

Transformations of Functions

ANSWERS

Calculator | 30 minutes | Total marks: 27

Name Class

1 $f(x) = 3x - 2$

(a) Work out $f(4)$

Answer 10 (1) [1 mark]

(b) Work out $f(-1)$

Answer -5 (1) [1 mark]

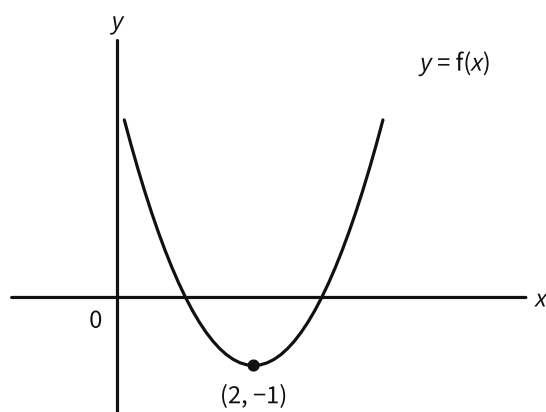
(c) Solve $f(x) = 13$

$$3x - 2 = 13 \text{ (1)}$$

$x =$ 5 (1) [2 marks]

2 The sketch shows the graph of $y = f(x)$.

The graph has a turning point at $(2, -1)$



Write down the coordinates of the turning point of the graph of

$y = f(x) + 3$ (2, 2) (1) [1 mark]

$y = f(x + 4)$ (-2, -1) (1) [1 mark]

$y = -f(x)$ (2, 1) (1) [1 mark]

$y = f(-x)$ (-2, -1) (1) [1 mark]

3

Describe fully the single transformation that maps the graph of $y = f(x)$ onto the graph of

(a) $y = f(x) - 5$

Translation (1) by the vector $\begin{pmatrix} 0 \\ -5 \end{pmatrix}$ (1)

[2 marks]

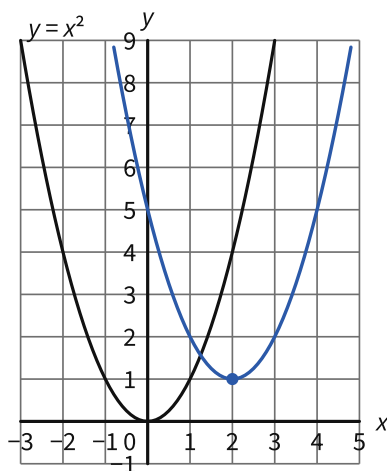
(b) $y = f(x - 3)$

Translation (1) by the vector $\begin{pmatrix} 3 \\ 0 \end{pmatrix}$ (1)

[2 marks]

4

The grid shows the graph of $y = x^2$



(a) On the same grid, sketch the graph of $y = (x - 2)^2 + 1$

Same shape moved 2 right (1) and 1 up (1) [2 marks]

(b) Write down the coordinates of the turning point of your graph.

Answer (2, 1) (1) [1 mark]

5

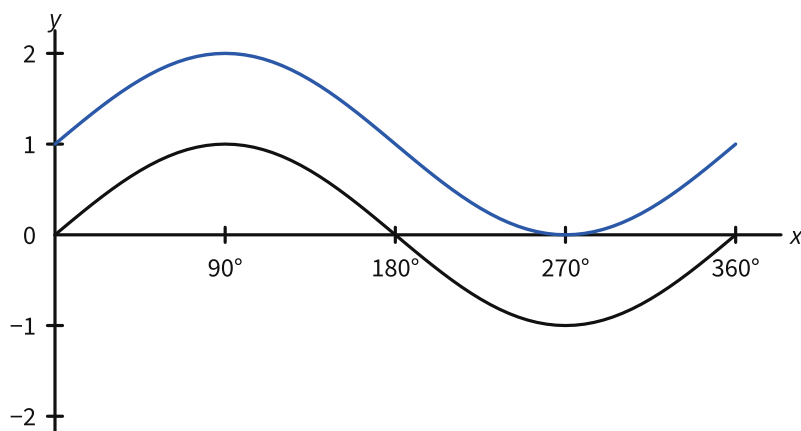
The graph of $y = x^2$ is translated by the vector $\begin{pmatrix} -3 \\ 4 \end{pmatrix}$

Write down the equation of the new graph.

Answer $y = (x + 3)^2 + 4$ (1)(1) [2 marks]

6

The diagram shows the graph of $y = \sin x$ for $0^\circ \leq x \leq 360^\circ$



- (a) On the same axes, sketch the graph of $y = \sin x + 1$

Same shape (1) moved up 1 (1)

[2 marks]

- (b) The point $(90^\circ, 1)$ lies on the graph of $y = \sin x$.

Write down the coordinates of the point it maps to on the graph of $y = -\sin x$.

Answer $(90^\circ, -1)$ (1)

[1 mark]

- (c) The graph of $y = \cos x$ has a maximum point at $(0^\circ, 1)$

Write down the coordinates of the point it maps to on the graph of $y = \cos(x - 30^\circ)$

Answer $(30^\circ, 1)$ (1)

[1 mark]

7

The graph of $y = f(x)$ has a minimum point at $(3, -4)$

- (a) Write down the coordinates of the maximum point of the graph of $y = -f(x) + 2$

reflect to $(3, 4)$ (1)

Answer $(3, 6)$ (1)

[2 marks]

- (b) Write down the coordinates of the minimum point of the graph of $y = f(x + 1) - 3$

one value correct (1)

Answer $(2, -7)$ (1)

[2 marks]

8

The graph of $y = 2x + 1$ is reflected in the y -axis.

Work out the equation of the new graph.

$$y = 2(-x) + 1 \quad (1)$$

Answer $y = -2x + 1 \quad (1)$

[2 marks]

Question	Topic	RAG
1	I can use function notation	
2	I can find where a point moves under a transformation of a graph	
3	I can describe a translation of a graph	
4	I can sketch a translated quadratic graph	
5	I can write the equation of a translated graph	
6	I can transform sine and cosine graphs	
7	I can combine transformations of a graph	
8	I can reflect a straight line graph	