TRANSFORMATION OF GRAPHS

You must write down all the stages in your working.

Question 1

A curve has equation $y = f(x)$

There is only one turning point on the curve.
The coordinates of this turning point are (4, 3)

Write down the coordinates of the turning point on the curve with equation

(i) $y = f(x + 5)$

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

(ii) $y = f(x) + 7$

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

(iii) $y = f(2x)$

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

Question 2

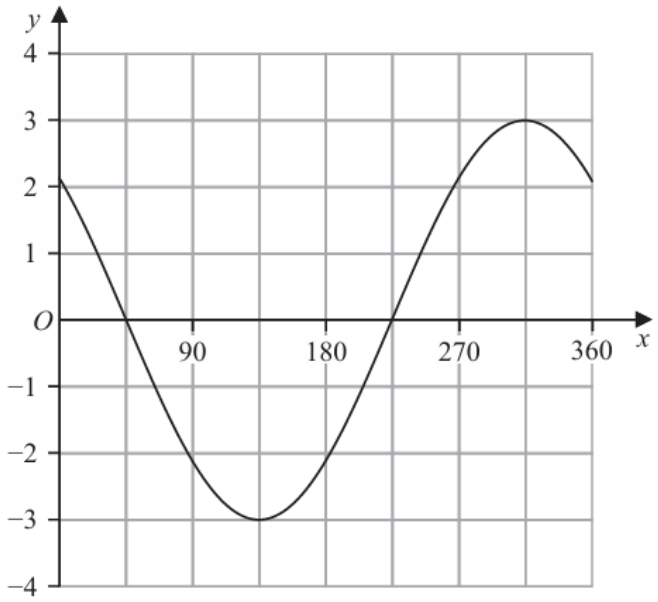
The curve with equation $f(x) = 5x^2 + 9x + 2$ is transformed to the curve with equation

$g(x) = 5(x+4)^2 + 9(x+4) + 8$ by the translation $\begin{pmatrix} a \\ b \end{pmatrix}$

(a) Write down the value of a and the value of b

(2)

The graph of $y = p\cos(x+q)^\circ$ for $0 \leqslant x \leqslant 360$ is drawn on the grid below.



Given that $p > 0$ and $0 < q < 360$

(b) find the value of p and the value of q

$p =$ .....

$q =$ .....

(2)

Question 3

A curve has equation $y = f(x)$

There is one minimum point on this curve.
The coordinates of this minimum point are (5, –4)

Write down the coordinates of the minimum point on the curve with equation

(i) $y = f(x + 7)$

(....., ...)

(1)

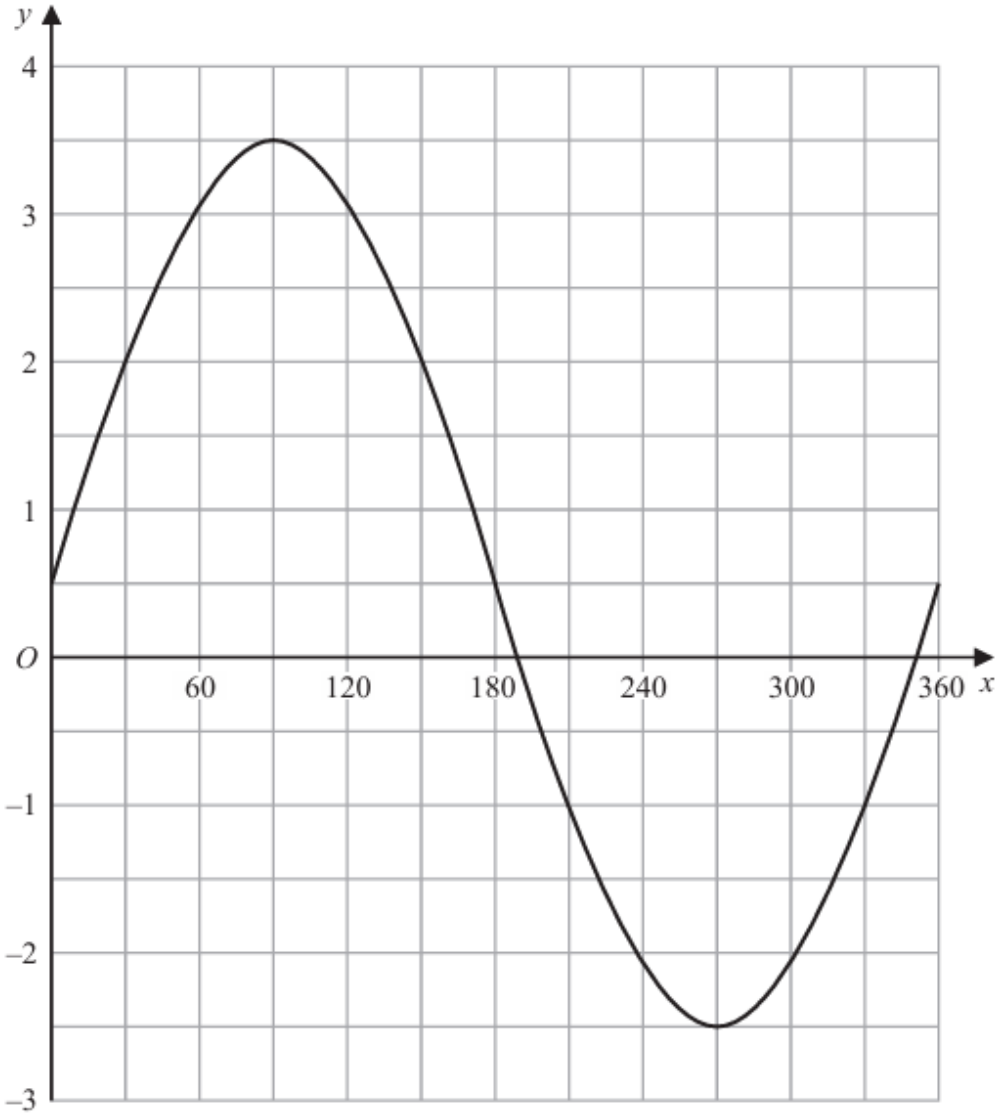
(ii) $y = f(x) – 6$

(....., ...)

(1)

Question 4

The graph of $y = a\sin x° + b$ is drawn on the grid.



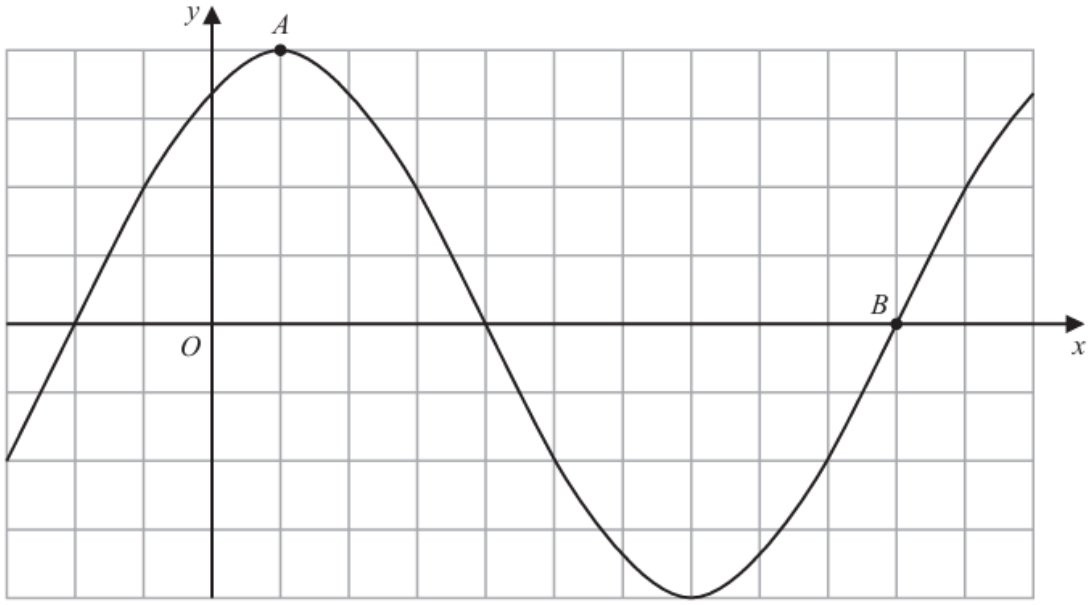
Find the value of a and the value of b

$a =$ .....

$b =$ .....

Question 5

The diagram shows a sketch of the graph of $y = 2\sin(x + 60)°$



(i) Find the coordinates of the point A

(..... , ...)

(1)

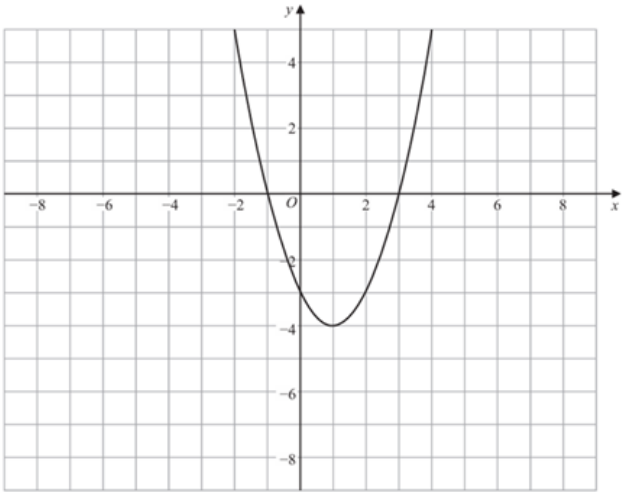
(ii) Find the coordinates of the point B

(..... , ...)

(1)

Question 6

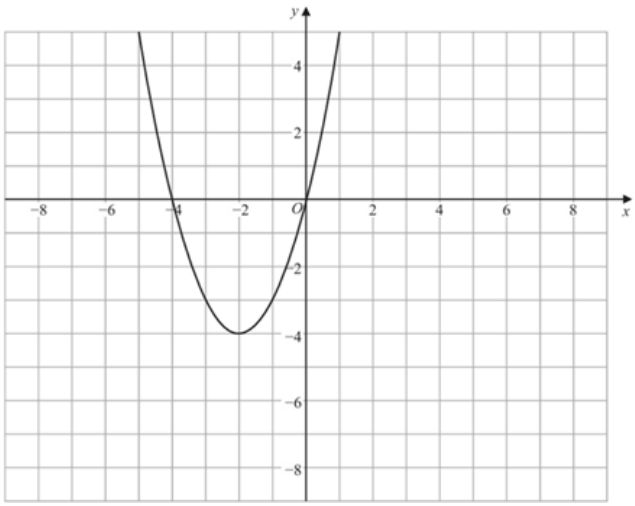
The graph of $y = f(x)$ is shown on the grid.



(a) On the grid above, sketch the graph of $y = f\left(\frac{1}{2}x\right)$

(2)

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



(b) Write down the value of k

.....

(1)

Question 7

The equation of a curve is $y = f(x)$

There is only one minimum point on the curve.
The coordinates of this minimum point are $(8, -12)$

Write down the coordinates of the minimum point on the curve with equation

(i) $y = f(x) + 3$

(..... , ...)

(1)

(ii) $y = f(2x)$

(..... , ...)

(1)

Question 8

A curve has equation $y = f(x)$

There is only one minimum point on the curve.
The coordinates of this minimum point are (5, 4)

Write down the coordinates of the minimum point on the curve with equation

(i) $y = f(x + 5)$

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

(ii) $y = 3f(x)$

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

(iii) $y = f(x) - 7$

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

Question 9

The curve with equation $f(x) = 5x^2 + 9x + 2$ is transformed to the curve with equation

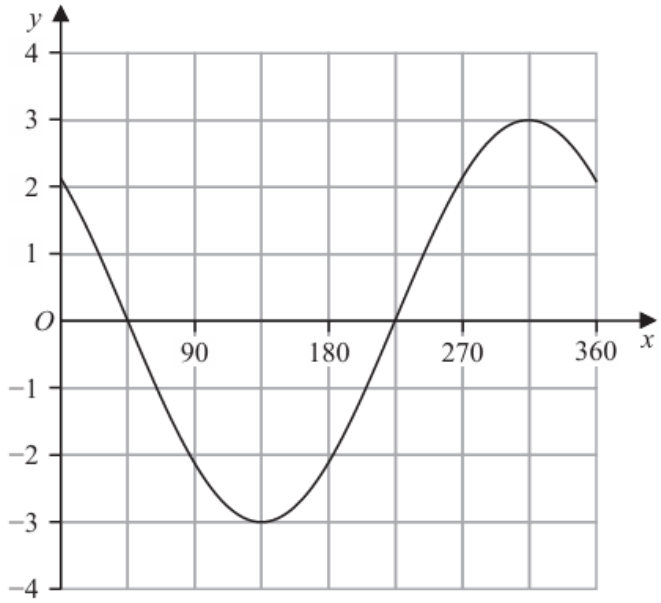
$g(x) = 5(x+4)^2 + 9(x+4) + 8$ by the translation $\begin{pmatrix} a \\ b \end{pmatrix}$

(a) Write down the value of a and the value of b

$a =$ .....

$b =$ .....
(2)

The graph of $y = p\cos(x+q)^\circ$ for $0 \leqslant x \leqslant 360$ is drawn on the grid below.



Given that $p > 0$ and $0 < q < 360$

(b) find the value of p and the value of q

$p =$ .....

$q =$ .....

(2)

Question 10

A curve has equation $y = f(x)$

There is only one turning point on the curve.
The coordinates of this turning point are (6, 5)

Write down the coordinates of the turning point on the curve with equation

(a) $y = f(x - 4)$

(..... , ...)

(1)

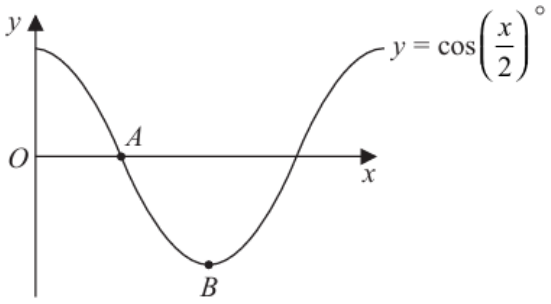
(b) $y = f(3x)$

(..... , ...)

(1)

Question 11

The diagram shows a sketch of the graph of $y = \cos\left(\frac{x}{2}\right)^\circ$



(i) Find the coordinates of the point A

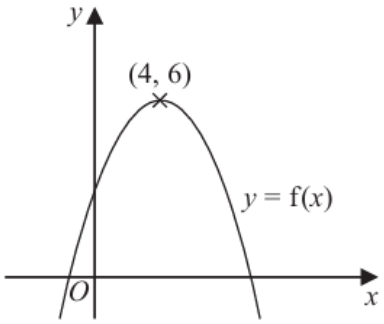
(.....,.....)
(1)

(ii) Find the coordinates of the point B

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

Question 12

The diagram shows a sketch of part of the curve with equation $y = f(x)$



There is one maximum point on this curve.
The coordinates of this maximum point are (4, 6)

(a) Write down the coordinates of the maximum point on the curve with equation

(i) $y = f(x + 4)$

(.....,.....)

(ii) $y = f(2x)$

(..... , ...)

(2)

The equation of a curve **C** is $y = x^2 + 3x + 4$

The curve **C** is transformed to curve **S** under the translation $\begin{pmatrix} 4 \\ 6 \end{pmatrix}$

(b) Find an equation of curve **S**.

You do not need to simplify the equation.

.....

(2)