# 4.3 Geometry: Transformations: 2-hour Pack

Calculator allowed · about 120 minutes

Name: _____ Date: ____ / ____ / _____

**Answer ALL questions. Show all your working.**

**1** The points A (-5, 1) and B (2, -1) are reflected in the line x = 2. Write down the coordinates of the images A' and B'.

**(2)**

**2** The points A (-4, 4) and B (-3, 2) are translated by 5 units to the right and -4 units up (negative values mean left or down). Write down the coordinates of A' and B'.

**(2)**

**3** The points A (4, -2) and B (-1, 4) are reflected in the line x = 2. Write down the coordinates of the images A' and B'.

**(2)**

**4** A shape is transformed by a single transformation. Three of its points map as follows: (5, 1) to (-1, -5), (1, 4) to (-4, -1), (1, 5) to (-5, -1).
Describe fully the single transformation.

**(2)**


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**5** The points A (-4, 1) and B (-2, 3) are translated by 4 units to the right and -3 units up (negative values mean left or down). Write down the coordinates of A' and B'.

**(2)**

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**6** The point P (-4, 0) is rotated 90° clockwise about the origin. Write down the coordinates of the image of P.

**(2)**

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**7** The points A (-1, 3) and B (4, 1) are translated by -4 units to the right and 6 units up (negative values mean left or down). Write down the coordinates of A' and B'.

**(2)**

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**8** A point A (1, -5) is mapped to A' (1, 1) by a translation. Write down the translation as a column vector in the form (x y), where x is the horizontal move and y the vertical move.

**(2)**

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**9** The point P (1, -4) is reflected in the x-axis and the image is then translated by 3 units to the right and 2 units up (negative means left or down). Write down the coordinates of the final image.

**(3)**


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**10** The points A (-5, -6) and B (-5, 0) are reflected in the line y = 2. Write down the coordinates of the images A' and B'.

**(2)**

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**11** The points A (-4, -5) and B (-3, -3) are translated by 4 units to the right and -3 units up (negative values mean left or down). Write down the coordinates of A' and B'.

**(2)**

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**12** The points A (-4, -2) and B (5, -6) are reflected in the line y = 0. Write down the coordinates of the images A' and B'.

**(2)**

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**13** The point P (-3, -2) is rotated 90° anticlockwise about (0, -1). Write down the coordinates of the image of P.

**(3)**

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**14** The point P (3, -4) is reflected in the x-axis and the image is then translated by 3 units to the right and 1 units up (negative means left or down). Write down the coordinates of the final image.

**(3)**


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**15** The points P (5, -3) and Q (6, 4) are enlarged by scale factor -1 about the origin. Write down the coordinates of the images P' and Q'.

**(2)**

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**16** The points P (0, 4) and Q (4, 1) are enlarged by scale factor 2 about (-1, 0). Write down the coordinates of the images P' and Q'.

**(3)**

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**17** The point P (2, -5) is rotated 90° anticlockwise about (-1, -1). Write down the coordinates of the image of P.

**(3)**

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**18** A shape is transformed by a single transformation. Three of its points map as follows: (6, 3) to (3, 6), (5, 3) to (3, 5), (4, 1) to (1, 4).
Describe fully the single transformation.

**(2)**

---

**19** A shape is transformed by a single transformation. Three of its points map as follows: (5, 4) to (4, -5), (3, 4) to (4, -3), (4, 1) to (1, -4).
Describe fully the single transformation.

**(2)**


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**20** The point P (3, 3) is reflected in the x-axis and the image is then translated by 4 units to the right and -1 units up (negative means left or down). Write down the coordinates of the final image.

**(3)**

---

**21** The point P (4, -1) is rotated 90° clockwise about (-1, 0). Write down the coordinates of the image of P.

**(3)**

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**22** The points P (-2, 0) and Q (-4, 2) are enlarged by scale factor 3 about (-1, 0). Write down the coordinates of the images P' and Q'.

**(3)**

---

**23** The point P (4, 5) is reflected in the y-axis and the image is then translated by 3 units to the right and 2 units up (negative means left or down). Write down the coordinates of the final image.

**(3)**


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**24** The points P (2, 6) and Q (0, -2) are enlarged by scale factor 3 about (2, 2). Write down the coordinates of the images P' and Q'.

**(3)**

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**25** The point P (3, -2) is reflected in the x-axis and the image is then translated by 2 units to the right and -4 units up (negative means left or down). Write down the coordinates of the final image.

**(3)**

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**26** The point P (1, -3) is rotated 180° anticlockwise about (-1, 1). Write down the coordinates of the image of P.

**(3)**

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**27** The points A (-6, -3) and B (0, -4) are reflected in the line y = x. Write down the coordinates of the images A' and B'.

**(2)**


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**28** A shape is transformed by a single transformation. Three of its points map as follows: (6, 3) to (3, 6), (4, 5) to (5, 4), (1, 4) to (4, 1).
Describe fully the single transformation.

**(2)**

**29** The point P (-1, -3) is reflected in the y-axis and the image is then translated by -3 units to the right and 1 units up (negative means left or down). Write down the coordinates of the final image.

**(3)**

**30** The point P (-2, 5) is rotated 180° clockwise about (0, 1). Write down the coordinates of the image of P.

**(3)**

**31** The points A (4, 1) and B (3, -3) are reflected in the line y = -x. Write down the coordinates of the images A' and B'.

**(2)**

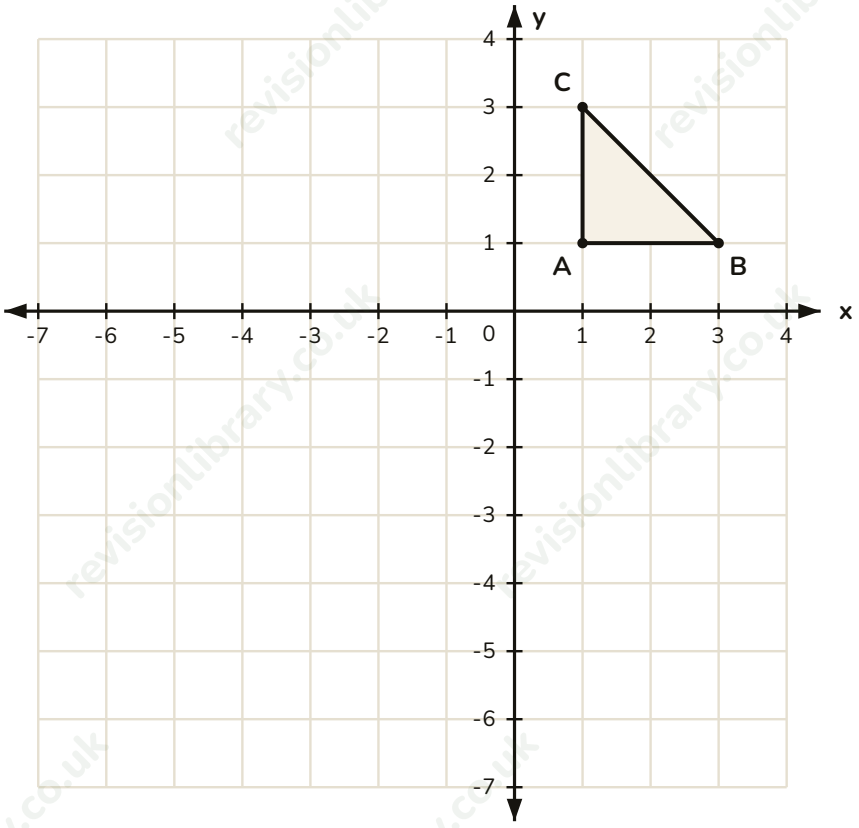

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**32** The points P (1, 0) and Q (-4, 4) are enlarged by scale factor -1 about (-1, 2). Write down the coordinates of the images P' and Q'.

**(3)**

---

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

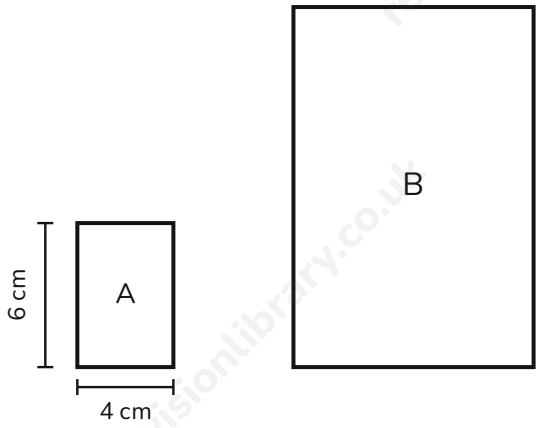



**(3)**


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**34** Two rectangles are similar. Rectangle A measures 4 cm by 6 cm. Rectangle B is an enlargement of rectangle A with scale factor 2.5.

Diagram NOT accurately drawn




**(a)** Work out the dimensions of rectangle B. **(2)**

.....

**(b)** Work out the area of rectangle B. **(2)**

.....

**(c)** Amir says, 'The area of rectangle B is 2.5 times the area of rectangle A.' Explain why Amir is wrong, and state the correct area scale factor. **(2)**


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**35** A map has a scale of 1 : 25000.

**(a)** The distance between the villages of Ashcombe and Bramerton on the map is 6.4 cm. Work out the real distance between the villages, in kilometres. **(3)**

.....

**(b)** A footpath on the map is being redrawn. Its length on the map changes from 3 cm to 4.5 cm, at the same scale. Work out the increase in the real length of the footpath, in metres. **(3)**

.....


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# Mark scheme · 4.3 Geometry: Transformations: 2-hour Pack

## Question 1

A' = (9, 1) **B1**
B' = (2, -1) **B1**
Answer: **(9, 1), (2, -1)**

## Question 2

A' = (1, 0) **B1**
B' = (2, -2) **B1**
Answer: **(1, 0), (2, -2)**

## Question 3

A' = (0, -2) **B1**
B' = (5, 4) **B1**
Answer: **(0, -2), (5, 4)**

## Question 4

correct type of transformation identified **M1**
reflection in the line y = -x cao **A1**
Answer: **reflection in the line y = -x**

## Question 5

A' = (0, -2) **B1**
B' = (2, 0) **B1**
Answer: **(0, -2), (2, 0)**

## Question 6

correct method (eg 90 degree turn of the position vector from the centre) **M1**
(0, 4) cao **A1**
Answer: **(0, 4)**

## Question 7

A' = (-5, 9) **B1**
B' = (0, 7) **B1**
Answer: **(-5, 9), (0, 7)**

## Question 8

subtracts the coordinates (new - old) **M1**
(0 6) cao **A1**
Answer: **(0 6)**

## Question 9

reflection carried out **M1**
intermediate image (1, 4) **A1**
(4, 6) cao **A1**
Answer: **(4, 6)**

## Question 10

A' = (-5, 10) **B1**
B' = (-5, 4) **B1**
Answer: **(-5, 10), (-5, 4)**

## Question 11

A' = (0, -8) **B1**
B' = (1, -6) **B1**
Answer: **(0, -8), (1, -6)**

## Question 12

A' = (-4, 2) **B1**
B' = (5, 6) **B1**
Answer: **(-4, 2), (5, 6)**

## Question 13

vector from the centre to P found **M1**
rotated correctly **M1**
(1, -4) cao **A1**
Answer: **(1, -4)**

## Question 14

reflection carried out **M1**
intermediate image (3, 4) **A1**
(6, 5) cao **A1**
Answer: **(6, 5)**

## Question 15

multiplies the position vector(s) from the centre by the scale factor **M1**
(-5, 3) and (-6, -4) cao **A1**
Answer: **(-5, 3), (-6, -4)**

## Question 16

vector from the centre to a point found **M1**
scaled by the scale factor **M1**
(1, 8) and (9, 2) cao **A1**
Answer: **(1, 8), (9, 2)**

## Question 17

vector from the centre to P found **M1**
rotated correctly **M1**
(3, 2) cao **A1**
Answer: **(3, 2)**

## Question 18

correct type of transformation identified **M1**
reflection in the line y = x cao **A1**
Answer: **reflection in the line y = x**

## Question 19

correct type of transformation identified **M1**
rotation of 90 degrees clockwise about the origin cao **A1**
Answer: **rotation of 90 degrees clockwise about the origin**

## Question 20

reflection carried out **M1**
intermediate image (3, -3) **A1**
(7, -4) cao **A1**
Answer: **(7, -4)**


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## Question 21

| | |
|---|---|
| vector from the centre to P found | M1 |
| rotated correctly | M1 |
| (-2, -5) cao | A1 |

Answer: **(-2, -5)**

## Question 22

| | |
|---|---|
| vector from the centre to a point found | M1 |
| scaled by the scale factor | M1 |
| (-4, 0) and (-10, 6) cao | A1 |

Answer: **(-4, 0), (-10, 6)**

## Question 23

| | |
|---|---|
| reflection carried out | M1 |
| intermediate image (-4, 5) | A1 |
| (-1, 7) cao | A1 |

Answer: **(-1, 7)**

## Question 24

| | |
|---|---|
| vector from the centre to a point found | M1 |
| scaled by the scale factor | M1 |
| (2, 14) and (-4, -10) cao | A1 |

Answer: **(2, 14), (-4, -10)**

## Question 25

| | |
|---|---|
| reflection carried out | M1 |
| intermediate image (3, 2) | A1 |
| (5, -2) cao | A1 |

Answer: **(5, -2)**

## Question 26

| | |
|---|---|
| vector from the centre to P found | M1 |
| rotated correctly | M1 |
| (-3, 5) cao | A1 |

Answer: **(-3, 5)**

## Question 27

| | |
|---|---|
| A' = (-3, -6) | B1 |
| B' = (-4, 0) | B1 |

Answer: **(-3, -6), (-4, 0)**

## Question 28

| | |
|---|---|
| correct type of transformation identified | M1 |
| reflection in the line y = x cao | A1 |

Answer: **reflection in the line y = x**

## Question 29

| | |
|---|---|
| reflection carried out | M1 |
| intermediate image (1, -3) | A1 |
| (-2, -2) cao | A1 |

Answer: **(-2, -2)**

## Question 30

| | |
|---|---|
| vector from the centre to P found | M1 |
| rotated correctly | M1 |
| (2, -3) cao | A1 |

Answer: **(2, -3)**

## Question 31

| | |
|---|---|
| A' = (-1, -4) | B1 |
| B' = (3, -3) | B1 |

Answer: **(-1, -4), (3, -3)**

## Question 32

| | |
|---|---|
| vector from the centre to a point found | M1 |
| scaled by the scale factor | M1 |
| (-3, 4) and (2, 0) cao | A1 |

Answer: **(-3, 4), (2, 0)**

## Question 33

| | |
|---|---|
| recognises the image lies on the opposite side of the centre from the object (negative scale factor) | M1 |
| correct method: multiplies each coordinate by -2 | M1 |
| A'(-2, -2), B'(-6, -2), C'(-2, -6) all correct cao | A1 |

Answer: **A'(-2, -2), B'(-6, -2), C'(-2, -6)**

## Question 34

| | |
|---|---|
| (a) 4 x 2.5 and 6 x 2.5 oe | M1 |
| (a) 10 cm and 15 cm cao | A1 |

(a) Answer: **10 cm by 15 cm**

| | |
|---|---|
| (b) 10 x 15 oe, ft from part (a) | M1 |
| (b) 150 cm² cao | A1 |

(b) Answer: **150 $cm^2$**

| | |
|---|---|
| (c) compares area of A (24 cm²) with area of B (150 cm²), giving ratio 150/24 = 6.25 oe | M1 |
| (c) correct explanation: the area scale factor is the linear scale factor squared, $2.5^2$ = 6.25, not 2.5 | A1 |

(c) Answer: **Amir is wrong; the area scale factor is $2.5^2$ = 6.25, not 2.5**

## Question 35

| | |
|---|---|
| (a) 6.4 x 25000 | M1 |
| (a) correct conversion of cm to km (divide by 100000) | M1 |
| (a) 1.6 km cao | A1 |

(a) Answer: **1.6 km**

| | |
|---|---|
| (b) real length before = 3 x 25000 = 75000 cm (= 750 m) and real length after = 4.5 x 25000 = 112500 cm (= 1125 m) | M1 |
| (b) correct conversion of cm to m (divide by 100) for at least one length | M1 |
| (b) 375 m cao | A1 |

(b) Answer: **375 m**


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