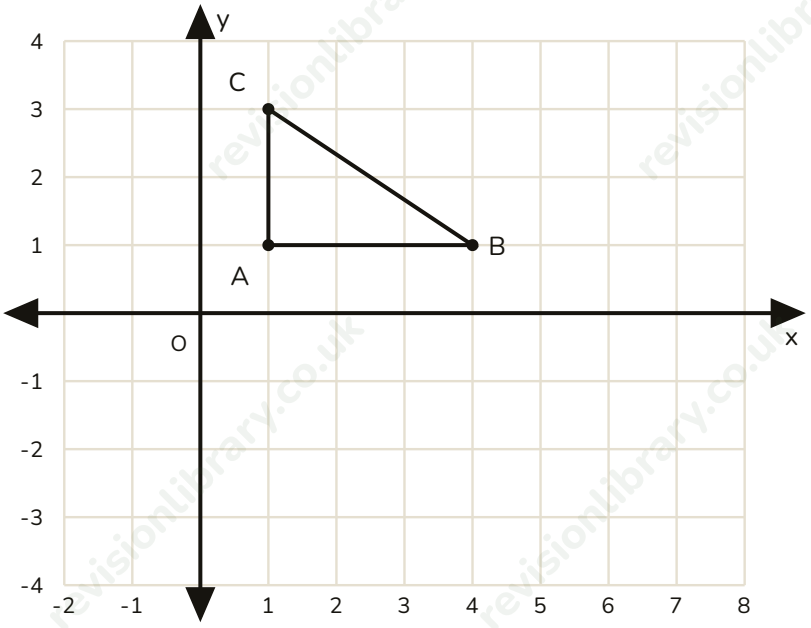
4.3 Geometry: Transformations: Test Pack

Calculator allowed · about 55 minutes

Name: _____ Date: ____ / ____ / _____

Answer ALL questions. Show all your working.

1 Triangle ABC has vertices A(1, 1), B(4, 1) and C(1, 3). Triangle ABC is translated by the vector (3, -2) to give triangle A'B'C'.



(a) Write down the coordinates of A'. **(1)**

.....

(b) Write down the coordinates of B'. **(1)**

.....

(c) Write down the coordinates of C'. **(1)**

.....

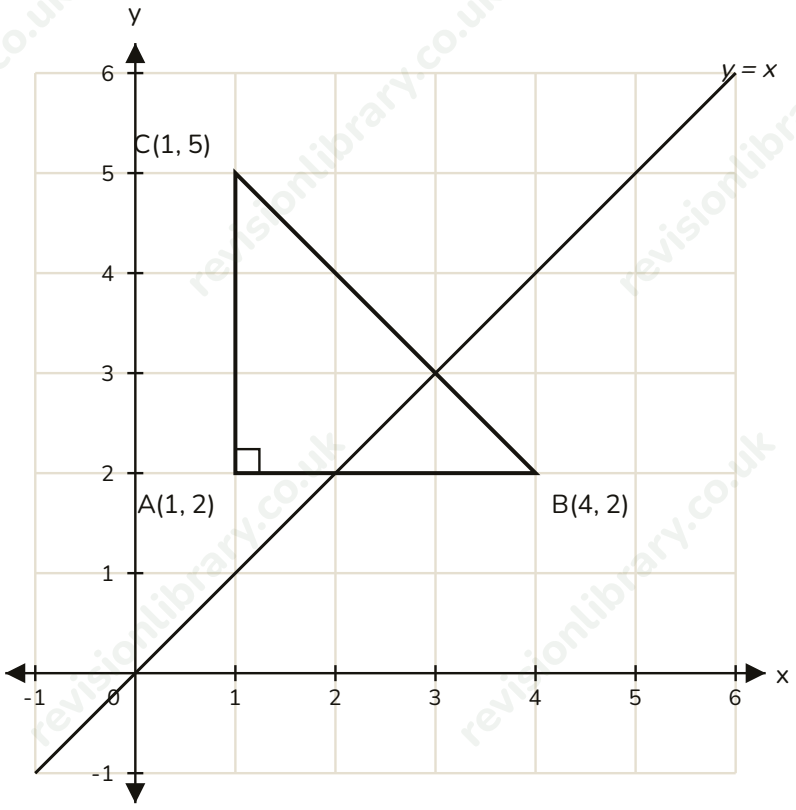
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2 State the order of rotational symmetry of each shape.

(2)

---

3 Triangle ABC has vertices A(1, 2), B(4, 2) and C(1, 5).



(a) Reflect triangle ABC in the line y = x. Write down the coordinates of A'. **(1)**

(b) Write down the coordinates of B'. **(1)**

.....

(c) Write down the coordinates of C'. **(1)**

.....

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4 Describe in words the single transformation that maps the point (x, y) to (-x, y) for every point on a shape.

(1)

5 A shape is translated by the vector (4, -6) to form its image. A vertex of the shape is at (-1, 8). Find the coordinates of the corresponding vertex on the image.

(2)

6 Shape P has vertices (2, 2), (4, 2) and (2, 3). Shape Q has vertices (5, 5), (7, 5) and (5, 6). Describe fully the single transformation that maps shape P onto shape Q.

(2)

7 A shape is translated by the vector (3, -1) and then by the vector (-5, 4). Which single vector describes the combined translation?

- ☐ A) (2, 3)
- ☐ B) (-2, 3)
- ☐ C) (8, -5)
- ☐ D) (-8, 5)

8 The points A (-3, 1) and B (-5, -3) are reflected in the line x = 0. Write down the coordinates of the images A' and B'.

(2)

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9 The points P (6, 6) and Q (-3, -1) are enlarged by scale factor 4 about (2, 2). Write down the coordinates of the images P' and Q'.

(3)

---

10 Triangle A(3, 5), B(6, 5), C(3, 8) is first rotated 90 degrees anticlockwise about the origin, then reflected in the x-axis. Give the final coordinates of A', B' and C'.

(3)

---

11 Shape M has vertices (1, 2), (4, 2) and (1, 5). Shape N has vertices (-2, 1), (-2, 4) and (-5, 1). Describe fully the single transformation that maps shape M onto shape N.

(3)

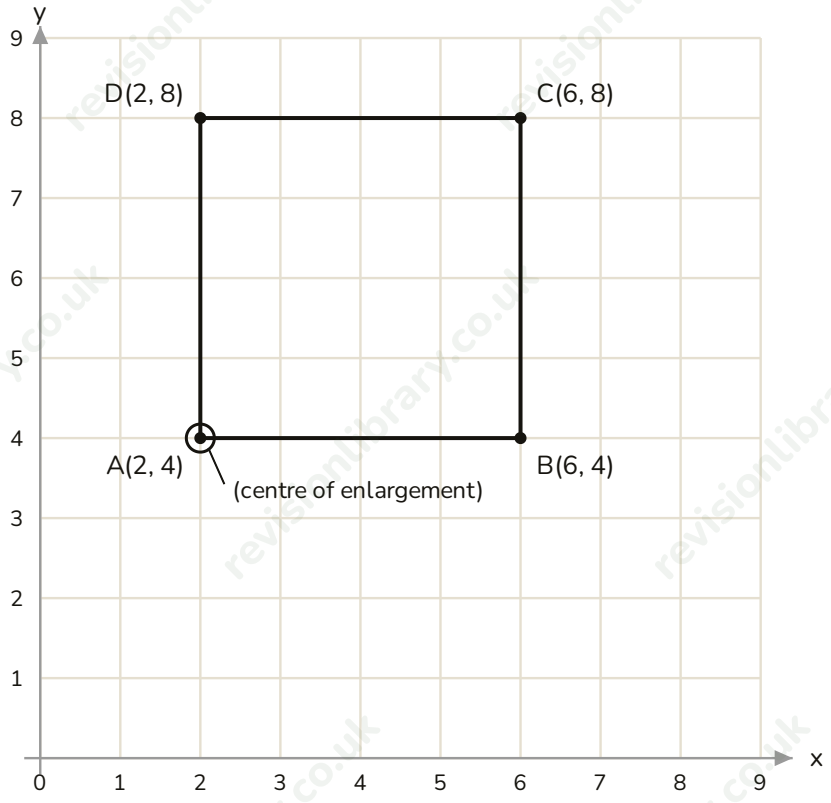
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12 A logo designer rotates point L(7, 2) about the point (2, 2) by 90 degrees clockwise. Find the coordinates of the image L'.

(3)

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13 Rectangle ABCD has vertices A(2, 4), B(6, 4), C(6, 8) and D(2, 8). Enlarge rectangle ABCD by scale factor 1/2, centre (2, 4).



(3)

14 Jordan says: "A shape and its enlargement by scale factor -1 about the origin are always congruent." Is Jordan correct? Give a reason.

(3)

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15 A model of a statue is built using a linear scale factor of 1 : 20 (the actual statue is 20 times bigger in each direction than the model). The model has a base area of 15 cm² and a volume of 45 cm³.

(a) Work out the base area of the actual statue, in m^2. **(3)**

.....

(b) Work out the volume of the actual statue, in m^3. **(3)**

.....

16 Point P has coordinates (a, b). P is reflected in the line y = x, and the image is then reflected in the x-axis, to give point P''. Show that the combined transformation is equivalent to a rotation of 90 degrees clockwise about the origin O.

(4)

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Mark scheme · 4.3 Geometry: Transformations: Test Pack

Question 1

(a) (4, -1) cao — **B1**

(a) Answer: **A' = (4, -1)**

(b) (7, -1) cao — **B1**

(b) Answer: **B' = (7, -1)**

(c) (4, 1) cao — **B1**

(c) Answer: **C' = (4, 1)**

Question 2

at least two of the three orders correct — **M1**

all three correct: rectangle (not a square) = 2, regular hexagon = 6, scalene triangle = 1 cao — **A1**

Answer: **Rectangle (not a square): 2; regular hexagon: 6; scalene triangle: 1**

Question 3

(a) (2, 1) cao — **B1**

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

(b) (2, 4) cao — **B1**

(b) Answer: **(2, 4)**

(c) (5, 1) cao — **B1**

(c) Answer: **(5, 1)**

Question 4

reflection in the y-axis cao — **B1**

Answer: **Reflection in the y-axis**

Question 5

applies translation to coordinates: (-1 + 4, 8 + -6) — **M1**

(3, 2) cao — **A1**

Answer: **(3, 2)**

Question 6

recognises a translation and attempts the vector, e.g. compares one pair of vertices — **M1**

translation by vector (3, 3) oe (must state 'translation' and give the vector) — **A1**

Answer: **Translation by vector (3, 3)**

Question 7

B cao — **B1**

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

Question 8

A' = (3, 1) — **B1**

B' = (5, -3) — **B1**

Answer: **(3, 1), (5, -3)**

Question 9

vector from the centre to a point found — **M1**

scaled by the scale factor — **M1**

(18, 18) and (-18, -10) cao — **A1**

Answer: **(18, 18), (-18, -10)**

Question 10

rotate 90 degrees anticlockwise: (x, y) -> (-y, x) shown for at least one vertex — **M1**

reflect in x-axis: show y -> -y for at least one rotated vertex — **M1**

final vertices A'(-5, -3), B'(-5, -6), C'(-8, -3) cao — **A1**

Answer: **A'(-5, -3), B'(-5, -6), C'(-8, -3)**

Question 11

checks a mapping rule against more than one vertex, e.g. tests (x, y) -> (-y, x) — **M1**

states rotation of 90 degrees anticlockwise — **A1**

states centre (0, 0) cao — **A1**

Answer: **Rotation of 90 degrees anticlockwise about the origin (0, 0)**

Question 12

finds the vector from the centre (2, 2) to L: (5, 0) — **M1**

applies the 90 degrees clockwise rule (x, y) -> (y, -x) to the vector: (0, -5) — **A1**

L' = centre + rotated vector = (2, -3) cao — **A1**

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

Question 13

correct method: image = centre + 0.5 x (vertex - centre), used for at least one vertex — **M1**

A'(2, 4) and B'(4, 4) both correct — **A1**

C'(4, 6) and D'(2, 6) both correct — **A1**

Answer: **A'(2, 4), B'(4, 4), C'(4, 6), D'(2, 6)**

Question 14

recognises that the size of the scale factor (its absolute value) is 1 — **M1**

explains that scale factor -1 multiplies every distance from the centre by 1 but reverses direction, which is equivalent to a rotation of 180 degrees about the origin — **M1**

concludes Jordan is correct because the image has exactly the same side lengths and angles as the original, so it is congruent — **A1**

Answer: **Yes. Scale factor -1 has size 1, so all lengths are unchanged; the image is a 180 degree rotation of the original about the origin, which is congruent to it.**

Question 15

(a) area scale factor = $20^2 = 400$ — **M1**

(a) 15 x 400 = 6000 cm² — **M1**

(a) 0.6 m² cao (correct conversion, dividing by 10000) — **A1**

(a) Answer: **0.6 m^2**

(b) volume scale factor = $20^3 = 8000$ — **M1**

(b) 45 x 8000 = 360000 cm³ — **M1**

(b) 0.36 m³ cao (correct conversion, dividing by 1000000) — **A1**

(b) Answer: **0.36 m^3**

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Question 16

reflects (a, b) in y = x correctly to get (b, a)	**M1**
reflects (b, a) in the x-axis correctly to get (b, -a)	**M1**
states the rule for a rotation of 90 degrees clockwise about the origin: (x, y) -> (y, -x)	**M1**
cso: correctly concludes that (a, b) -> (b, -a) matches the rotation rule, so the combined transformation is equivalent to a rotation of 90 degrees clockwise about the origin O	**A1**

Answer: **The combined transformation is equivalent to a rotation of 90 degrees clockwise about the origin O**

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