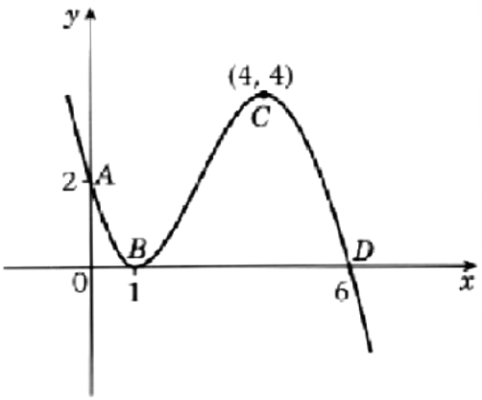
# Transformations of Graphs

1.

The following diagram shows a sketch of the curve with equation $y = f(x)$. The points $A(0, 2)$, $B(1, 0)$, $C(4, 4)$ and $D(6, 0)$ lie on the curve.




Sketch the following graphs and give the coordinates of the points $A$, $B$, $C$ and $D$ after each transformation:

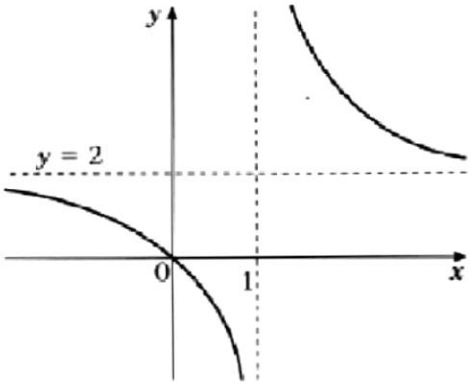
**a** $f(x + 1)$ **b** $f(x) - 4$ **c** $f(x + 4)$

**d** $f(2x)$ **e** $3f(x)$ **f** $f(\frac{1}{2}x)$

**g** $\frac{1}{2}f(x)$ **h** $f(-x)$

2.

The curve $y = f(x)$ passes through the origin and has horizontal asymptote $y = 2$ and vertical asymptote $x = 1$, as shown in the diagram.



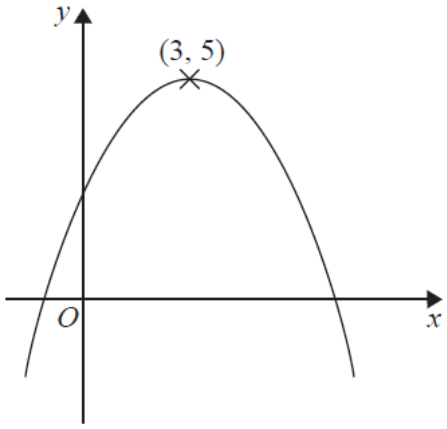

Sketch the following graphs and give the equations of any asymptotes and, for all graphs except **a**, give coordinates of intersections with the axes after each transformation.

**a** $f(x) + 2$ **b** $f(x + 1)$ **c** $2f(x)$

**d** $f(x) - 2$ **e** $f(2x)$ **f** $f(\frac{1}{2}x)$

**g** $\frac{1}{2}f(x)$ **h** $-f(x)$

3.




The diagram shows part of the curve with equation $y = f(x)$.
The coordinates of the maximum point of the curve are $(3, 5)$.

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

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

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

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

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

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

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

**(3)**

The curve with equation $y = f(x)$ is transformed to give the curve with equation $y = f(x) - 4$

(b) Describe the transformation.

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**(1)**

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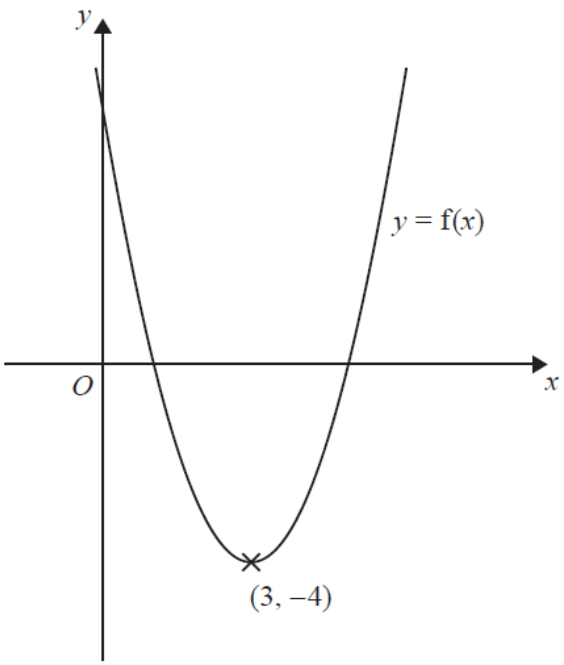
4.




The diagram shows part of the curve with equation $y = f(x)$.
The coordinates of the minimum point of this curve are $(3, -4)$

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

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

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

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

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

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

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

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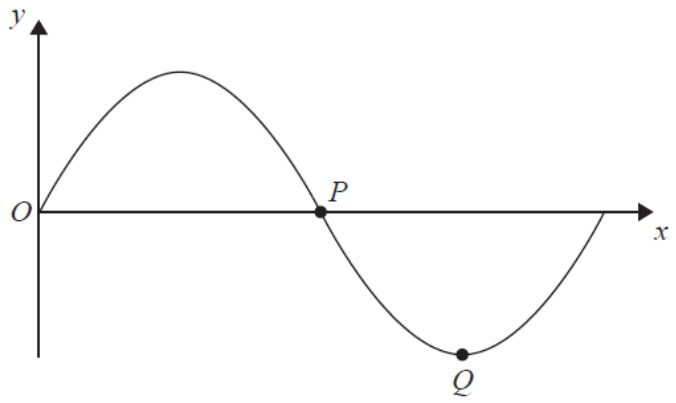
5.

The diagram shows part of a sketch of the curve $y = \sin x°$.




(a) Write down the coordinates of the point $P$.

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

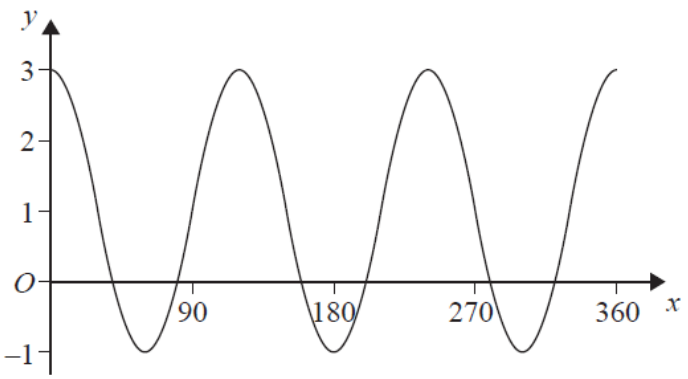
**(1)**

(b) Write down the coordinates of the point $Q$.

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

**(1)**

Here is a sketch of the curve $y = a\cos bx° + c, \quad 0 \leqslant x \leqslant 360$



(c) Find the values of $a$, $b$ and $c$.

$a =$ .....

$b =$ .....

$c =$ .....

**(3)**

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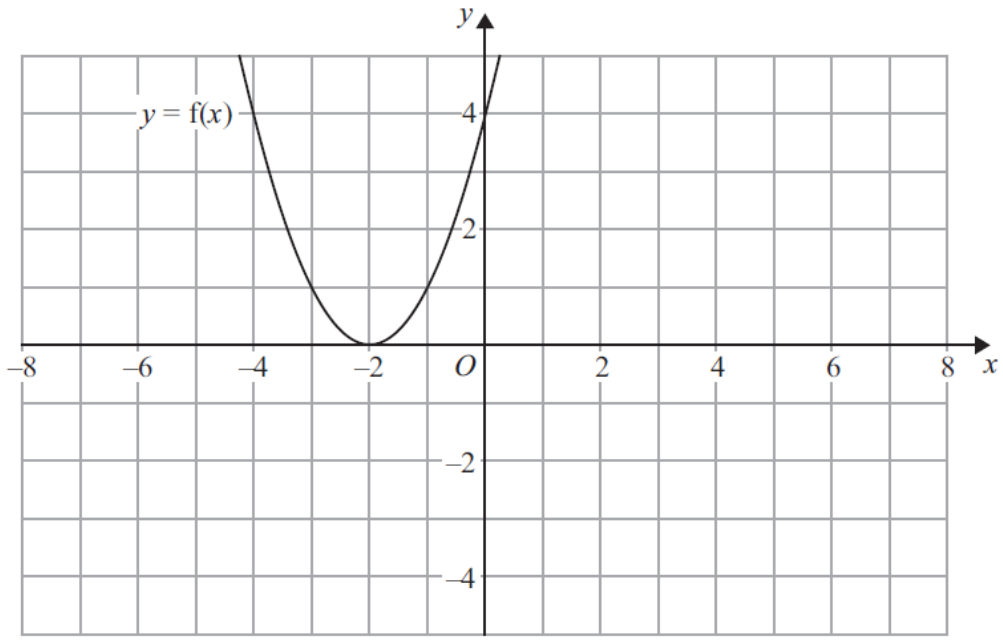
6.

$y = f(x)$

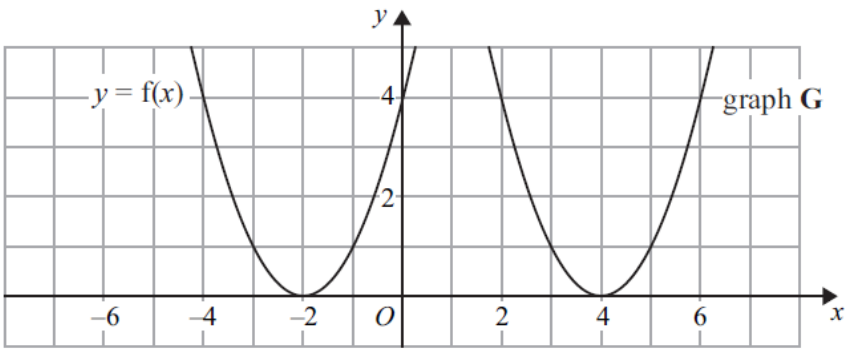
The graph of $y = f(x)$ is shown on the grid.




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

**(2)**

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




The graph **G** is a translation of the graph of $y = f(x)$.

(b) Write down the equation of graph **G**.

.....

(1)

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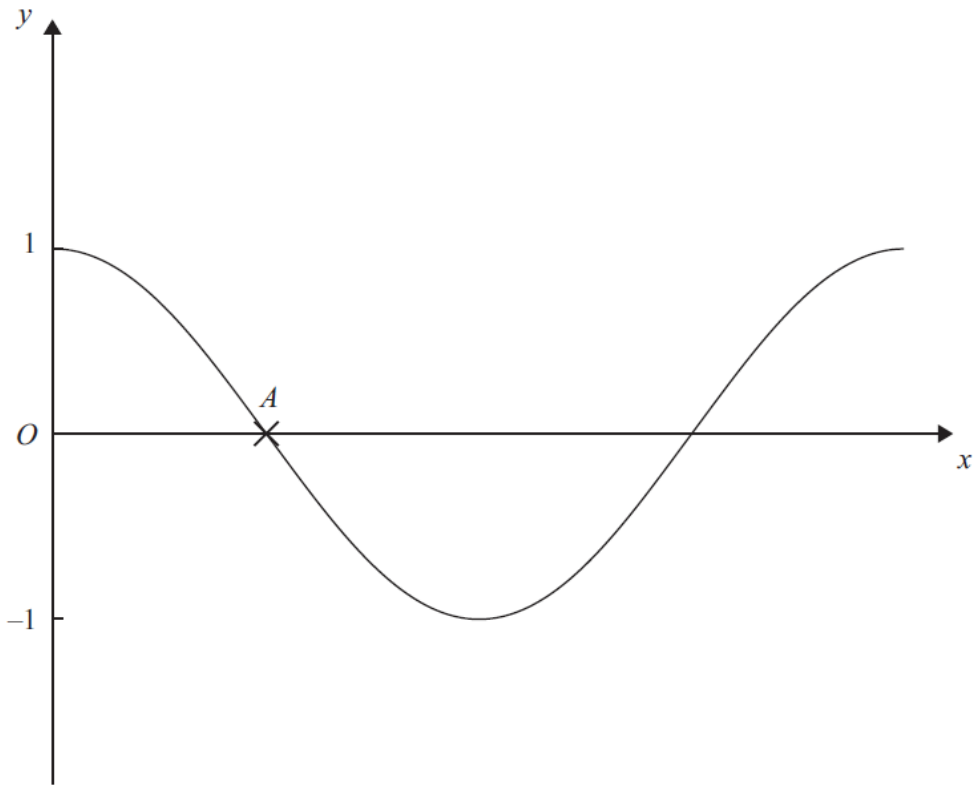
7.

The diagram shows a sketch of the graph of $y = \cos x°$




(a) Write down the coordinates of the point $A$.

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

(1)

(b) On the same diagram, draw a sketch of the graph of $y = 2 \cos x°$

(1)

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8.

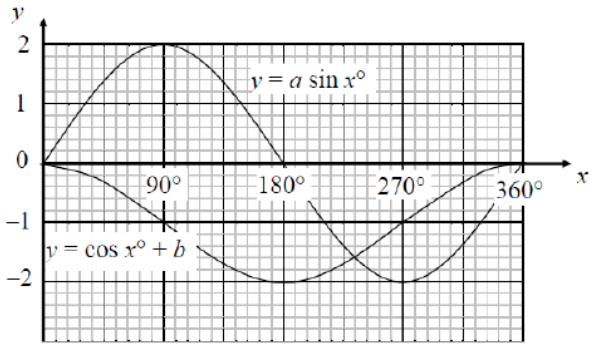


Diagram **NOT** accurately drawn

The diagram shows part of two graphs.

The equation of one graph is $y = a \sin x°$
The equation of the other graph is $y = \cos x° + b$

Find the values of the constants $a$ and $b$.