

# Graph Transformations

For Pearson Edexcel GCSE Mathematics (1MA1) • Higher tier

Name \_\_\_\_\_

Total marks: **21**

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Answer **all** questions in the spaces provided. Show your working: marks are given for correct method.

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- 1**    (a)    The graph of  $y = x^2$  is translated 4 units up.  
Write down the equation of the translated graph.

.....  
(1)

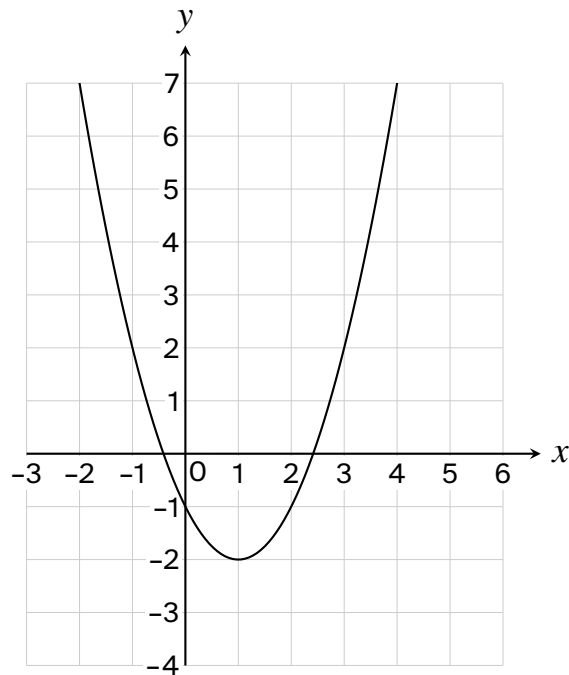
- (b)    The graph of  $y = x^2$  is translated 3 units to the left.  
Write down the equation of the translated graph.

.....  
(1)

**(Total for Question 1 is 2 marks)**

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- 2 The graph of  $y = f(x)$  is shown on the grid.



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

.....  
(1)

- (b) On the same grid, sketch the graph of  $y = f(x - 2)$

(2)

- (c) The graph of  $y = f(x) + k$  touches the  $x$ -axis at exactly one point.  
Find the value of  $k$ .

$k =$  .....  
(1)

**(Total for Question 2 is 4 marks)**

- 3** (a) The graph of  $y = \cos x^\circ$  is translated to give the graph of  $y = \cos x^\circ + 2$   
Describe the transformation.

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(1)

- (b) The graph of  $y = \cos x^\circ$  is translated to give the graph of  $y = \cos(x - 30)^\circ$   
Describe the transformation.

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(1)

**(Total for Question 3 is 2 marks)**

- 4** The point  $A(3, 4)$  lies on the curve  $y = g(x)$   
Write down the coordinates of the image of  $A$  on the curve with equation  
(i)  $y = g(-x)$       (ii)  $y = -g(x)$       (iii)  $y = g(x + 3)$

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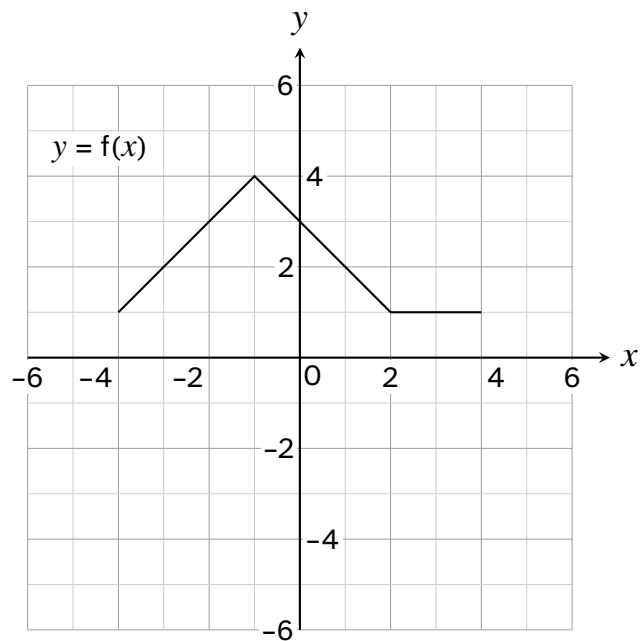
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(3)

**(Total for Question 4 is 3 marks)**

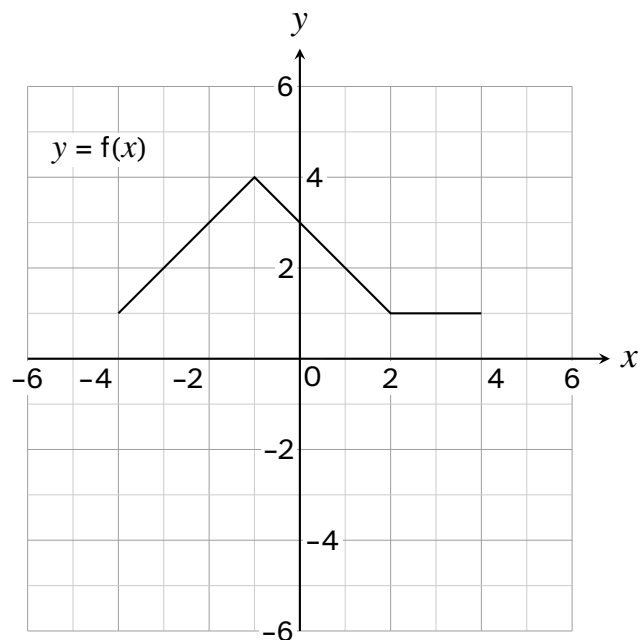
5 The graph of  $y = f(x)$  is shown on each grid.

(a) On the grid, sketch the graph of  $y = -f(x)$



(2)

(b) On the grid, sketch the graph of  $y = f(x + 1) - 3$



(2)

**(Total for Question 5 is 4 marks)**

- 6 The curve  $C$  has equation  $y = x^2 + 2x - 3$   
 The curve  $C$  is translated to give the curve  $D$  with equation  $y = x^2 - 6x + 5$   
 Find the vector of the translation.

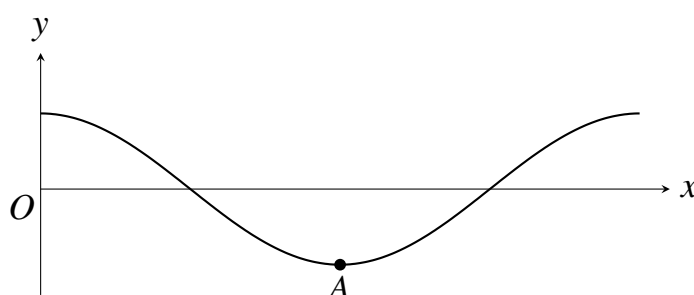
$\left( \begin{array}{c} \phantom{0} \\ \phantom{0} \end{array} \right)$

(2)

**(Total for Question 6 is 2 marks)**

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- 7 Here is a sketch of the graph of  $y = \cos x^\circ$  for  $0 \leq x \leq 360$   
 The point marked  $A$  is the minimum point on the graph.



The graph of  $y = \cos x^\circ$  is translated by the vector  $\begin{pmatrix} 30 \\ 2 \end{pmatrix}$

- (a) Write down the coordinates of the image of  $A$ .

$( \dots\dots\dots , \dots\dots\dots )$

(1)

- (b) Write down an equation of the translated graph.

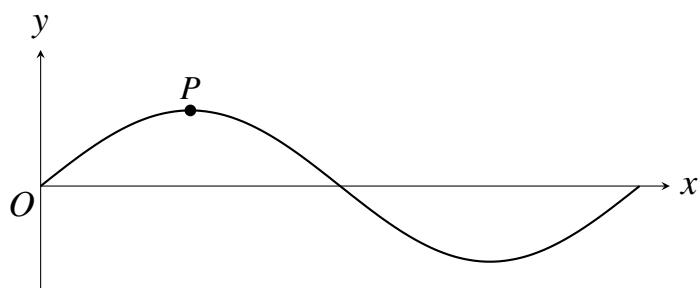
$y = \dots\dots\dots$

(1)

**(Total for Question 7 is 2 marks)**

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- 8** Here is a sketch of the graph of  $y = \sin x^\circ$  for  $0 \leq x \leq 360$   
The point marked  $P$  is a turning point on the graph.



The graph of  $y = \sin x^\circ$  is reflected in the  $x$ -axis and then translated 3 units up, to give the graph of  $y = g(x)$

- (a) Find an expression for  $g(x)$  in terms of  $x$ .

$$g(x) = \dots\dots\dots (1)$$

- (b) Find the coordinates of the image of  $P$  on the graph of  $y = g(x)$

$$(\dots\dots\dots, \dots\dots\dots) (1)$$

**(Total for Question 8 is 2 marks)**