



KS3.M-G17 Transformations: Translation and Enlargement

AQA KS3.M-G17 · Calculators not allowed · about 60 minutes

Name: _____ Date: ____ / ____ / ____

Answer ALL questions. Show all your working.

- 1** Write down the column vector that describes a translation 4 squares to the right and 2 squares up.

(1)

- 2** Write down the column vector that describes a translation 3 squares to the left and 5 squares down.

(1)

- 3** A translation is given by the column vector $\begin{pmatrix} 0 \\ 6 \end{pmatrix}$. Describe this translation in words.

(1)

- 4** Carry out the addition of the two column vectors. $\begin{pmatrix} 2 \\ -3 \end{pmatrix} + \begin{pmatrix} -1 \\ 4 \end{pmatrix}$.

(2)

- 5** A triangle has vertices at A(1, 2), B(3, 2) and C(2, 4). Translate the triangle by the vector $\begin{pmatrix} 4 \\ -1 \end{pmatrix}$. Write the new coordinates of A, B and C.

(2)

- 6** On a square grid, shape S is translated by the vector $(-2, 3)$ to form shape T. If a vertex of S is at $(6, 1)$, what are the coordinates of the corresponding vertex of T?

(2)

- 7** Enlarge the triangle with vertices $(1, 1)$, $(3, 1)$ and $(1, 4)$ by scale factor 2 about the origin $(0, 0)$. Write the coordinates of the image.

(3)

- 8** Enlarge the triangle with vertices $(2, -1)$, $(5, 3)$ and $(2, 3)$ by scale factor 3 about the point $(1, 0)$. Give the coordinates of the image.

(3)

- 9** A square with corners at $(2, 2)$, $(5, 2)$, $(5, 5)$, $(2, 5)$ is enlarged by scale factor $\frac{1}{2}$ about the origin. Give the coordinates of the image.

(2)

- 10** Enlarge point $P(4, 6)$ by scale factor 4 about the point $(2, 1)$. Work out the image P' .

(2)

- 11** A triangle with vertices $(2, 2)$, $(4, 2)$ and $(2, 5)$ is first translated by $(3, -1)$ then enlarged by scale factor 2 about the origin. Find the coordinates after both transformations.

(3)

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- 12** Enlarge the rectangle with corners $(1, 1)$, $(5, 1)$, $(5, 3)$, $(1, 3)$ by scale factor 0.5 about the point $(1, 1)$. Give the coordinates of the image.

(3)

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- 13** The point Q is at $(-1, 4)$. It is translated by $(5, -6)$ then enlarged by scale factor 2 about the origin. Find the final coordinates.

(2)

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- 14** A triangle has vertices at $(2, 0)$, $(4, 0)$ and $(2, 3)$. It is enlarged by scale factor 3 about the point $(2, 0)$. Give the coordinates of the image.

(3)

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- 15** A pentagon has a vertex at $(0, 2)$. After enlargement by scale factor 2 about the origin the image of that vertex is $(0, 4)$. If the original pentagon is then translated by $(1, -3)$, what is the coordinate of that translated vertex?

(2)

- 16** Sam says: "Enlarging a shape by scale factor 1 about any point always gives the same shape in the same place." Is Sam correct? Give a reason.

(3)

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- 17** A triangle has vertices A(1, 2), B(4, 2) and C(1, 5). A enlargement with scale factor 1.5 about the origin maps A to A'. Find the coordinates of A', B' and C'. (Give any decimal answers to one decimal place if needed.)

(3)

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- 18** Stretch question. A shape is enlarged by scale factor 2 about the point (3, -1). One vertex of the original shape is at (7, 5) and the corresponding vertex of the image is at (11, 9). Verify these coordinates and explain whether these two points are consistent with enlargement by scale factor 2 about (3, -1). Show your working.

(4)

Mark scheme · KS3.M-G17 Transformations: Translation and Enlargement

Question 1

- **B1** Correct column vector (4, 2) cao
- Answer: **[4, 2] (or column vector (4, 2))**

Question 2

- **B1** Correct column vector (-3, -5) cao
- Answer: **[-3, -5] (or column vector (-3, -5))**

Question 3

- **B1** Description equivalent to "6 squares up" or "up 6" cao
- Answer: **Translate up 6**

Question 4

- **M1** Adds components correctly: $(2 + -1, -3 + 4)$ or equivalent
- **A1** Gives final vector (1, 1) cao
- Answer: **[1, 1] (or column vector (1, 1))**

Question 5

- **M1** Adds vector to each point correctly, showing at least one correct addition
- **A1** All three coordinates correct: A'(5,1), B'(7,1), C'(6,3) cao
- Answer: **A'(5, 1), B'(7, 1), C'(6, 3)**

Question 6

- **M1** Applies translation to coordinates $(6 + -2, 1 + 3)$ or equivalent
- **A1** Gives (4, 4) cao
- Answer: **(4, 4)**

Question 7

- **M1** Multiplies coordinates by 2 for at least one point correctly
- **M1** Shows method for other points or lists transformed coordinates
- **A1** All three correct: (2,2), (6,2), (2,8) cao
- Answer: **(2, 2), (6, 2), (2, 8)**

Question 8

- **M1** Subtracts centre (1,0) from a point, multiplies by 3 and adds centre for at least one point
- **M1** Applies method to remaining points or shows clear working
- **A1** All three image coordinates correct: (4, -3), (13, 9), (4, 9) cao
- Answer: **(4, -3), (13, 9), (4, 9)**

Question 9

- **M1** Multiplies each coordinate by $\frac{1}{2}$ or 0.5
- **A1** Gives (1,1), (2.5,1), (2.5,2.5), (1,2.5) cao
- Answer: **(1, 1), (2.5, 1), (2.5, 2.5), (1, 2.5)**

Question 10

- **M1** Subtracts centre (2,1): vector (2,5), multiplies by 4 to get (8,20) then adds centre
- **A1** P'(10,21) cao
- Answer: **P'(10, 21)**

Question 11

- **M1** Applies translation to each point or shows one correct translated point
- **M1** Then multiplies translated coordinates by 2 about origin correctly
- **A1** Final coordinates correct: (10,2), (14,2), (10,8) cao
- **Answer: (10, 2), (14, 2), (10, 8)**

Question 12

- **M1** Subtracts centre (1,1) from a corner: e.g. (0,0), (4,0), (4,2), (0,2) then multiplies by 0.5
- **M1** Adds centre back to get image coordinates for points other than the centre
- **A1** Gives images: (1,1), (3,1), (3,2), (1,2) cao
- **Answer: (1, 1), (3, 1), (3, 2), (1, 2)**

Question 13

- **M1** Translates: $(-1+5, 4-6) = (4, -2)$, then multiplies by 2
- **A1** Final point (8, -4) cao
- **Answer: (8, -4)**

Question 14

- **M1** Takes (2,0) as centre, subtracts centre for other points: (0,0), (2,0), (0,3)
- **M1** Multiplies by 3 and adds centre back correctly
- **A1** Image coordinates: (2,0), (8,0), (2,9) cao
- **Answer: (2, 0), (8, 0), (2, 9)**

Question 15

- **M1** Applies translation to original vertex (0,2): $(0+1, 2-3)$
- **A1** Gives (1, -1) cao
- **Answer: (1, -1)**

Question 16

- **M1** States whether correct or not: correct that shape is unchanged in size
- **M1** Explains that scale factor 1 means distances from centre are multiplied by 1 so points do not move
- **A1** Concludes that the shape remains in the same place and size; wording equivalent to this earns the mark
- **Answer: Yes. Scale factor 1 multiplies all distances from the centre by 1 so every point stays where it is; the shape is unchanged.**

Question 17

- **M1** Multiplies coordinates by 1.5 for at least one point correctly
- **M1** Applies to remaining points or shows method
- **A1** Gives A'(1.5, 3.0), B'(6.0, 3.0), C'(1.5, 7.5) with acceptable rounding
- **Answer: A'(1.5, 3.0), B'(6.0, 3.0), C'(1.5, 7.5)**

Question 18

- **M1** Finds vector from centre to original: $(7-3, 5-(-1)) = (4, 6)$ or equivalent
- **M1** Multiplies that vector by 2 to get (8, 12)
- **M1** Adds centre back: $(3+8, -1+12) = (11, 11)$ or shows this calculation
- **A1** Conclusion that image should be (11, 11), so given image (11, 9) is not consistent with scale factor 2 about (3, -1); explanation given
- **Answer: Not consistent. Correct image would be (11, 11), so (11, 9) is incorrect for scale factor 2 about (3, -1).**