

Name

Class



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Transformation of graphs

(9 – 1) Topic booklet

HIGHER

These questions have been collated from previous years GCSE Mathematics papers.

You must have: Ruler graduated in centimetres and millimetres, protractor, pair of compasses, pen, HB pencil, eraser.

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.*
- Diagrams are NOT accurately drawn, unless otherwise indicated.
- You must **show all your working out.**
- If the question is a **1F** question you are not allowed to use a calculator.
- If the question is a **2F** or a **3F** question, you may use a calculator to help you answer.

Information

- 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.

Answer ALL questions

Write your answers in the space provided.

You must write down all the stages in your working.

- 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 .

(.....,))

June 2019 – Paper 3H

(Total for Question 15 is 2 marks)

- 16** 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 $(9, 1)$

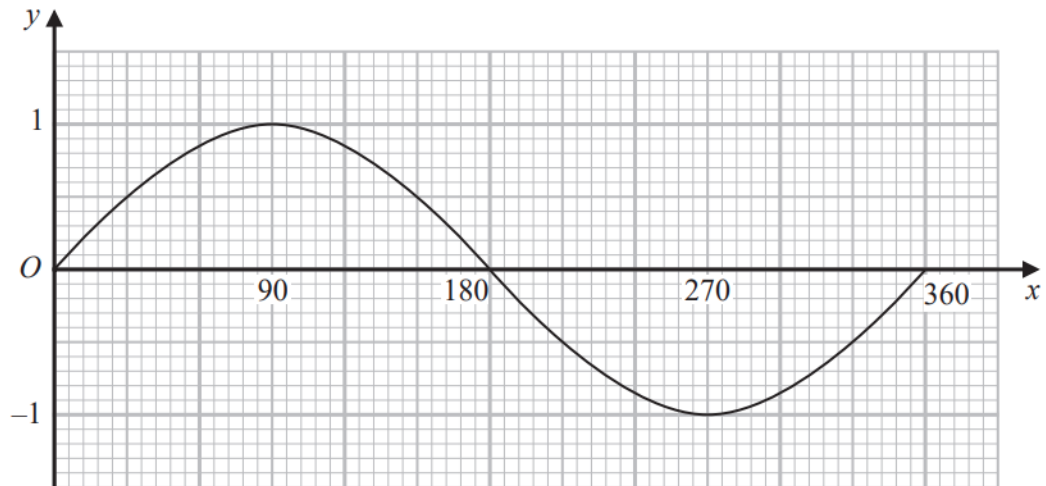
Find the coordinates of point P .

(.....,))

Specimen 1 – Paper 3H

(Total for Question 16 is 2 marks)

18 Here is a graph of $y = \sin x^\circ$ for $0 \leq x \leq 360$



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

$$\sin x^\circ = 0.6 \quad \text{for } 0 \leq x \leq 720$$

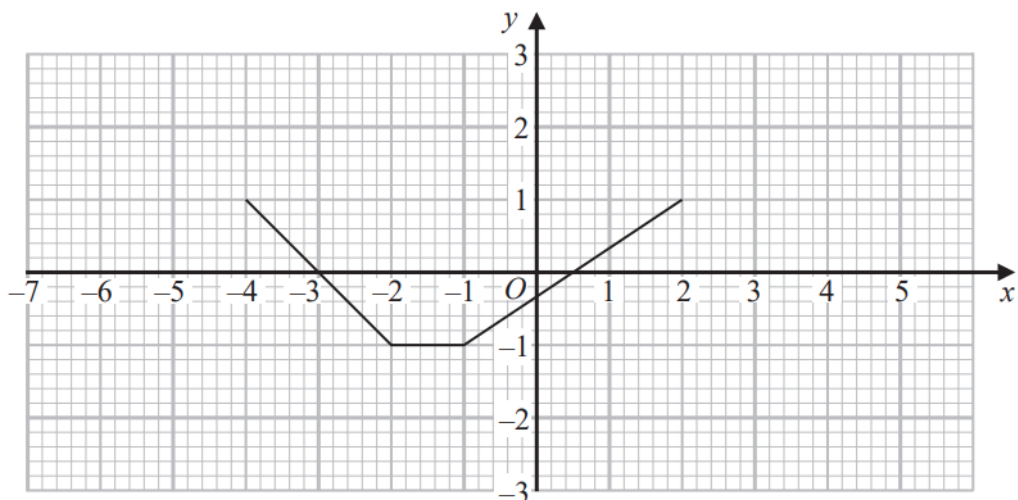
.....
(2)

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

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

.....
(1)

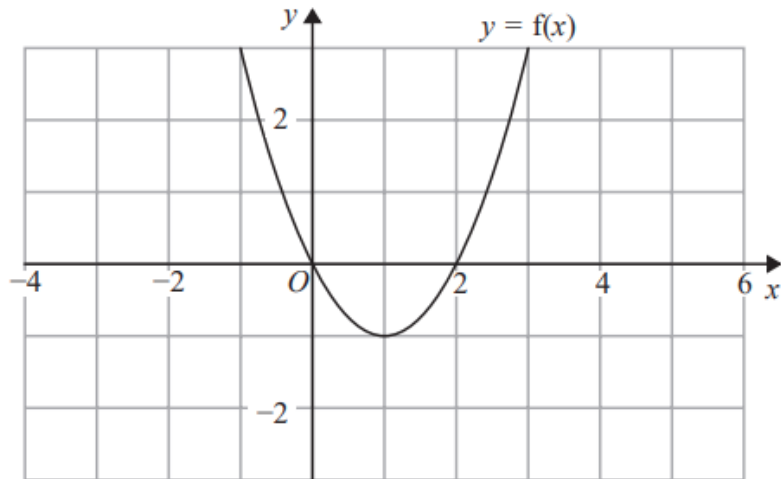
Here is a graph of $y = f(x)$



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

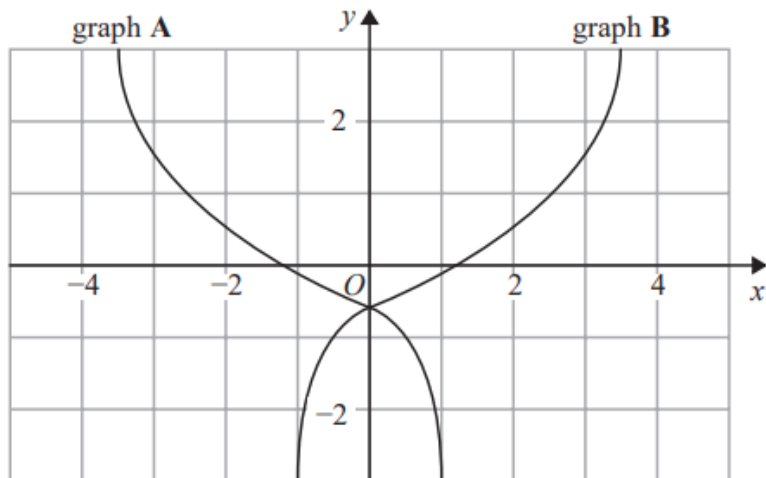
(1)

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)



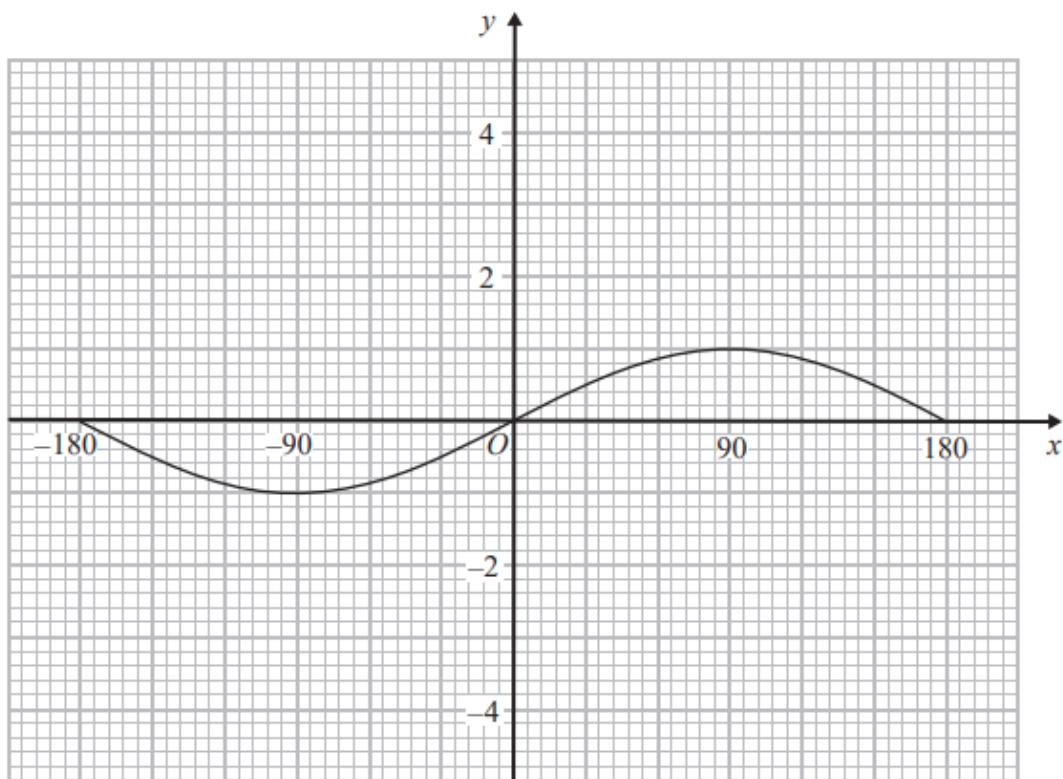
On the grid, graph A has been reflected to give graph B.

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

(b) Write down the equation of graph B.

.....
(1)

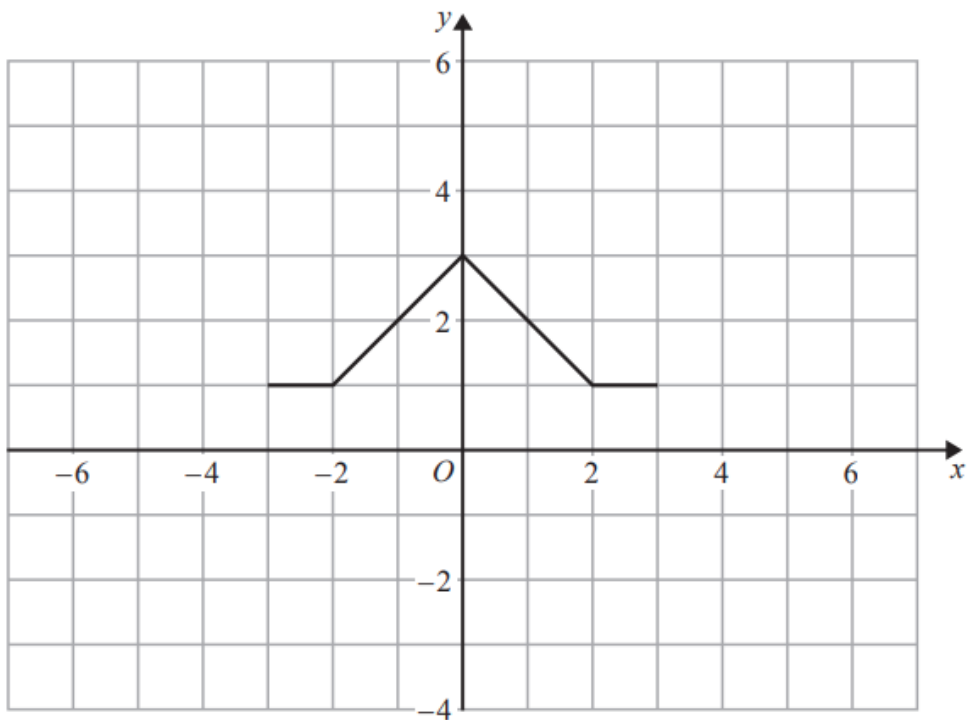
18 Here is the graph of $y = \sin x^\circ$ for $-180 \leq x \leq 180$



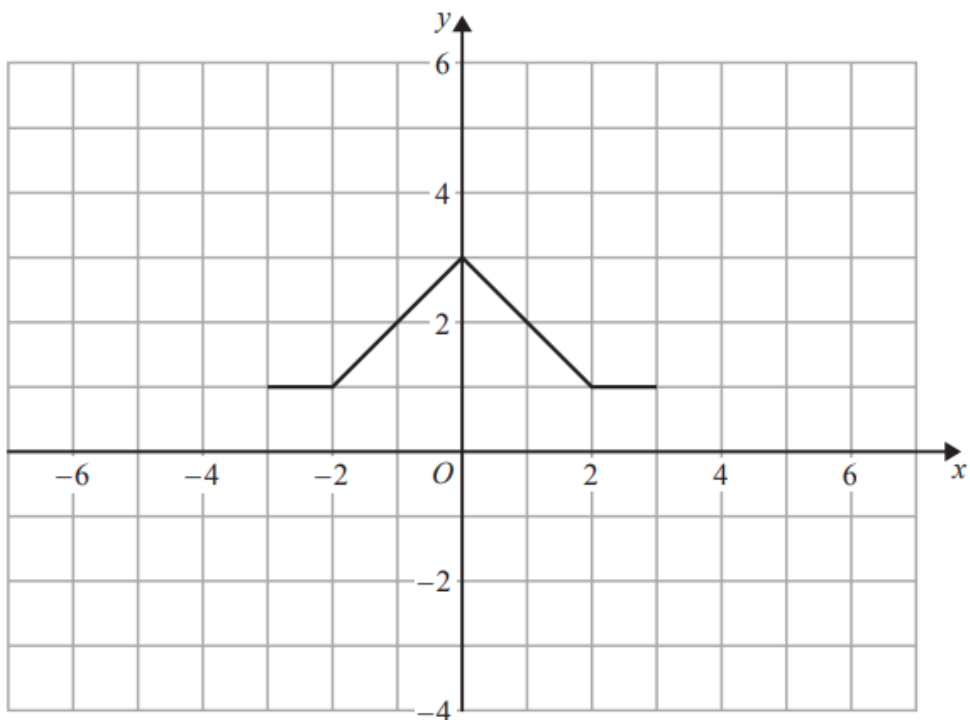
On the grid, sketch the graph of $y = \sin x^\circ - 2$ for $-180 \leq x \leq 180$

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

(i) On this grid, draw the graph of $y = 2f(x)$

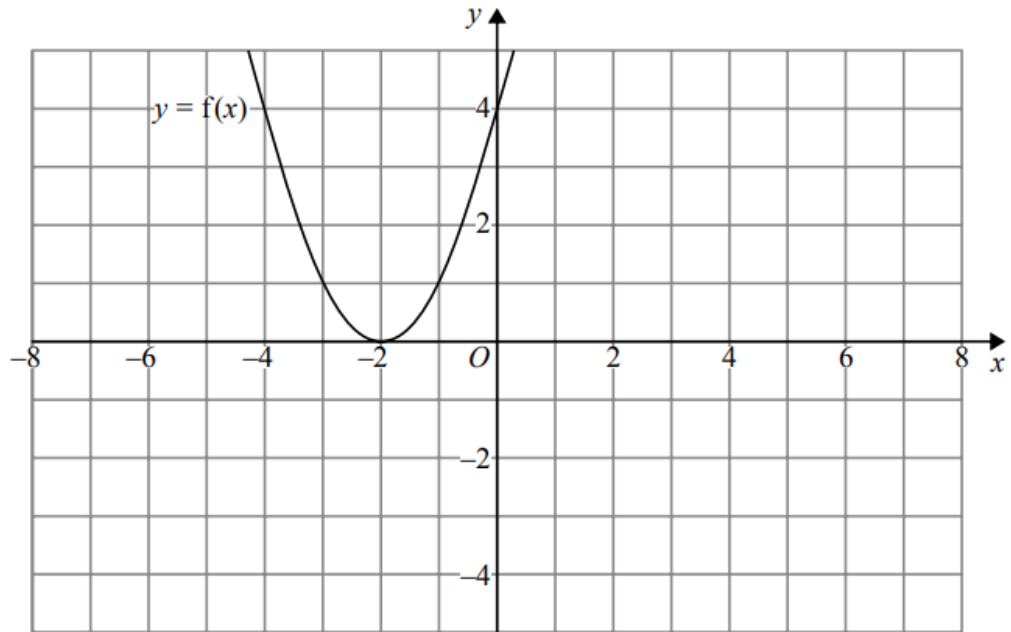


(ii) On the grid below, draw the graph of $y = f(x - 3)$



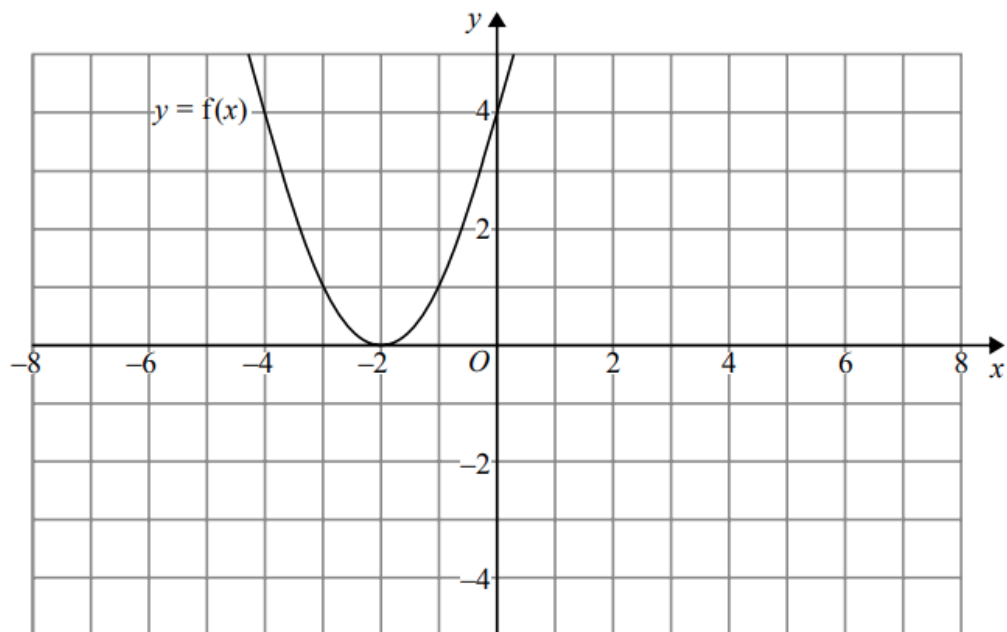
(2)

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



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

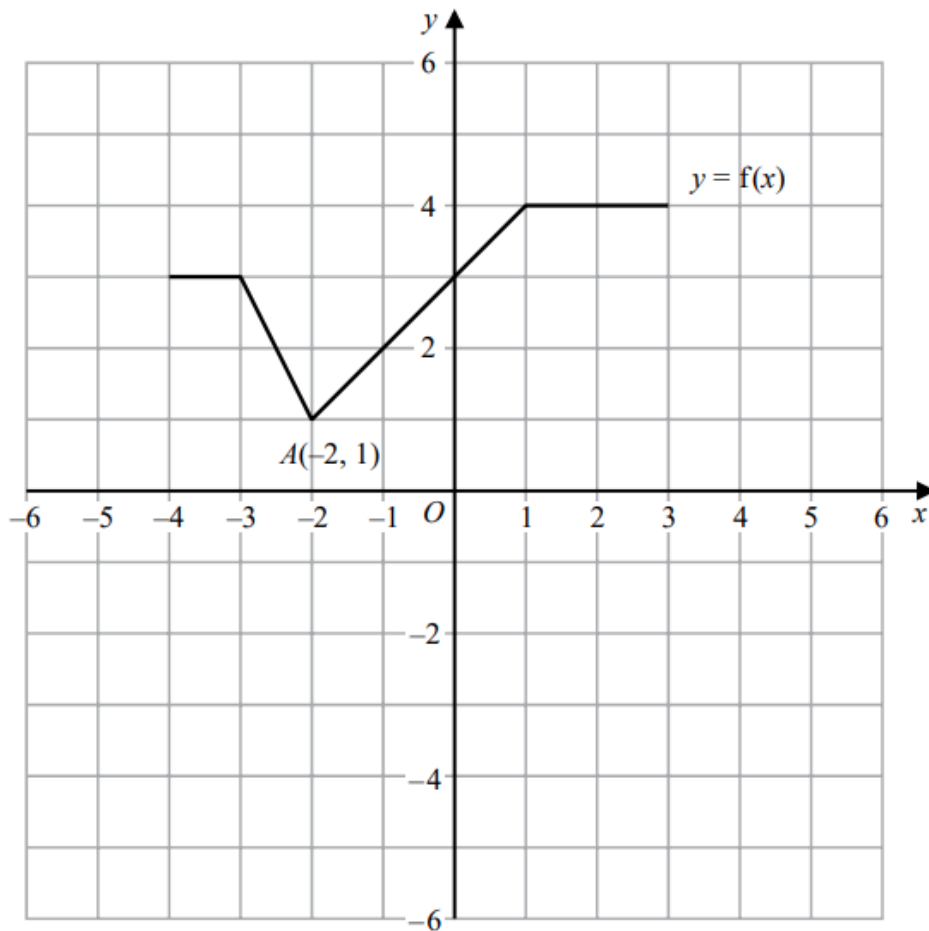
(1)



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

(1)

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)

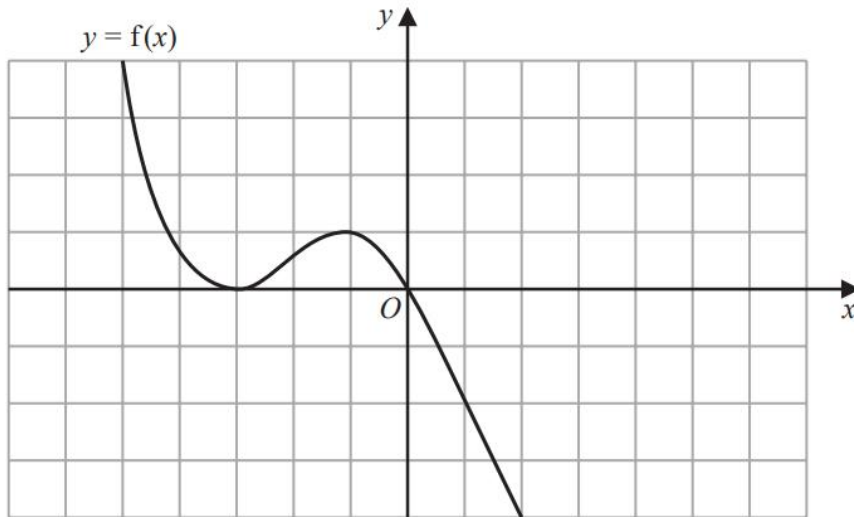
Point $A(-2, 1)$ lies on the graph of $y = f(x)$.

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)

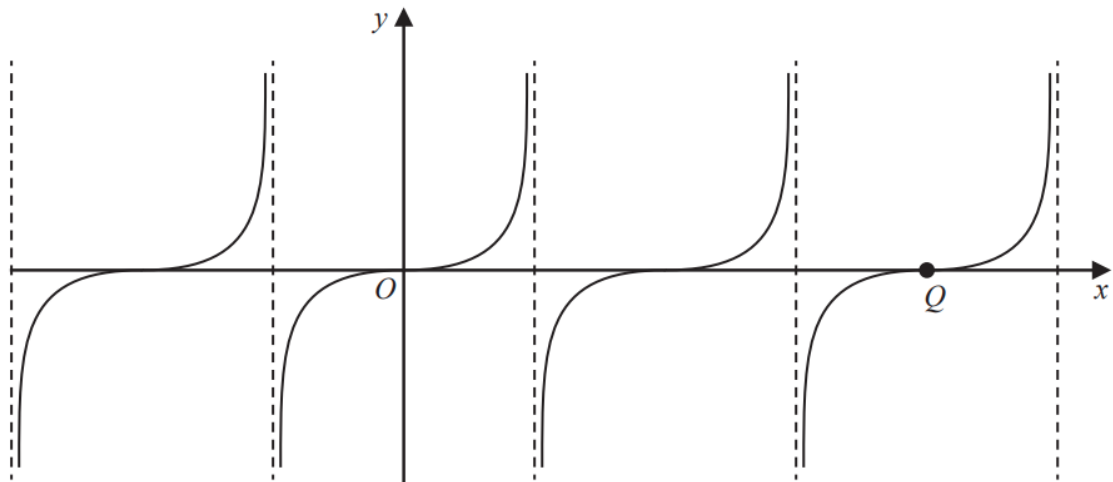
21 The graph of $y = f(x)$ is shown on the grid below.



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

(1)

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



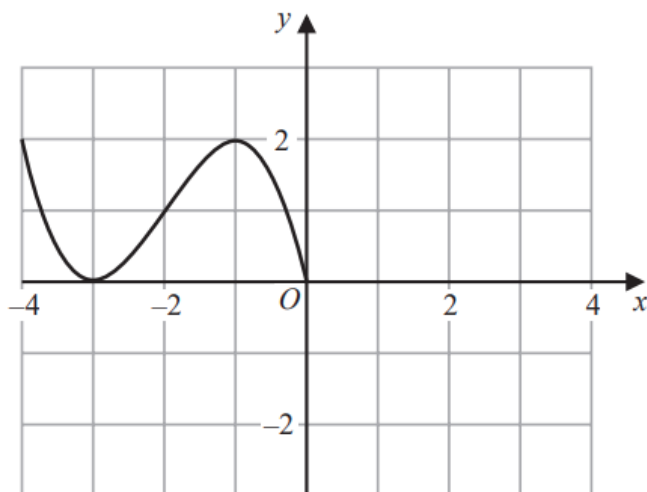
The graph of $y = \tan x^\circ$ is translated to give the graph of $y = g(x)$

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 .

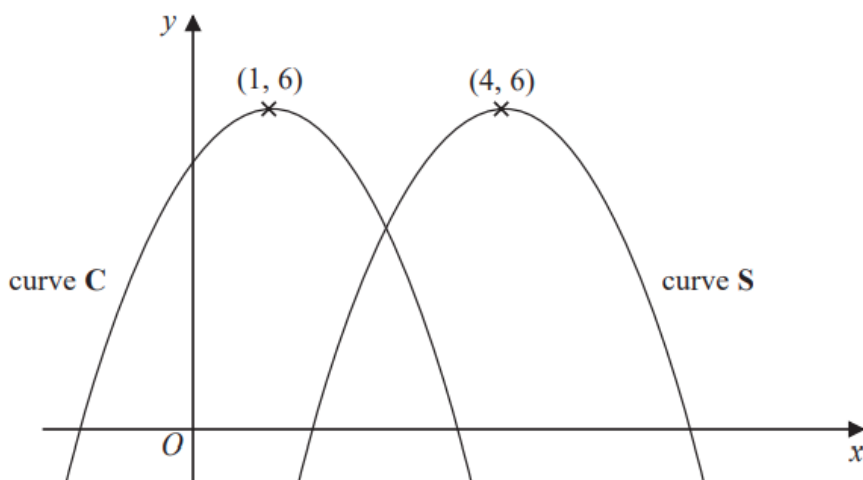
(2)

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)

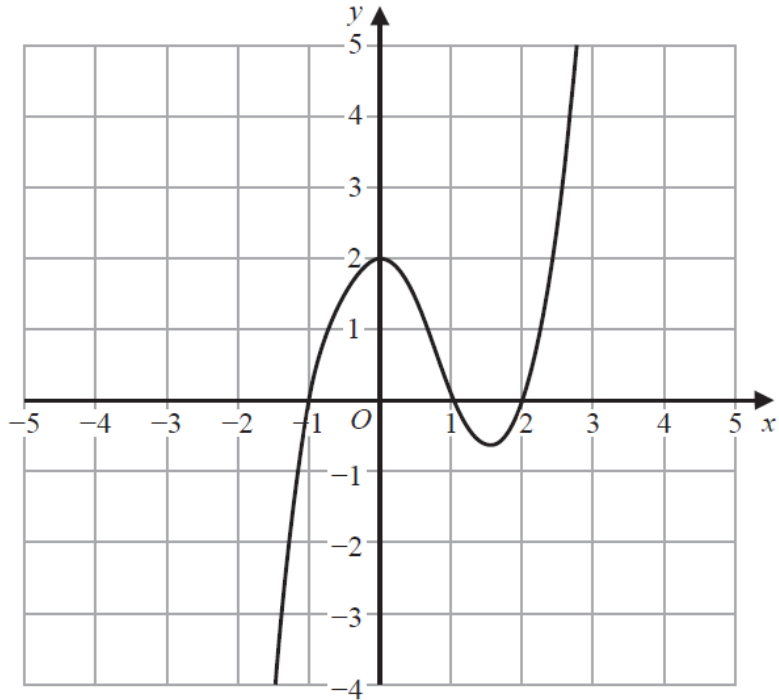


The curve C with equation $y = 5 + 2x - x^2$ is transformed by a translation to give the curve S such that the point $(1, 6)$ on C is mapped to the point $(4, 6)$ on S.

(b) Find an equation for S.

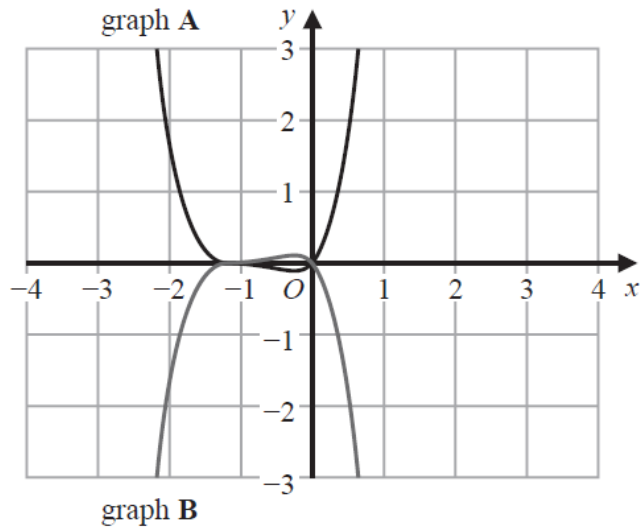
(2)

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)