GCSE · Edexcel · Maths

1 hour 36 questions

Exam Questions

Transformations of Graphs

Translations of Graphs / Reflections of Graphs

Easy (10 questions)	/19
Medium (12 questions)	/31
Hard (14 questions)	/39
Total Marks	**/89**

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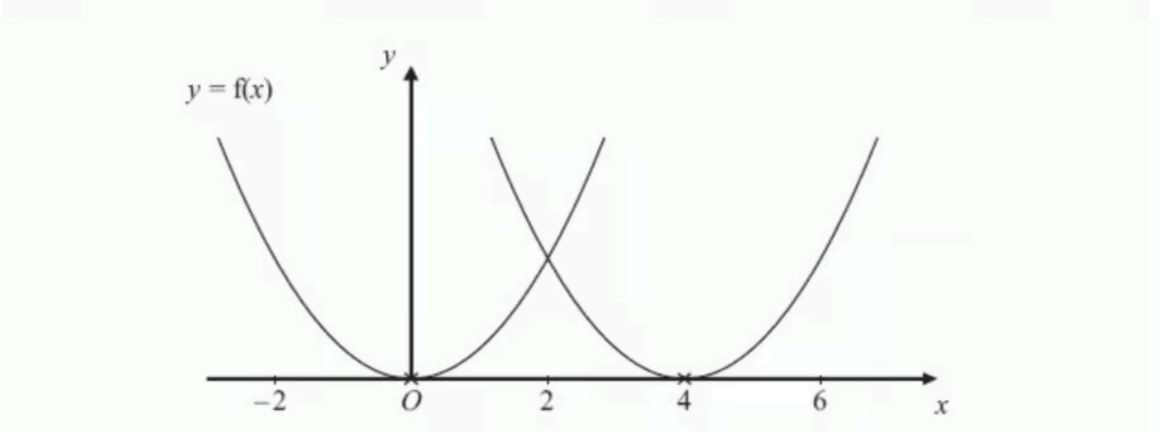
Easy Questions

1



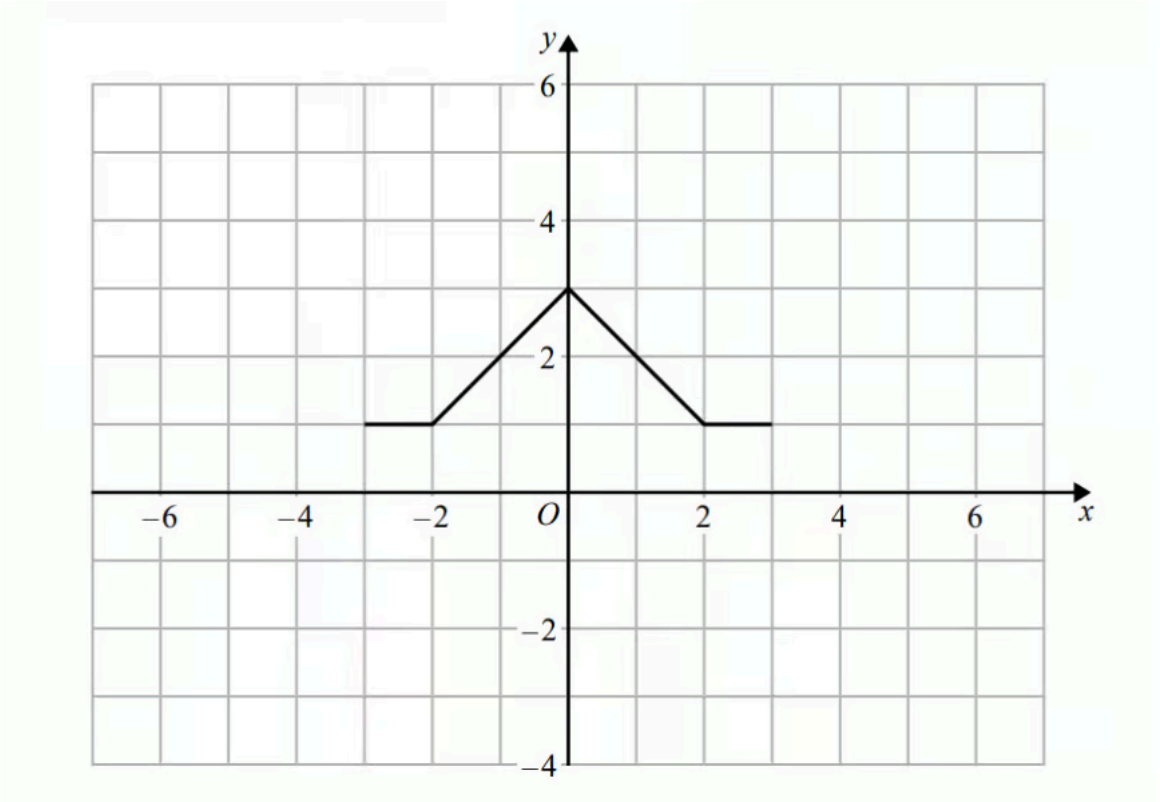
The curve with equation $y = f(x)$ is translated so that the point at (0, 0) is mapped onto the point (4, 0).

Find an equation of the translated curve.

(2 marks)

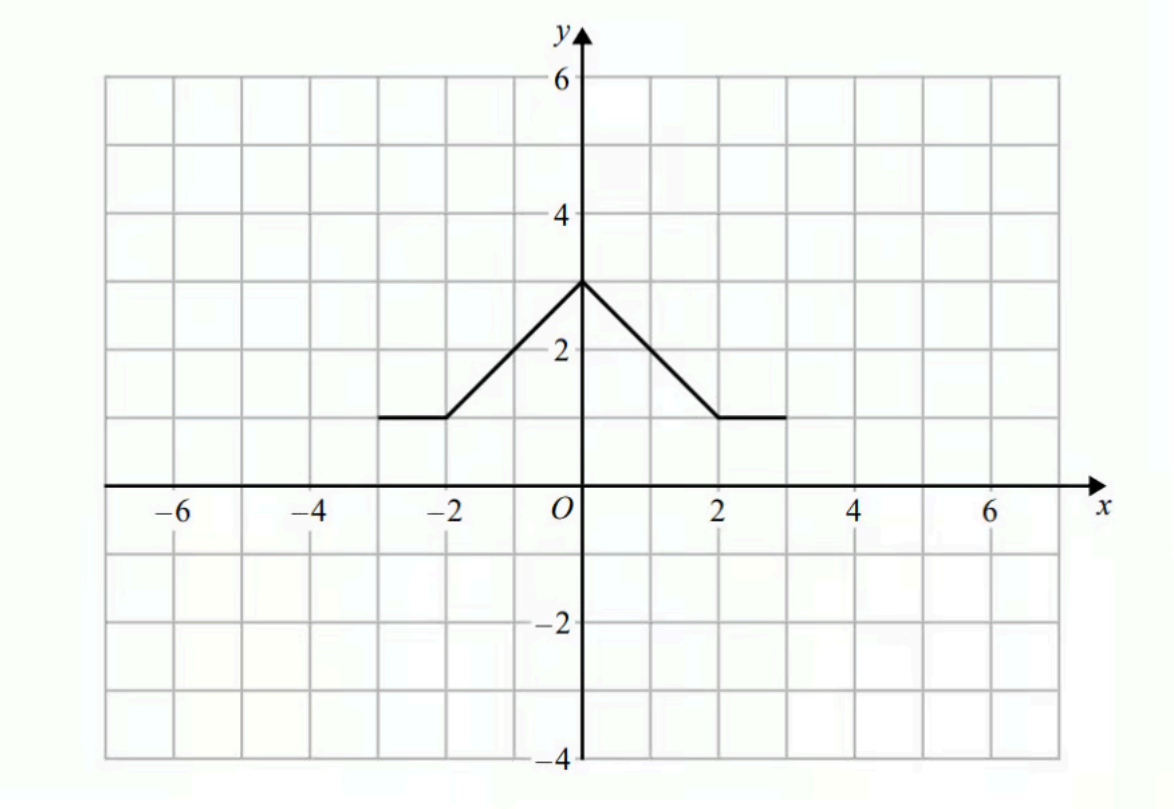
2 The graph of $y = f(x)$ is shown on both grids below.

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



[1]

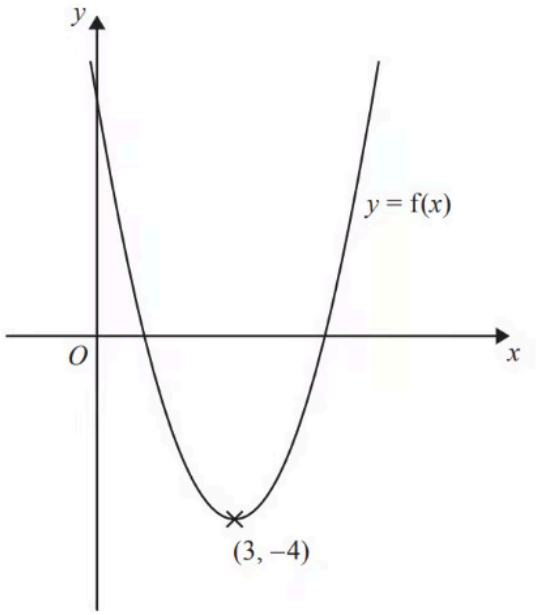
ii) On the grid below, draw the graph of $y = f(x - 3)$



[1]

(2 marks)

3



The diagram shows part of the curve with equation $y = \mathrm{f}(x)$.
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) $y = \mathrm{f}(x) + 3$

[1]

ii) $y = \mathrm{f}(x + 2)$

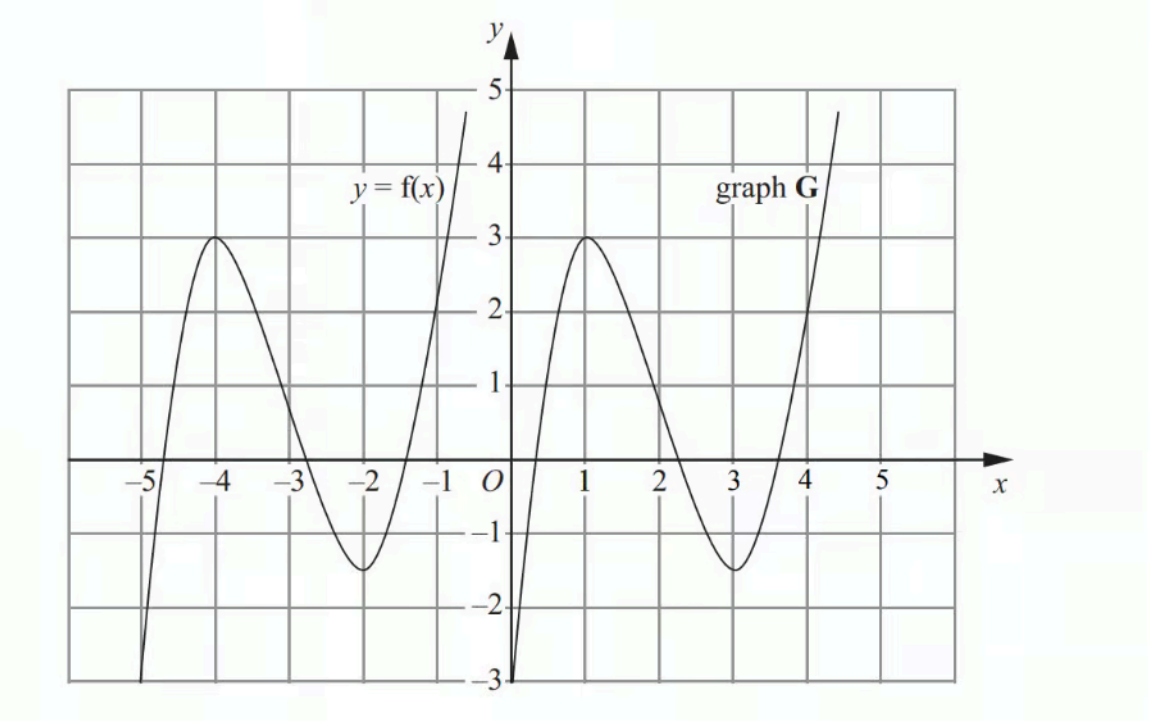
[1]

iii) $y = \mathrm{f}(-x)$

[1]

(3 marks)

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



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

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

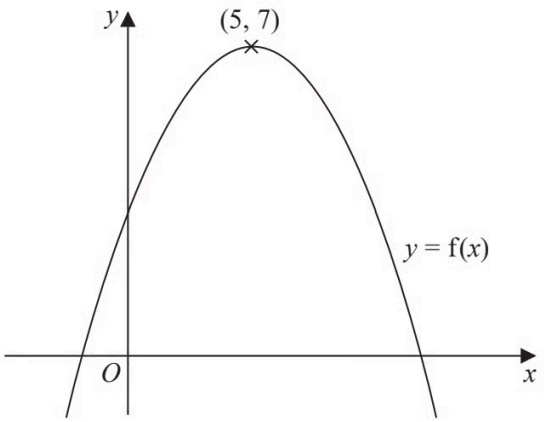
(1 mark)

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

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

(2 marks)

5 The diagram shows a sketch of the curve with equation $y = \mathrm{f}(x)$



There is only one maximum point on the curve.
The coordinates of this maximum point are (5, 7)

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

i) $y = \mathrm{f}(x + 9)$

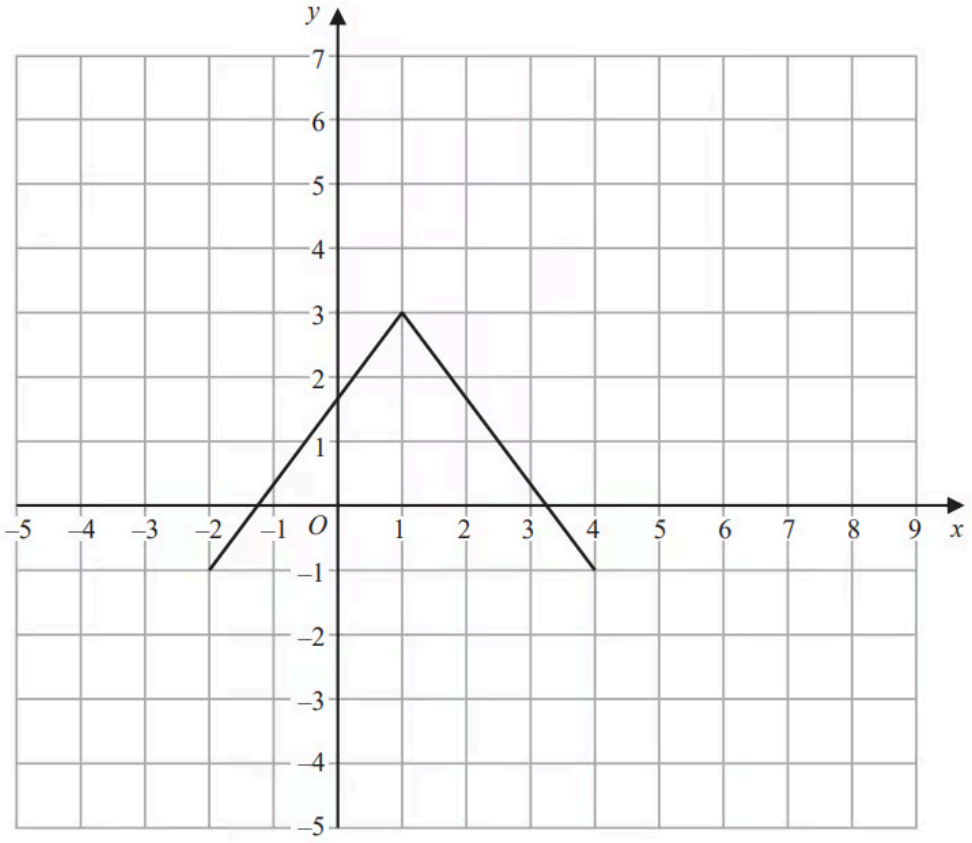
[1]

ii) $y = \mathrm{f}(x) + 3$

[1]

(2 marks)

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



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

(2 marks)

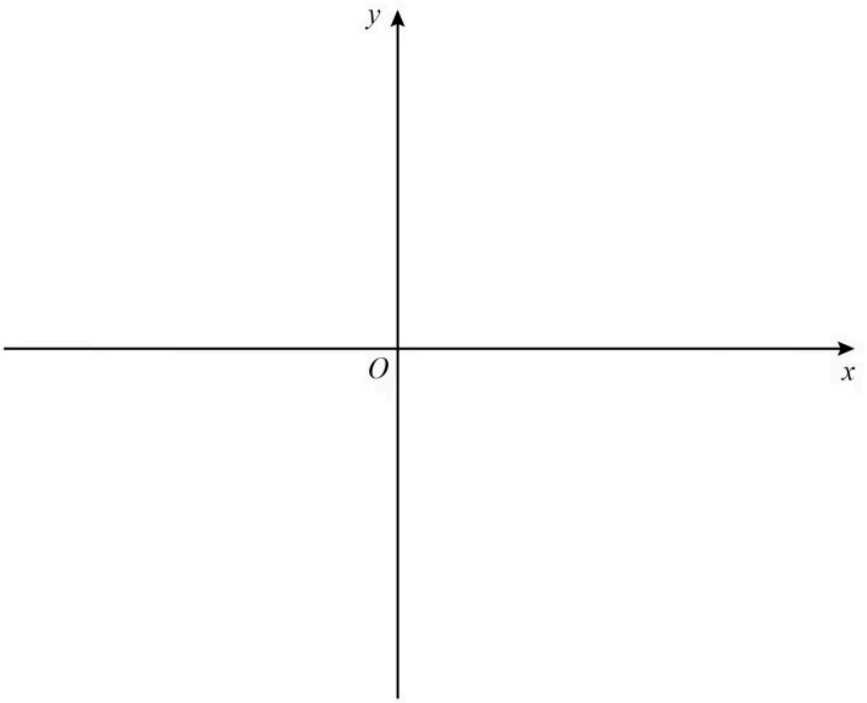
7 The curve with equation $y = g(x)$ is transformed to the curve with equation $y = -g(x)$ by the single transformation **T**.

Describe fully the transformation **T**.

(1 mark)

8 On the axes, sketch the curve $y = x^3 - 2$

You must show the coordinates of the y-intercept.

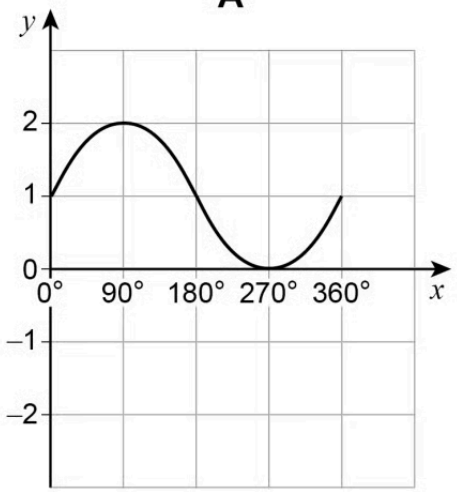


(2 marks)

9 One of these is the graph of $y = 1 + \sin x$ for $0° \leqslant x \leqslant 360°$

Choose the letter above the correct graph.

A



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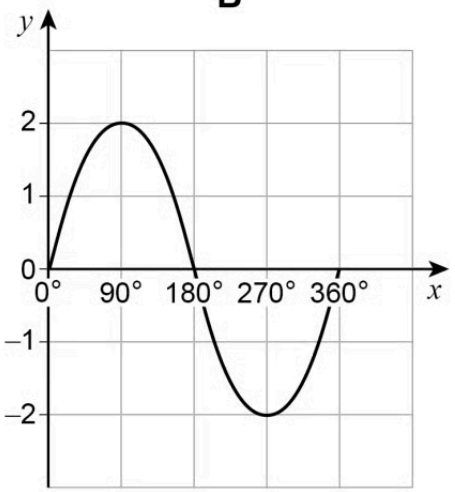

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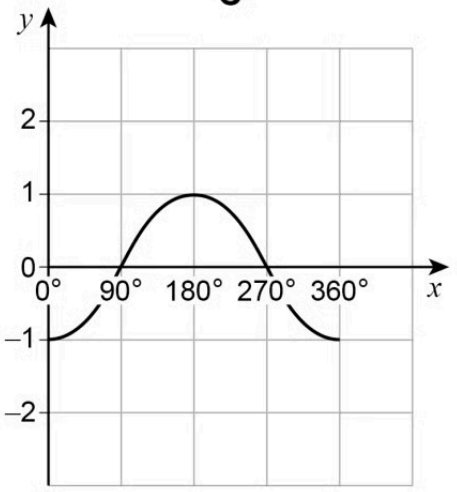
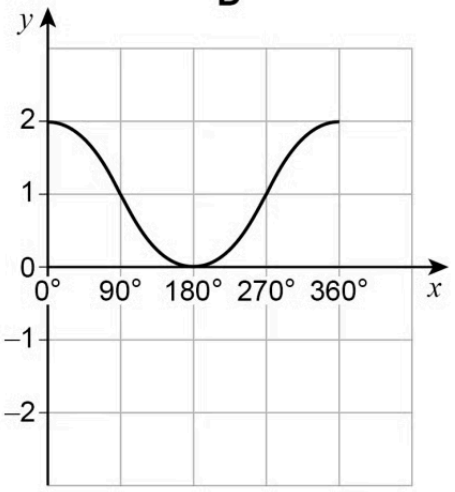


D



(1 mark)

10 (7, 28) is a point on the graph $y = \mathrm{f}(x)$

Choose the point which **must** be on the graph $y = \mathrm{f}(x) + 2$

A. (7, 26)

B. (7, 30)

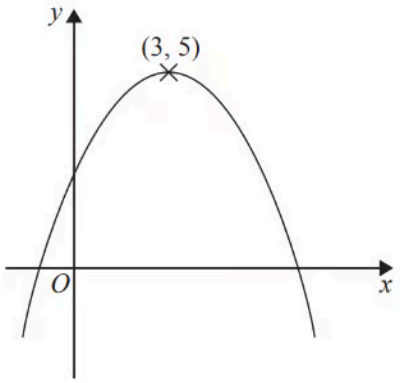
C. (5, 28)

D. (9, 28)

(1 mark)

Medium Questions

1 (a)



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

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

i) $y = \mathrm{f}(x+3)$

[1]

ii) $y = -\mathrm{f}(x)$

[1]

iii) $y = \mathrm{f}(-x)$

[1]

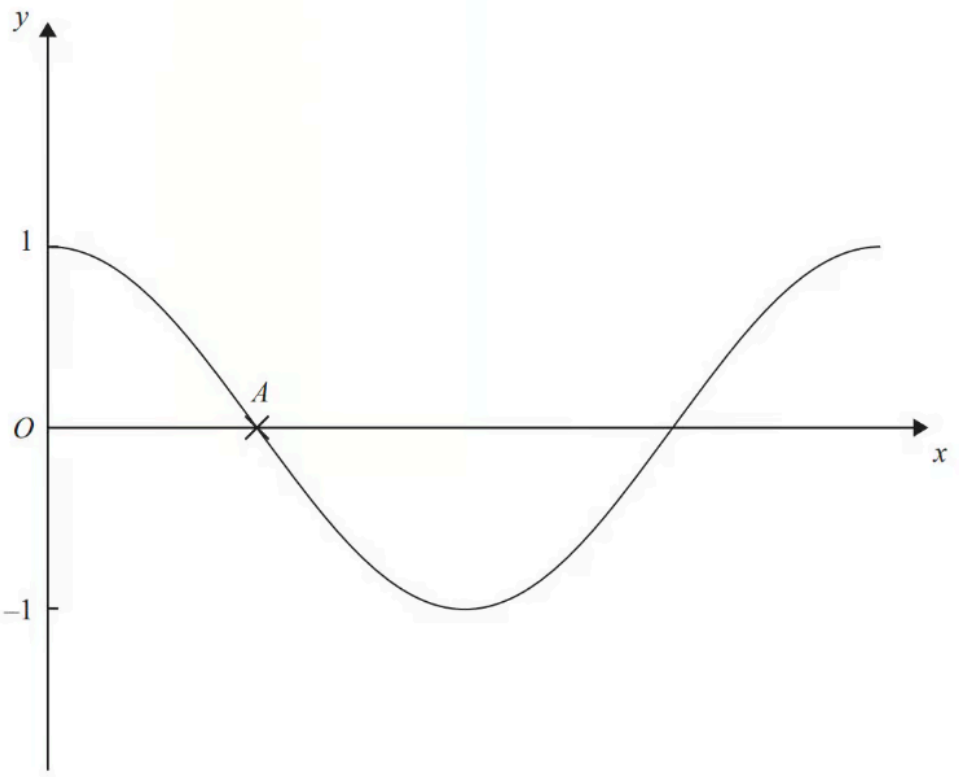
(3 marks)

(b) The curve with equation $y = \mathrm{f}(x)$ is transformed to give the curve with equation $y = \mathrm{f}(x) - 4$

Describe the transformation.

(1 mark)

2 (a) The diagram shows a sketch of the graph of $y = \cos x$.



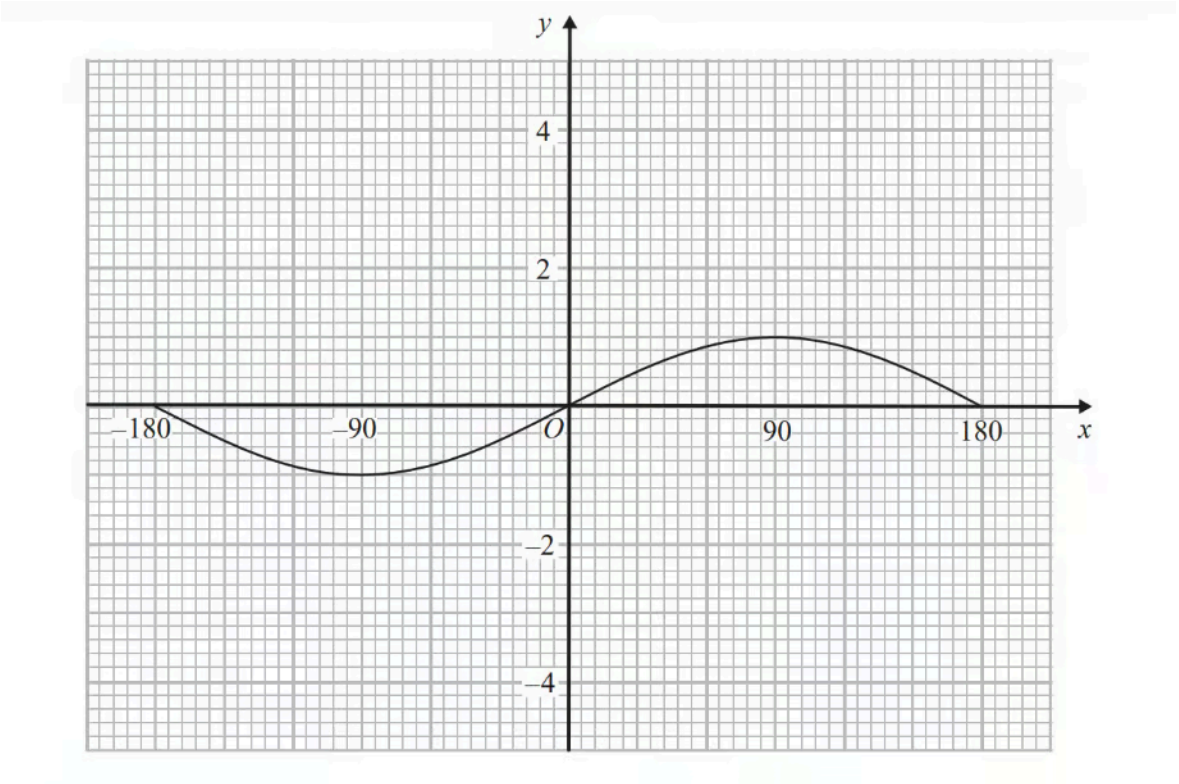
Write down the coordinates of the point A.

(1 mark)

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

(1 mark)

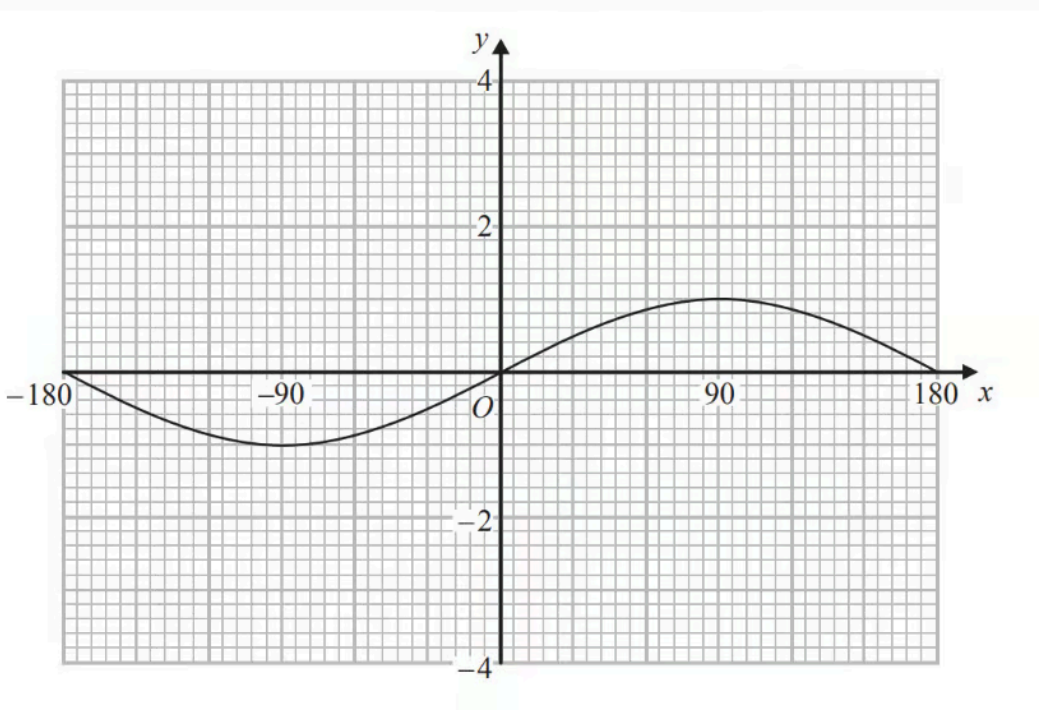
3 Here is the graph of $y = \sin x°$ for $-180 \leqslant x \leqslant 180$



On the grid, sketch the graph of $y = \sin x° - 2$ for $-180 \leqslant x \leqslant 180$

(2 marks)

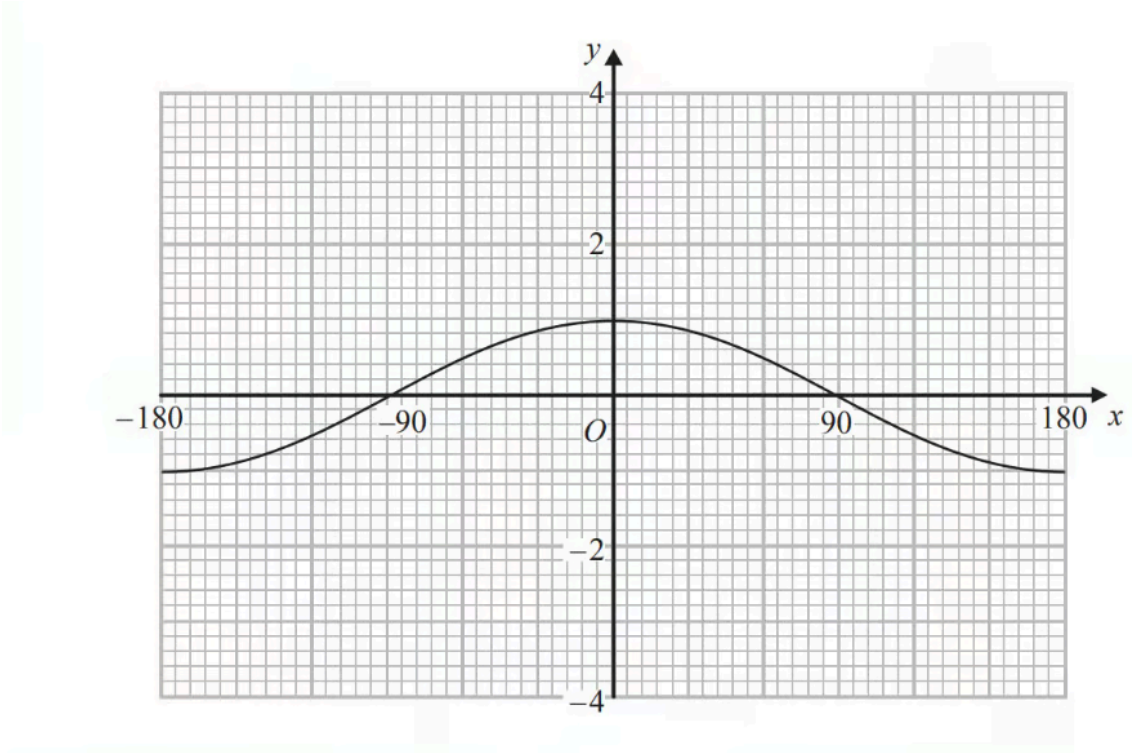
4 (a) Here is the graph of $y = \sin x°$ for $-180 \leqslant x \leqslant 180$



On the grid above, sketch the graph of $y = \sin x° + 2$ for $-180 \leqslant x \leqslant 180$

(2 marks)

(b) Here is the graph of $y = \cos x°$ for $-180 \leqslant x \leqslant 180$

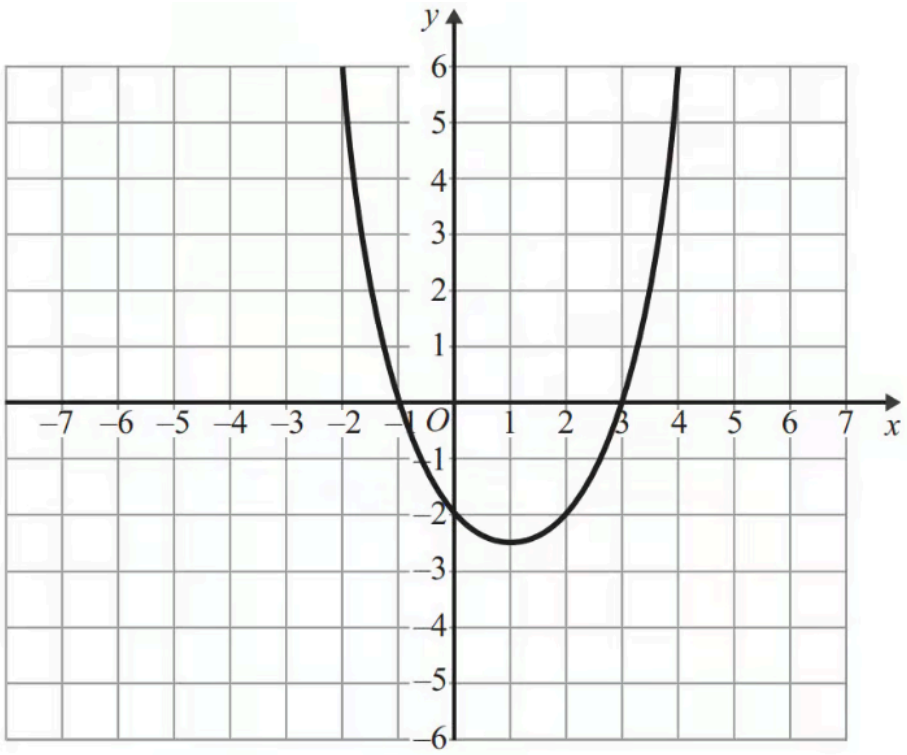


On the grid above, sketch the graph of $y = -\cos x°$ for $-180 \leqslant x \leqslant 180$

(2 marks)

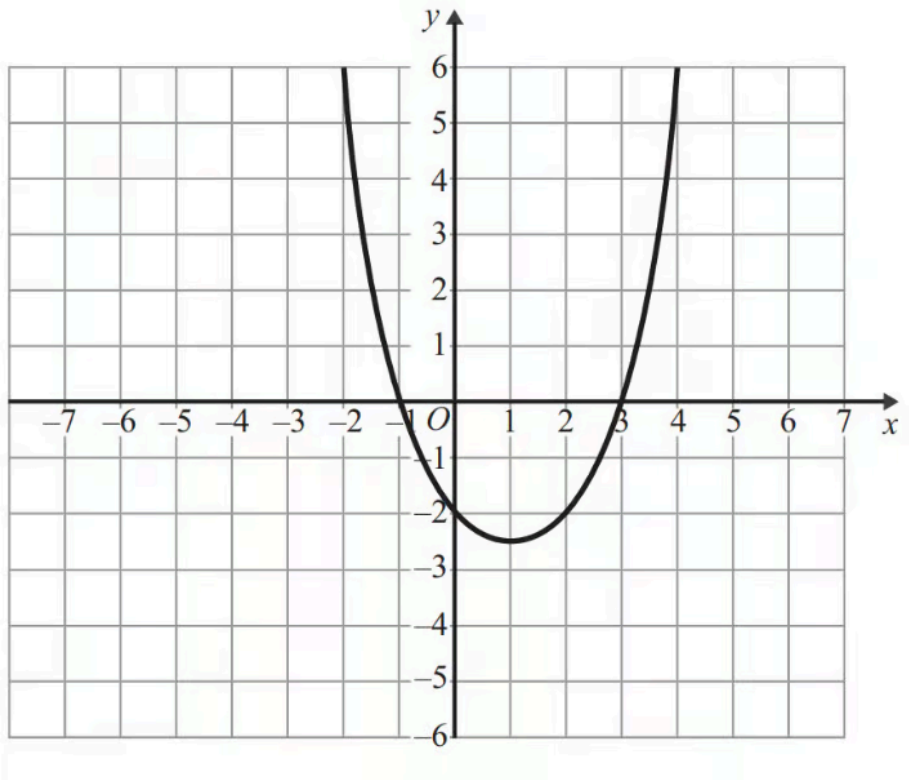
5 (a) The graph of $y = f(x)$ is shown on the grids.

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



(2 marks)

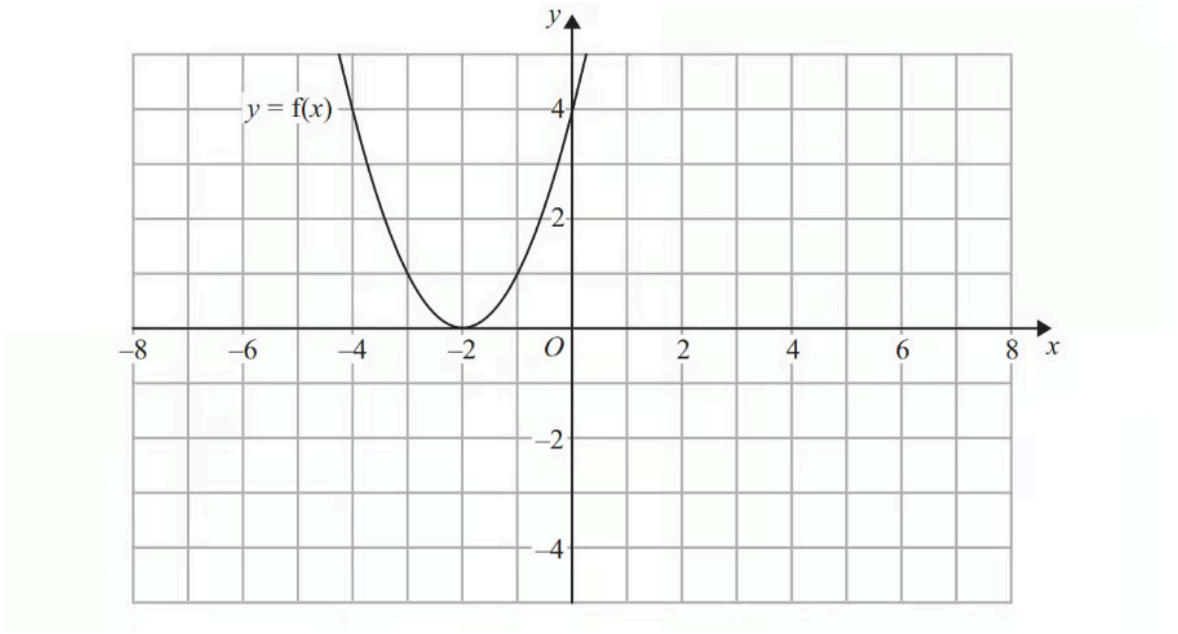
(b) On this grid, sketch the graph of $y = -f(x)$



(2 marks)

6 (a) $y = \mathrm{f}(x)$

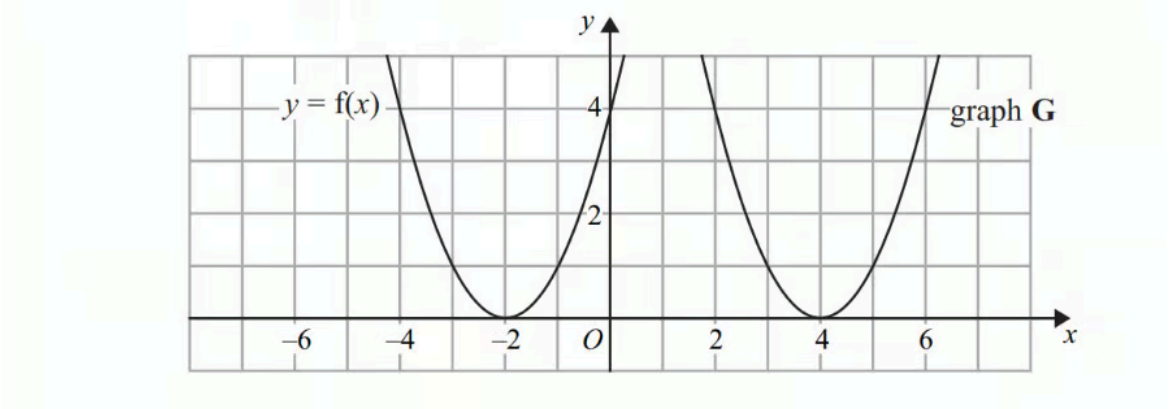
The graph of $y = \mathrm{f}(x)$ is shown on the grid.



On the grid above, sketch the graph of $y = -\mathrm{f}(x)$.

(2 marks)

(b) The graph of $y = \mathrm{f}(x)$ is shown on the grid.

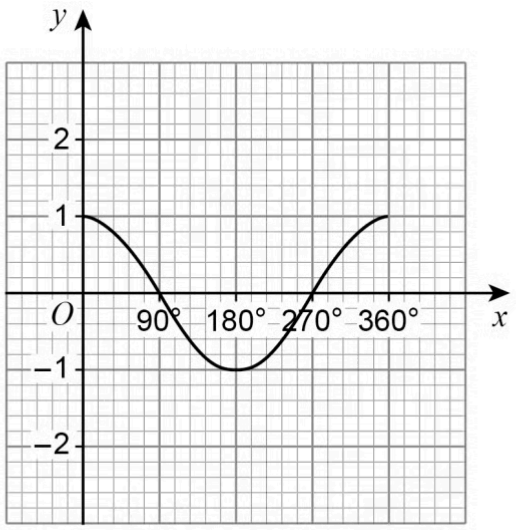


The graph **G** is a translation of the graph of $y = \mathrm{f}(x)$.

Write down the equation of graph **G**.

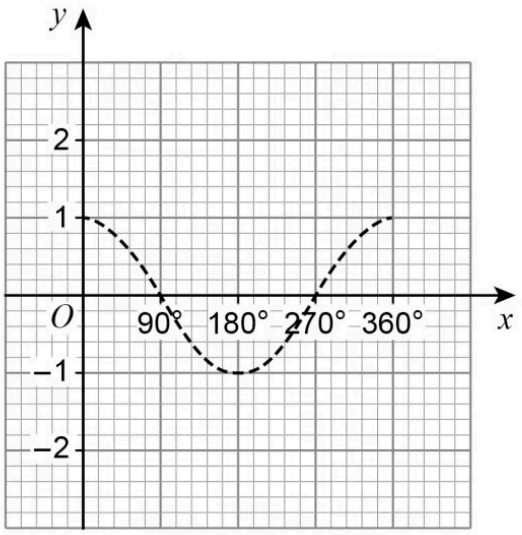
(1 mark)

7 (a) Here is the graph of $y = \cos x$ for $0° \leqslant x \leqslant 360°$



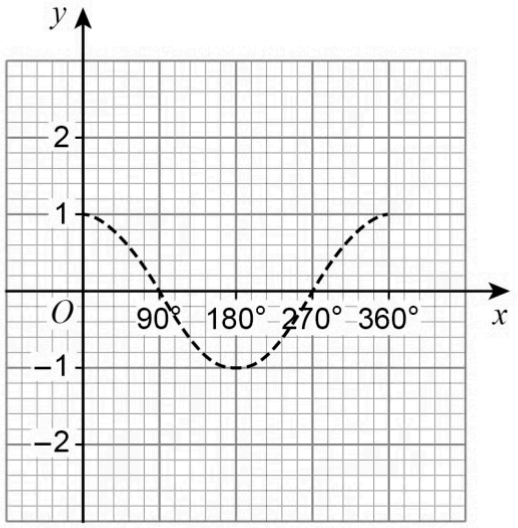
In parts (a) and (b) the graph of $y = \cos x$ is shown as a dashed line.

On the grid below, draw the graph of $y = \cos(x - 90°)$ for $0° \leqslant x \leqslant 360°$



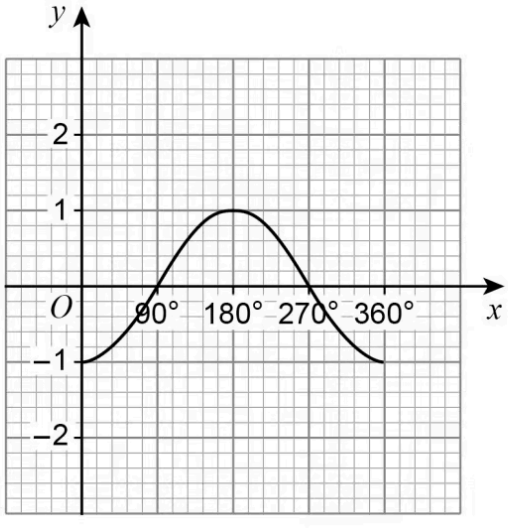
(1 mark)

(b) On the grid below, draw the graph of $y = 1 + \cos x$ for $0° \leqslant x \leqslant 360°$



(1 mark)

(c) Rita tries to draw the graph of $y = \cos(-x)$ for $0° \leqslant x \leqslant 360°$ Here is her graph.

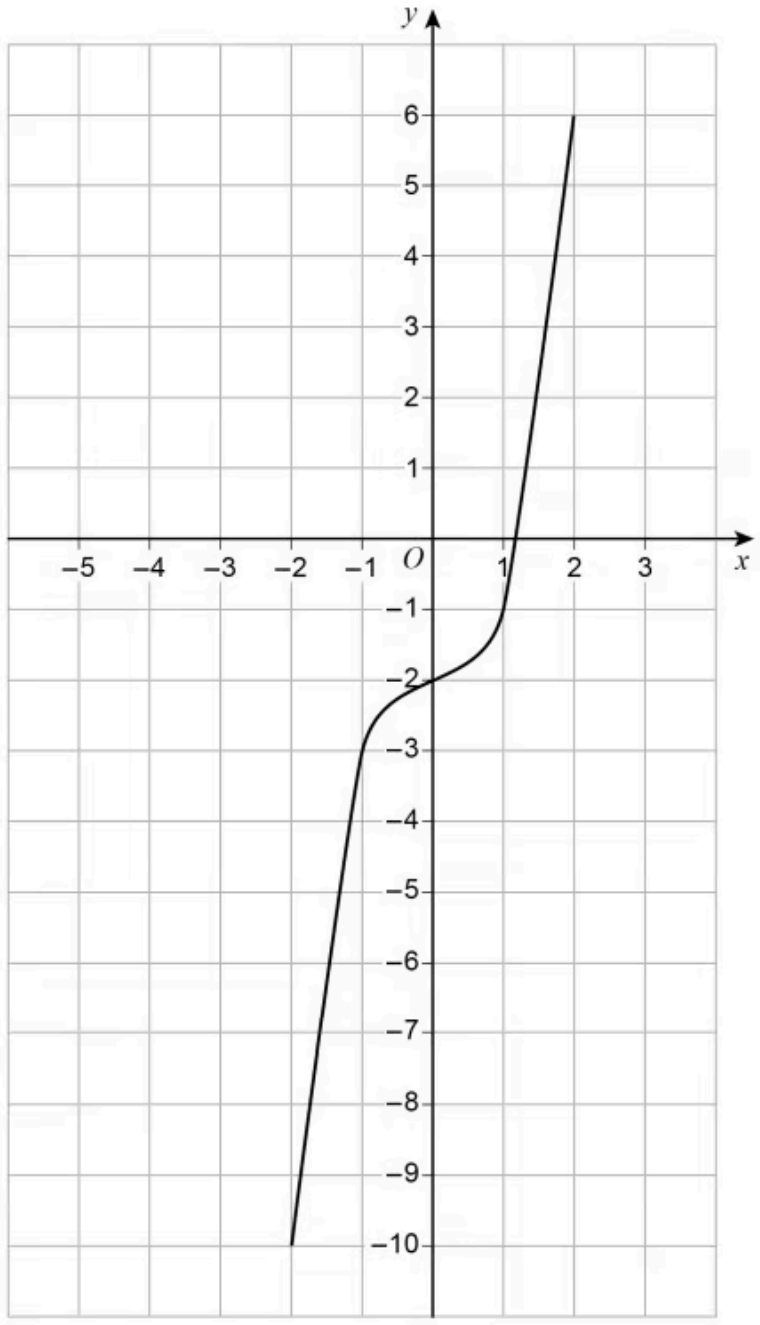


Give a reason why Rita's graph is incorrect.

(1 mark)

8 Here is a sketch of $y = f(x)$

The curve passes through the points (–2, –10) (–1, –3) (0, –2) (1, –1) (2, 6)



On the grid, sketch the curve $y = f(x + 2)$

(2 marks)

9 The curve with equation $y = x^2 - 5x + 2$ is reflected in the x-axis.

Choose the equation of the reflected curve.

A. $y = x^2 - 5x - 2$

B. $y = -x^2 + 5x + 2$

C. $y = -x^2 + 5x - 2$

D. $y = x^2 + 5x + 2$

(1 mark)

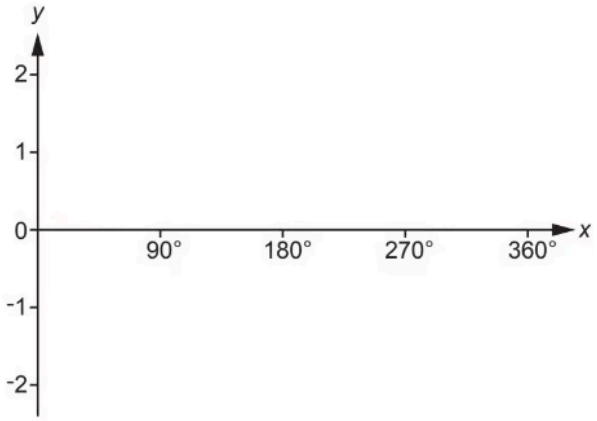
10 The graph of $y = \cos(x - 30)$ for $0° \leqslant x \leqslant 360°$ crosses the x-axis in two places.

Write down the values of x where this occurs.

$x =$ .....

(2 marks)

11 Sketch the graph of $y = -\sin x$ for $0° \leqslant x \leqslant 360°$.



(3 marks)

12 $y = f(x)$ is a curve on a graph.

It is transformed to the curve $y = f(x) + 3$.

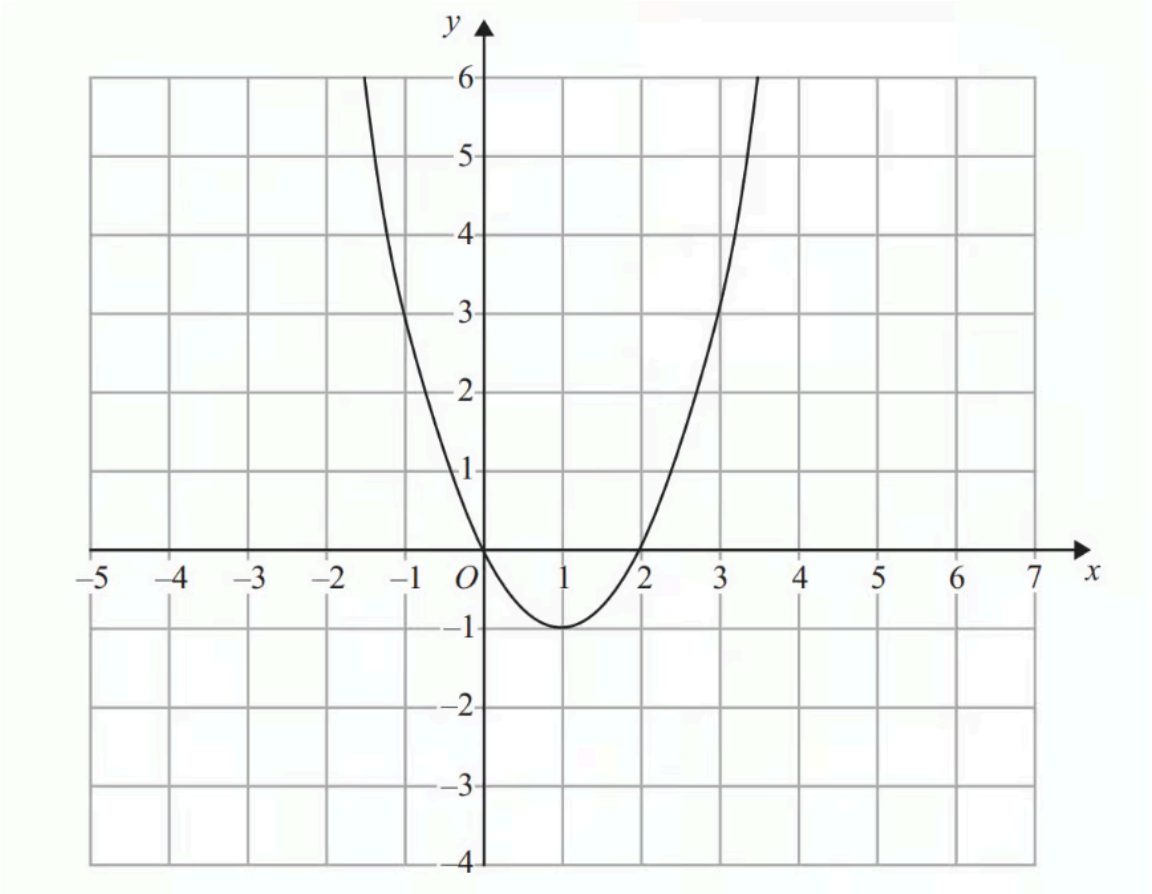
Describe the single transformation that has been performed on the curve $f(x)$.

(1 mark)

Hard Questions

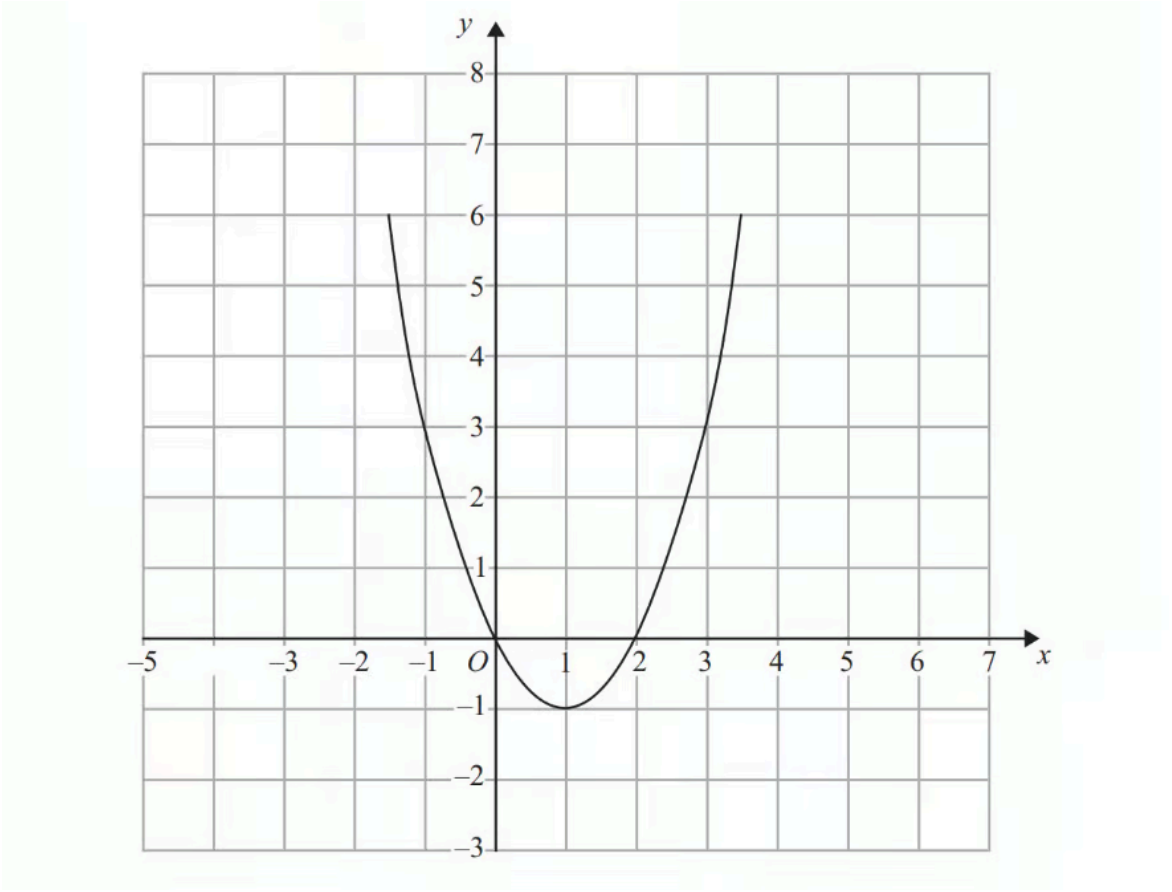
1 (a) The graph of $y = f(x)$ is shown on each of the grids.

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



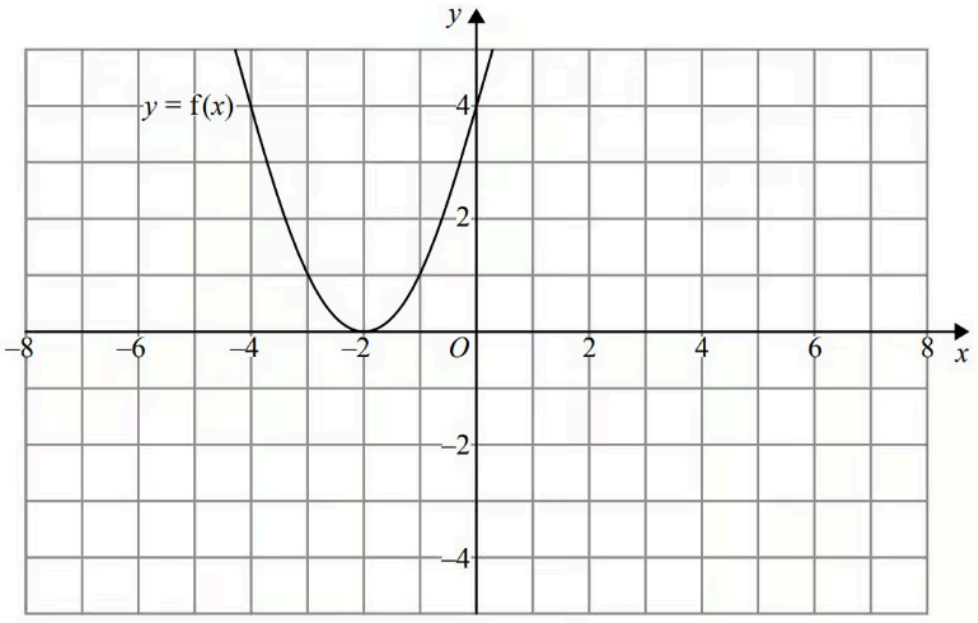
(2 marks)

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



(2 marks)

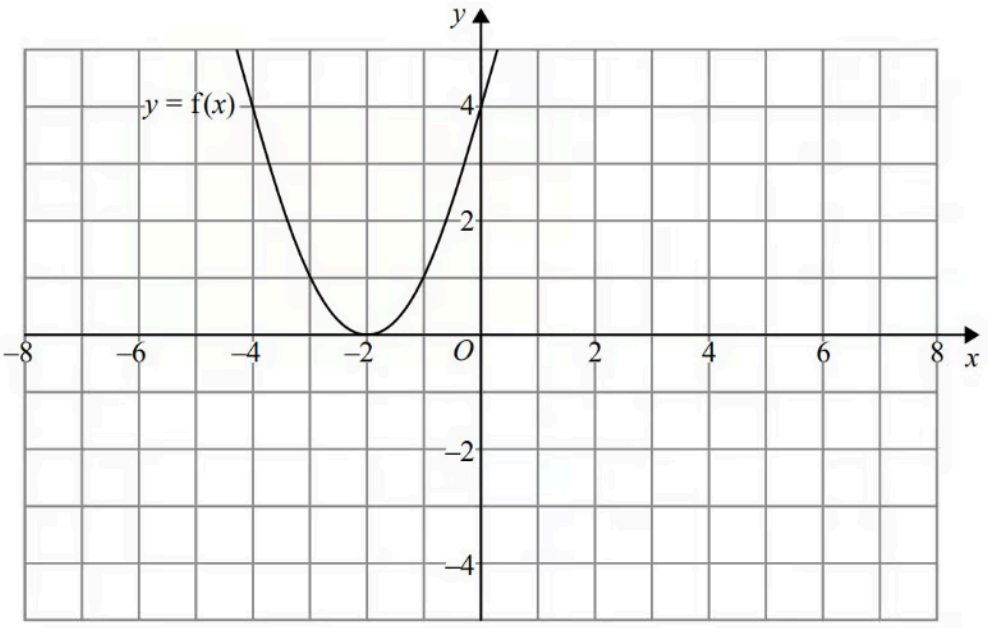
2 (a) The graph of $y = f(x)$ is shown on both grids below



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

(1 mark)

(b)

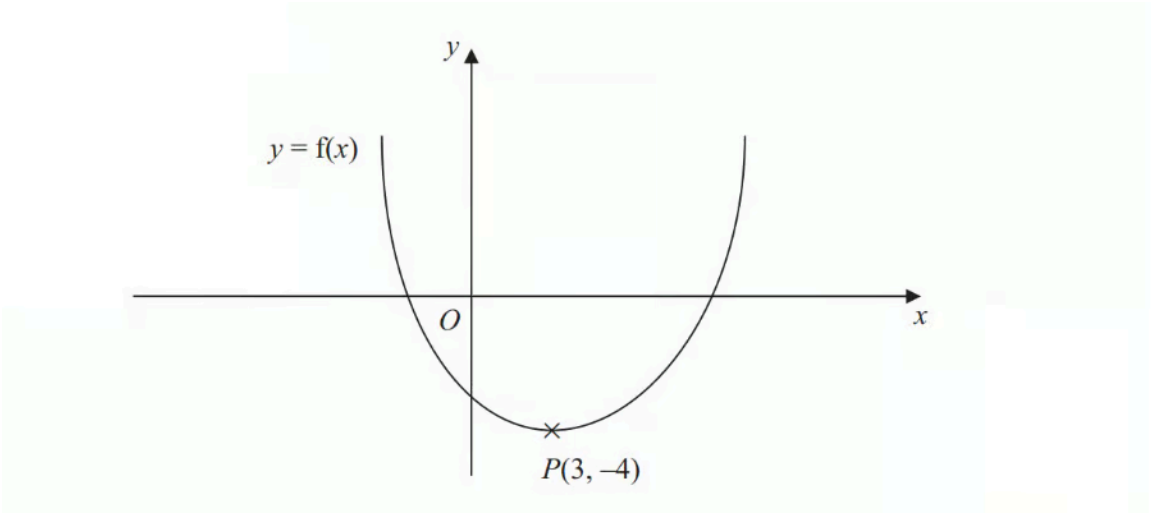


On this grid, sketch the graph of $y = -f(x) + 3$

(1 mark)

3 (a) This is a sketch of the curve with the equation $y = f(x)$.

The only minimum point of the curve is at $P(3, -4)$.



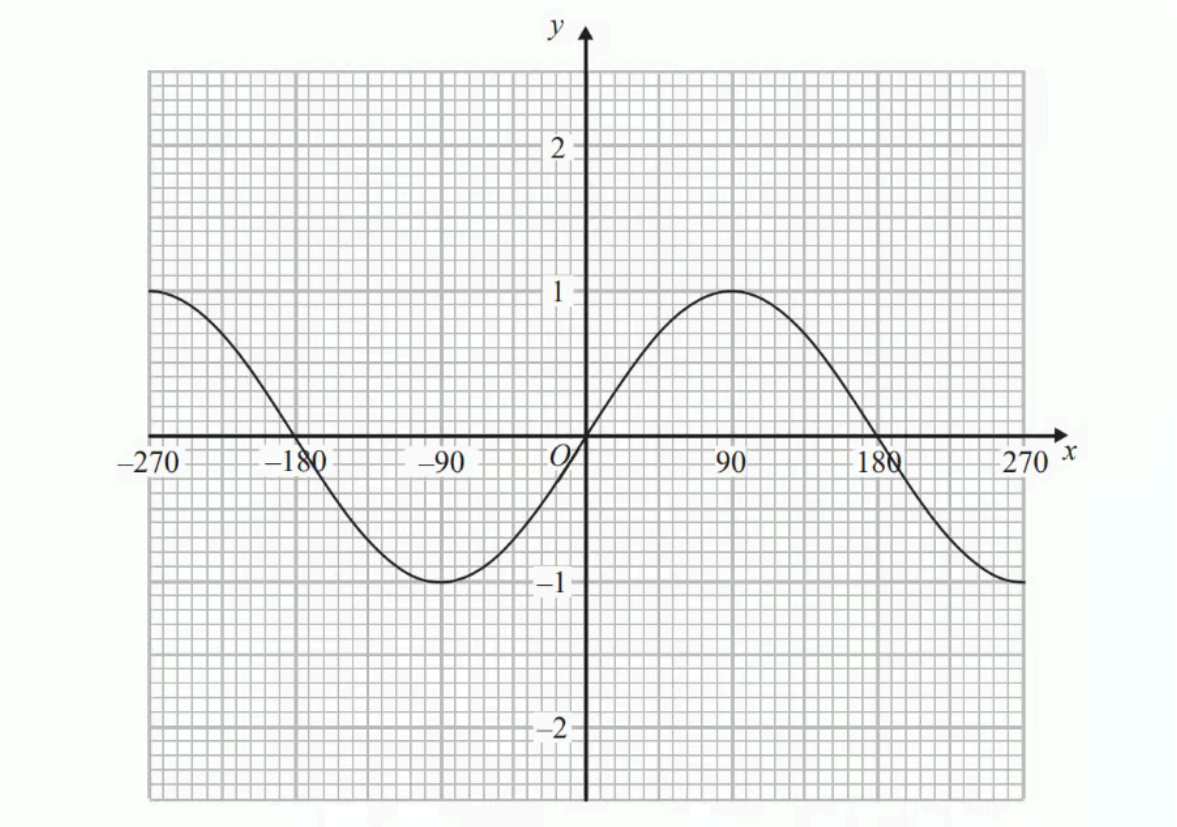
Write down the coordinates of the minimum point of the curve with the equation $y = f(x-2)$

(2 marks)

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

(2 marks)

4



The graph of $y = \sin x°$ for values of x from -270 to $+270$ is shown above.

On the same axes, draw the graph of $y = 1 - \sin x°$ for values of x from -270 to $+270$

(2 marks)

5 The graph of $y = f(x)$ is transformed to give the graph of $y = -f(x + 3)$
The point A on the graph of $y = f(x)$ is mapped to the point P on the graph of $y = -f(x + 3)$

The coordinates of point A are $(9, 1)$
Find the coordinates of point P.

(2 marks)

6 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.

(2 marks)

7 The graph of $y = h(x)$ intersects the x-axis at two points.
The coordinates of the two points are (–1, 0) and (6, 0)

The graph of $y = h(x + a)$ passes through the point with coordinates (2, 0), where a is a constant.

Find the two possible values of a.

(2 marks)

8 The curve $\mathbf{S}$ has equation $y = \mathrm{f}(x)$ where $\mathrm{f}(x) = x^2$
The curve $\mathbf{T}$ has equation $y = \mathrm{g}(x)$ where $\mathrm{g}(x) = 2x^2 - 12x + 13$

By writing $\mathrm{g}(x)$ in the form $a(x - b)^2 - c$, where a, b and c are constants, describe fully a series of transformations that map the curve $\mathbf{S}$ onto the curve $\mathbf{T}$.

(4 marks)

9 (a) The curve C has equation $y = \mathrm{f}(x)$ where $\mathrm{f}(x) = 9 - 3(x + 2)^2$

The point A is the maximum point on $\mathbf{C}$.

Write down the coordinates of A.

(1 mark)

(b) The curve $\mathbf{C}$ is transformed to the curve $\mathbf{S}$ by a translation of $\begin{pmatrix} 4 \\ 0 \end{pmatrix}$ Find an equation for the curve $\mathbf{S}$.

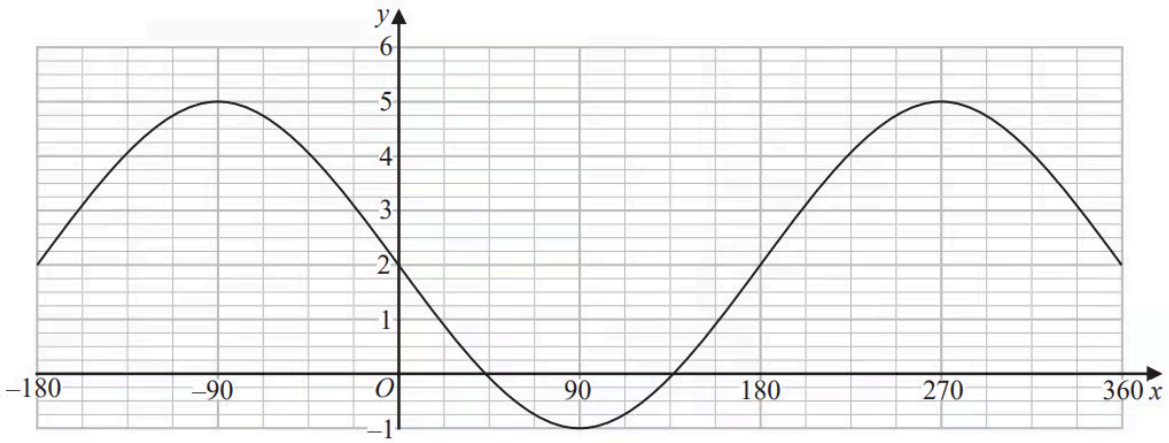
(1 mark)

(c) The curve $\mathbf{C}$ is transformed to the curve $\mathbf{T}$.
The curve $\mathbf{T}$ has equation $y = 3(x + 2)^2 - 9$

Describe fully the transformation that maps curve $\mathbf{C}$ onto curve $\mathbf{T}$.

(1 mark)

10 The graph of $y = a\cos(x - b)° + c$ for $-180 \leqslant x \leqslant 360$ is drawn on the grid below.



Find the value of a, the value of b and the value of c.

a = ...
b = ...
c = ...

(3 marks)

11 The equation of a curve $\mathbf{C}$ is $y = x^2 + 3x + 4$

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

Find an equation of curve $\mathbf{S}$.

You do need to simplify the equation.

(2 marks)

12 The graph of $y = x^3 + 6$ is translated 4 units to the right.

The translated graph has equation $y = \mathrm{f}(x)$

Work out $\mathrm{f}(x)$.

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

(4 marks)

13 Curve P has equation $y = 2(x - 1)^2 - 5$

Curve Q is a reflection in the y-axis of curve P.

Work out the equation of curve Q.

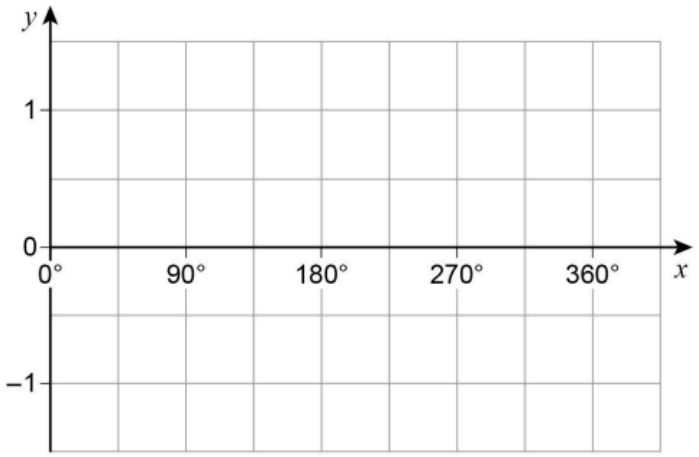
Give your answer in the form $y = ax^2 + bx + c$ where a, b and c are integers.

(3 marks)

14 For all values of x

$$f(x) = \sin x$$
$$g(x) = x + 90$$

On the grid, draw the graph of the composite function $y = fg(x)$ for $0° \leqslant x \leqslant 360°$



(2 marks)