



EP.M119 Coordinates, Reflection and Translation

GL ASSESSMENT GL-11PLUS-MATHS · Calculators not allowed · about 55 minutes

Total Marks

Name: _____ Date: ____ / ____ / ____

Answer ALL questions. Show all your working.

- 1** Point A is at (3, -7). What is the y-coordinate of A?

- ☐ A) 3
☐ B) -7
☐ C) 7
☐ D) -3
☐ E) 0

(Total for Question 1 is 1 mark)

- 2** Write the coordinates of point B if B is 4 units left of the origin and 3 units above it.

(Total for Question 2 is 1 mark)

- 3** Which of the following points lies in quadrant III?

- ☐ A) (2, -5)
☐ B) (-4, 3)
☐ C) (-3, -2)
☐ D) (0, -1)
☐ E) (5, 0)

(Total for Question 3 is 1 mark)

- 4** Points A and B are A(2, -1) and B(-3, 4). Work out the midpoint of AB.

(Total for Question 4 is 2 marks)

5 Reflect point C(-5, 2) in the x-axis. Give the coordinates of the image.

(Total for Question 5 is 1 mark)

6 Reflect point D(4, -7) in the y-axis. Give the coordinates of the image.

(Total for Question 6 is 1 mark)

7 Translate point E(1, -3) by the vector (4, 5). Give the coordinates of the image.

(Total for Question 7 is 1 mark)

8 Point F is at (-2, 6). (a) Reflect F in the x-axis. (b) Then translate the image by (-3, -2). Give the coordinates after each step.

(a) Reflect F in the x-axis. (1)

(b) Translate the result by (-3, -2). (1)

(Total for Question 8 is 2 marks)

9 Triangle T has vertices A(1,1), B(4,1), C(1,3). Translate the triangle by (-2, -1). Give the coordinates of A', B' and C'.

(Total for Question 9 is 2 marks)

10 Which translation maps $(2, 3)$ to $(-1, -1)$?

- ☐ A) $(-3, -4)$
- ☐ B) $(3, 4)$
- ☐ C) $(-1, -2)$
- ☐ D) $(-3, 4)$
- ☐ E) $(-4, -1)$

(Total for Question 10 is 1 mark)

11 Point P moves from $(-4, 2)$ to $Q(1, -1)$. Give the translation vector that moves P to Q.

(Total for Question 11 is 2 marks)

12 Point G is at $(3, -5)$. It is reflected in the x-axis, then translated by $(-2, 3)$. Work out the final coordinates.

(Total for Question 12 is 2 marks)

13 Point H is at $(-2, 0)$. Which reflection will move H to $(2, 0)$?

- ☐ A) Reflect in the x-axis
- ☐ B) Reflect in the y-axis
- ☐ C) Reflect in the line $y = x$
- ☐ D) Translate by $(4, 0)$
- ☐ E) Rotate 180 degrees about the origin

(Total for Question 13 is 1 mark)

14 A square has vertices $(2,2)$, $(5,2)$, $(5,5)$, $(2,5)$. The square is reflected in the y-axis and then translated by $(-1, 0)$. Find the coordinates of the image of the vertex $(2,5)$.

(Total for Question 14 is 2 marks)

- 15** Triangle with vertex A(-1, 2) is reflected in the x-axis to form A1, then A1 is translated by (4, -1) to form A2. Find the coordinates of A2.

(Total for Question 15 is 2 marks)

- 16** A point (x, y) is reflected in the x-axis and then in the y-axis. The final image is (6, -4). What were the original coordinates?

(Total for Question 16 is 2 marks)

- 17** A point starts at (1, 1). It is translated by (2, -1), then reflected in the y-axis, then translated by (-3, 5). What are the final coordinates?

(Total for Question 17 is 2 marks)

- 18** Point P is at (4, -1). It is reflected in the line $y = 0$ then reflected in the line $x = 1$. Find the final coordinates of the image.

(Total for Question 18 is 2 marks)

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Question 1

- **B1** correct option B (-7) cao
- **Answer: B) -7** (the y-coordinate is -7). (1 mark.) A pupil who picks A or D has confused x and y; C has wrong sign; E is wrong column value only.)

Question 2

- **B1** (-4, 3) cao
- **Answer: (-4, 3)**

Question 3

- **B1** correct option C ((-3, -2)) cao
- **Answer: C) (-3, -2).** Quadrant III has $x < 0$ and $y < 0$. (Options A and D have $x \geq 0$; B has $y > 0$; E lies on the x-axis.)

Question 4

- **M1** Correct method: average x-values and average y-values ($(2 + -3)/2$, $(-1 + 4)/2$) seen
- **A1** (-0.5, 1.5) cao
- **Answer: (-0.5, 1.5).** Working: $x\text{-mid} = (2 + (-3))/2 = -1/2 = -0.5$; $y\text{-mid} = (-1 + 4)/2 = 3/2 = 1.5$.

Question 5

- **B1** (-5, -2) cao
- **Answer: (-5, -2).** Reflection in the x-axis changes y to its negative; x stays the same.

Question 6

- **B1** (-4, -7) cao
- **Answer: (-4, -7).** Reflection in the y-axis changes x to its negative; y stays the same.

Question 7

- **B1** (5, 2) cao
- **Answer: (5, 2).** Work: $(1 + 4, -3 + 5) = (5, 2)$.

Question 8

- (a) **B1** (-2, -6) cao
- (a) **Answer: (-2, -6)**
- (b) **B1** (-5, -8) cao
- (b) **Answer: (-5, -8)**

Question 9

- **M1** Evidence of translation applied to at least one vertex, e.g. (1,1) $\rightarrow$ (-1,0) or equivalent
- **A1** A'(-1,0), B'(2,0), C'(-1,2) cao
- **Answer: A'(-1, 0), B'(2, 0), C'(-1, 2).** Work: add (-2, -1) to each vertex.

Question 10

- **B1** correct option A ((-3, -4)) cao
- **Answer: A) (-3, -4).** Work: $(-1 - 2, -1 - 3) = (-3, -4)$. Distractors: B is sign error; C arithmetic error; D changes y sign incorrectly; E swaps components.

Question 11

- **M1** Method: difference Q - P seen, e.g. $(1 - (-4), -1 - 2)$ or equivalent
- **A1** (5, -3) cao
- **Answer: (5, -3).** Work: x increases by 5, y decreases by 3.

Question 12

- **M1** Reflect then translate method seen, e.g. $(3, -5) \rightarrow (3, 5) \rightarrow (1, 8)$
- **A1** $(1, 8)$ cao
- **Answer: $(1, 8)$. Reflection in x-axis gives $(3, 5)$; adding $(-2, 3)$ gives $(1, 8)$.**

Question 13

- **B1** correct option B (reflect in the y-axis) cao
- **Answer: B) Reflect in the y-axis. Reflection in y-axis changes $(-2, 0)$ to $(2, 0)$. A would give $(-2, 0) \rightarrow (-2, 0)$ as $y=0$ unchanged; C swaps coordinates; D gives $(2, 0)$ only if translate by $(4, 0)$ from $(-2, 0)$ but that is also correct numerically; however translation is not a reflection so B is correct reflection. (Note: D would move H to $(2, 0)$ but the question asks which reflection.)**

Question 14

- **M1** Reflect then translate method applied to the vertex, e.g. $(2, 5) \rightarrow (-2, 5) \rightarrow (-3, 5)$
- **A1** $(-3, 5)$ cao
- **Answer: $(-3, 5)$. Reflect $(2, 5)$ in y-axis to get $(-2, 5)$, then add $(-1, 0)$ to get $(-3, 5)$.**

Question 15

- **M1** Reflect then translate method shown, e.g. $(-1, 2) \rightarrow (-1, -2) \rightarrow (3, -3)$
- **A1** $(3, -3)$ cao
- **Answer: $(3, -3)$. Reflection in x-axis gives $(-1, -2)$; adding $(4, -1)$ gives $(3, -3)$.**

Question 16

- **M1** Method: track sign changes or reverse reflections, e.g. after two reflections image is $(-x, -y)$ so set equal to $(6, -4)$
- **A1** $(-6, 4)$ cao
- **Answer: $(-6, 4)$. Reason: reflection in x then y gives $(-x, -y) = (6, -4)$ so $x = -6, y = 4$.**

Question 17

- **M1** Method showing sequence applied correctly, e.g. $(1, 1) \rightarrow (3, 0) \rightarrow (-3, 0) \rightarrow (-6, 5)$
- **A1** $(-6, 5)$ cao
- **Answer: $(-6, 5)$. Steps: $(1, 1) + (2, -1) = (3, 0)$; reflect in y-axis $\rightarrow (-3, 0)$; add $(-3, 5) \rightarrow (-6, 5)$.**

Question 18

- **M1** Method: reflect in $y=0$ to change sign of y, then reflect in $x=1$ using $x_{\text{new}} = 2*1 - x$
- **A1** $(-2, 1)$ cao
- **Answer: $(-2, 1)$. Work: reflect in $y=0$ gives $(4, 1)$. Reflect in $x=1$: $x' = 2*1 - 4 = -2, y' = 1$.**