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GCSE MATHS

Algebra

Edexcel 1MA1 | Subtopic collection Topic 25

Transforming graphs

Higher tier

Past paper question booklet

26	2003-2024	Higher
question groups	available papers	tier

Before you begin

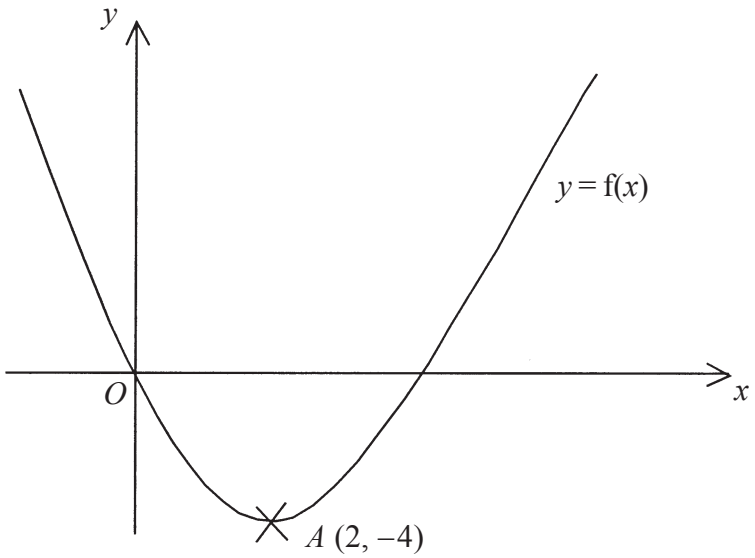
1. Show working and use units where appropriate.
2. Use extra paper if you need more space.
3. Print at actual size (100%) for measurement questions.

Name _____ **Date** _____

Whole questions are retained for context; some parts cover other points. Legacy sources are labelled.

24. This is a sketch of the curve with equation $y = f(x)$.
It passes through the origin O.

Leave blank



The only vertex of the curve is at $A\ (2, -4)$

(a) Write down the coordinates of the vertex of the curve with equation

(i) $y = f(x - 3)$,

(..... , ...)

(ii) $y = f(x) - 5$,

(..... , ...)

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

(..... , ...)

(iv) $y = f(2x)$.

(..... , ...)

(4)

The curve with equation $y = x^2$ has been translated to give the curve $y = f(x)$.

(b) Find $f(x)$ in terms of x.

$f(x) =$ .....

(4)

20. The expression $x^2 - 6x + 14$ can be written in the form $(x - p)^2 + q$, for all values of x.

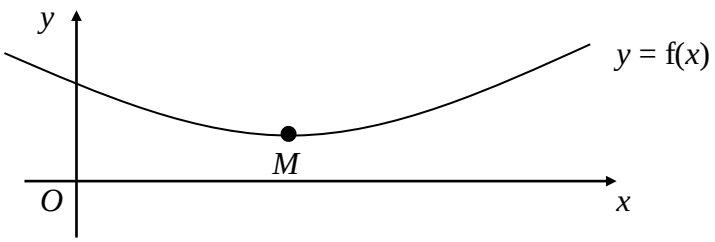
(a) Find the value of (i) p, (ii) q.

(i) p = ...

(ii) q = ...

(3)

The equation of a curve is $y = f(x)$, where $f(x) = x^2 - 6x + 14$.
Here is a sketch of the graph of $y = f(x)$.

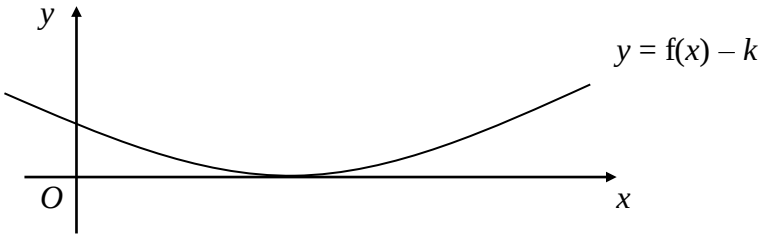


(b) Write down the coordinates of the minimum point, M, of the curve.

.....

(1)

Here is a sketch of the graph of $y = f(x) - k$, where k is a positive constant.
The graph touches the x-axis.



(c) Find the value of k.

$k =$ .....

(1)

(d) For the graph of $y = f(x - 1)$,

(i) write down the coordinates of the minimum point,

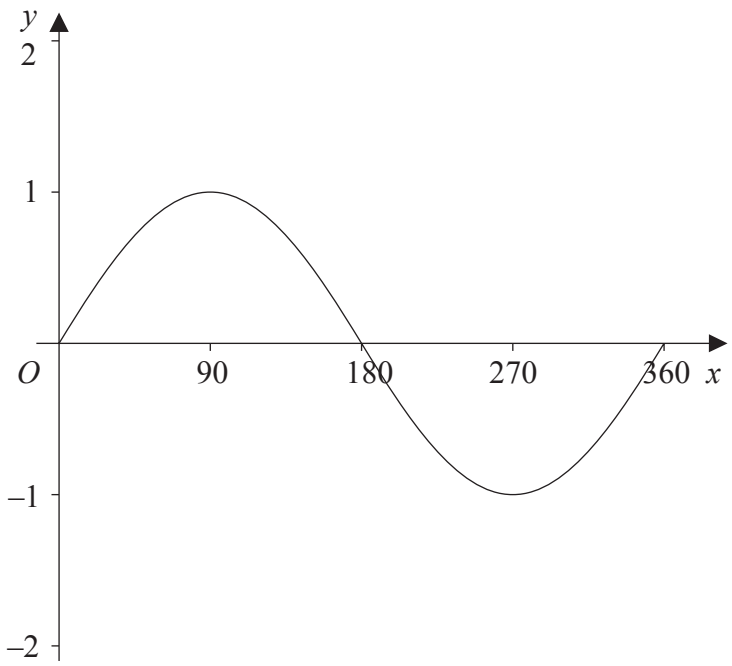
.....

(ii) find the coordinates of the point where the curve crosses the y-axis.

.....

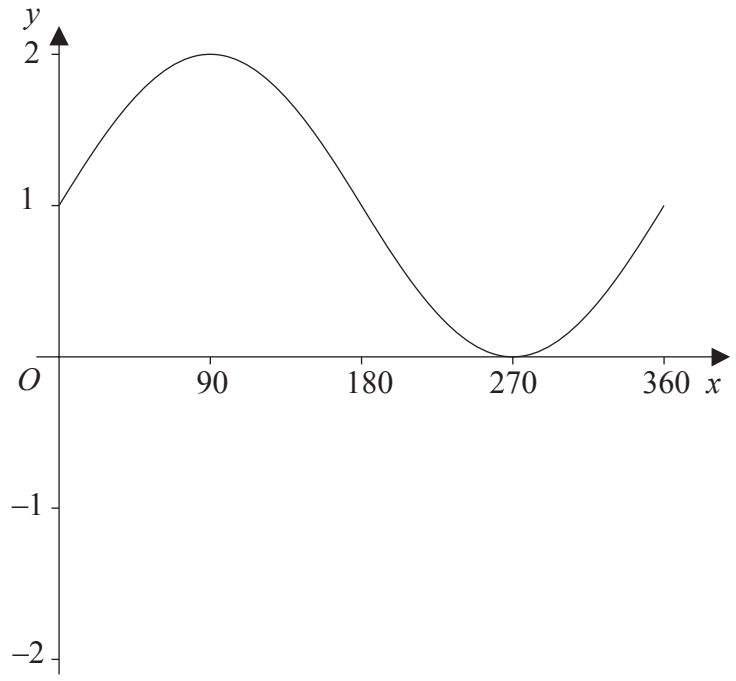
(3)

20. A sketch of the curve $y = \sin x°$ for $0 \leqslant x \leqslant 360$ is shown below.



(a) Using the sketch above, or otherwise, find the equation of each of the following two curves.

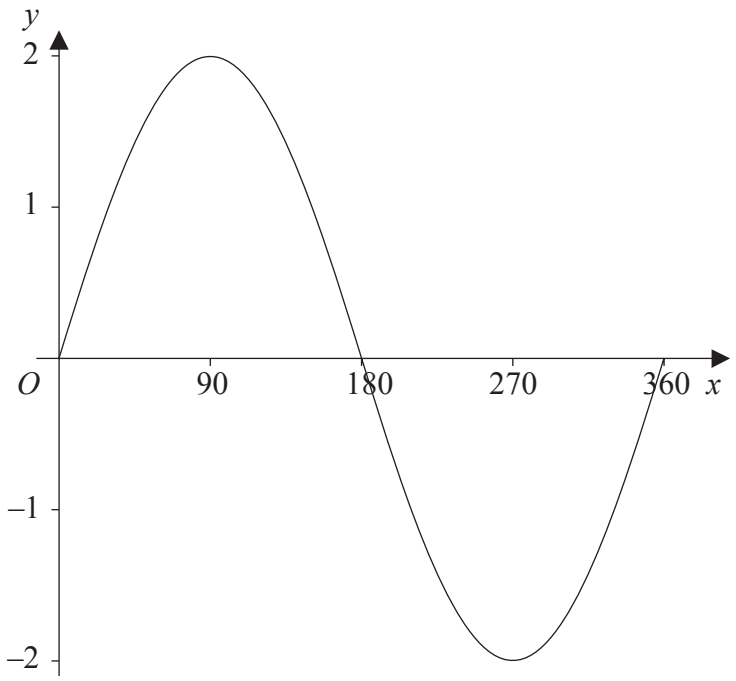
(i)



(i) Equation $y =$ .....

blank

(ii)



(ii) Equation y = ...

(2)

(b) Describe fully the sequence of two transformations that maps the graph of $y = \sin x°$ onto the graph of $y = 3 \sin 2x°$.

.....

.....

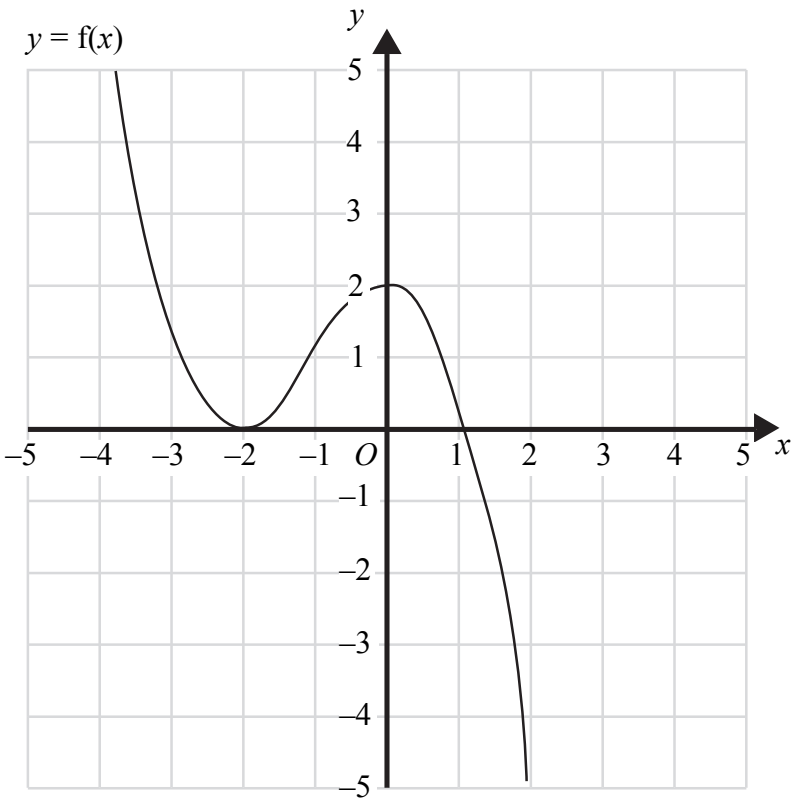
.....

.....

(3)

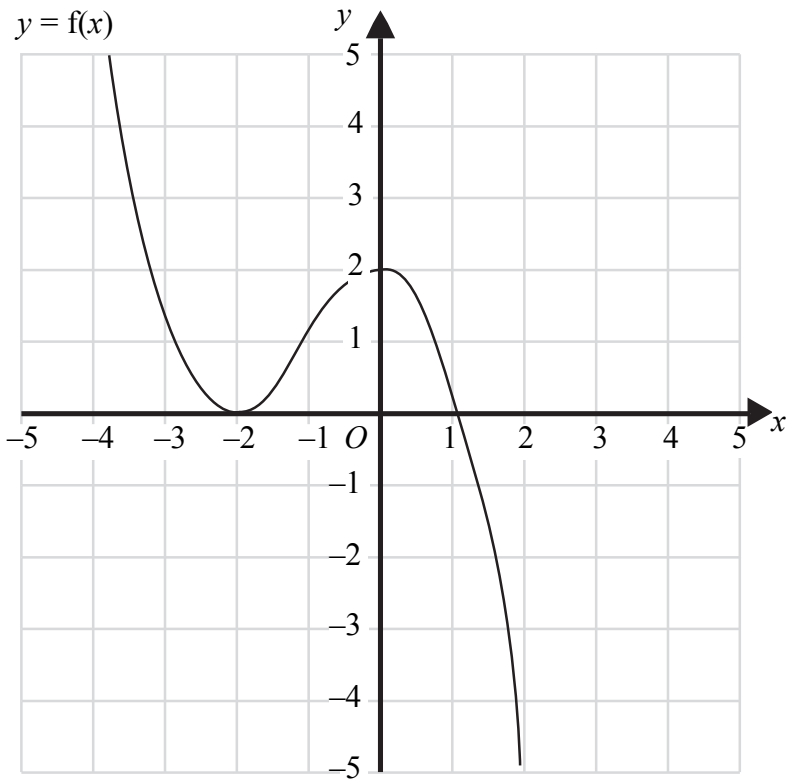
20. The graph of $y = f(x)$ is shown on the grids.

(a) On this grid, sketch the graph of $y = f(x - 1)$



(2)

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



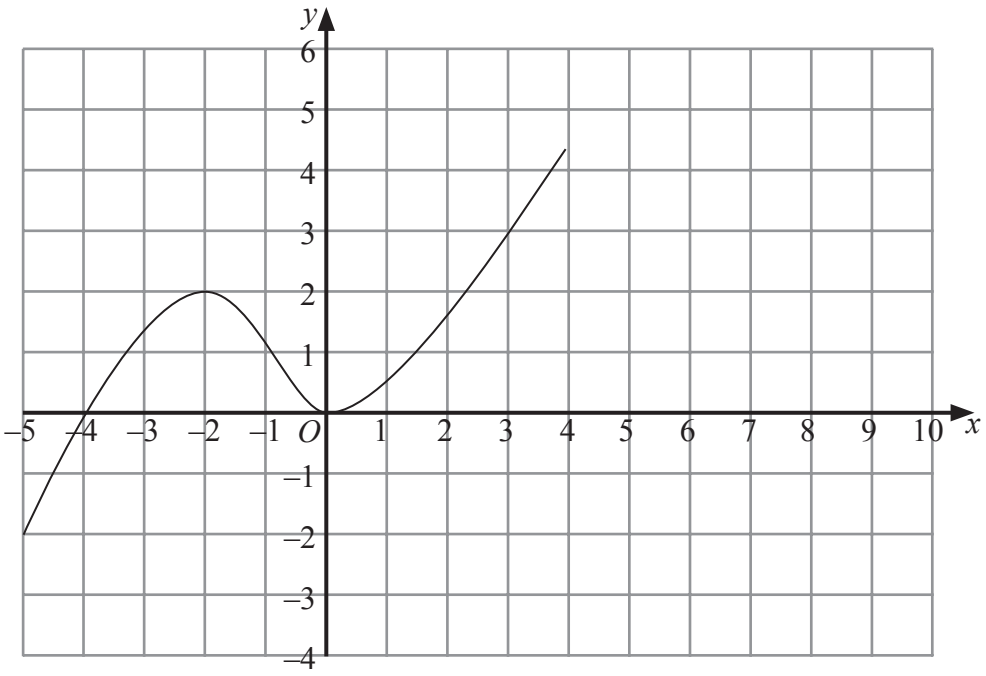
(2)

(Total 4 marks)

Q20

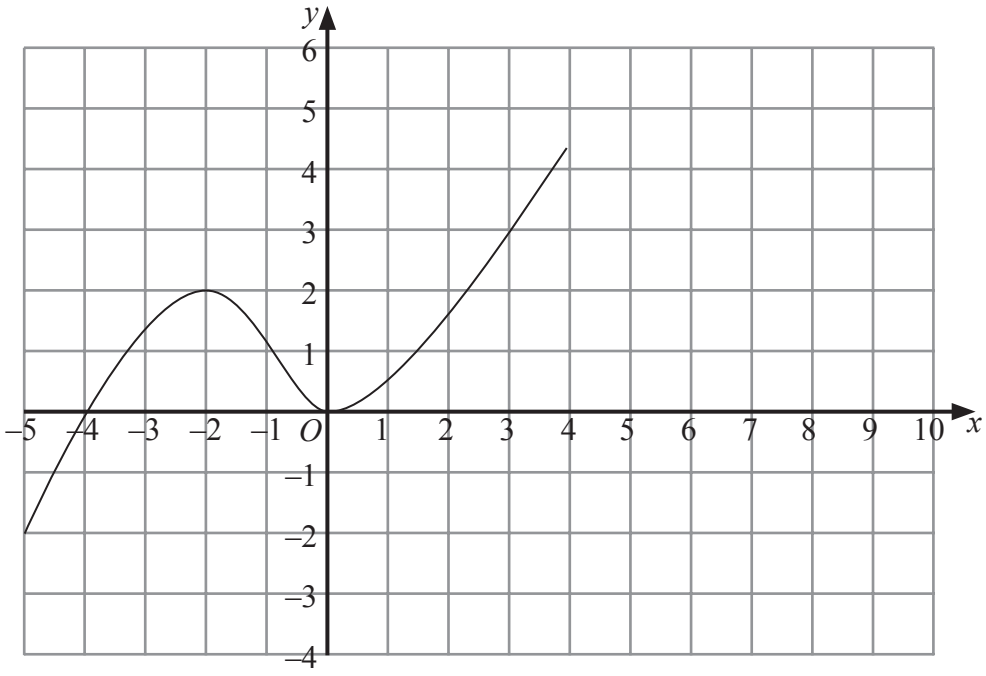
27. The graph of $y = f(x)$ is shown on the grids.

(a) On this grid, sketch the graph of $y = f(x) + 2$



(2)

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

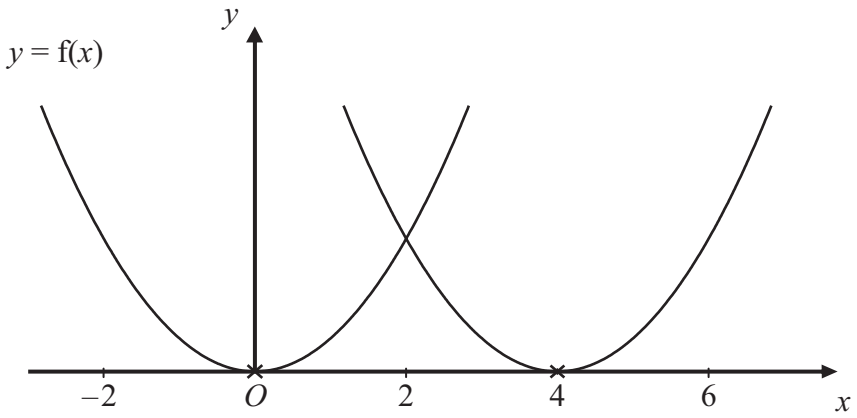


(2)

Q27

(Total 4 marks)

26.

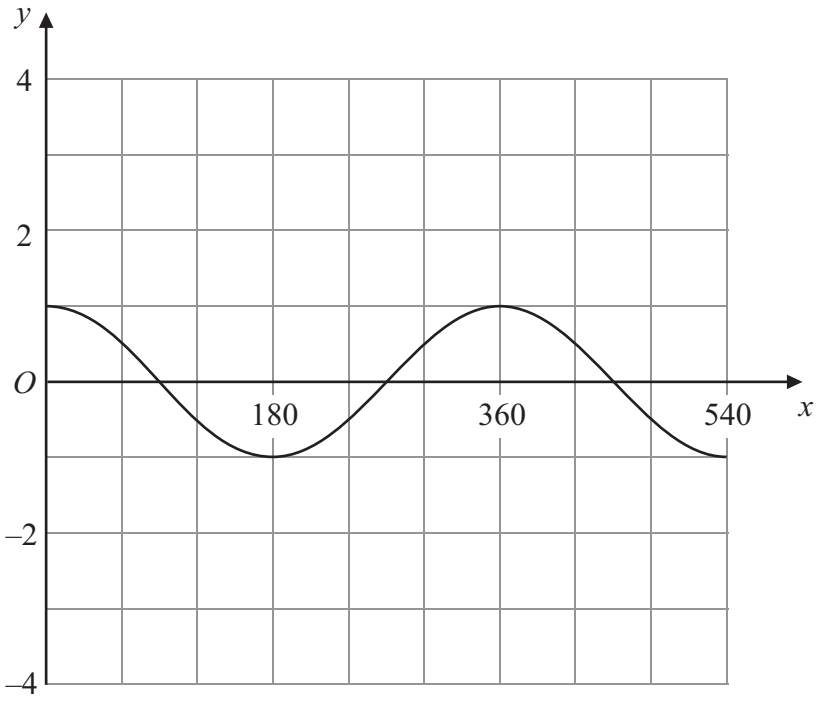


The curve with equation $y = f(x)$ is translated so that the point at (0, 0) is mapped onto the point (4, 0).

(a) Find an equation of the translated curve.

.....

(2)



The grid shows the graph of $y = \cos x°$ for values of x from 0 to 540

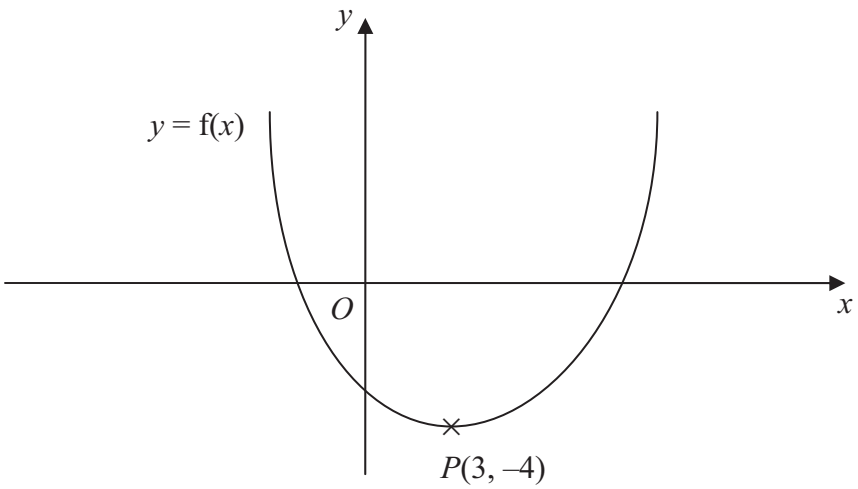
(b) On the grid, sketch the graph of $y = 3\cos(2x°)$ for values of x from 0 to 540

(2)

(Total 4 marks)

Q26

24. This is a sketch of the curve with the equation $y = f(x)$.
The only minimum point of the curve is at $P(3, -4)$.



(a) Write down the coordinates of the minimum point of the curve with the equation $y = f(x - 2)$

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

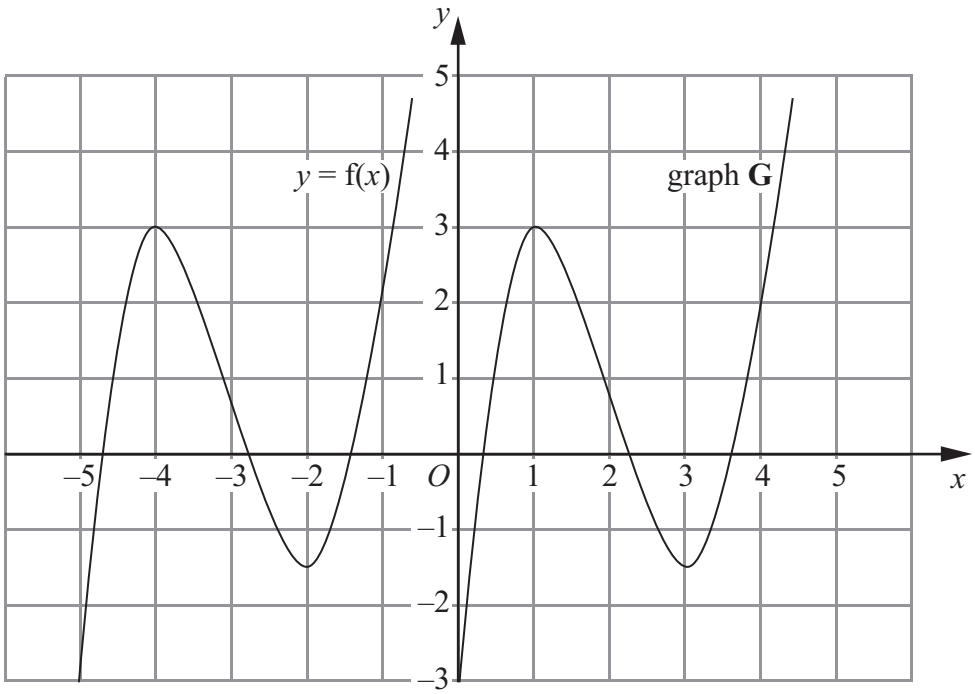
(b) Write down the coordinates of the minimum point of the curve with the equation $y = f(x + 5) + 6$

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

Q24

(Total 4 marks)

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



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

(a) Write down, in terms of f, the equation of graph **G**.

$y =$ .....

(1)

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

(b) Write down the coordinates of the maximum point of the graph of $y = f(-x)$.

(..... , ...)

(2)

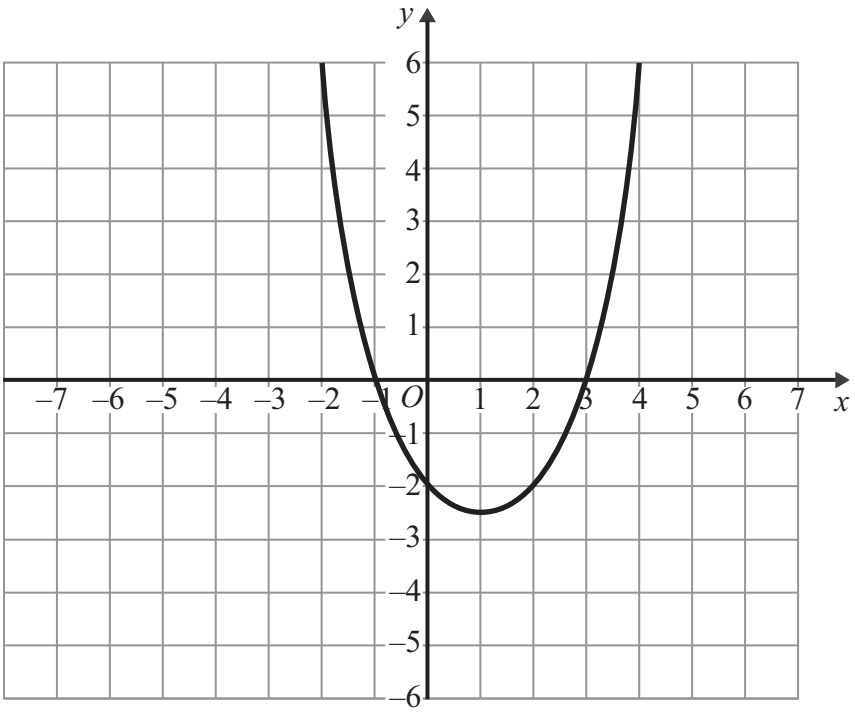
(Total 3 marks)

Q27

Blank

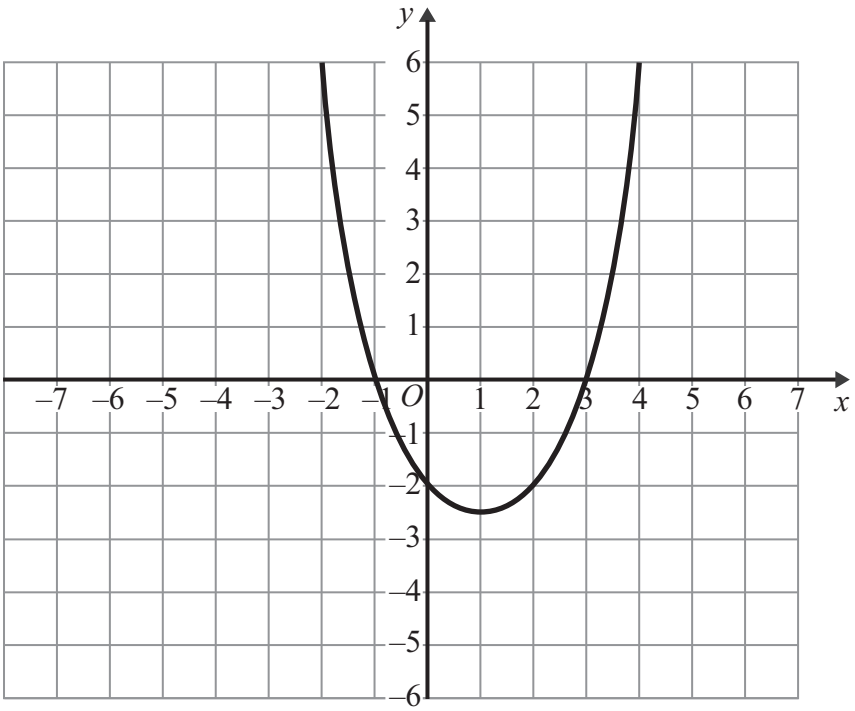
27. The graph of $y = f(x)$ is shown on the grids.

(a) On this grid, sketch the graph of $y = f(x - 3)$



(2)

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

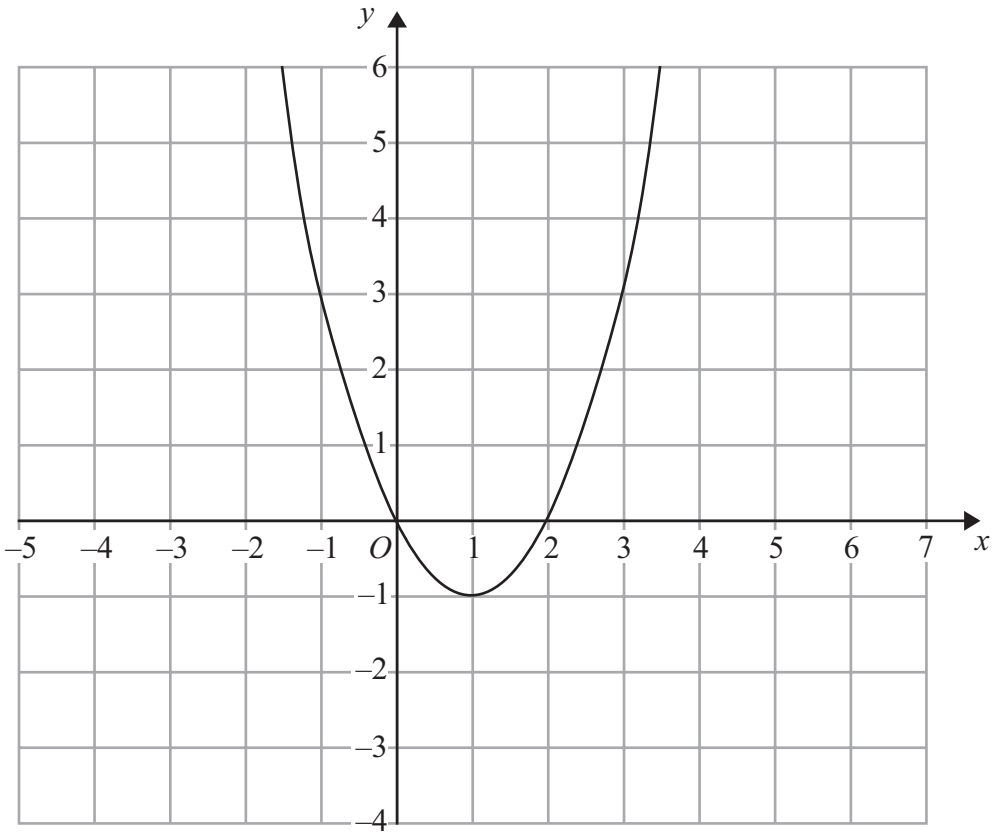


(2) **Q27**

(Total 4 marks)

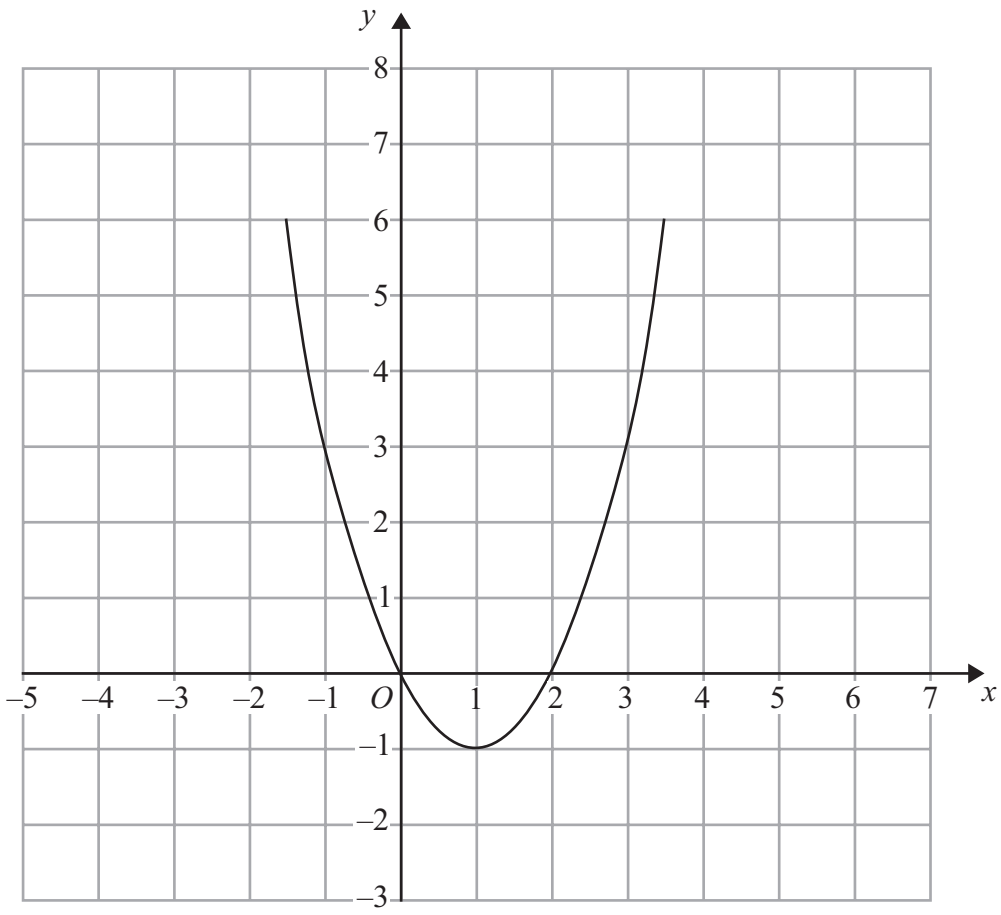
26 The graph of $y = f(x)$ is shown on each of the grids.

(a) On this grid, sketch the graph of $y = f(x - 3)$



(2)

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

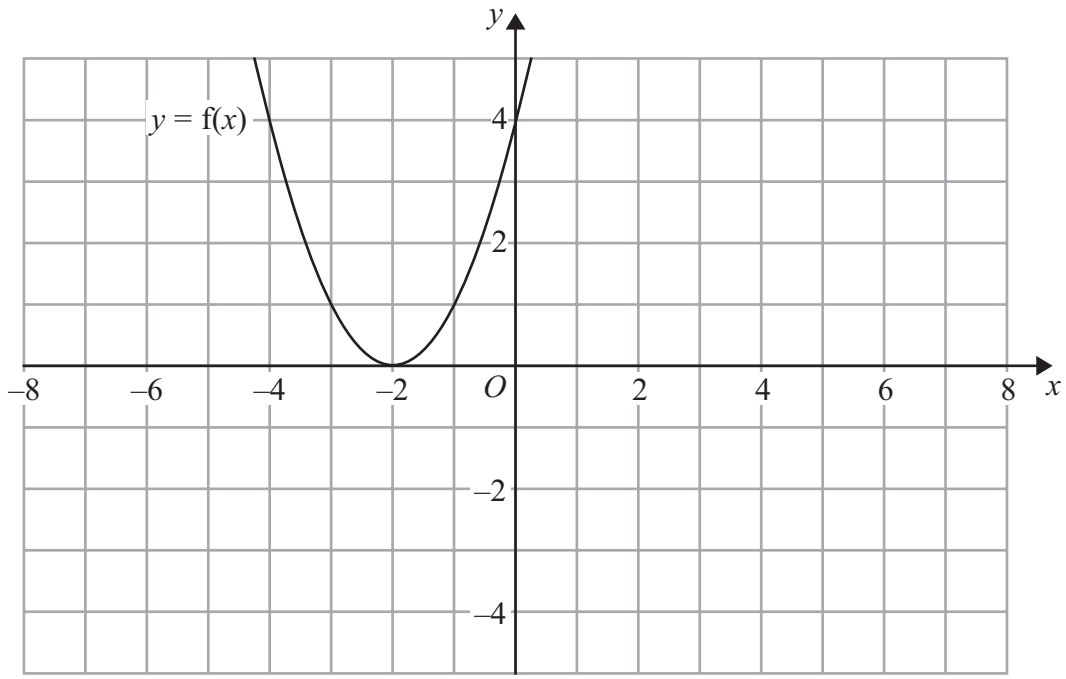


(2)

(Total for Question 26 is 4 marks)

25 $y = f(x)$

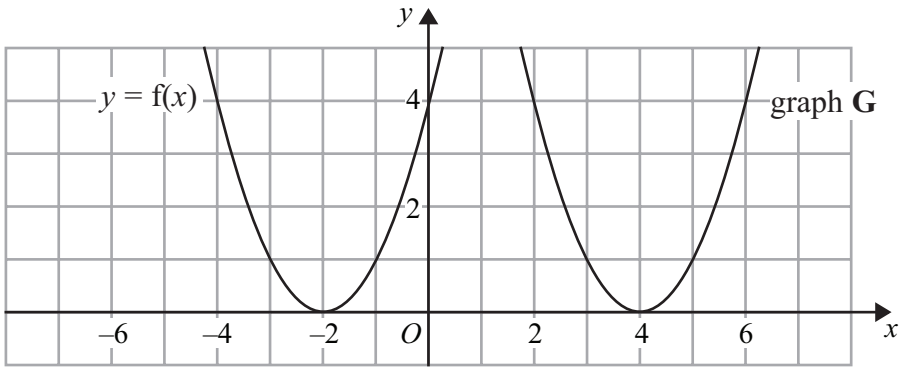
The graph of $y = f(x)$ is shown on the grid.



(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 $y = f(x)$.

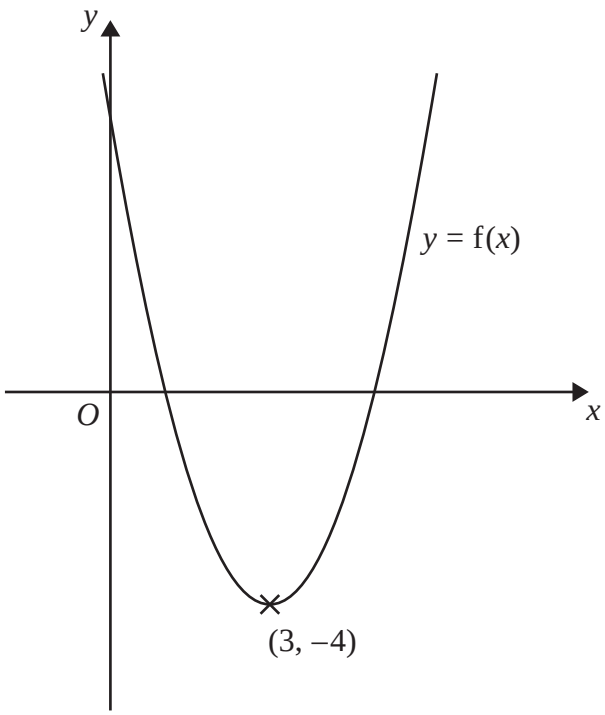
(b) Write down the equation of graph **G**.

.....

(1)

(Total for Question 25 is 3 marks)

25



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) $y = f(2x)$

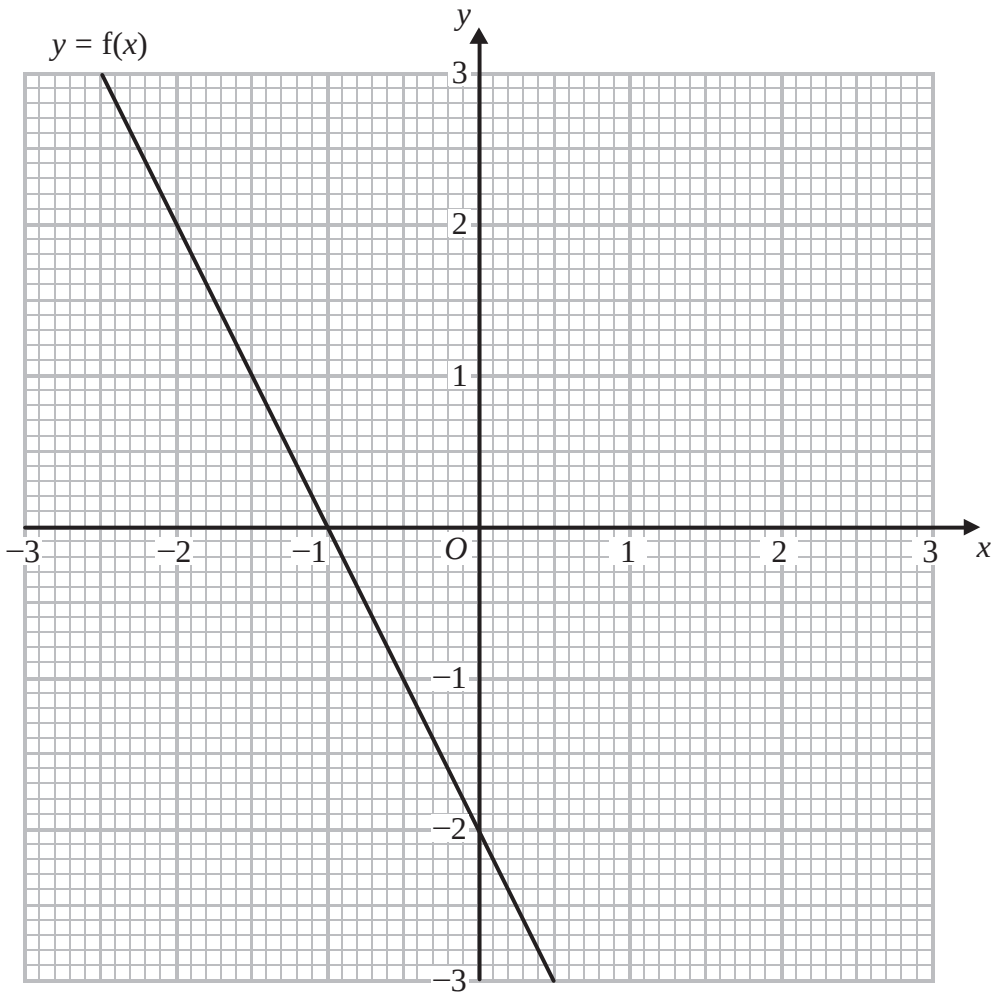
(..... , ...)

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

(..... , ...)

(Total for Question 25 is 3 marks)

22 Here is the graph of $y = f(x)$.



(a) Write down the coordinates of the point where the graph of $y = \frac{1}{2}f(x)$ meets the y-axis.

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

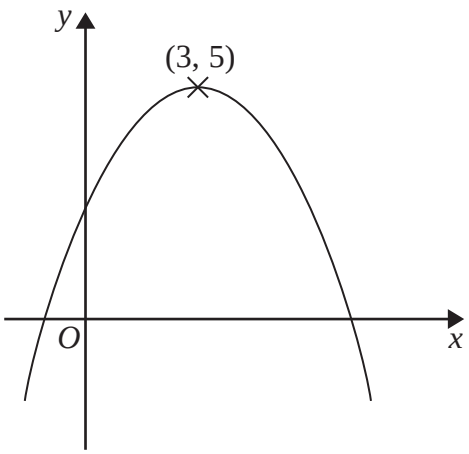
(1)

(b) On the grid, draw the graph of $y = f(x - 1)$.

(2)

(Total for Question 22 is 3 marks)

24



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 $y = f(x) – 4$

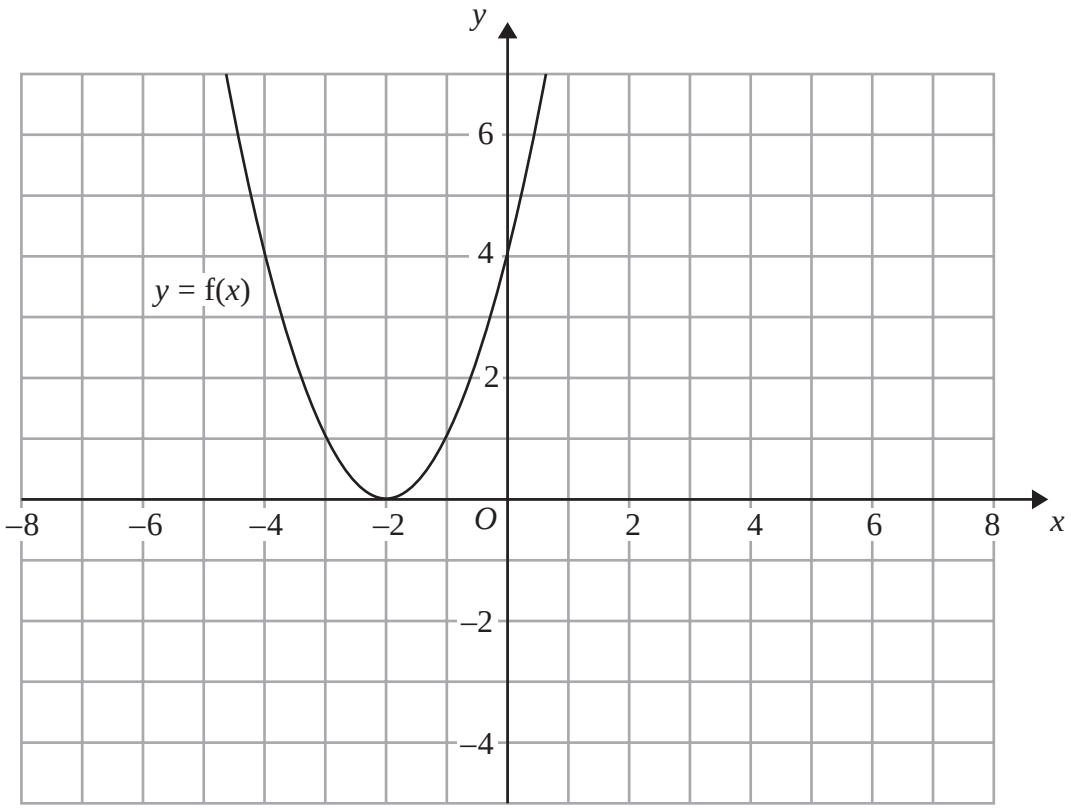
(b) Describe the transformation.

.....

(1)

(Total for Question 24 is 4 marks)

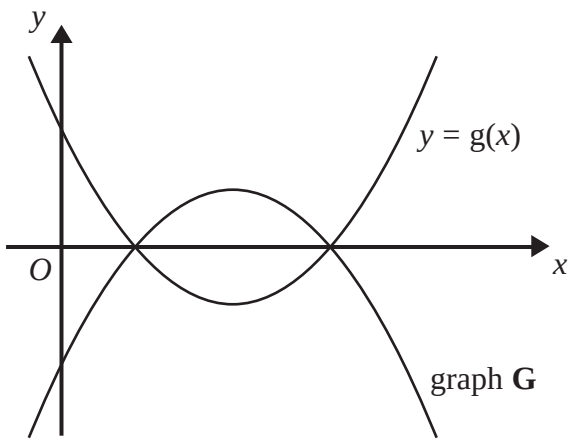
21 The graph of $y = f(x)$ is shown on the grid.



(a) On the grid above, sketch the graph of $y = f(x + 3)$

(2)

The graph of $y = g(x)$ is shown below.



The graph **G** is the reflection of $y = g(x)$ in the x-axis.

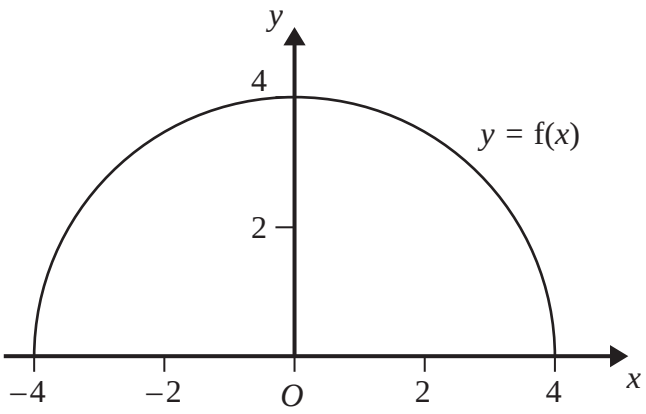
(b) Write down an equation of graph **G**.

.....

(1)

(Total for Question 21 is 3 marks)

22 Here is the graph of $y = f(x)$.



(a) Write down the coordinates of the point where the graph of $y = f(x) - 3$ meets the y-axis.

(..... , ...)

(1)

The graph of $y = f(4x)$ meets the x-axis at the points P and Q.

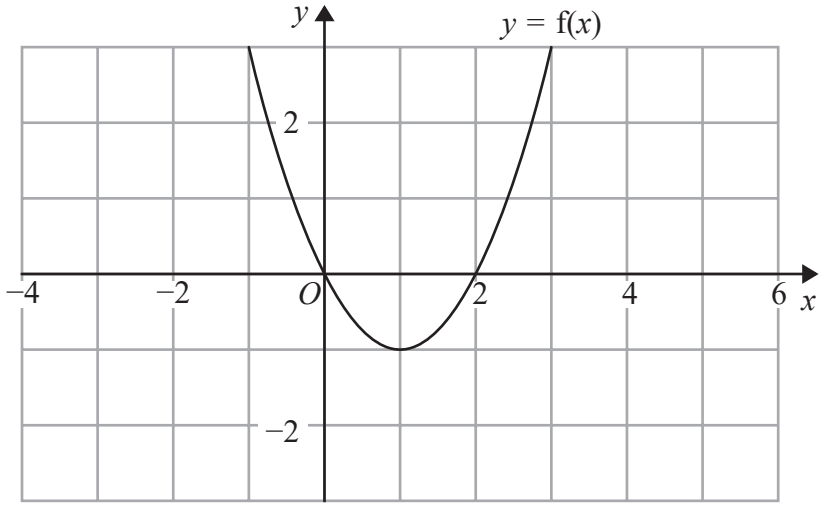
(b) Work out the length of the line segment PQ.

.....

(2)

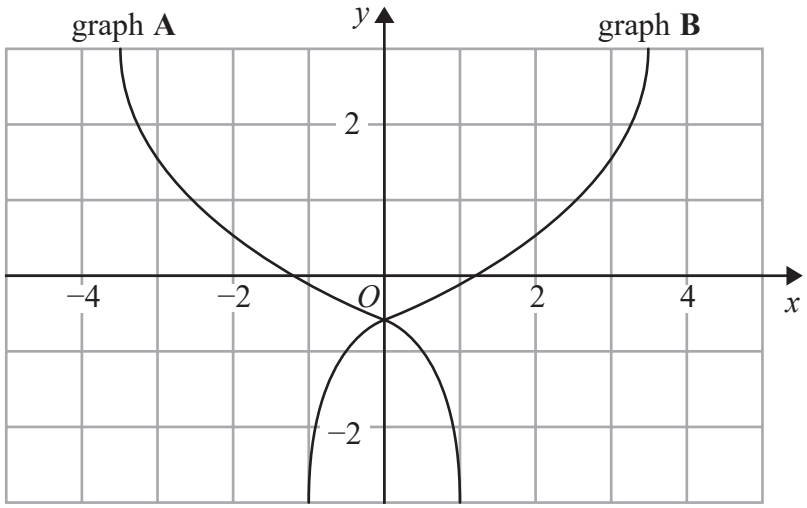
(Total for Question 22 is 3 marks)

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



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

(1)



On the grid, graph **A** has been reflected to give graph **B**.

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

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

.....

(1)

(Total for Question 18 is 2 marks)

15 The graph of the curve C with equation $y = f(x)$ is transformed to give the graph of the curve S with equation $y = f(-x) - 3$

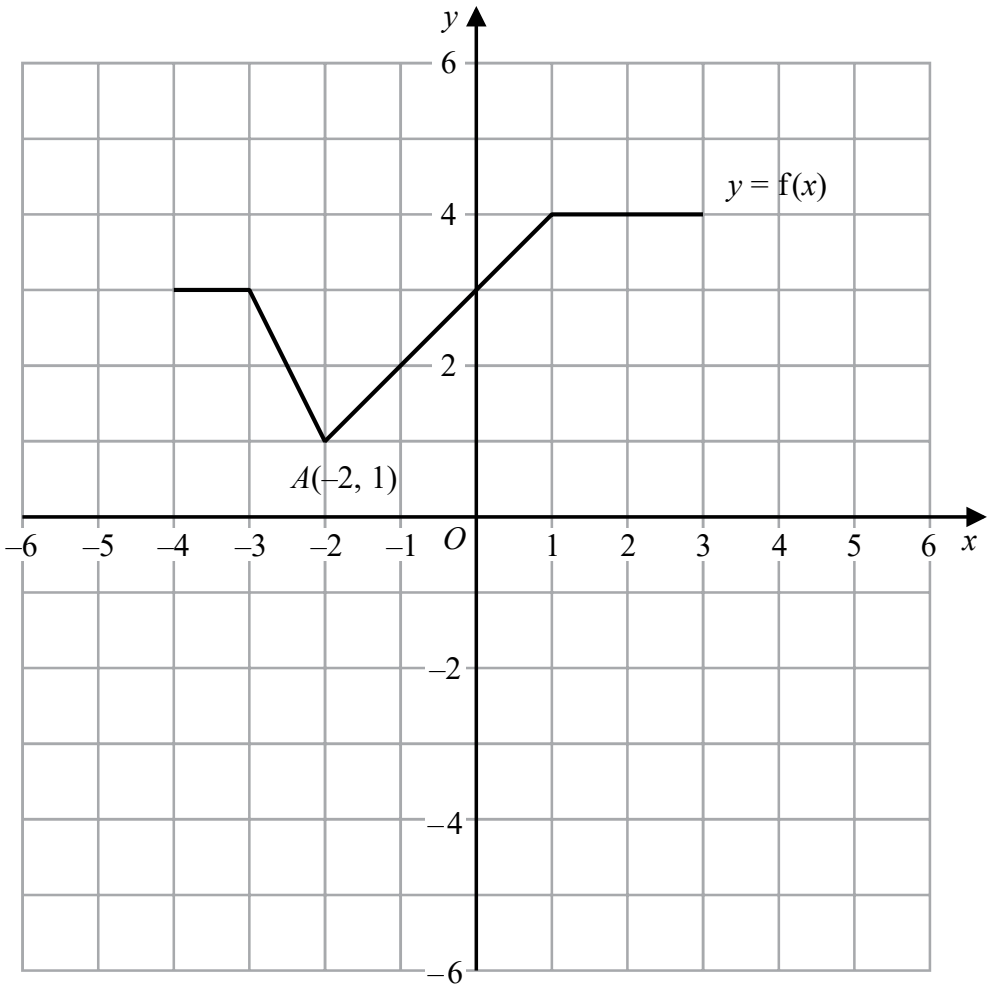
The point on C with coordinates (7, 2) is mapped to the point Q on S.

Find the coordinates of Q.

(..... , ...)

(Total for Question 15 is 2 marks)

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



(a) On the grid, draw the graph with equation $y = f(x + 1) - 3$

(2)

Point $A(-2, 1)$ lies on the graph of $y = f(x)$.

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

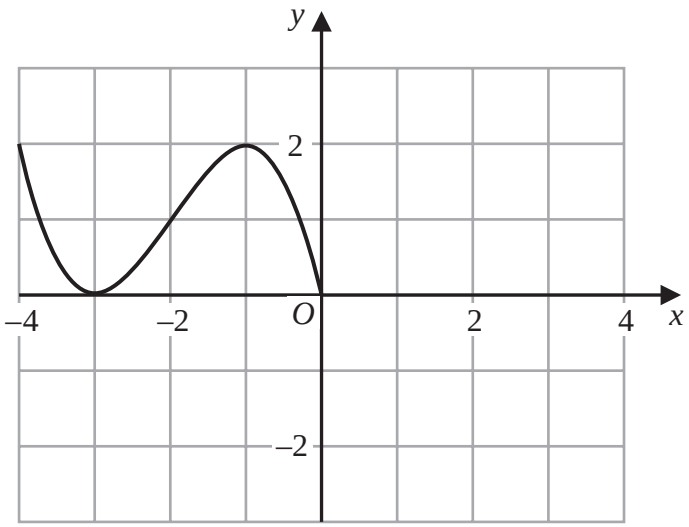
(b) Write down the coordinates of point B.

(..... , ...)

(1)

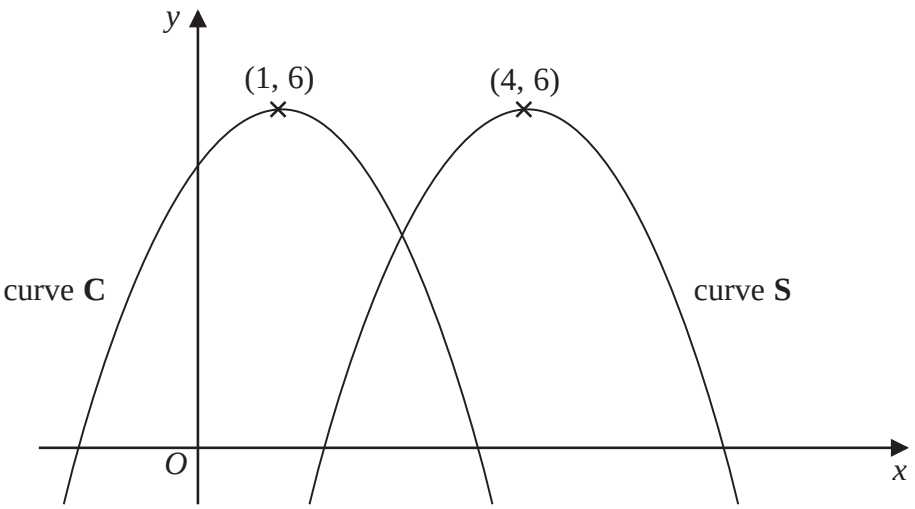
(Total for Question 20 is 3 marks)

21 The graph of the curve with equation $y = f(x)$ is shown on the grid below.



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

(2)



The curve **C** with equation $y = 5 + 2x - x^2$ is transformed by a translation to give the curve **S** such that the point (1, 6) on **C** is mapped to the point (4, 6) on **S**.

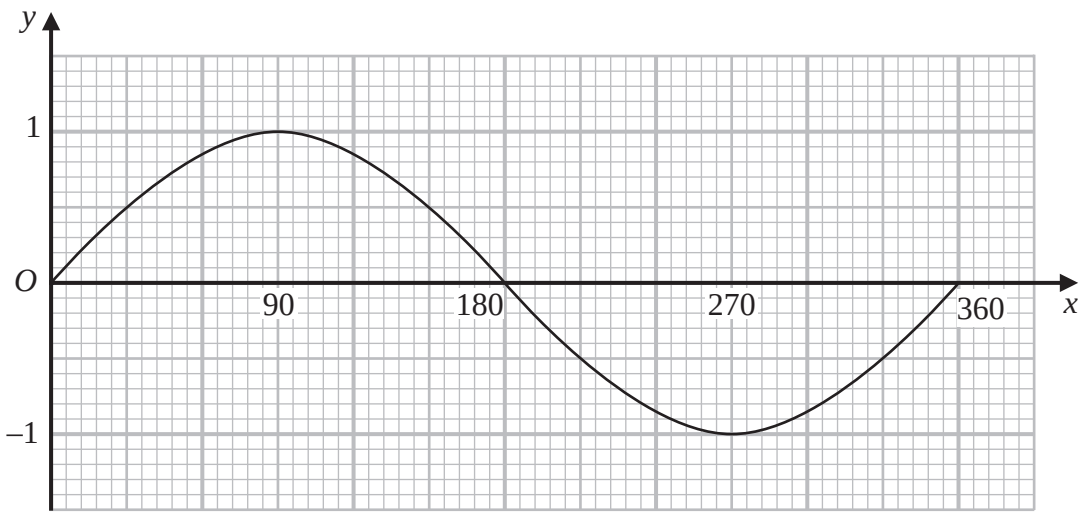
(b) Find an equation for **S**.

.....

(2)

(Total for Question 21 is 4 marks)

18 Here is a graph of $y = \sin x°$ for $0 \leqslant x \leqslant 360$



(a) Using this graph, find estimates of all **four** solutions of

$$\sin x° = 0.6 \quad \text{for } 0 \leqslant x \leqslant 720$$

.....

(2)

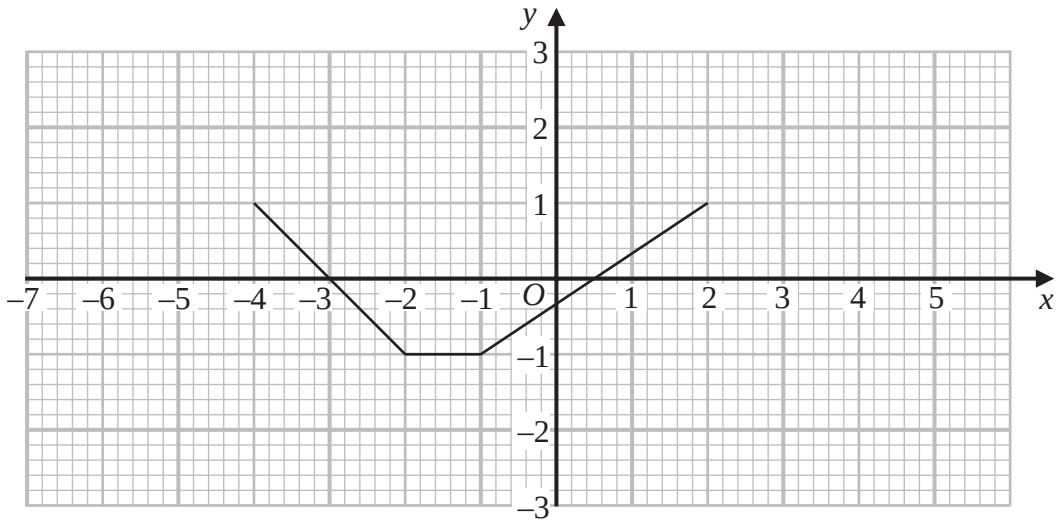
The graph of $y = \sin x°$ is reflected in the x-axis.

(b) Write down an equation of the reflected graph.

.....

(1)

Here is a graph of $y = f(x)$

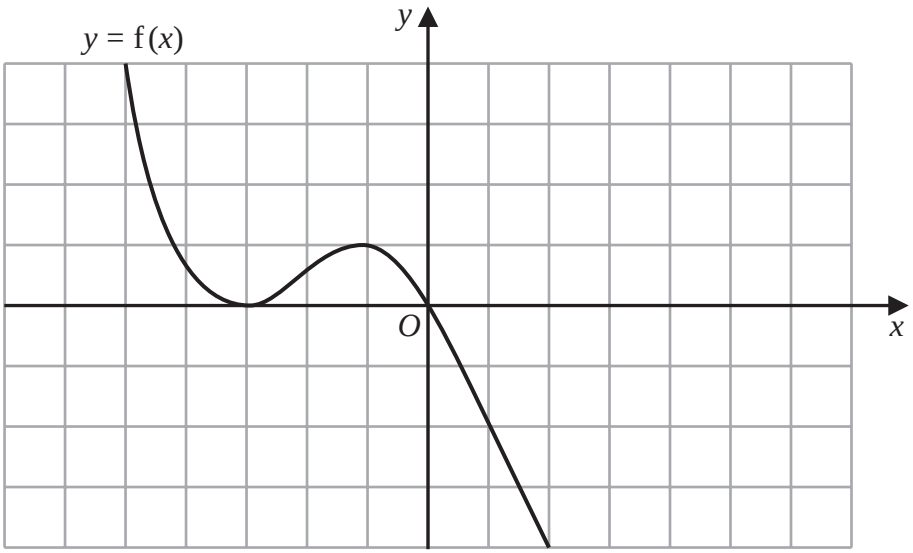


(c) On the grid, draw the graph of $y = f(x – 2)$

(1)

(Total for Question 18 is 4 marks)

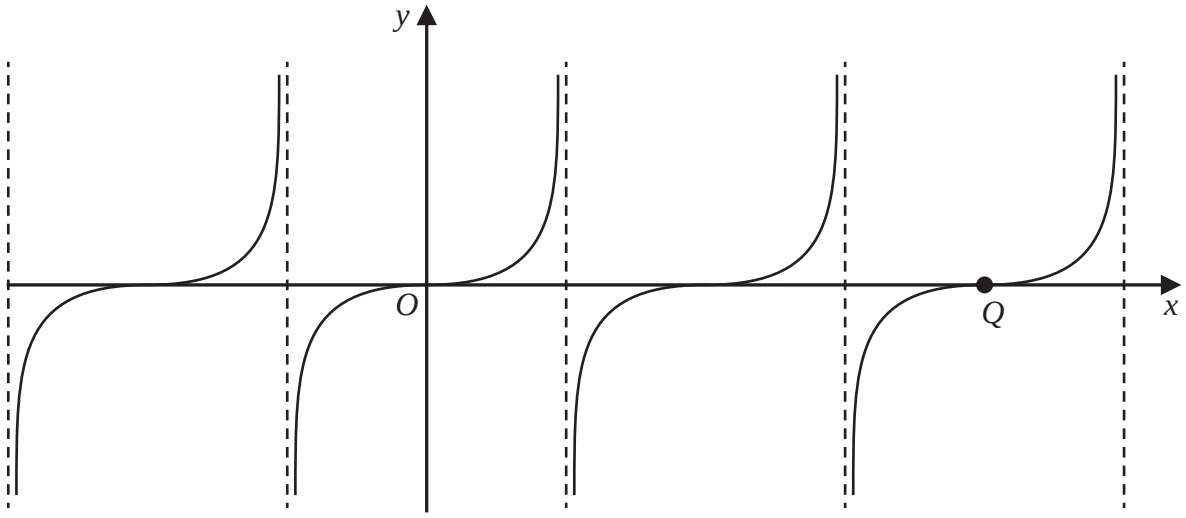
21 The graph of $y = f(x)$ is shown on the grid below.



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

(1)

Here is a sketch of the graph of $y = \tan x°$



The graph of $y = \tan x°$ is translated to give the graph of $y = g(x)$

Following the translation the point Q, shown on the graph above, moves to point R.
Point R has coordinates $(90, -5)$

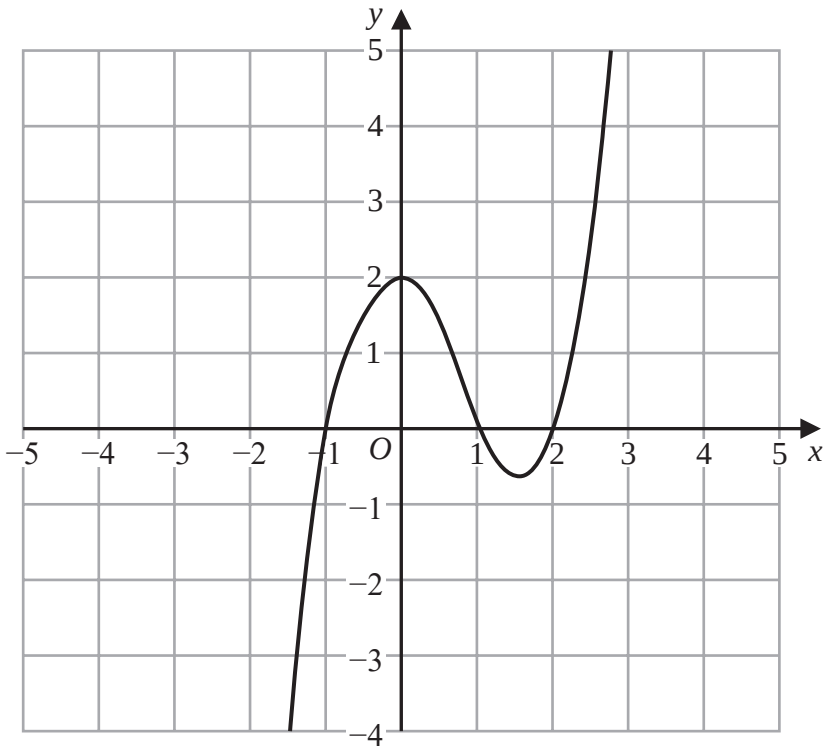
(b) Find an expression for $g(x)$ in terms of x.

.....

(2)

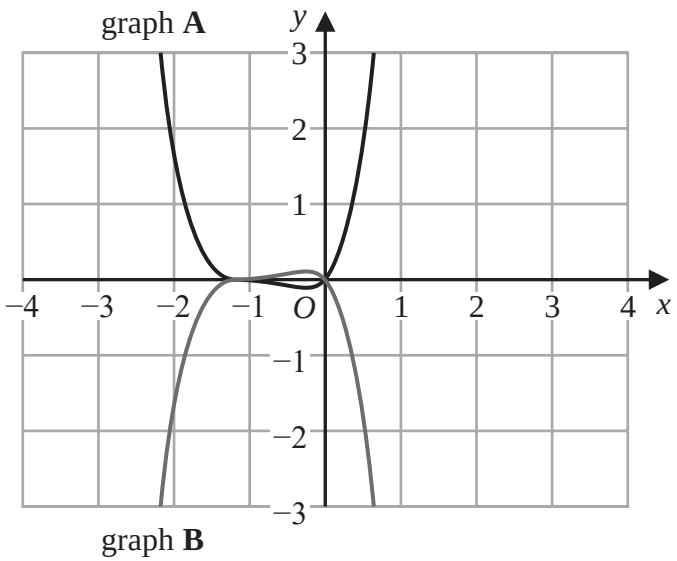
(Total for Question 21 is 3 marks)

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



(a) On the grid above, sketch the graph of $y = f(x + 2)$

(1)



On this grid, graph **A** has been reflected to give graph **B**.
The equation of graph **A** is $y = g(x)$

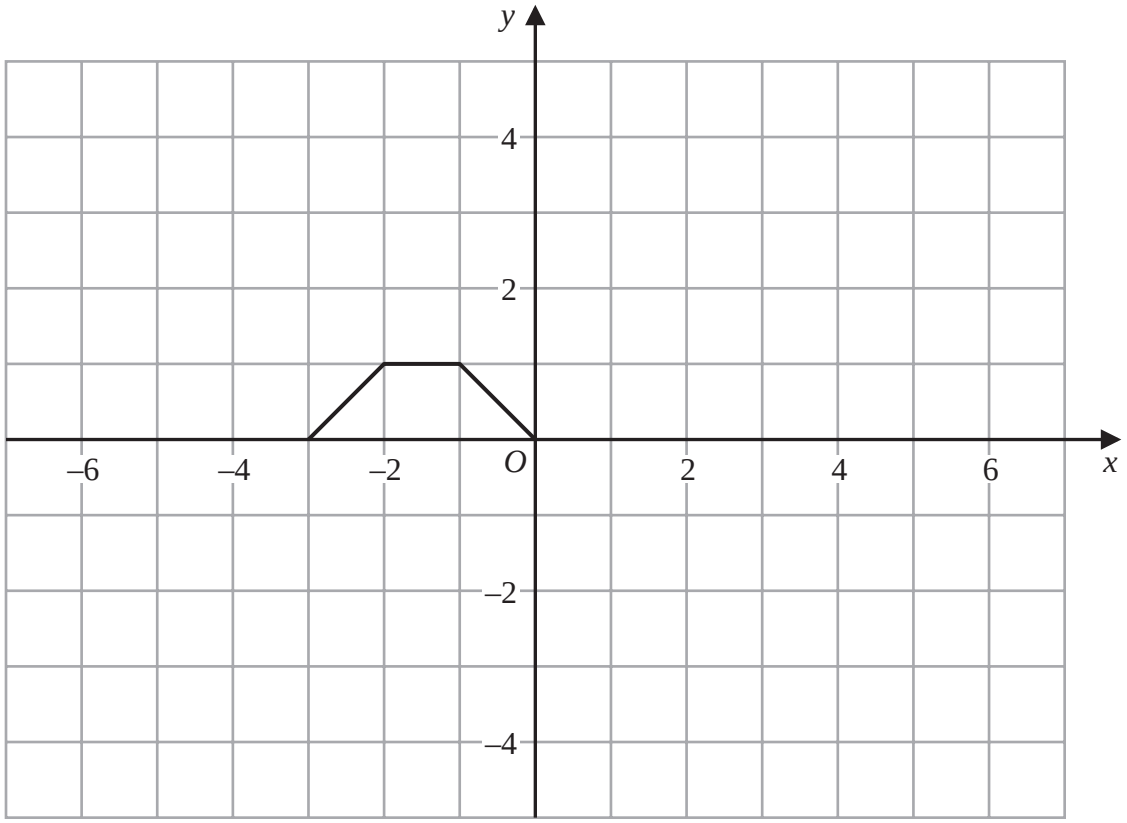
(b) Write down an equation of graph **B**.

.....

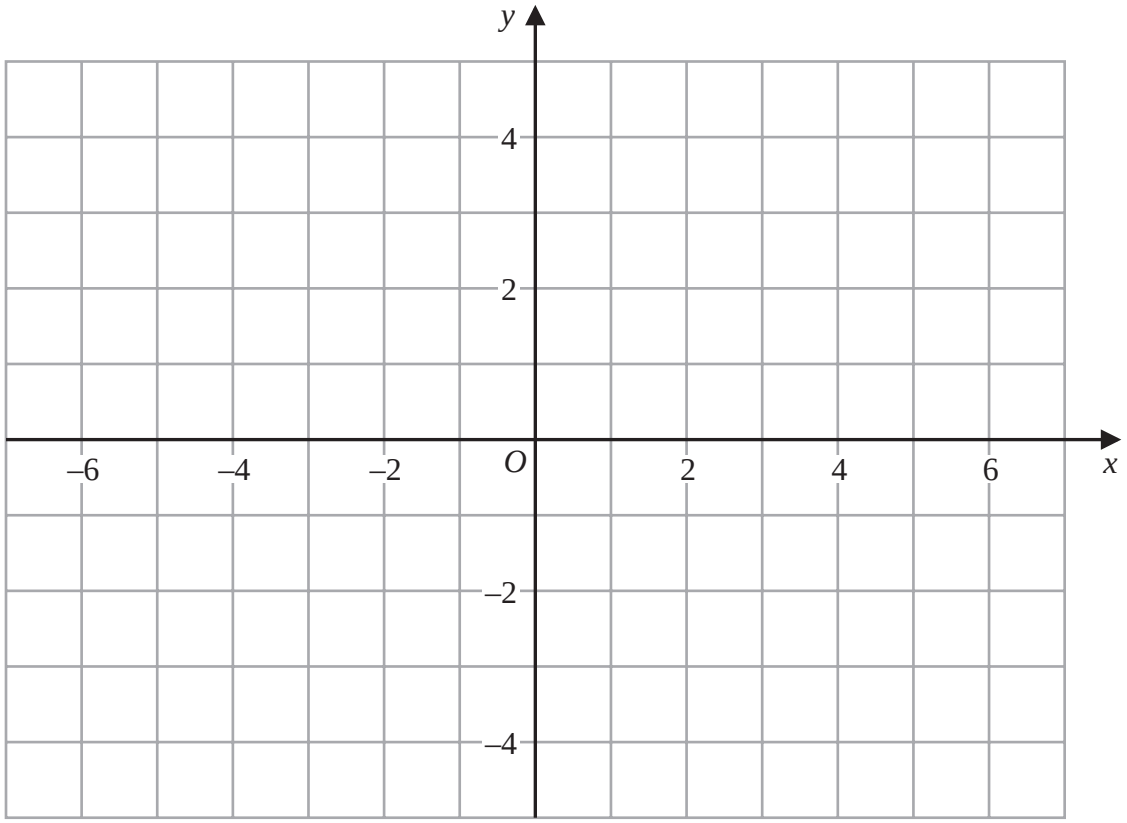
(1)

(Total for Question 23 is 2 marks)

21 Here is the graph of $y = f(x)$

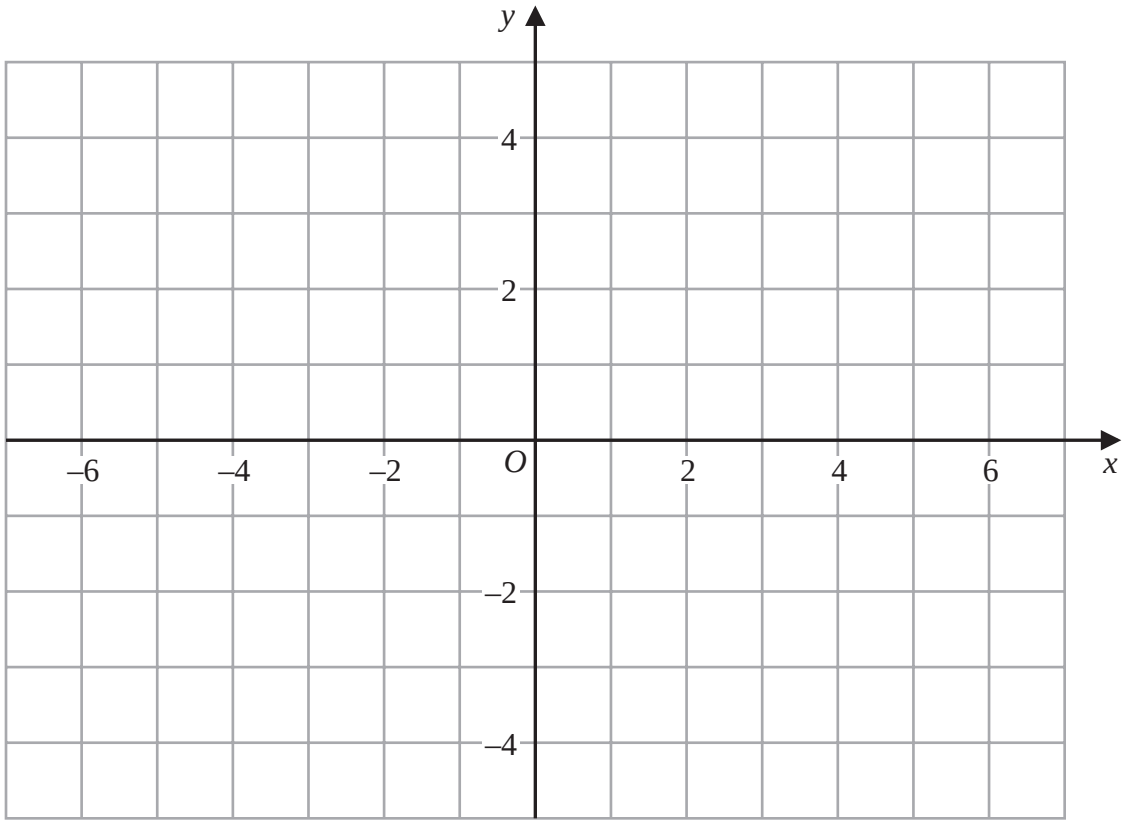


(a) On the grid below, draw the graph of $y = f(x) - 4$



(1)

(b) On the grid below, draw the graph of $y = f(-x)$



(1)

(Total for Question 21 is 2 marks)

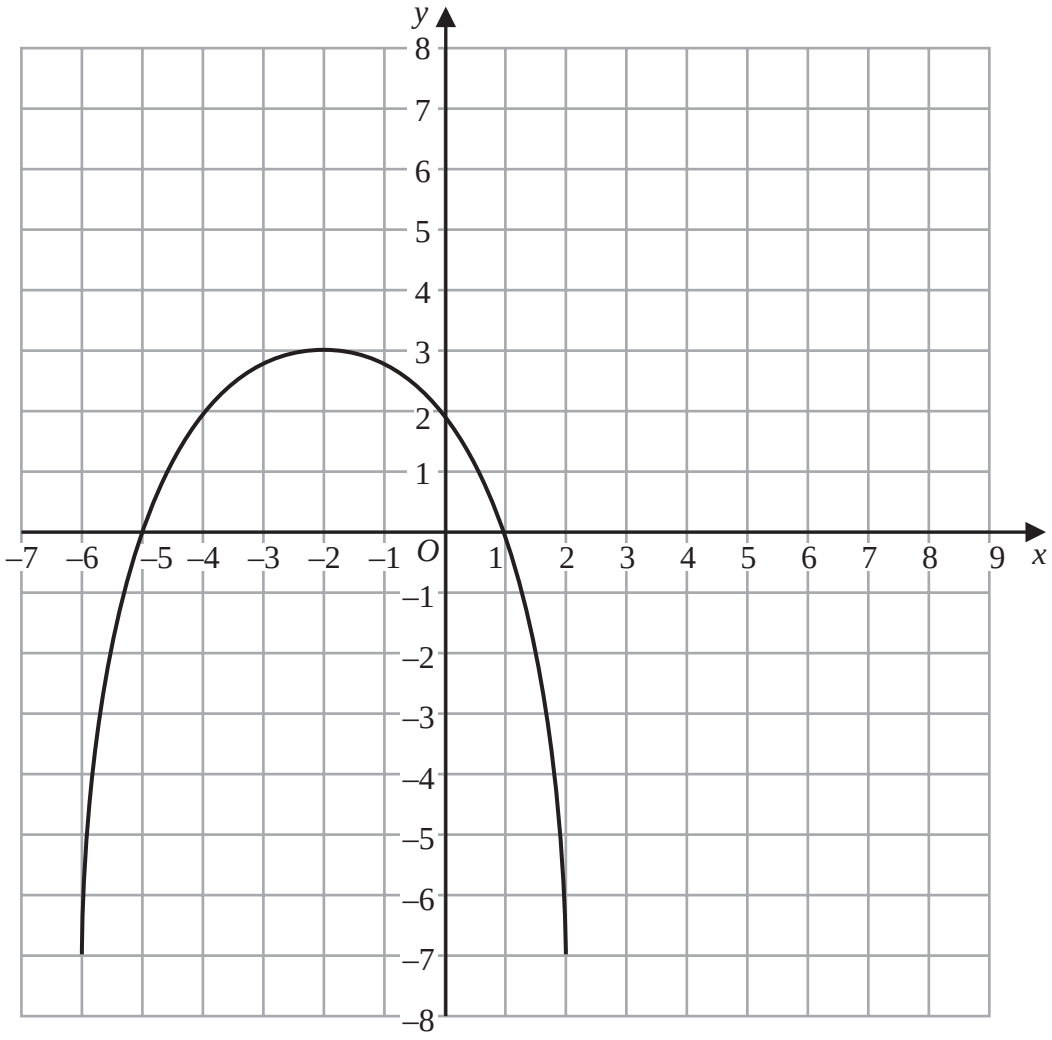
20 The turning point on the graph of $y = g(x)$ has coordinates $(-3, 6)$

(a) Write down the coordinates of the turning point on the graph of $y = g(x - 7)$

(..... , ...)

(1)

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

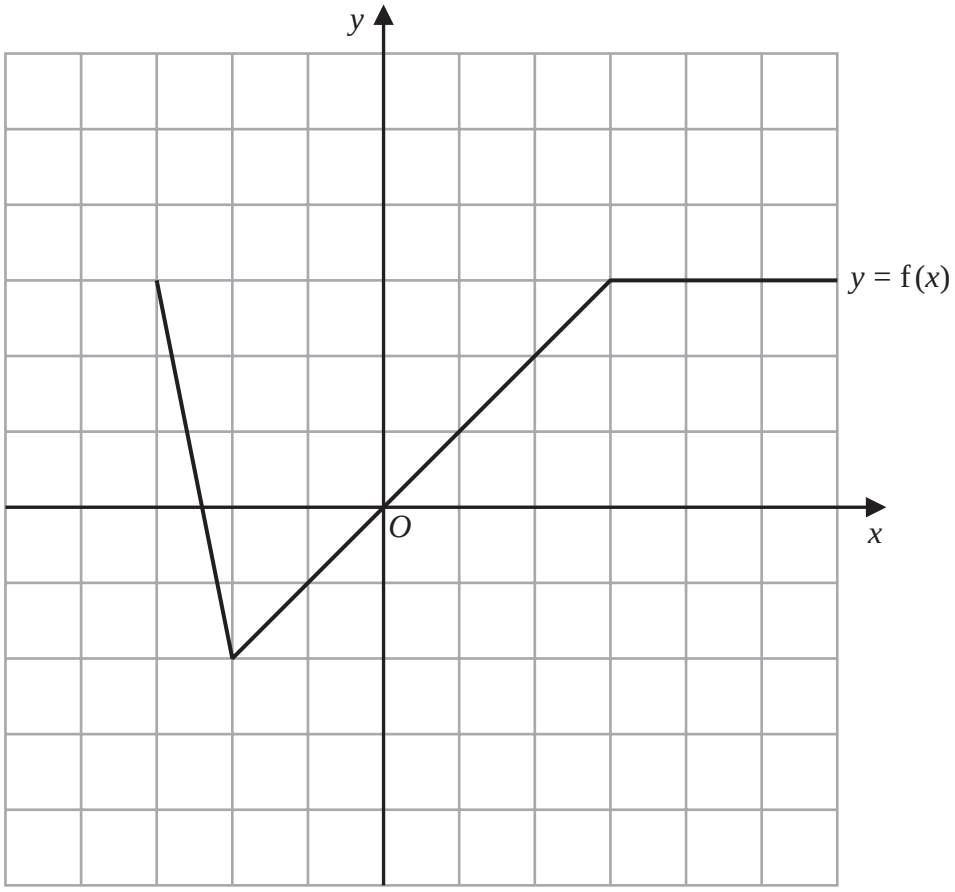


(b) On the grid, sketch the graph of $y = f(-x) + 3$

(2)

(Total for Question 20 is 3 marks)

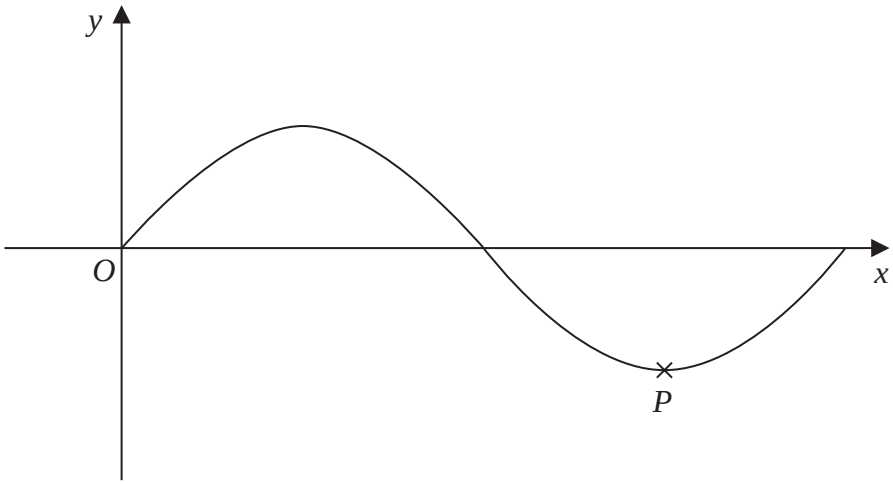
21 Here is the graph of $y = f(x)$



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

(1)

Here is a sketch of the graph of $y = \sin x°$



The point marked P is a turning point on the graph.

The graph of $y = \sin x°$ is translated to give the graph of $y = \sin(x + 180)° + 4$

Following the translation the point P, shown on the graph above, moves to point R.

(b) Find the coordinates of R.

(..... , ...)

(3)

(Total for Question 21 is 4 marks)