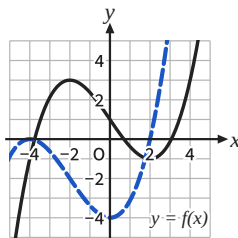


1 Graph transformations

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

- On the grid, sketch $y = f(x+2) - 3$.
- Write down the turning points of your sketch.

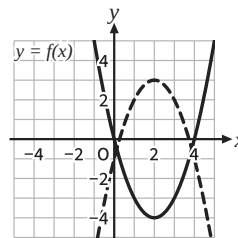


- a) left 2 and down 3
b) $(-4, 0)$ and $(0, -4)$

2 Graph transformations

The dashed graph is $y = f(x)$ reflected in the x axis, then translated.

- Write its equation in terms of f .
- (a, b) is on $y = f(x)$. Where does it go on the dashed graph?

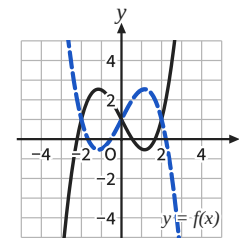


- a) $y = -f(x) - 1$
b) $(a, -b - 1)$

3 Graph transformations

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

- On the grid, sketch $y = f(-x)$.
- Use the graphs to solve $f(x) = f(-x)$.



- a) reflect it in the y axis
b) where they cross: $x = -2, 0$ or 2

4 Graph transformations

- The graph of $y = 2x^2 - 12x + 13$ is a translation of $y = 2x^2$. Find the vector.
- $y = x^2$ is reflected in the x axis, then translated by $\begin{pmatrix} -1 \\ 4 \end{pmatrix}$. Write the new equation as $y = ax^2 + bx + c$.

- a) $2(x^2 - 6x) + 13 = 2(x - 3)^2 - 5: \begin{pmatrix} 3 \\ -5 \end{pmatrix}$
b) $y = -(x + 1)^2 + 4 = -x^2 - 2x + 3$

Transformations of functions

revision mat answers

5 Where does the point go?

$P(4, -1)$ is on the graph of $y = f(x)$.

- Find where P goes on $y = 2 - f(x + 3)$.
- On $y = -f(x - 2)$, a point Q on $y = f(x)$ goes to $(0, 5)$. Find Q .

- a) left 3, reflect, up 2: $(1, 3)$
b) undo: down to $(0, -5)$, left 2: $(-2, -5)$

6 Where does the point go?

$f(x) = x^2 - 6x + 5$

- Complete the square to find the turning point of $y = f(x)$.
- Find the turning point of $y = -f(x - 2)$. Is it a maximum or a minimum?

- a) $(x - 3)^2 - 4: (3, -4)$
b) right 2, then reflect
 $(5, 4)$, a maximum

7 Where does the point go?

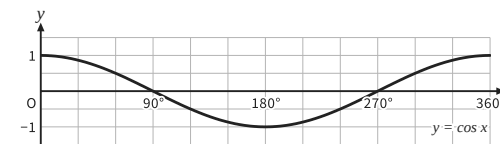
- On $y = f(x + a) + b$, the point $(2, 3)$ on $y = f(x)$ goes to $(-1, 7)$. Find a and b .
- On $y = f(-x)$, the point $(k, 3)$ goes to $(2k - 6, 3)$. Find k .

- a) left 3 and up 4: $a = 3, b = 4$
b) $-k = 2k - 6$
 $k = 2$

8 Where does the point go?

- $y = \cos x$ is translated so that $(0^\circ, 1)$ goes to $(60^\circ, 3)$. Write the new equation.

- Find the maximum point of $y = 3 - \cos x$ from 0° to 360° .



- a) right 60° , up 2: $y = \cos(x - 60^\circ) + 2$
b) $\cos x = -1$ at $180^\circ: (180^\circ, 4)$