Graph Translations and Reflections

GCSE 1MA1 · Practice Worksheet

I DO

The curve with equation $y = f(x)$ has a single turning point at $(-2, 5)$.

(a) Write down the coordinates of the turning point of the curve with equation:

$$y = -f(x + 3)$$

(2 marks)

(b) Write down the coordinates of the turning point of the curve with equation:

$$y = f(-x) + 3$$

(2 marks)

WE DO

The curve with equation $y = f(x)$ has a single turning point at $(4, -3)$.

(a) Write down the coordinates of the turning point of the curve with equation:

$$y = f(x - 2) + 5$$

(2 marks)

(b) Write down the coordinates of the turning point of the curve with equation:

$$y = -f(x) + 2$$

(2 marks)

YOU DO 1

The curve with equation $y = f(x)$ has a single turning point at (3, 7).

(a) Write down the coordinates of the turning point of the curve with equation:

$$y = f(-x)$$

(2 marks)

(b) Write down the coordinates of the turning point of the curve with equation:

$$y = f(x) - 4$$

(2 marks)

YOU DO 2

The curve with equation $y = f(x)$ has a single turning point at $(-6, 2)$.

(a) Write down the coordinates of the turning point of the curve with equation:

$$y = f(x + 5) - 1$$

(2 marks)

(b) Write down the coordinates of the turning point of the curve with equation:

$$y = -f(x)$$

(2 marks)

CHALLENGE

(a) The curve with equation $y = f(x)$ has a single turning point at $(2, -5)$.
The curve is transformed to $y = f(x + b) + a$.
The new turning point is at $(7, 15)$.
Find the values of a and b.

(b) The curve with equation $y = g(x)$ has a single turning point at $(-3, 8)$.
The curve is transformed to $y = g(-x) + k$.
The new turning point is at $(m, 2)$.
Find the values of m and k.

ANSWERS & WORKED SOLUTIONS

I Do

(a) $y = -f(x + 3)$. Translate 3 left: $(-2, 5) \to (-5, 5)$. Reflect in the x-axis: $(-5, 5) \to (-5, -5)$.

(b) $y = f(-x) + 3$. Start from the original $(-2, 5)$. Reflect in the y-axis: $(-2, 5) \to (2, 5)$. Translate 3 up: $(2, 5) \to (2, 8)$.

Each part acts on the original curve, not the preceding answer.

ANSWERS & WORKED SOLUTIONS

We Do

(a) Translate 2 right: $(4, -3) \rightarrow (6, -3)$. Translate 5 up: $(6, -3) \rightarrow (6, 2)$. Answer: (6, 2).

(b) Reflect in the x-axis: $(4, -3) \rightarrow (4, 3)$. Translate 2 up: $(4, 3) \rightarrow (4, 5)$. Answer: (4, 5).

Each part acts on the original curve, not the preceding answer.

ANSWERS & WORKED SOLUTIONS

You Do 1

(a) Reflect in the y-axis: $(3, 7) \to (-3, 7)$. Answer: $(-3, 7)$.

(b) Start from (3, 7). Translate 4 down: $(3, 7) \to (3, 3)$. Answer: (3, 3).

Each part acts on the original curve, not the preceding answer.

ANSWERS & WORKED SOLUTIONS

You Do 2

(a) Translate 5 left: $(-6, 2) \rightarrow (-11, 2)$. Translate 1 down: $(-11, 2) \rightarrow (-11, 1)$. Answer: $(-11, 1)$.

(b) Start from $(-6, 2)$. Reflect in the x-axis: $(-6, 2) \rightarrow (-6, -2)$. Answer: $(-6, -2)$.

Each part acts on the original curve, not the preceding answer.

ANSWERS & WORKED SOLUTIONS

Challenge

(a) The horizontal translation gives $2 - b = 7$, so $b = -5$. The vertical translation gives $-5 + a = 15$, so $a = 20$. Answer: $a = 20$, $b = -5$.

(b) Reflection in the y-axis gives $m = 3$. The vertical translation gives $8 + k = 2$, so $k = -6$. Answer: $m = 3$, $k = -6$.