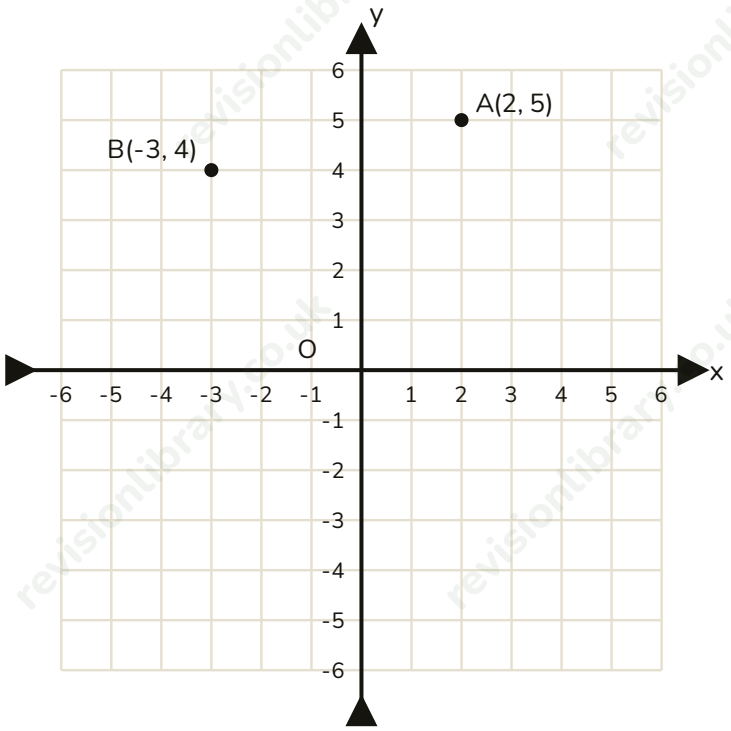
4.3 Geometry: Transformations: 1-hour Pack

Calculator allowed · about 60 minutes

Name: _____ Date: ____ / ____ / _____

Answer ALL questions. Show all your working.

1 Point A has coordinates (2, 5) and point B has coordinates (-3, 4). All rotations are about the origin O.



(a) A is rotated 90 degrees clockwise about O. Write down the coordinates of the image of A. **(1)**

.....

(b) B is rotated 180 degrees about O. Write down the coordinates of the image of B. **(1)**

.....

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2 Triangle ABC has vertices A(2, 2), B(6, 2) and C(2, 5). Translate the triangle by the vector (-3, 1). Write down the coordinates of A', B' and C'.

.....

.....

(2)

---

3 Point A has coordinates (3, 4) and point B has coordinates (-2, 6). All rotations are about the origin O.

(a) A is rotated 90 degrees clockwise about O. Write down the coordinates of the image of A. **(1)**

.....

(b) B is rotated 180 degrees about O. Write down the coordinates of the image of B. **(1)**

.....

---

4 Rotate point R(-5, -3) 90 degrees anticlockwise about the origin. Write down the coordinates of the image.

(2)

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5 Point A has coordinates (2, 3). A is translated by the vector (1, -4) to give point A1. A1 is then reflected in the y-axis to give point A2. Find the coordinates of A2.

(2)

---

6 The points A (1, -5) and B (1, -2) are translated by 6 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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7 A point A (-3, 3) is mapped to A' (-3, 2) 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)

---

8 The points A (-2, -4) and B (0, -1) are translated by 2 units to the right and -1 units up (negative values mean left or down). Write down the coordinates of A' and B'.

(2)

---

9 A point A (3, -5) is mapped to A' (9, -5) 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)

---

10 A shape is transformed by a single transformation. Three of its points map as follows: (3, 5) to (-5, -3), (2, 3) to (-3, -2), (6, 1) to (-1, -6).
Describe fully the single transformation.

(2)

---

11 The points A (-4, 2) and B (0, -1) are reflected in the line x = -1. Write down the coordinates of the images A' and B'.

(2)

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12 The points A (4, 3) and B (5, 2) are translated by -2 units to the right and 0 units up (negative values mean left or down). Write down the coordinates of A' and B'.

(2)

---

13 The point P (-1, -5) is reflected in the x-axis and the image is then translated by 0 units to the right and 4 units up (negative means left or down). Write down the coordinates of the final image.

(3)

---

14 The points A (-4, 0) and B (-3, -2) are reflected in the line y = -3. Write down the coordinates of the images A' and B'.

(2)

---

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

(2)

---

16 The point P (0, -2) is rotated 180° clockwise about the origin. Write down the coordinates of the image of P.

(2)

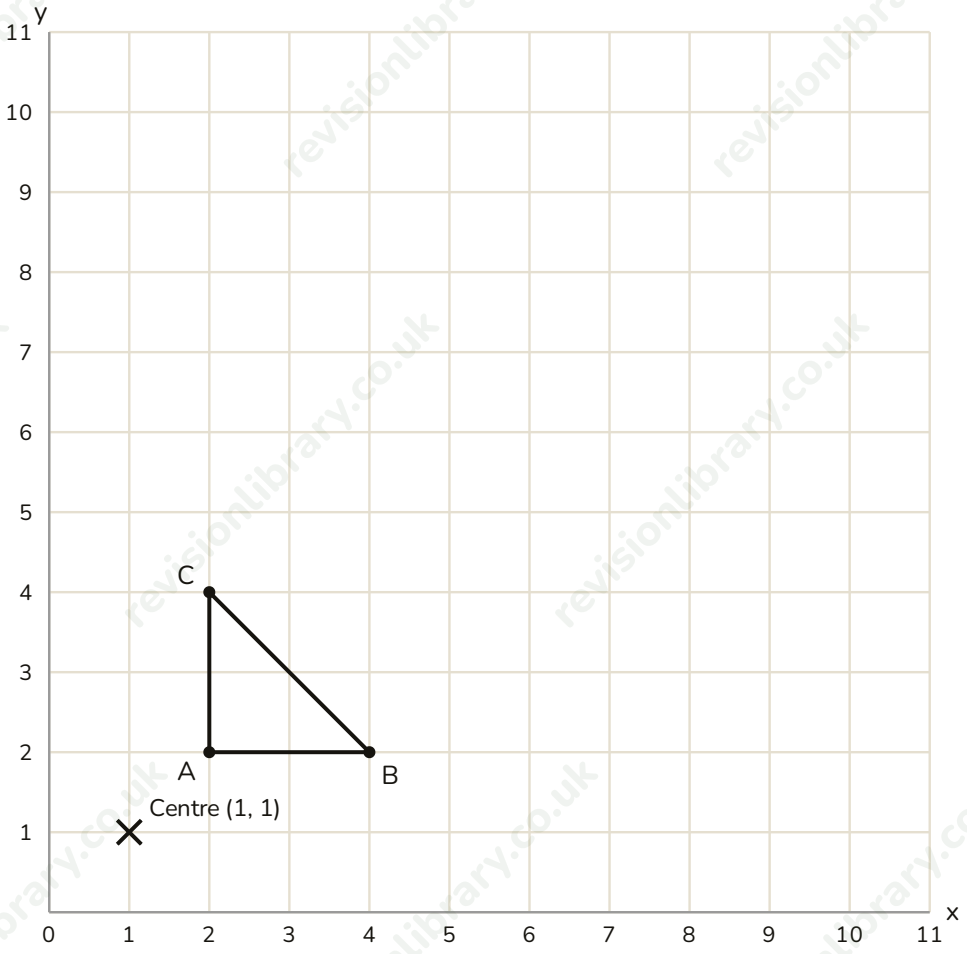
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17 The point P (-1, -5) is rotated 180° anticlockwise about (1, -1). Write down the coordinates of the image of P.

(3)

---

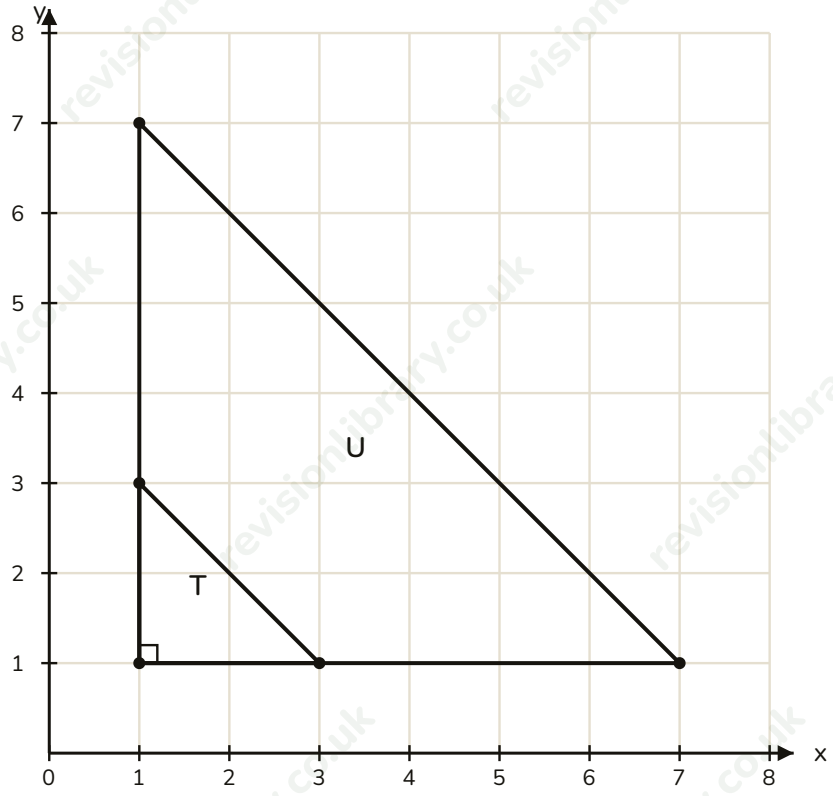
18 Triangle ABC has vertices A(2, 2), B(4, 2) and C(2, 4). Triangle ABC is enlarged by scale factor 3, centre (1, 1). Find the coordinates of A', B' and C'.



(3)

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19 Shape T has vertices (1, 1), (1, 3) and (3, 1). Shape U has vertices (1, 1), (1, 7) and (7, 1). Describe fully the single transformation that maps shape T onto shape U.



(3)

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20 A triangle has vertices (2, -1), (6, -1) and (6, 2). First reflect the triangle in the y-axis, then rotate the result 90 degrees clockwise about the origin. Give the final coordinates of the three vertices.

(4)

---

21 Triangle ABC is reflected, and the image is then rotated, to form triangle A'B'C'.

(a) State, giving a reason, whether triangle A'B'C' is congruent to triangle ABC. **(1)**

(b) State, giving a reason, whether triangle A'B'C' is similar to triangle ABC. **(1)**

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Mark scheme · 4.3 Geometry: Transformations: 1-hour Pack

Question 1

(a) (5, -2) cao **B1**

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

(b) (3, -4) cao **B1**

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

Question 2

adds the vector to each vertex, showing at least one correct addition **M1**

A'(-1, 3), B'(3, 3), C'(-1, 6) cao **A1**

Answer: **A'(-1, 3), B'(3, 3), C'(-1, 6)**

Question 3

(a) (4, -3) cao **B1**

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

(b) (2, -6) cao **B1**

(b) Answer: **(2, -6)**

Question 4

correct rotation method: (x, y) -> (-y, x) or equivalent **M1**

(3, -5) cao **A1**

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

Question 5

A1 = (3, -1) found correctly (or equivalent correct intermediate working) **M1**

A2 = (-3, -1) cao **A1**

Answer: **A2 = (-3, -1)**

Question 6

A' = (7, 1) **B1**

B' = (7, 4) **B1**

Answer: **(7, 1), (7, 4)**

Question 7

subtracts the coordinates (new - old) **M1**

(0 -1) cao **A1**

Answer: **(0 -1)**

Question 8

A' = (0, -5) **B1**

B' = (2, -2) **B1**

Answer: **(0, -5), (2, -2)**

Question 9

subtracts the coordinates (new - old) **M1**

(6 0) cao **A1**

Answer: **(6 0)**

Question 10

correct type of transformation identified **M1**

reflection in the line y = -x cao **A1**

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

Question 11

A' = (2, 2) **B1**

B' = (-2, -1) **B1**

Answer: **(2, 2), (-2, -1)**

Question 12

A' = (2, 3) **B1**

B' = (3, 2) **B1**

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

Question 13

reflection carried out **M1**

intermediate image (-1, 5) **A1**

(-1, 9) cao **A1**

Answer: **(-1, 9)**

Question 14

A' = (-4, -6) **B1**

B' = (-3, -4) **B1**

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

Question 15

A' = (-4, 4) **B1**

B' = (-10, -2) **B1**

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

Question 16

correct method (eg 180 degree turn of the position vector from the centre) **M1**

(0, 2) cao **A1**

Answer: **(0, 2)**

Question 17

vector from the centre to P found **M1**

rotated correctly **M1**

(3, 3) cao **A1**

Answer: **(3, 3)**

Question 18

correct method: image = centre + 3 x (vertex - centre), used for at least one vertex **M1**

A'(4, 4) correct **A1**

B'(10, 4) and C'(4, 10) both correct **A1**

Answer: **A'(4, 4), B'(10, 4), C'(4, 10)**

Question 19

identifies the invariant point (1, 1) as the centre of enlargement **M1**

scale factor 3 found correctly, e.g. from ratio of a pair of corresponding lengths **A1**

fully describes: enlargement, scale factor 3, centre (1, 1) **A1**

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

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Question 20

reflect in y-axis: x -> -x shown for at least one vertex	**M1**
rotate 90 degrees clockwise: (x, y) -> (y, -x) shown for at least one reflected vertex	**M1**
applies both steps to the remaining vertices correctly	**M1**
final vertices (-1, 2), (-1, 6), (2, 6) cao (in any order)	**A1**

Answer: **(-1, 2), (-1, 6), (2, 6)**

Question 21

(a) yes, congruent, because reflections and rotations are both rigid transformations (isometries) that preserve all side lengths and angles	**B1**

(a) Answer: **Yes, congruent**

(b) yes, similar, because congruent shapes are a special case of similar shapes with scale factor 1 (angles equal and sides in the same ratio)	**B1**

(b) Answer: **Yes, similar**

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