15)

Question 7

area scale factor $(-3)^2 = 9$ (the negative sign does not matter for size) **M1**

36 cm² **A1**

Answer: 36 cm^2

Question 8

area scale factor = $(-2)^2 = 4$ **M1**

32 cm² cao **A1**

Answer: 32 cm^2

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