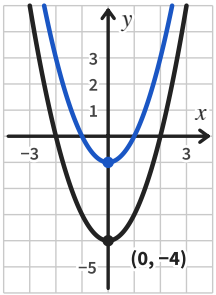
Graph translations

ANSWERS

1

The graph of $y = f(x)$ is drawn.
Sketch $y = f(x) + 3$ on the grid.



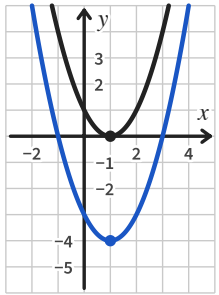
The graph moves up 3

Turning point (0, −1)

Column vector $\begin{pmatrix} 0 \\ 3 \end{pmatrix}$

2

The graph of $y = f(x)$ is drawn.
Sketch $y = f(x) - 4$ on the grid.



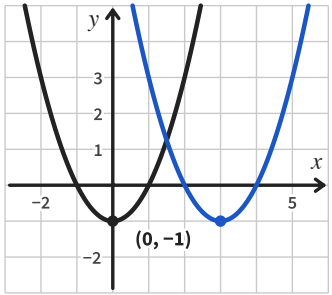
The graph moves down 4

Turning point (1, −4)

Column vector $\begin{pmatrix} 0 \\ -4 \end{pmatrix}$

3 Notice the change!

The graph of $y = f(x)$ is drawn.
Sketch $y = f(x - 3)$ on the grid.



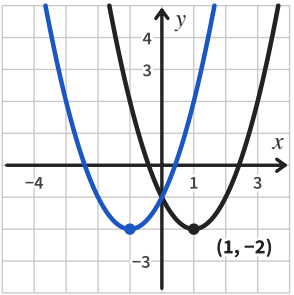
The graph moves right 3

Turning point (3, −1)

Column vector $\begin{pmatrix} 3 \\ 0 \end{pmatrix}$

4

The graph of $y = f(x)$ is drawn.
Sketch $y = f(x + 2)$ on the grid.



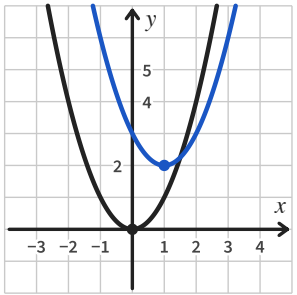
The graph moves left 2

Turning point (−1, −2)

Column vector $\begin{pmatrix} -2 \\ 0 \end{pmatrix}$

5 Notice the change!

The graph of $y = f(x) = x^2$ is drawn.
Sketch $y = f(x - 1) + 2$ on the grid.



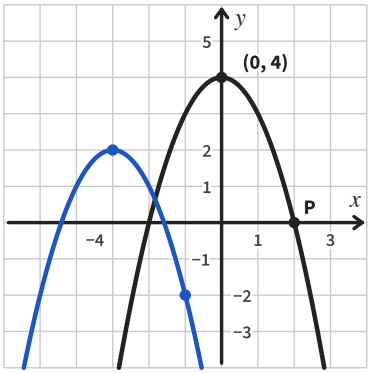
The graph moves right 1, up 2

Turning point (1, 2)

Column vector $\begin{pmatrix} 1 \\ 2 \end{pmatrix}$

6

The graph of $y = f(x)$ is drawn.
Sketch $y = f(x + 3) - 2$ on the grid.

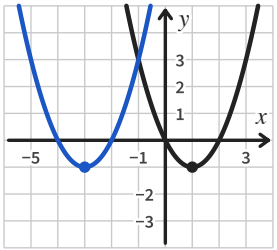


Turning point (−3, 2)

P goes to (−1, −2)

7

Sam says the graph of $y = f(x + 4)$ is the graph of $y = f(x)$ moved 4 to the right.
Explain his mistake, and write down the turning point.

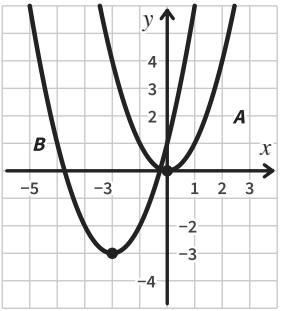


Inside the bracket it moves the opposite way: 4 left

Turning point (−3, −1)

8 Notice the change!

Curve A is $y = f(x) = x^2$. Curve B is curve A translated. Write down the column vector and the equation of curve B.



Column vector $\begin{pmatrix} -2 \\ -3 \end{pmatrix}$

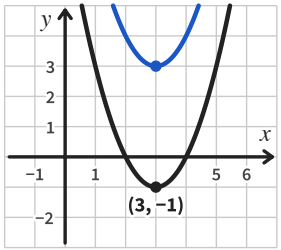
Curve B $y = f(x + 2) - 3$

Graph translations *further practice*

ANSWERS

9

The graph of $y = f(x)$ is drawn.
Sketch $y = f(x) + 4$ and write down its turning point.



up 4

(3, −1) goes to (3, 3)

Answer (3, 3)

10

The turning point of $y = f(x)$ is (3, −5).
Write down the turning point of $y = f(x - 2)$.

− 2 inside: right 2

(3 + 2, −5)

Answer (5, −5)

11

The point (−1, 6) is on $y = f(x)$.
Which point does it move to on $y = f(x + 5) - 6$?

left 5, down 6

(−1 − 5, 6 − 6)

Answer (−6, 0)

12

Describe fully the single transformation that maps $y = f(x)$ onto $y = f(x + 3) - 1$.

+ 3 inside: left 3

− 1 outside: down 1

Answer translation by $\begin{pmatrix} -3 \\ -1 \end{pmatrix}$

13

$f(x) = x^2$. The graph of $y = (x - 5)^2 + 2$ is a translation of $y = f(x)$. Write down the column vector.

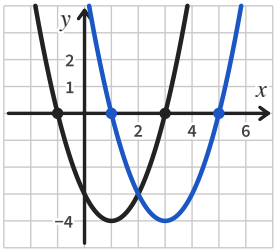
$(x - 5)^2 + 2 = f(x - 5) + 2$

right 5, up 2

Answer $\begin{pmatrix} 5 \\ 2 \end{pmatrix}$

14

The graph of $y = f(x)$ crosses the x axis at $x = -1$ and $x = 3$.
Where does $y = f(x - 2)$ cross the x axis?



right 2

−1 + 2 = 1, 3 + 2 = 5

Answer $x = 1$ and $x = 5$

15

In a computer game, a frog jumps along the curve $y = f(x)$.
The highest point of the jump is (2, 5).
The next jump is the same curve moved 6 squares to the right.
Write down its equation and its highest point.

right 6: − 6 inside the bracket

(2 + 6, 5)

Answer $y = f(x - 6)$, (8, 5)

16

Jo says $y = f(x + 2) - 2$ and $y = f(x - 2) + 2$ are the same graph, because the numbers cancel.
Is she right? Explain.

the first moves left 2, down 2

the second moves right 2, up 2

Answer No