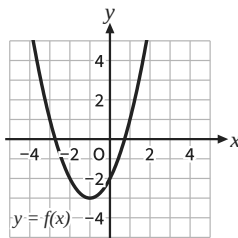


1 Graph transformations

The grid shows $y = f(x)$.

- On the grid, sketch $y = f(x - 2)$.
- Describe fully the single transformation.



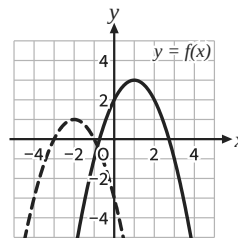
a) the same shape, lowest at $(1, -3)$

b) a translation by $\begin{pmatrix} 2 \\ 0 \end{pmatrix}$

2 Graph transformations

The dashed graph is a translation of $y = f(x)$.

- Write the translation as a column vector.
- Write the equation of the dashed graph in terms of f .

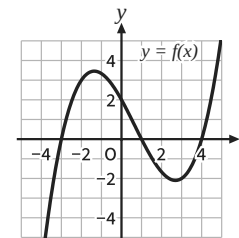


a) $\begin{pmatrix} -3 \\ -2 \end{pmatrix}$ b) $y = f(x + 3) - 2$

3 Graph transformations

The grid shows $y = f(x)$.

- On the grid, sketch $y = -f(x)$.
- Which points on $y = f(x)$ stay where they are on $y = -f(x)$?



a) reflect it in the x axis

b) $(-3, 0)$, $(1, 0)$ and $(4, 0)$

4 Graph transformations

- The graph of $y = x^2$ is translated by $\begin{pmatrix} -2 \\ 5 \end{pmatrix}$.

Write the equation of the new graph.

- The graph of $y = x^2 - 6x + 11$ is a translation of $y = x^2$. Find the vector.

a) $y = (x + 2)^2 + 5$

b) $x^2 - 6x + 11 = (x - 3)^2 + 2$

$\begin{pmatrix} 3 \\ 2 \end{pmatrix}$

Transformations of functions revision mat answers

Higher A

5 Where does the point go?

$P(3, -2)$ is on the graph of $y = f(x)$. Find where P goes on the graph of

- $y = f(x + 4)$ and $y = f(x) - 3$
- $y = f(-x)$ and $y = -f(x)$

a) $(-1, -2)$ and $(3, -5)$

b) $(-3, -2)$ and $(3, 2)$

6 Where does the point go?

The graph of $y = f(x)$ has a maximum point at $(-1, 4)$.

- Write down the maximum point of $y = f(x - 3)$.
- Write down the turning point of $y = 2 - f(x)$. Is it a maximum or a minimum?

a) $(2, 4)$

b) $-f$: $(-1, -4)$, then up 2

$(-1, -2)$, a minimum

7 Where does the point go?

- On a new graph, $(4, 1)$ on $y = f(x)$ goes to $(-4, 1)$ and $(0, 3)$ stays at $(0, 3)$. Write the new equation.
- On $y = f(x + a)$, the point $(5, -2)$ goes to $(2, -2)$. Find a .

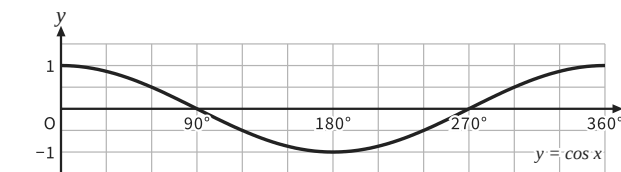
a) a reflection in the y axis:

$y = f(-x)$

b) left 3, so $a = 3$

8 Where does the point go?

- Write down the minimum point of $y = \cos x + 2$.
- Where does $(90^\circ, 0)$ go on $y = \cos(x + 30^\circ)$?



a) $(180^\circ, -1)$ moves up 2: $(180^\circ, 1)$

b) left 30° : $(60^\circ, 0)$