

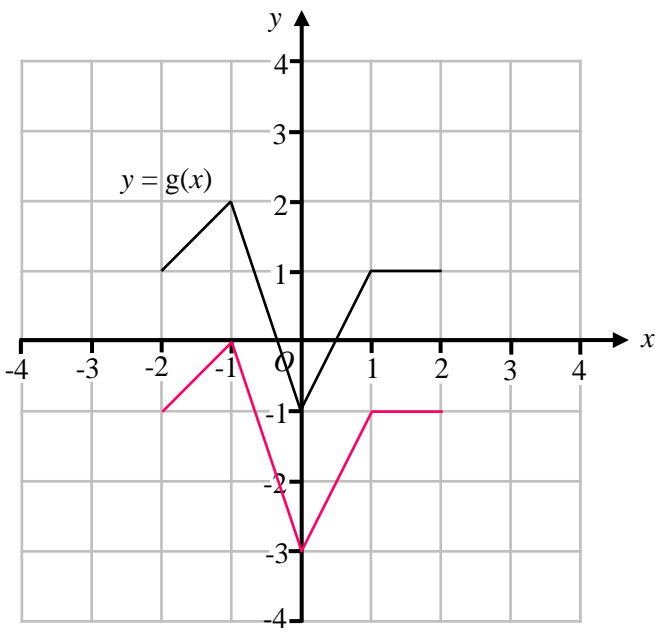
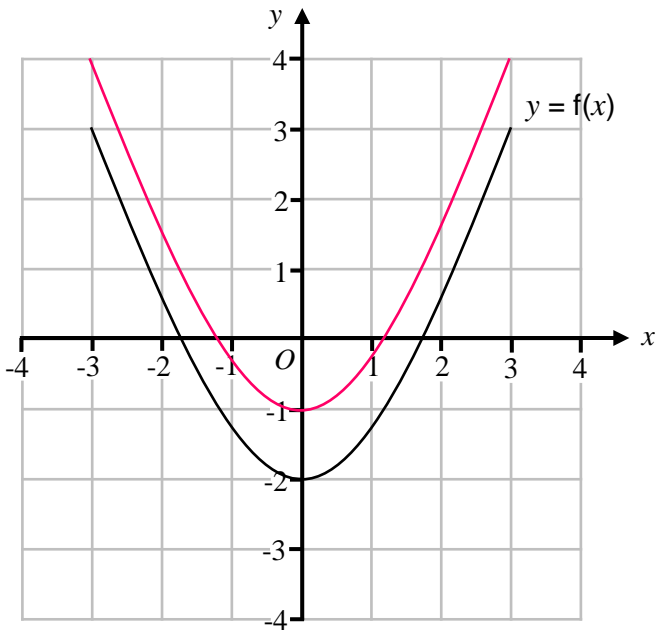


Transformations of Graphs



← REVISE THIS TOPIC

1 The graphs of $y = f(x)$ and $y = g(x)$ are shown on the grids below.

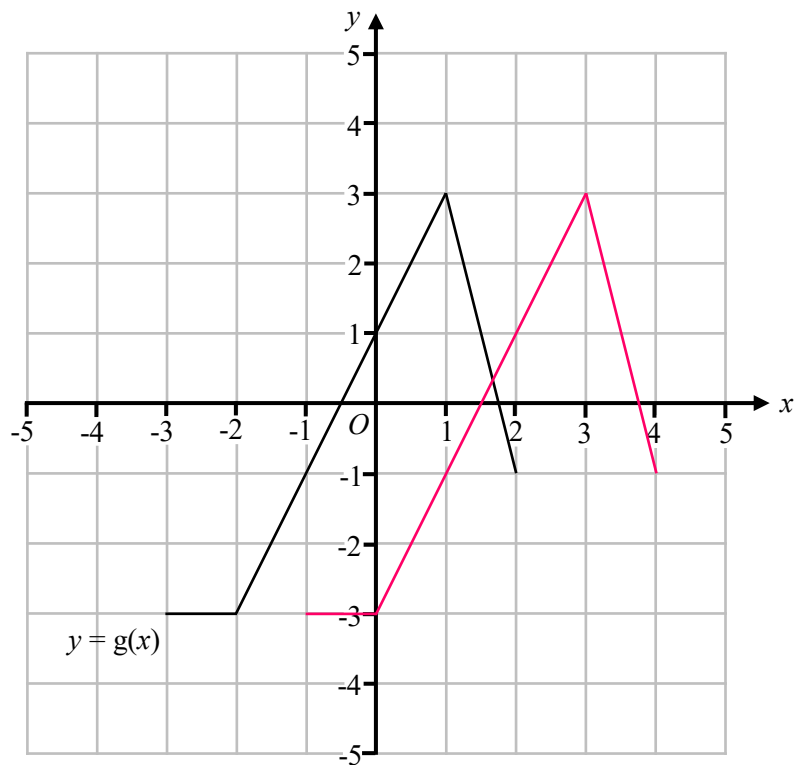
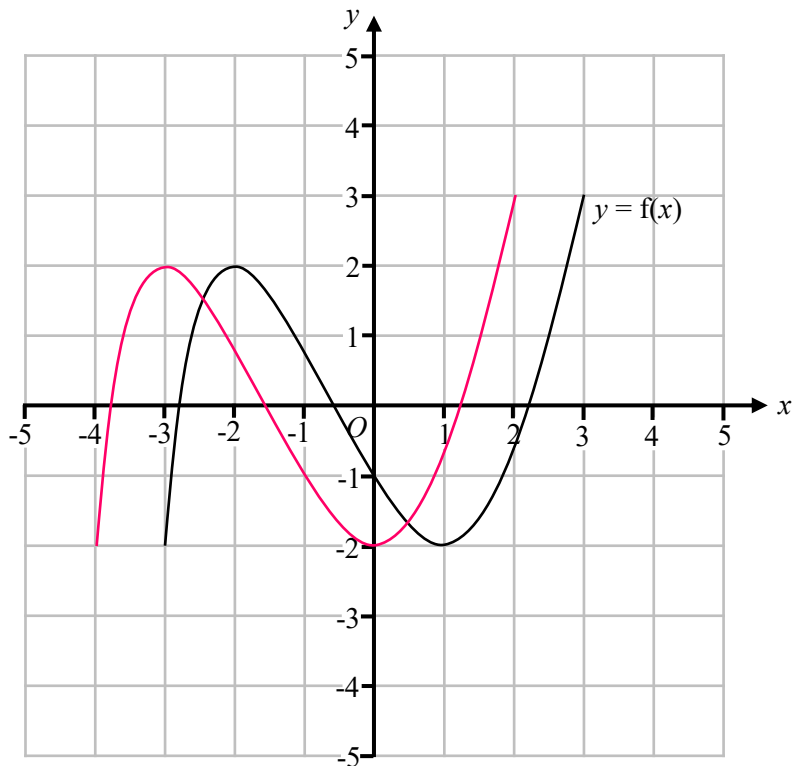


(a) Draw the graph of $y = f(x) + 1$ onto the first grid. (1)

(b) Draw the graph of $y = g(x) - 2$ onto the second grid. (1)

(Total for Question 1 is 2 marks)

2 The graphs of $y = f(x)$ and $y = g(x)$ are shown on the grids below.

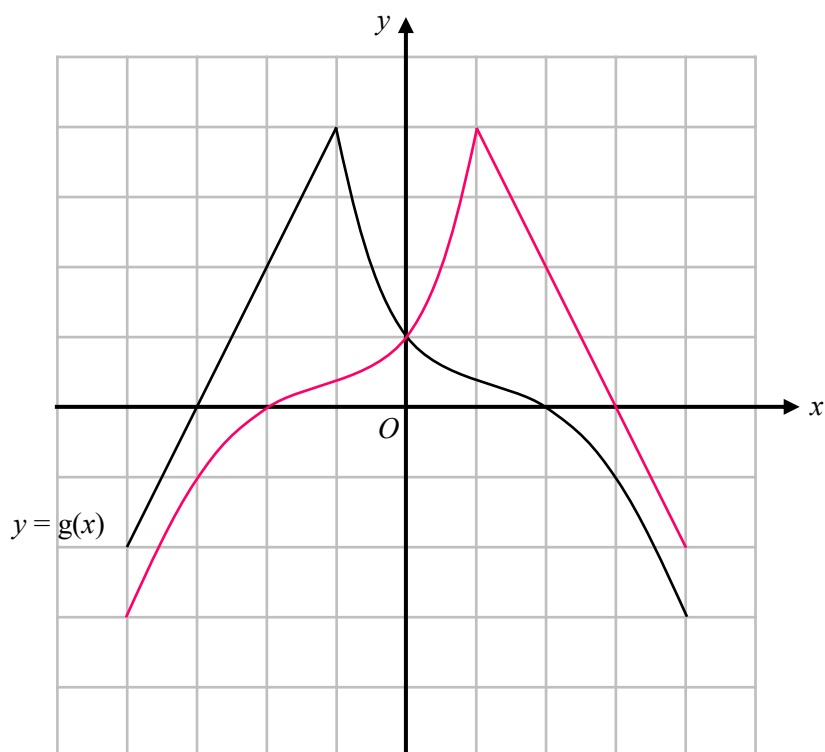
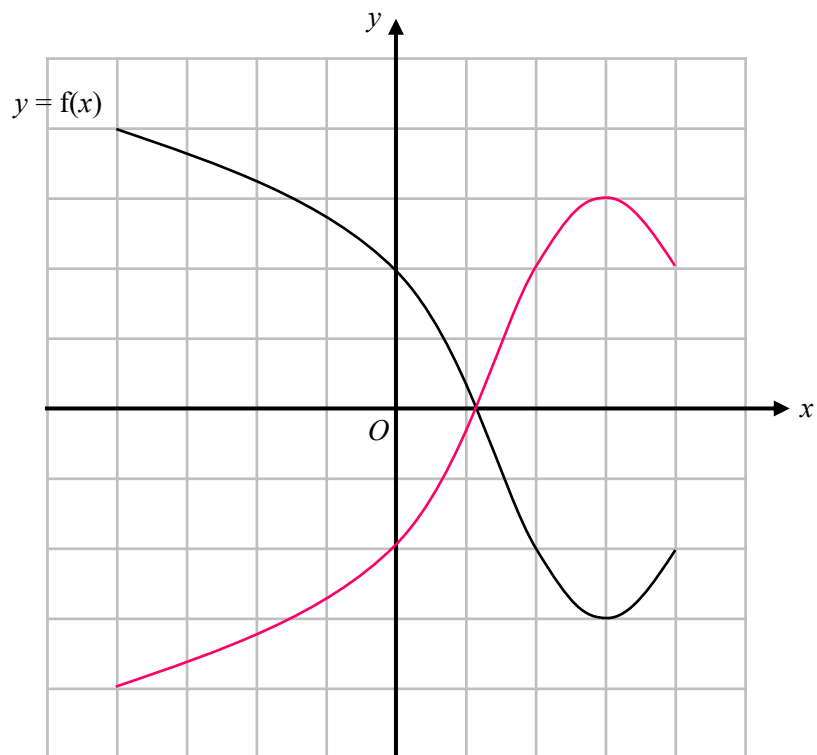


(a) Draw the graph of $y = f(x + 1)$ onto the first grid. (1)

(b) Draw the graph of $y = g(x - 2)$ onto the second grid. (1)

(Total for Question 2 is 2 marks)

3 The graphs of $y = f(x)$ and $y = g(x)$ are shown on the grids below.

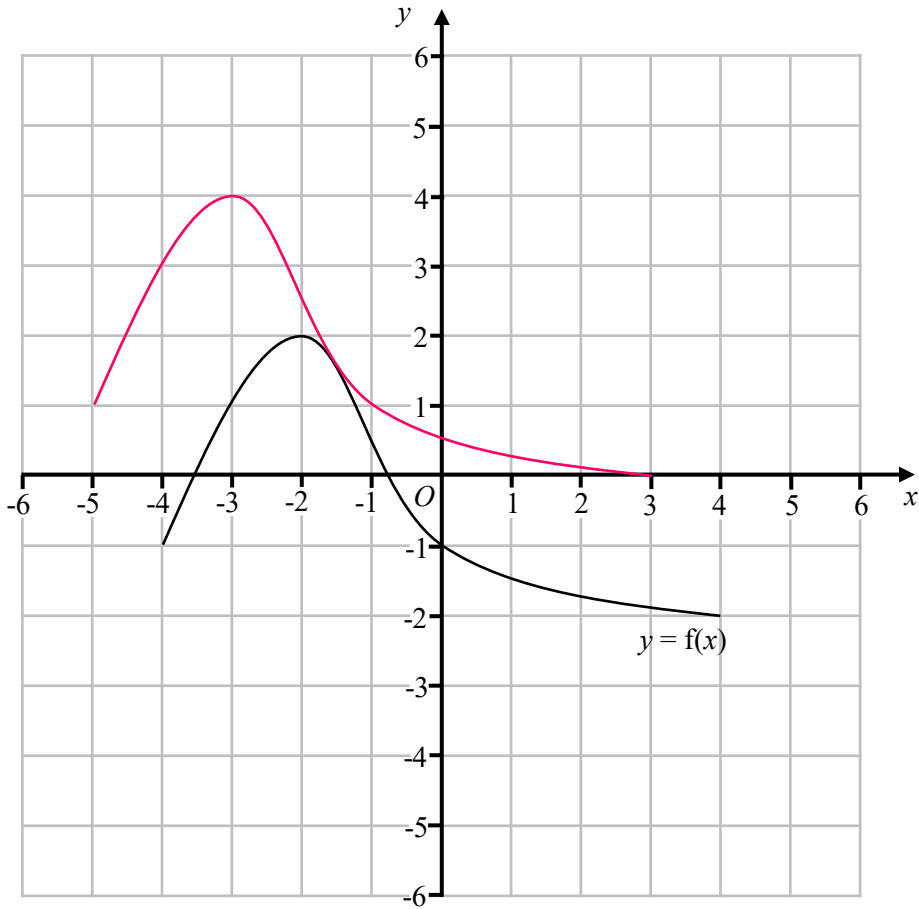


(a) Draw the graph of $y = -f(x)$ onto the first grid. (1)

(b) Draw the graph of $y = g(-x)$ onto the second grid. (1)

(Total for Question 3 is 2 marks)

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



(a) Draw the graph of $y = f(x + 1) + 2$ onto the grid above. (2)

Point $A(-2, 2)$ is on the graph $y = f(x)$

When the graph of $y = f(x)$ is transformed to the graph with equation $y = f(-x)$ the point A is mapped to point B .

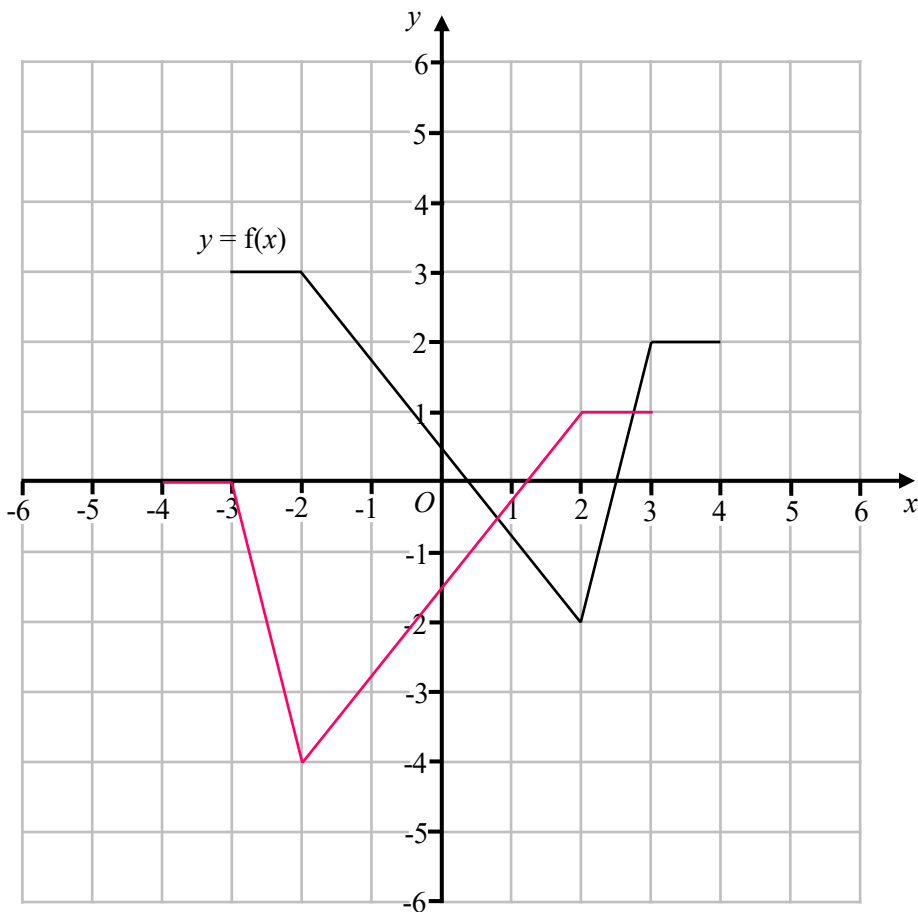
(b) Write down the coordinates of point B .

2 2
 (.....,)
 (1)

(Total for Question 4 is 3 marks)



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



(a) Draw the graph of $y = f(-x) - 2$ onto the grid above. (2)

Point $A(4, 2)$ is on the graph $y = f(x)$

When the graph of $y = f(x)$ is transformed to the graph with equation $y = -f(x + 7)$ the point A is mapped to point B .

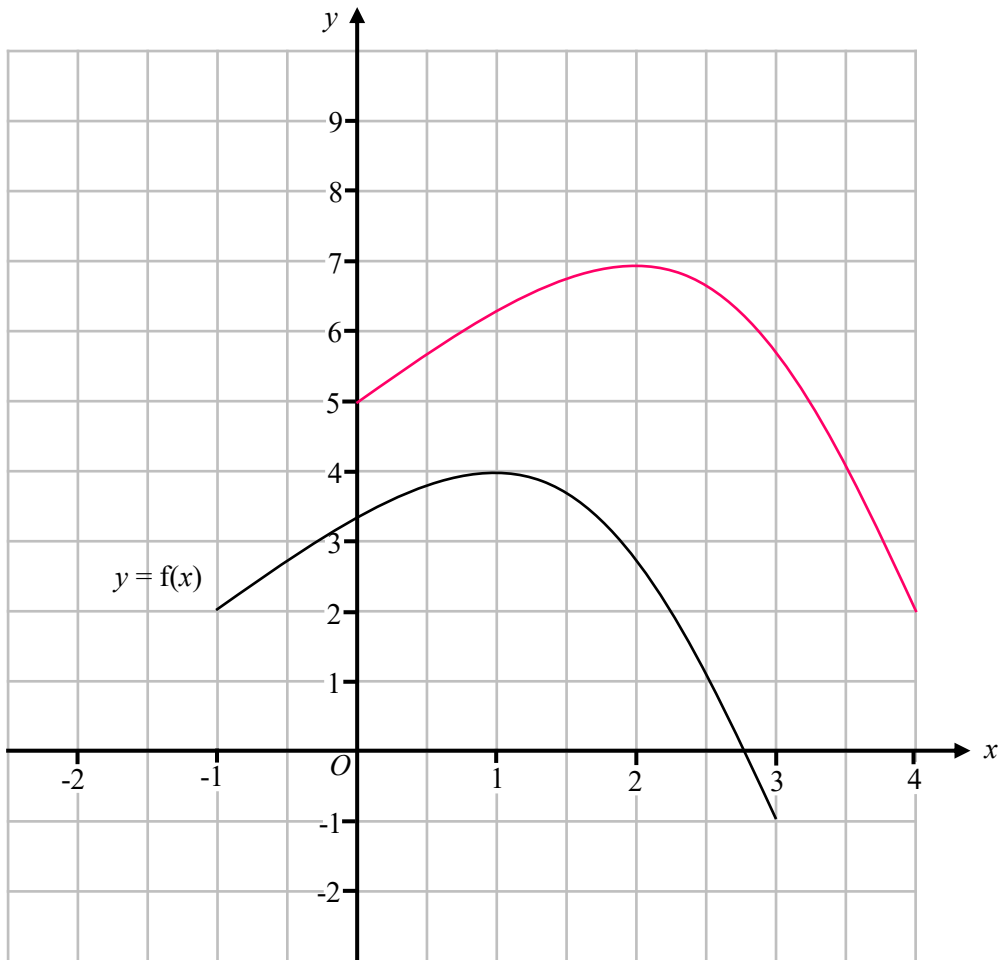
(b) Write down the coordinates of point B .

$(-3, -2)$
 (2)

(Total for Question 5 is 4 marks)



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



(a) Draw the graph of $y = f(x - 1) + 3$ onto the grid above. (2)

Point $A(3, -1)$ is on the graph $y = f(x)$

When the graph of $y = f(x)$ is transformed to the graph with equation $y = -f(-x)$ the point A is mapped to point B .

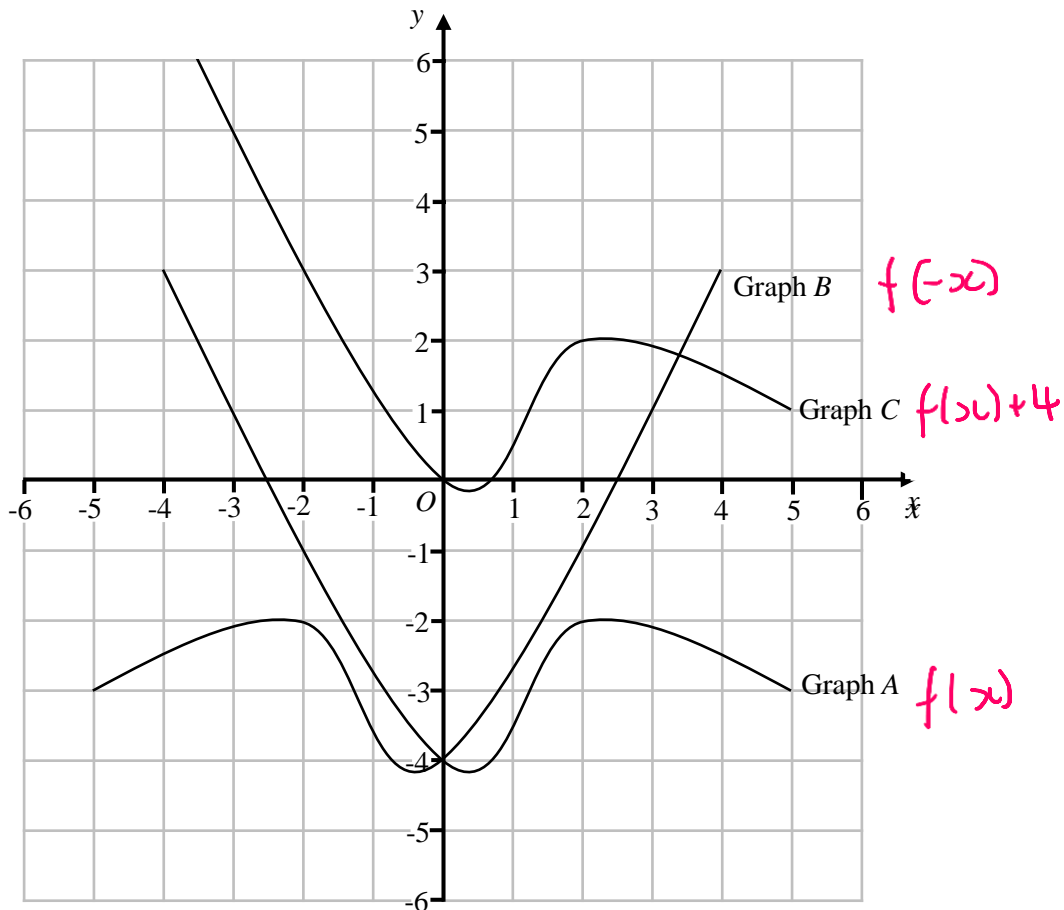
(b) Write down the coordinates of point B .

-3 1
 (.....,)
 (2)

(Total for Question 6 is 4 marks)



7 The grid below shows the graphs A , B and C .



On the grid above

graph A has been reflected to give graph B .
 graph A has been translated to give graph C .

The equation of graph A is $y = f(x)$

(a) Write down an equation of graph B .

$f(-x)$

 (1)

(b) Write down an equation of graph C .

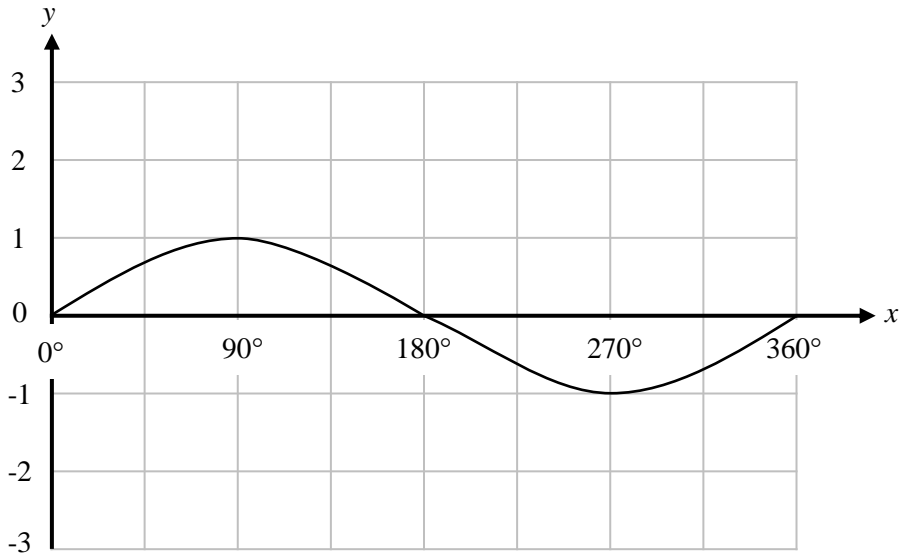
$f(x) + 4$

 (2)

(Total for Question 7 is 3 marks)

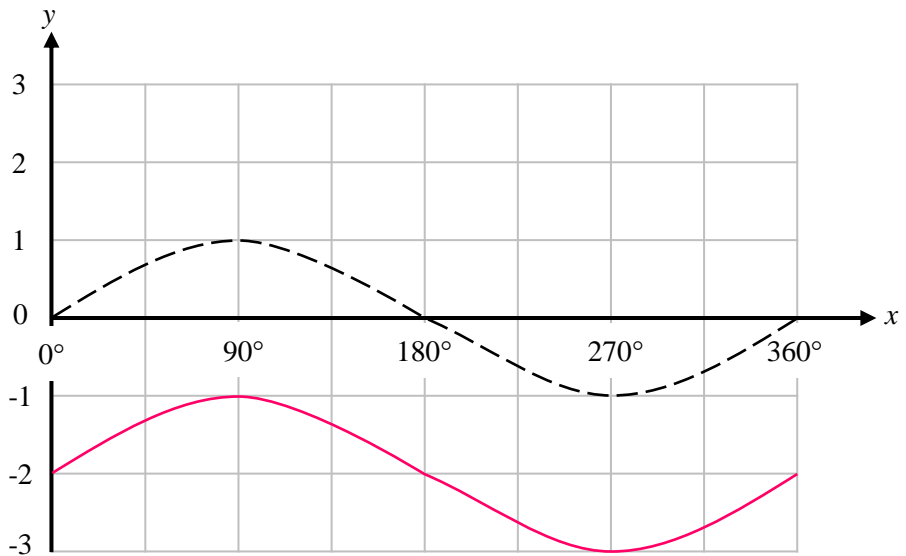


8 Here is the graph of $y = \sin x^\circ$ for $0^\circ \leq x \leq 360^\circ$



In parts (a), (b) and (c) the graph of $y = \sin x^\circ$ is shown as a dashed line.

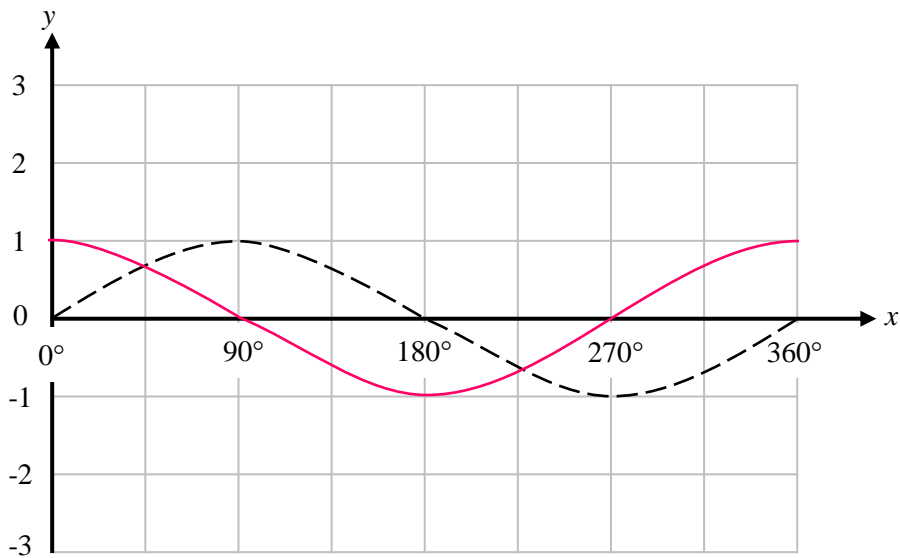
(a) On the grid below sketch the graph of $y = \sin x^\circ - 2$ for $0^\circ \leq x \leq 360^\circ$



(1)

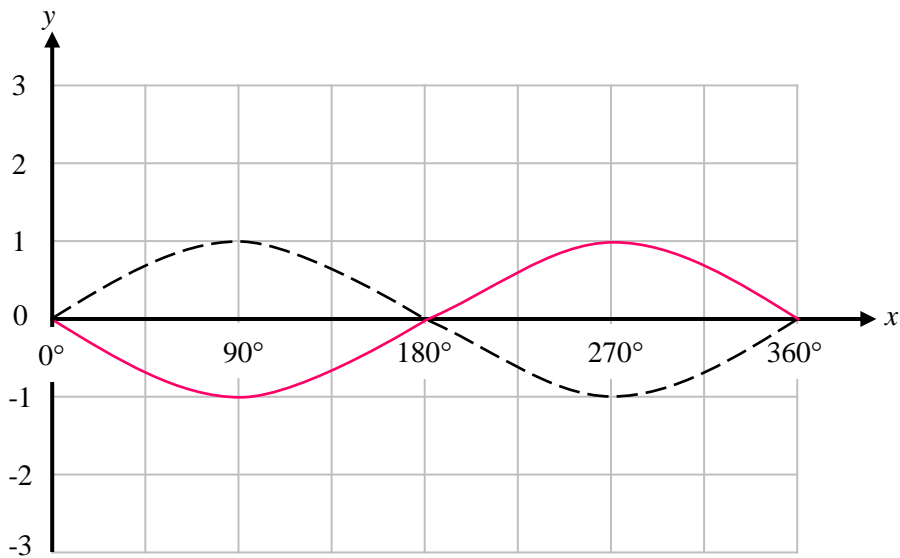


(b) On the grid below sketch the graph of $y = \sin(x + 90^\circ)$ for $0^\circ \leq x \leq 360^\circ$



(1)

(c) On the grid below sketch the graph of $y = -\sin x^\circ$ for $0^\circ \leq x \leq 360^\circ$



(1)



(Total for Question 8 is 3 marks)

- 9 The graph of $y = 3x^2 + 2x - 5$ is reflected in the x -axis.
The reflected graph has equation $y = f(x)$

↑
 $-f(x)$

Work out $f(x)$.

Give your answer in the form $ax^2 + bx + c$ where a , b and c are integers.

$$\begin{aligned}
 & - (3x^2 + 2x - 5) \\
 = & -3x^2 - 2x + 5
 \end{aligned}$$

$$-3x^2 - 2x + 5$$

(Total for Question 9 is 2 marks)

- 10 The graph of $y = x^2 + 5$ is translated 3 units to the left.
The translated graph has equation $y = f(x)$

↑
 $f(x+3)$

Work out $f(x)$.

Give your answer in the form $x^2 + ax + b$ where a and b are integers.

$$\begin{aligned}
 & (x + 3)^2 + 5 \\
 = & x^2 + 6x + 9 + 5 \\
 = & x^2 + 6x + 14
 \end{aligned}$$

$$x^2 + 6x + 14$$

(Total for Question 10 is 3 marks)



11 The graph of $y = 2x^2 - 5x + 3$ is reflected in the y-axis.

The reflected graph has equation $y = f(x)$

$$\uparrow$$

$$f(-x)$$

Work out $f(x)$.

Give your answer in the form $ax^2 + bx + c$ where a , b and c are integers.

$$2(-x)^2 - 5(-x) + 3$$

$$= 2x^2 + 5x + 3$$

$$2x^2 + 5x + 3$$

(Total for Question 11 is 2 marks)

12 The graph of $y = x^3 - 5$ is translated 2 units to the right.

The translated graph has equation $y = f(x)$

$$\uparrow$$

Work out $f(x)$.

$$f(x-2)$$

Give your answer in the form $x^3 + ax^2 + bx + c$ where a , b and c are integers.

$$(x-2)^3 - 5$$

$$= (x^2 - 4x + 4)(x-2) - 5$$

$$= x^3 - 4x^2 + 4x - 2x^2 + 8x - 8 - 5$$

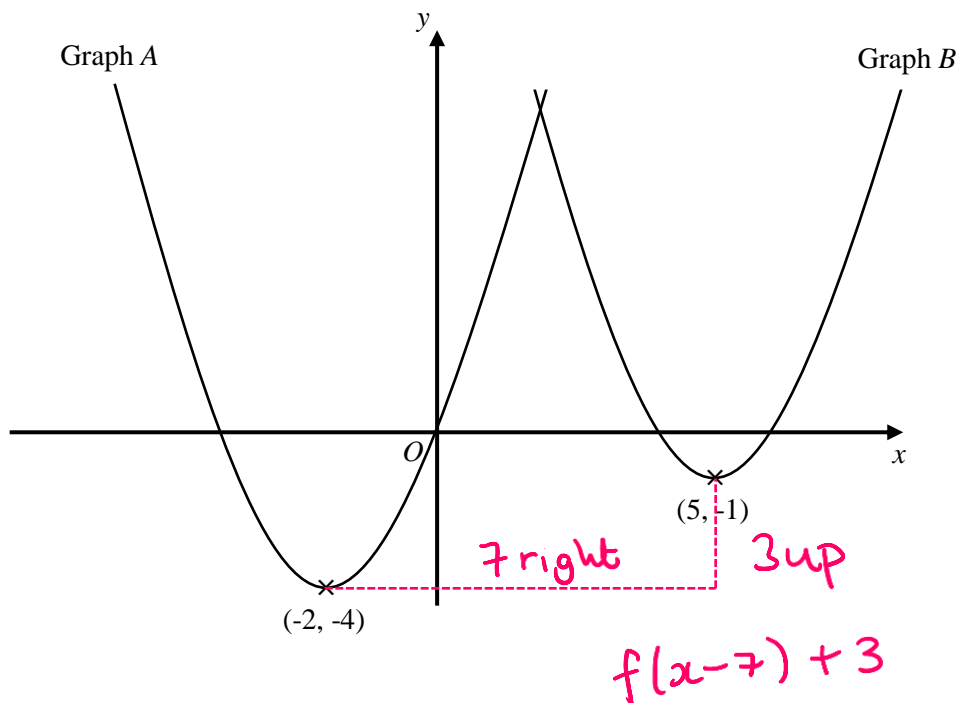
$$= x^3 - 6x^2 + 12x - 13$$

$$x^3 - 6x^2 + 12x - 13$$

(Total for Question 12 is 4 marks)



13 Here are sketches of two graphs.



Graph A has equation $y = x^2 + 4x$

Graph A is translated to give graph B so that the turning point $(-2, -4)$ on graph A is mapped to the point $(5, -1)$ on graph B.

Work out an equation for graph B.

Give your answer in the form $x^2 + ax + b$ where a and b are integers.

$$\begin{aligned}
 & (x-7)^2 + 4(x-7) + 3 \\
 = & x^2 - 14x + 49 + 4x - 28 + 3 \\
 = & x^2 - 10x + 24
 \end{aligned}$$

$$\underline{\underline{x^2 - 10x + 24}}$$

(Total for Question 13 is 4 marks)



14 The graph of $y = 10 - 2x^2$ is translated 3 units to the right and 1 unit up.
The translated graph has equation $y = f(x)$

Work out $f(x)$.

$$f(x-3) + 1$$

Give your answer in the form $ax^2 + bx + c$ where a , b and c are integers.

$$\begin{aligned}
 & 10 - 2(x-3)^2 + 1 \\
 &= 10 - 2(x^2 - 6x + 9) + 1 \\
 &= 10 - 2x^2 + 12x - 18 + 1 \\
 &= -2x^2 + 12x - 7
 \end{aligned}$$

$$-2x^2 + 12x - 7$$

(Total for Question 14 is 4 marks)

