

Reflections

Solutions

For Pearson Edexcel GCSE Mathematics (1MA1) • Foundation tier

Each question is shown in grey, followed by the working, one step per line. The final answer is in a box. *Marks* shows how the marks are usually given in the exam, and **Tip** points out a common mistake.

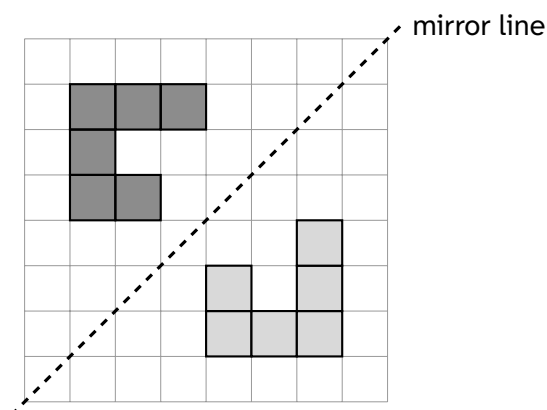
1 (2 marks)

On the grid, reflect the shaded shape in the mirror line.

Each square moves to the same distance on the other side of the diagonal mirror line.

Measure the distance at right angles to the line (diagonally across the squares).

Squares on the line stay where they are.



Answer: Correct reflection

Tip: Turn the page so the mirror line is vertical, or use tracing paper. This makes a diagonal mirror line much easier.

Marks: 2 marks for a correct reflection. 1 mark for 4 or 5 squares correct.

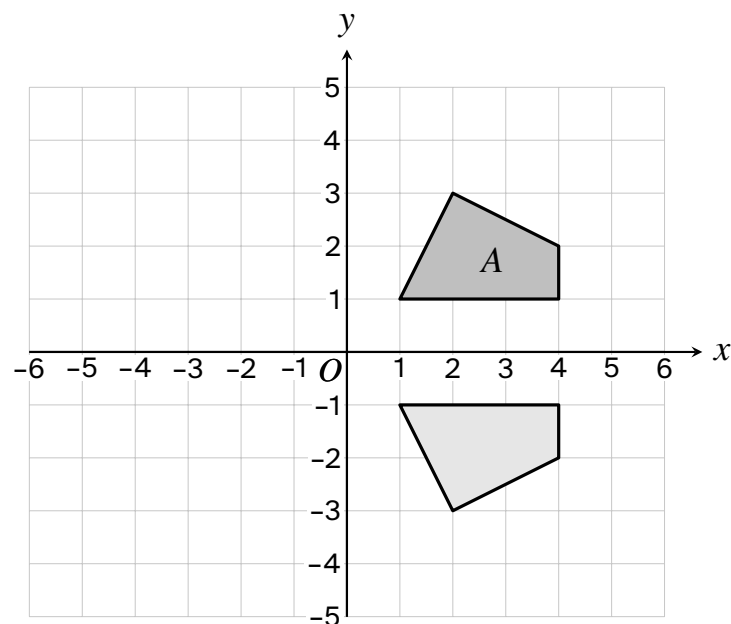
2 (2 marks)

On the grid, reflect shape *A* in the x -axis.

The x -axis is the horizontal line $y = 0$.

The x -coordinates stay the same. The y -coordinates change sign.

Image vertices: $(1, -1)$, $(4, -1)$, $(4, -2)$, $(2, -3)$



Answer: Correct reflection

Tip: The x -axis is **horizontal**. A common mistake is to reflect in the y -axis instead.

Marks: 2 marks for a correct reflection. 1 mark for any reflection in a horizontal line.

3 (2 marks)

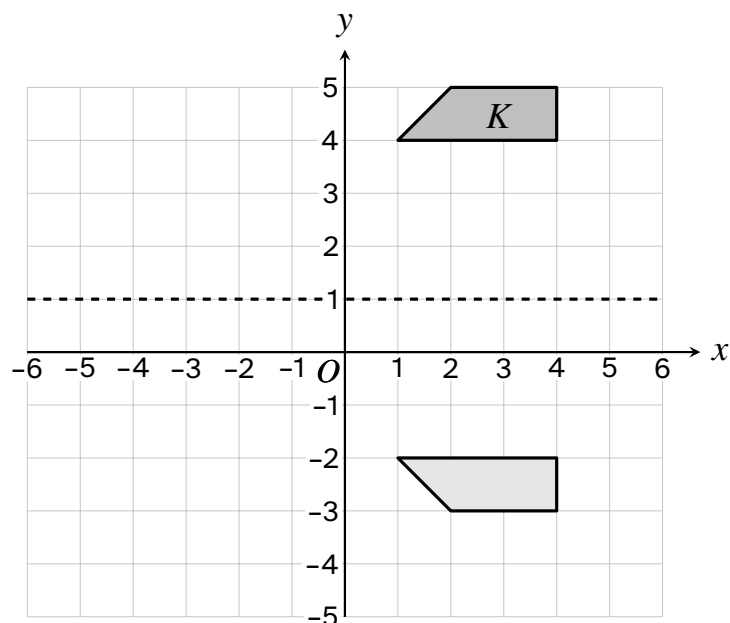
On the grid, reflect shape *K* in the line $y = 1$

$y = 1$ is the horizontal line through 1 on the y -axis.

Each vertex moves to the same distance on the other side of $y = 1$.

For example, $(4, 5)$ is 4 above the line, so its image is 4 below: $(4, -3)$.

Image vertices: $(1, -2)$, $(4, -2)$, $(4, -3)$, $(2, -3)$



Answer: Correct reflection

Tip: $y = 1$ is a **horizontal** line. Many students use $x = 1$ (vertical) by mistake.

Marks: 2 marks for a correct reflection. 1 mark for a reflection in any horizontal line.

4 (2 marks)

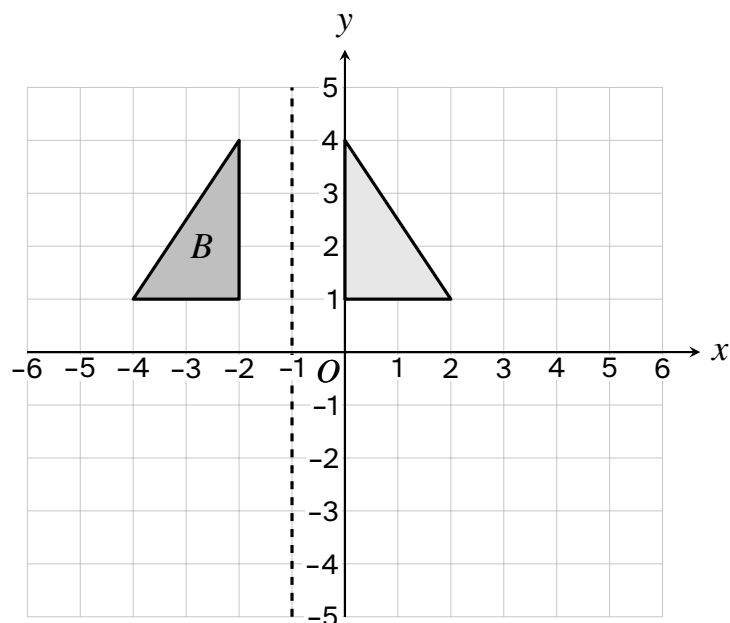
On the grid, reflect triangle B in the line $x = -1$

$x = -1$ is the vertical line through -1 on the x -axis.

Each vertex moves to the same distance on the other side of the line.

For example, $(-4, 1)$ is 3 units left of the line, so its image is 3 units right: $(2, 1)$.

Image vertices: $(2, 1)$, $(0, 1)$, $(0, 4)$



Answer: Correct reflection

Marks: 2 marks for a correct reflection. 1 mark for a reflection in any vertical line.

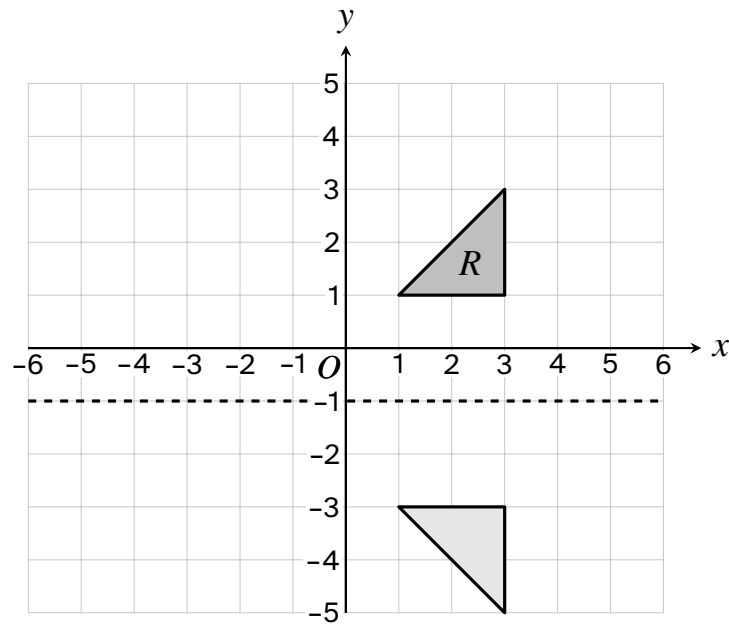
5 (3 marks)

- (a) On the grid, reflect shape *R* in the mirror line.

The mirror line is the horizontal line $y = -1$.

Each vertex moves to the same distance on the other side of it.

Image vertices: $(1, -3)$, $(3, -3)$, $(3, -5)$



Answer: Correct reflection

Marks: 2 marks for a correct reflection. 1 mark for 2 correct vertices.

- (b) The vertex $(3, 3)$ of shape R is reflected in the mirror line.
Write down the coordinates of its image.

The mirror line is the horizontal line $y = -1$, so the x -coordinate stays as 3.

$(3, 3)$ is 4 units above the line.

So its image is 4 units below the line: $-1 - 4 = -5$

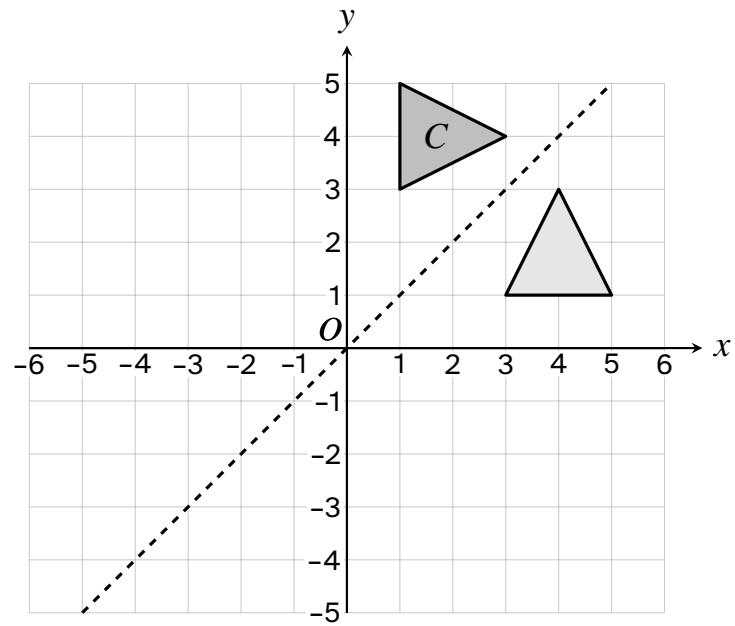
Answer: $(3, -5)$

6 (2 marks)

On the grid, reflect triangle C in the line $y = x$

Reflecting in $y = x$ swaps the coordinates: (x, y) becomes (y, x) .

Image vertices: $(3, 1)$, $(5, 1)$, $(4, 3)$

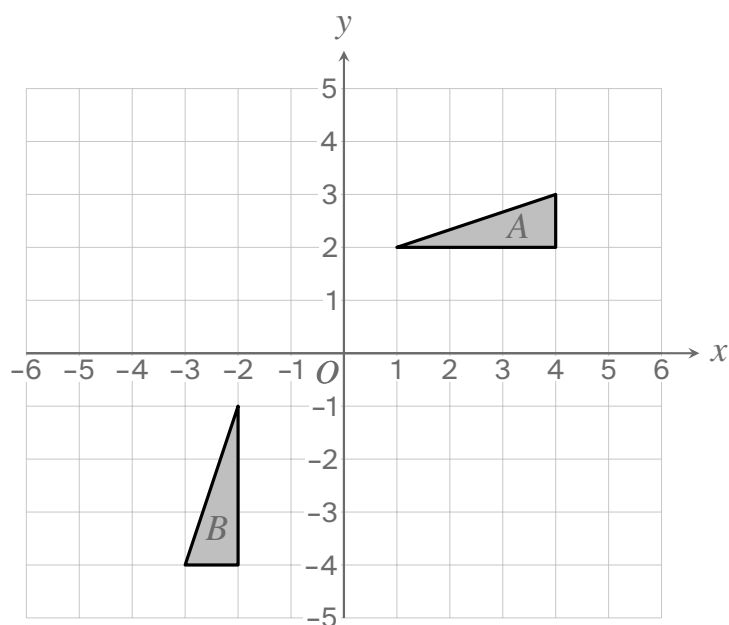


Answer: $(3, 1)$, $(5, 1)$, $(4, 3)$

Marks: 2 marks for a correct reflection. 1 mark for two correct vertices.

7 (2 marks)

Shape *A* is reflected in a straight line to give shape *B*.

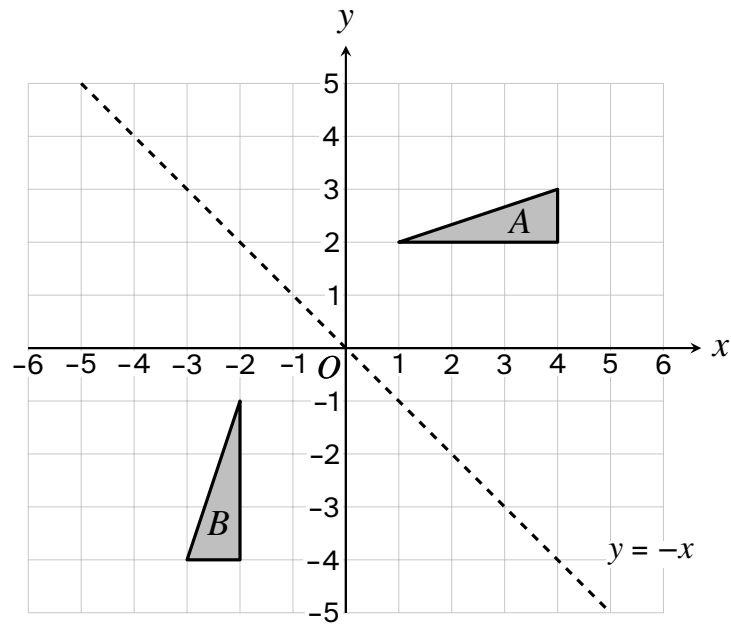


(a) Write down the equation of the line of reflection.

Look at a vertex and its image: $(4, 3)$ maps to $(-3, -4)$.

The coordinates have swapped and both signs have changed.

This is a reflection in the diagonal line through $(1, -1)$, $(0, 0)$ and $(-1, 1)$.



Answer: $y = -x$

Tip: Check one pair of points: each point and its image must be the same distance from the line, on opposite sides.

- (b) Shape A is reflected in the y -axis to give shape C .

Write down the coordinates of the vertex of C that is the image of $(4, 3)$

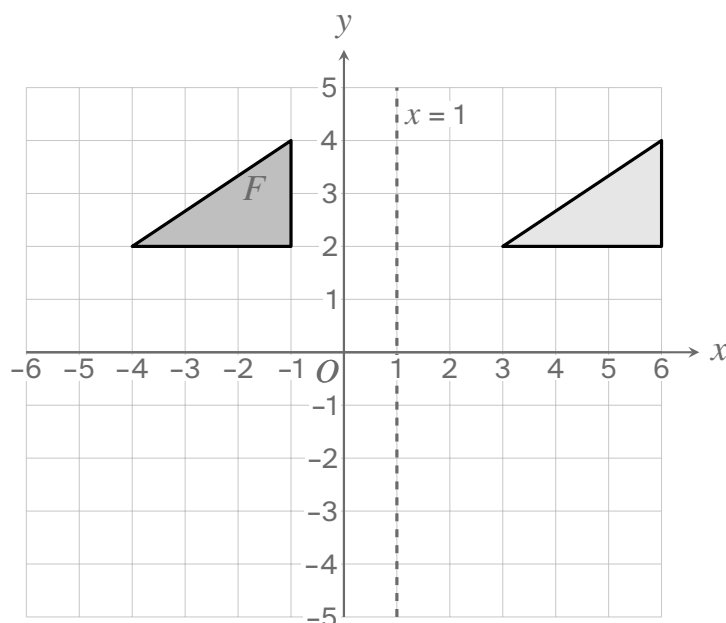
Reflecting in the y -axis keeps the y -coordinate the same.

The x -coordinate changes sign: 4 becomes -4 .

Answer: $(-4, 3)$

8 (1 mark)

Keira is asked to reflect shape F in the line $x = 1$



Keira's answer is shown on the grid.

Explain what Keira has done wrong.

Keira has moved the shape 7 squares to the right without flipping it. This is a translation, not a reflection.

In a reflection, each point is the same distance from the mirror line on the other side.

For example, $(-4, 2)$ is 5 units left of $x = 1$, so its image should be $(6, 2)$, 5 units right of the line.

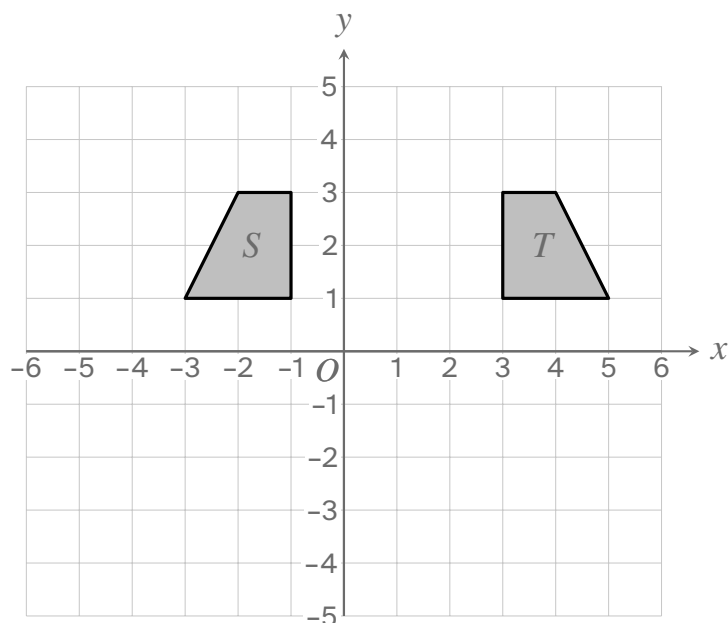
The correct image has vertices $(6, 2)$, $(3, 2)$, $(3, 4)$

Answer: She has translated the shape instead of reflecting it (the image is not flipped)

Tip: Check one vertex: its image must be the same distance from the mirror line. Say clearly what she did (translated it) and what should happen (it should be flipped over the line).

9 (2 marks)

Describe fully the single transformation that maps shape S onto shape T .



T is a mirror image of S , so the transformation is a reflection.

The mirror line is vertical and halfway between the shapes.

For example, $(-1, 1)$ maps to $(3, 1)$. Halfway between $x = -1$ and $x = 3$ is $x = 1$.

Answer: Reflection in the line $x = 1$

Tip: Use the word “reflection” (not “flip”) and give the equation of the mirror line. Do not add a second transformation.

Marks: 1 mark for reflection. 1 mark for the line $x = 1$.

10 (2 marks)

(a) The point P has coordinates $(-2, 5)$

P is reflected in the line $y = 1$

Write down the coordinates of the image of P .

$y = 1$ is a horizontal line, so the x -coordinate stays as -2 .

P is $5 - 1 = 4$ units above the line.

So the image is 4 units below the line: $1 - 4 = -3$

Answer: $(-2, -3)$

(b) The point Q is reflected in the line $x = 3$

The image of Q is the point $(7, -4)$

Write down the coordinates of Q .

$x = 3$ is a vertical line, so the y -coordinate stays as -4 .

$(7, -4)$ is $7 - 3 = 4$ units to the right of the line.

So Q is 4 units to the left of the line: $3 - 4 = -1$

Answer: $(-1, -4)$