

1MA1 Higher themed papers: Transformations: Trig graphs

Write your name here						
Surname	Other names					
Pearson Edexcel Level 1/Level 2 GCSE (9–1)	Centre Number <table border="1"><tr><td></td><td></td><td></td><td></td><td></td></tr></table>					
	Candidate Number <table border="1"><tr><td></td><td></td><td></td><td></td><td></td></tr></table>					
Mathematics Transformations: Trig graphs						
	Paper Reference 1MA1					
You must have: Ruler graduated in centimetres and millimetres, protractor, pair of compasses, pen, HB pencil, eraser, calculator. Tracing paper may be used.						
Total Marks						

Instructions

- Use **black** ink or ball-point pen.
- **Fill in the boxes** at the top of this page with your name, centre number and candidate number.
- Answer **all** questions.
- Answer the questions in the spaces provided – *there may be more space than you need.*
- You must **show all your working.**
- Diagrams are **NOT** accurately drawn, unless otherwise indicated.
- If your calculator does not have a π button, take the value of π to be 3.142 unless the question instructs otherwise.

Information

- The total mark for this paper is **30**. There are **11** questions.
- Questions have been arranged in an ascending order of mean difficulty, as found by all students in the June 2017–November 2019 examinations.
- The marks for **each** question are shown in brackets – *use this as a guide as to how much time to spend on each question.*

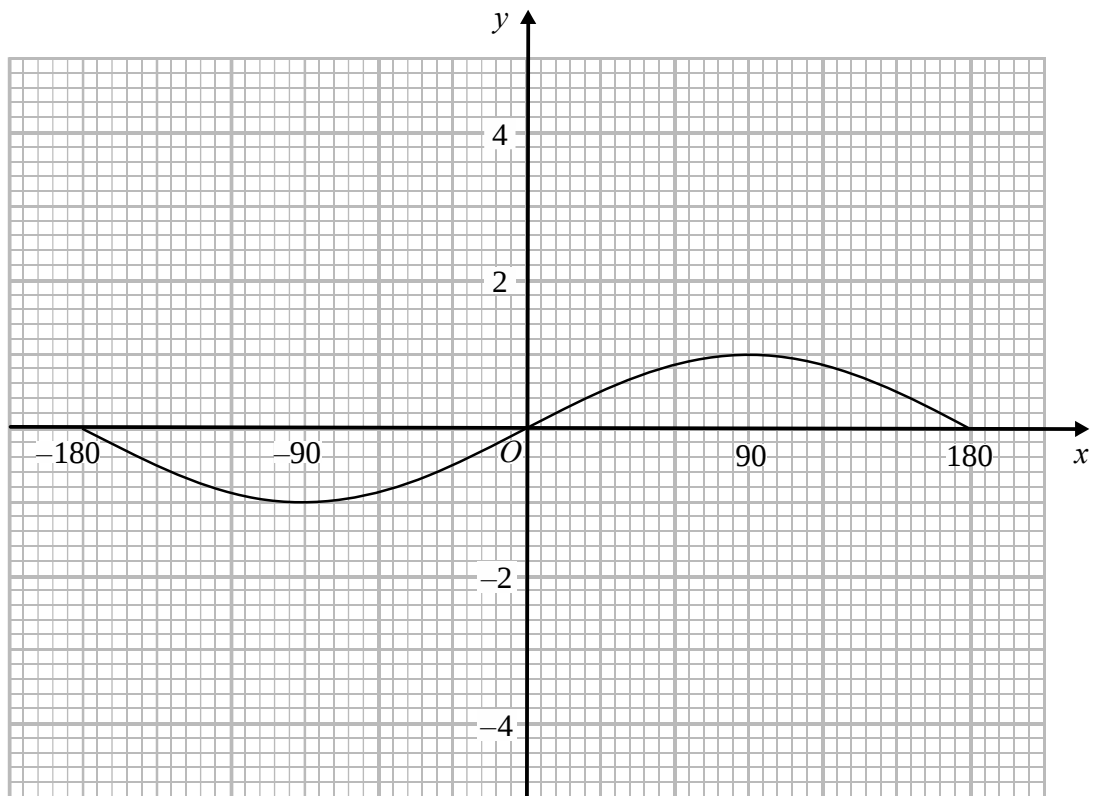
Advice

- Read each question carefully before you start to answer it.
- Keep an eye on the time.
- Try to answer every question.
- Check your answers if you have time at the end.

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- 1 Here is the graph of $y = \sin x^\circ$ for $-180 \leq x \leq 180$

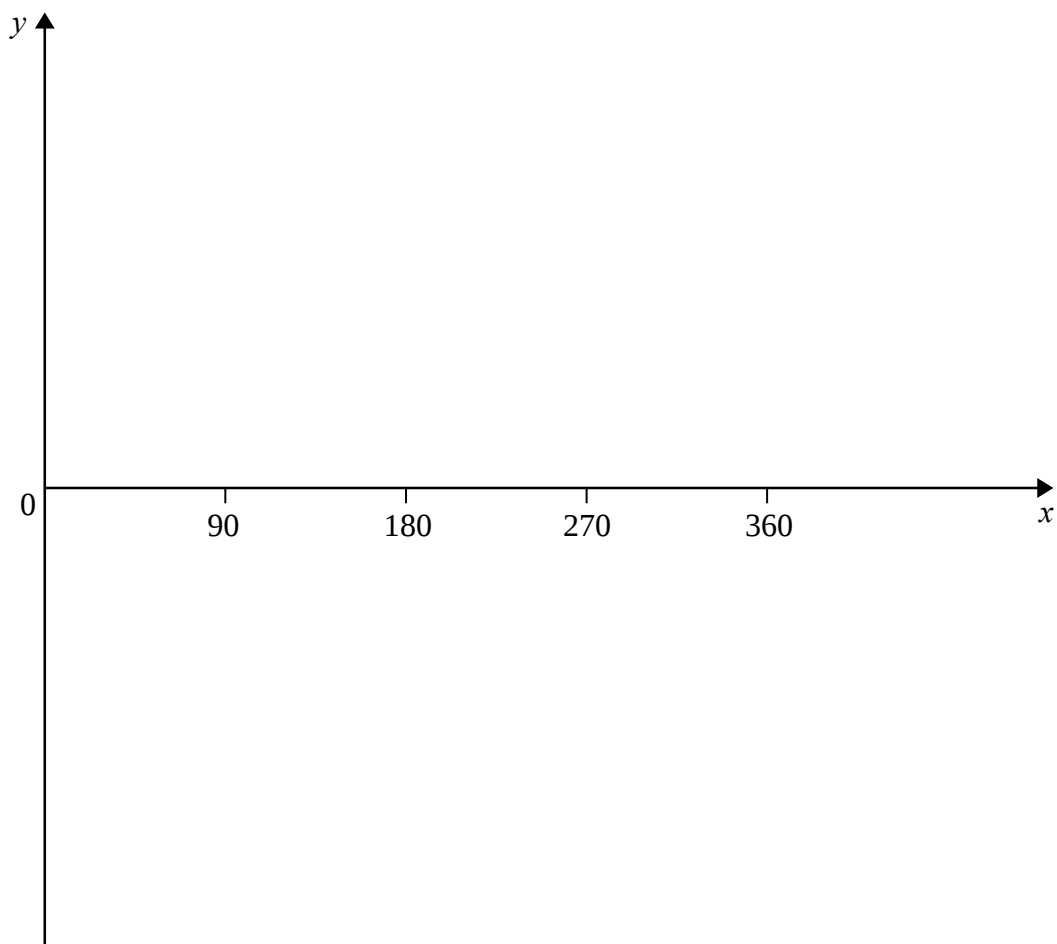


On the grid, sketch the graph of $y = \sin x^\circ - 2$ for $-180 \leq x \leq 180$

(Total for Question 1 is 2 marks)

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- 2 Sketch the graph of $y = \tan x^\circ$ for $0 \leq x \leq 360$

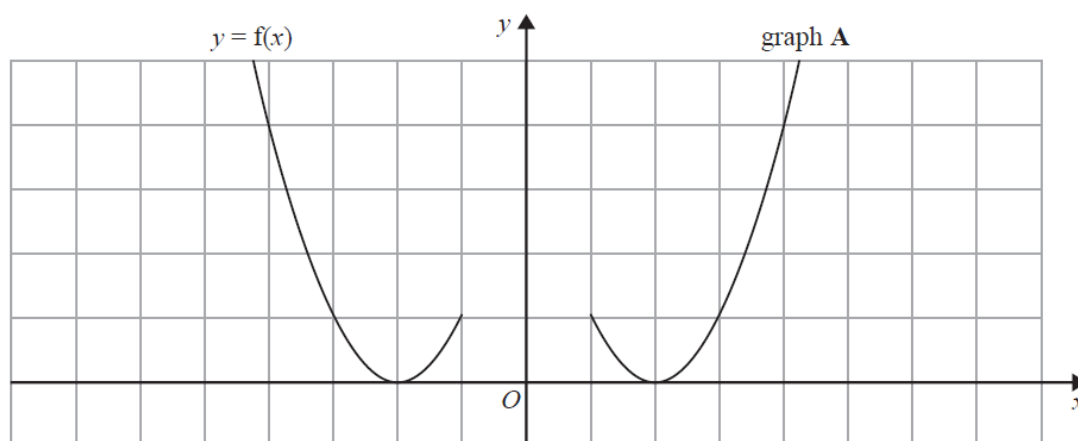


(Total for Question 2 is 2 marks)

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



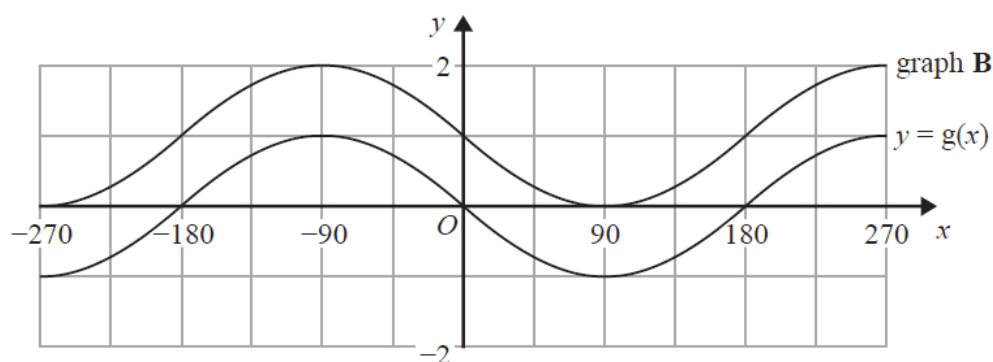
Graph **A** is a reflection of the graph of $y = f(x)$.

- (a) Write down the equation of graph **A**.

.....

(1)

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



Graph **B** is a translation of $y = g(x)$.

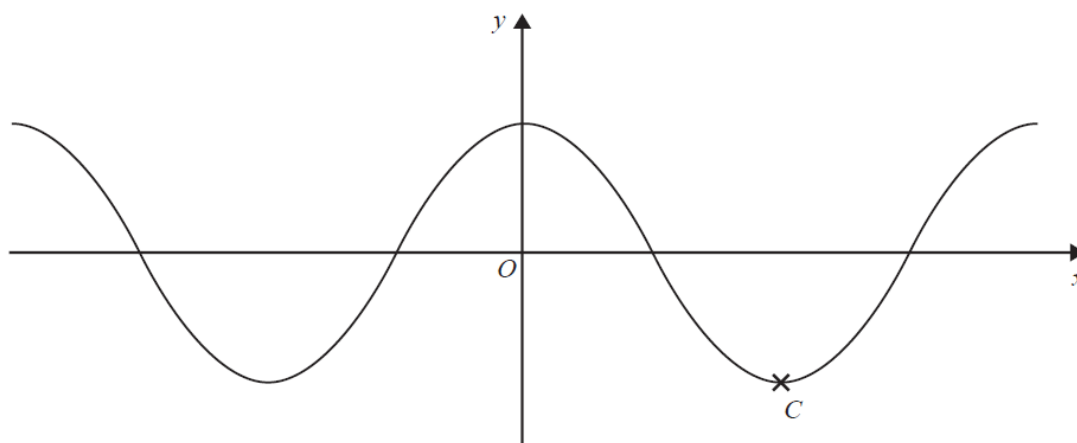
- (b) Write down the equation of graph **B**.

.....

(1)

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The graph of $y = \cos x^\circ$ is shown.



(c) Write down the coordinates of the point marked C .

(..... ,)

(1)

(Total for Question 3 is 3 marks)

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- 4 The equation of a curve is $y = a^x$
A is the point where the curve intersects the y-axis.

(a) State the coordinates of A.

(..... ,)
(1)

The equation of circle C is $x^2 + y^2 = 16$

The circle C is translated by the vector $\begin{pmatrix} 3 \\ 0 \end{pmatrix}$ to give circle B.

(b) Draw a sketch of circle B.

Label with coordinates
the centre of circle B
and any points of intersection with the x-axis.

(3)

(Total for Question 4 is 4 marks)

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- 5 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.

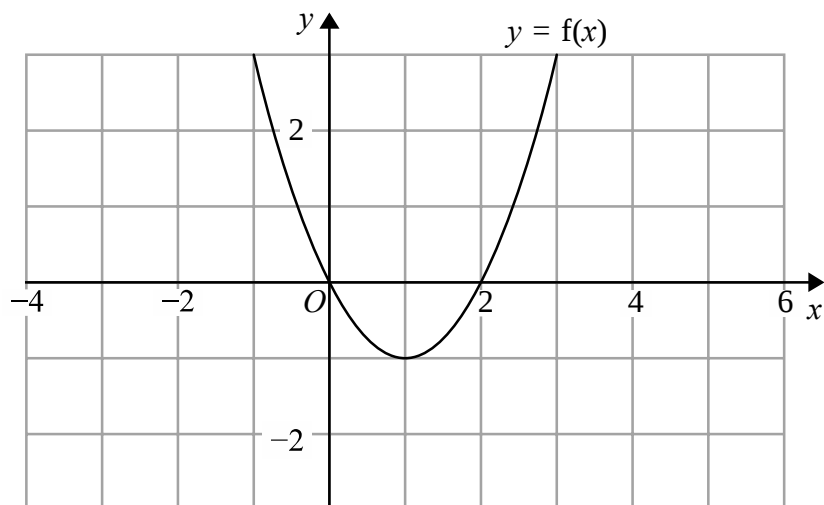
(..... ,)

(Total for Question 5 is 2 marks)

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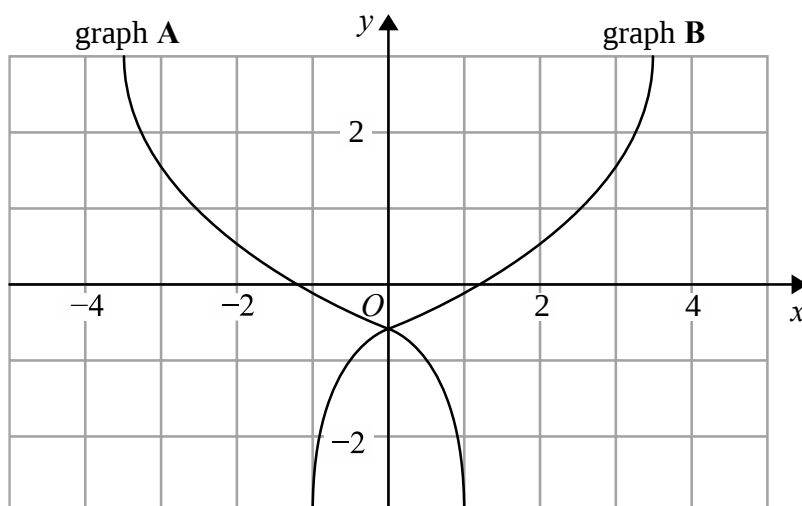


- 6** The graph of $y = f(x)$ is shown on the grid below.



- (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 $y = g(x)$

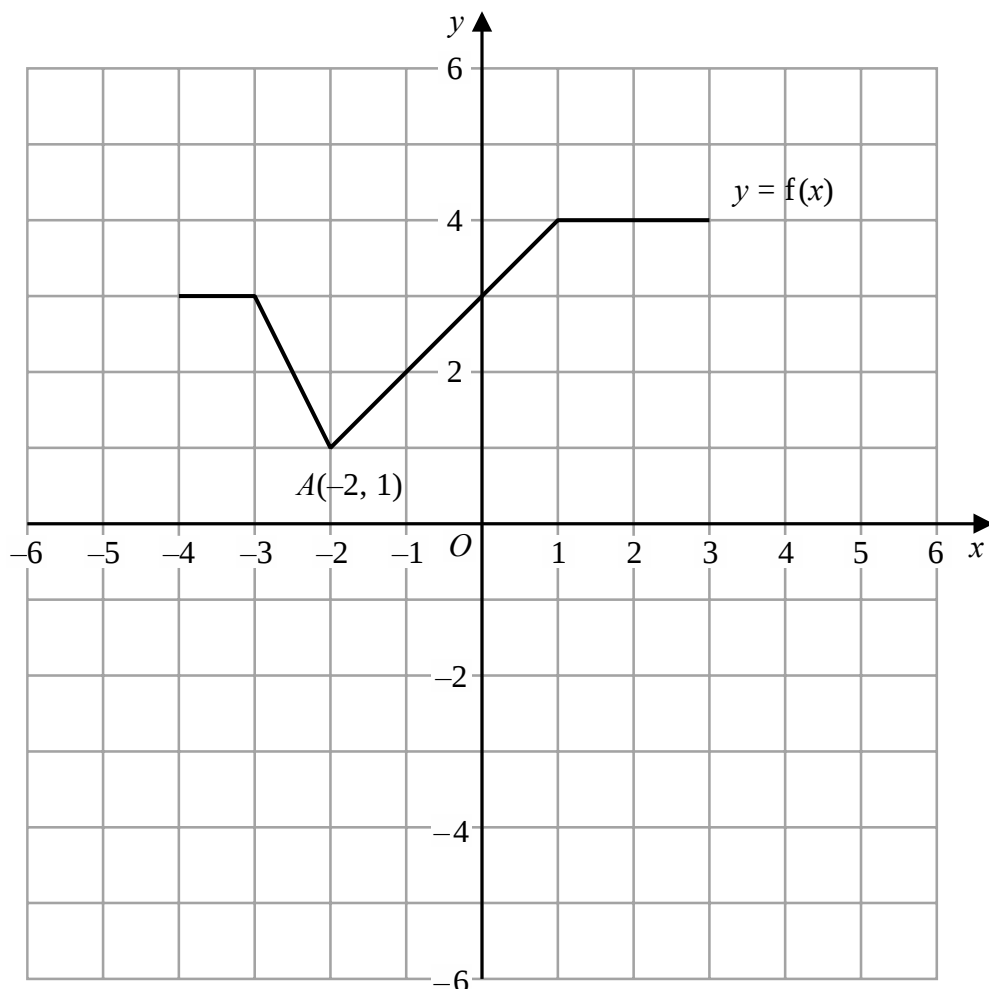
- (b) Write down the equation of graph **B**.

(1)

(Total for Question 6 is 2 marks)



7 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 .

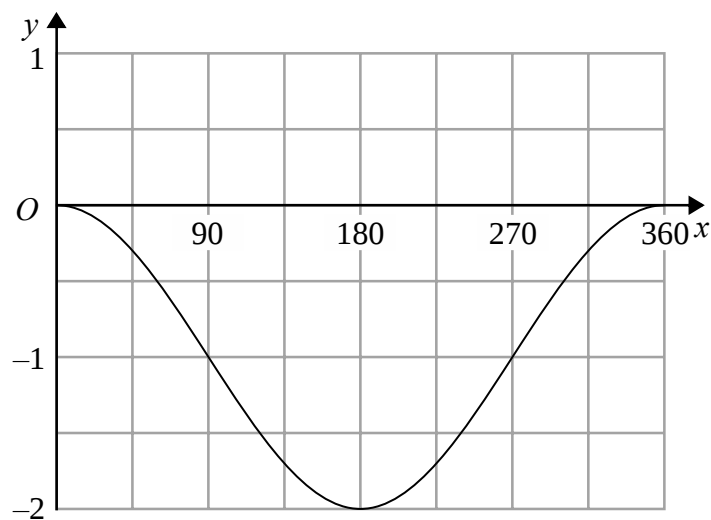
(.....,)

(1)

(Total for Question 7 is 3 marks)

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- 8** Here is a sketch of the curve $y = \sin (x + a)^\circ + b$



Given that $0 < a < 360$
find the value of a and the value of b .

$a = \dots\dots\dots$

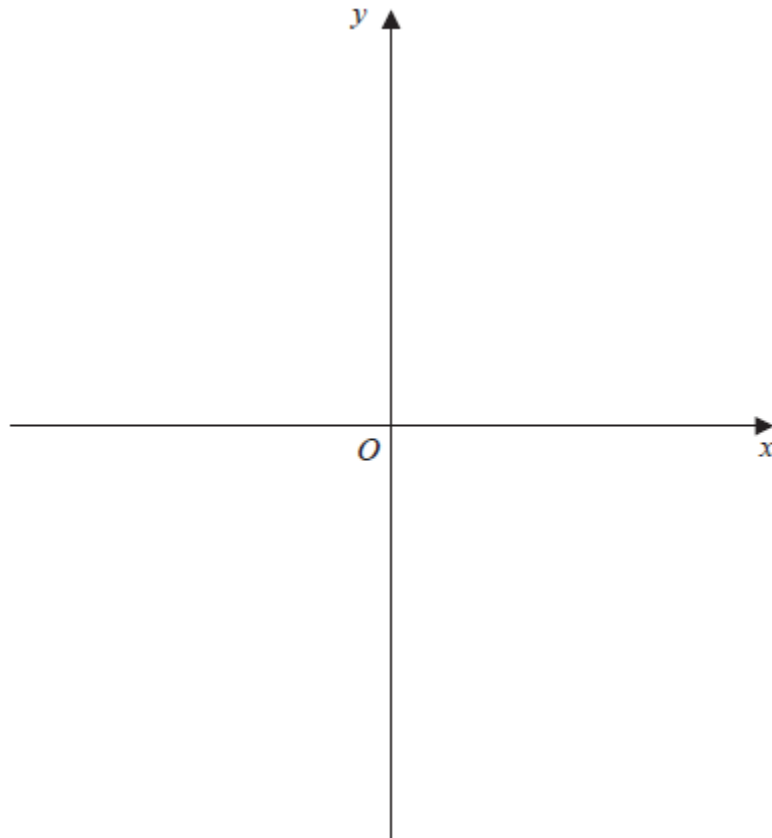
$b = \dots\dots\dots$

(Total for Question 8 is 2 marks)

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9 The graph of $y = x^2$ is reflected in the line with equation $y = x$ to give the curve **C**.

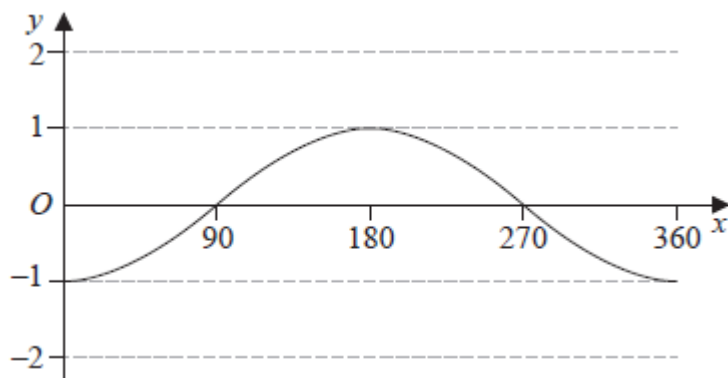
- (a) Sketch the graph of $y = x^2$ and the curve **C**.
Clearly label the graphs.



(Total for Question 9 is 3 marks)

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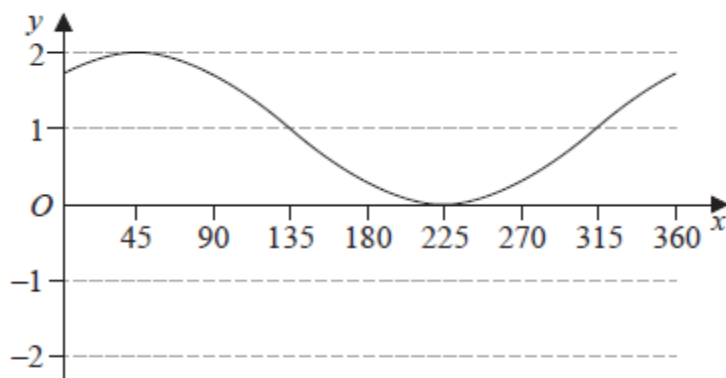
- 10 Here is a sketch of the graph of a trigonometric function for $0 \leq x \leq 360$



- (a) Write down a possible equation of the graph.

.....
(1)

Here is a sketch of the graph of $y = \cos(x - p)^\circ + r$ for $0 \leq x \leq 360$



- (b) Find the value of p and the value of r .

$p =$

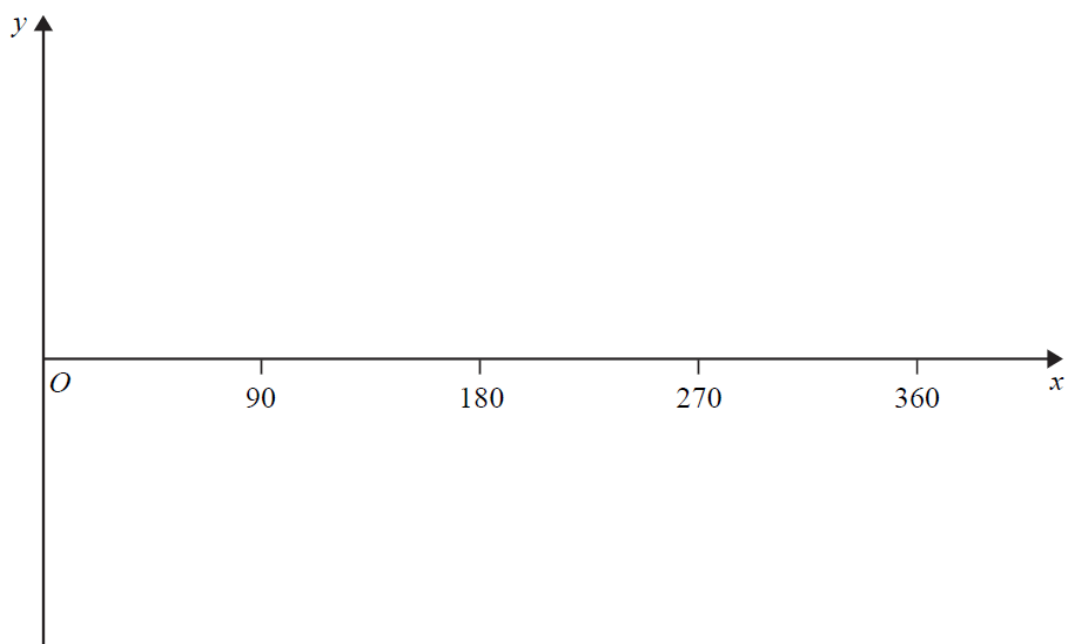
$r =$

(2)

(Total for Question 10 is 3 marks)

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- 11** (a) Sketch the graph of $y = \cos x^\circ$ for $0 \leq x \leq 360$

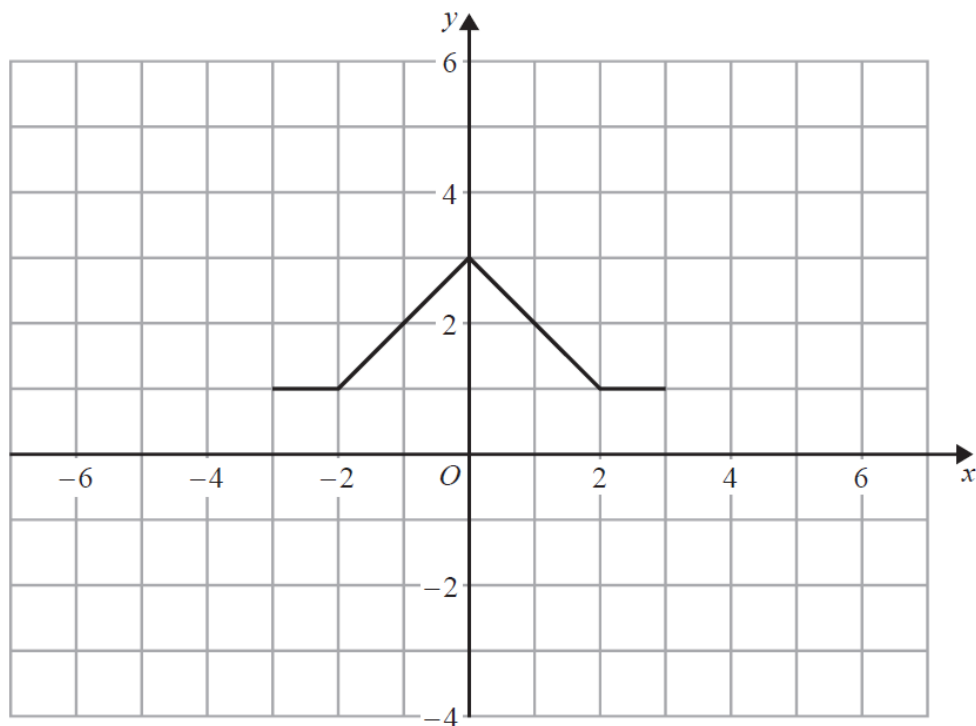


(2)

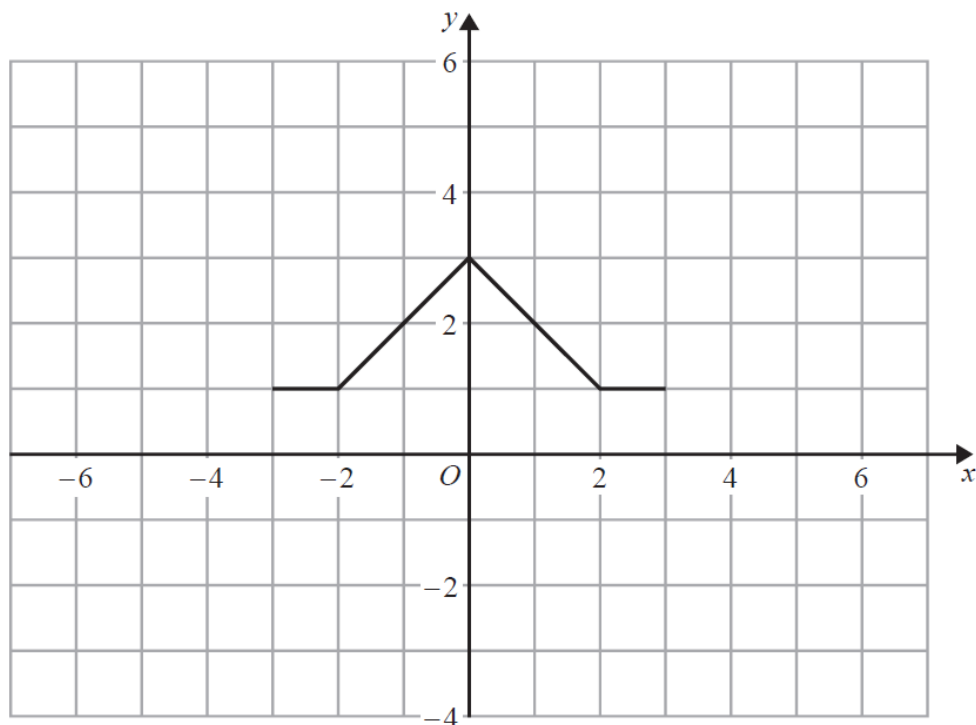
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(b) The graph of $y = f(x)$ is shown on both grids below.

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



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



(2)

(Total for Question 11 is 4 marks)

TOTAL MARKS FOR PAPER: 30