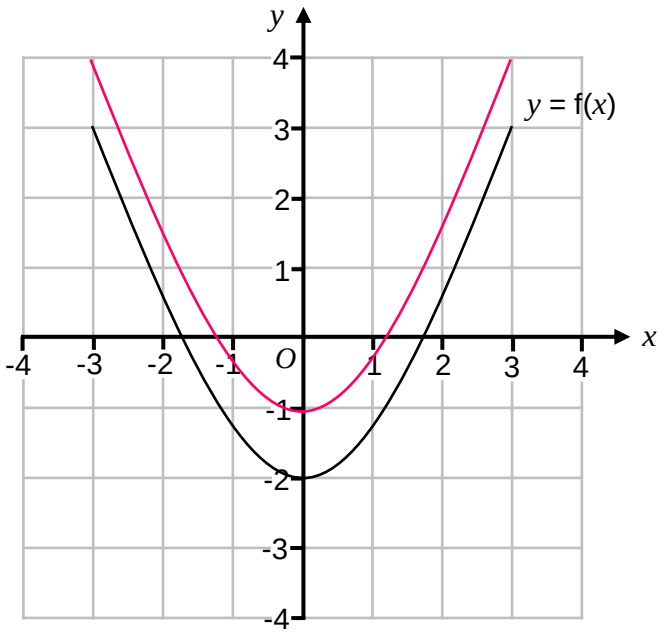
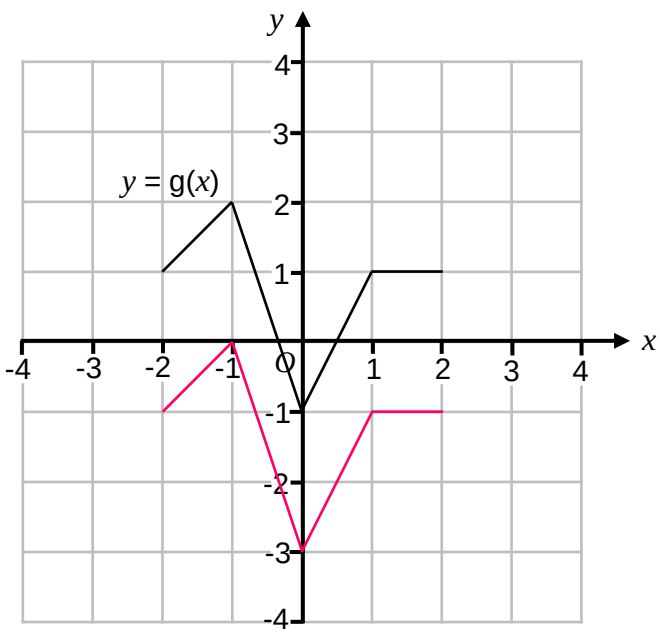
Transformations of Graphs

SCAN ME

REVISE THIS TOPIC

1 The graphs of $y = f(x)$ and $y = g(x)$ are shown on the grids below.



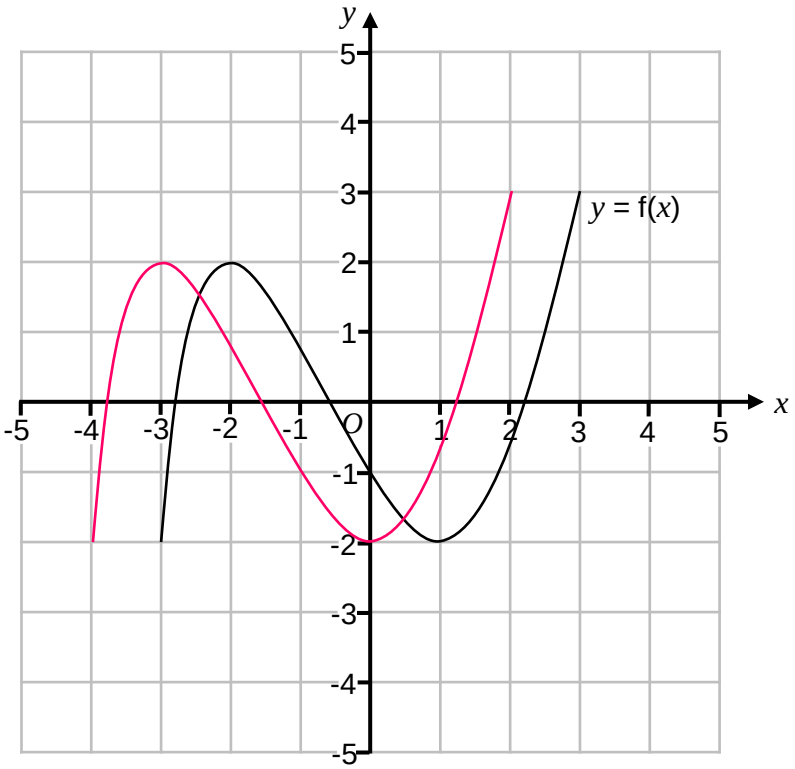


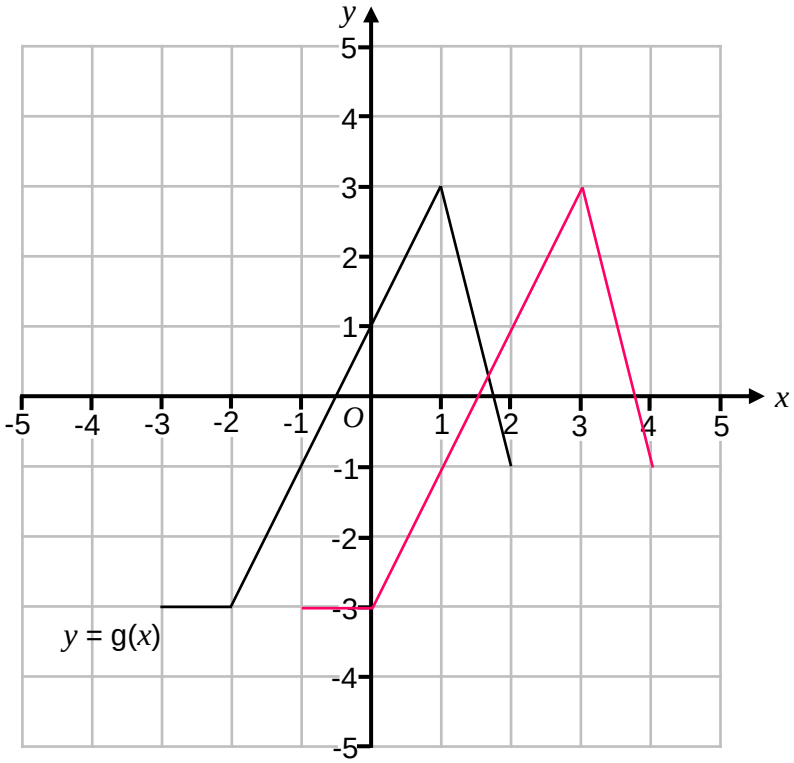
1 (a) Draw the graph of $y = f(x) + 1$ onto the first grid. **[1 mark]**

1 (b) Draw the graph of $y = g(x) - 2$ onto the second grid. **[1 mark]**

2

2 The graphs of $y = f(x)$ and $y = g(x)$ are shown on the grids below.

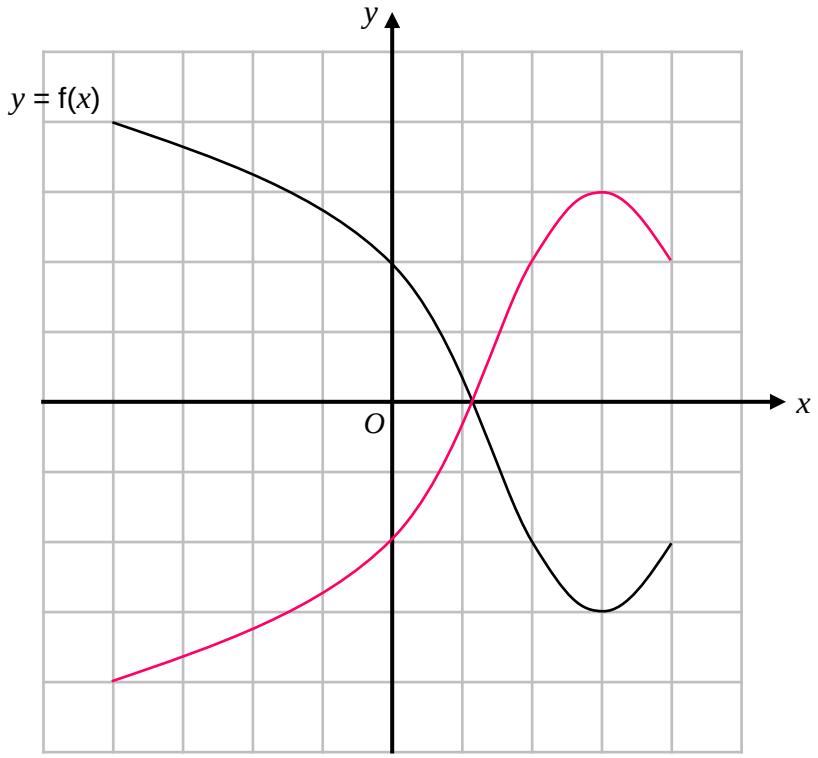


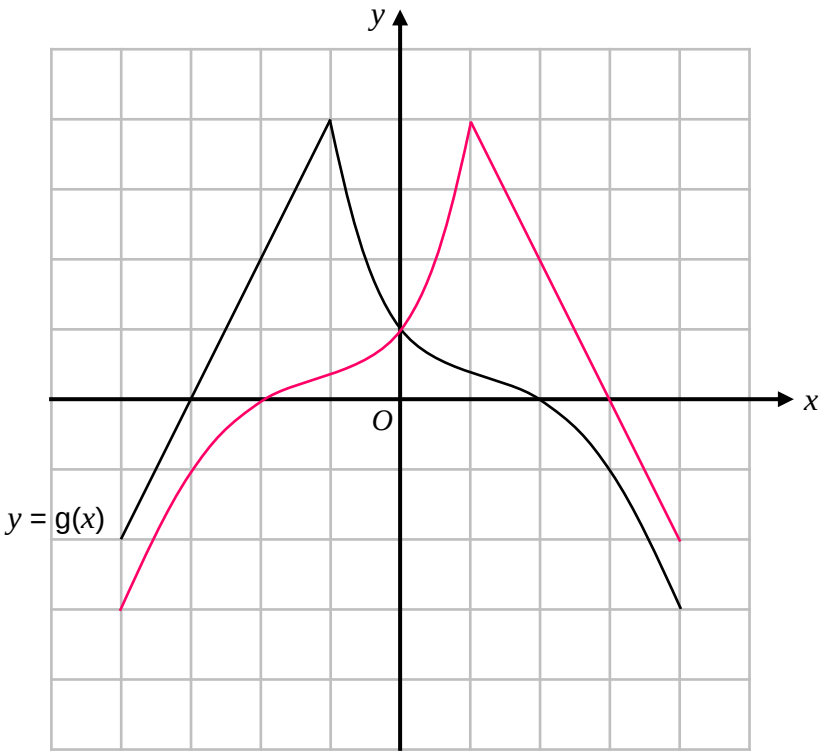


2 (a) Draw the graph of $y = f(x + 1)$ onto the first grid. **[1 mark]**

2 (b) Draw the graph of $y = g(x - 2)$ onto the second grid. **[1 mark]**

3 The graphs of $y = f(x)$ and $y = g(x)$ are shown on the grids below.



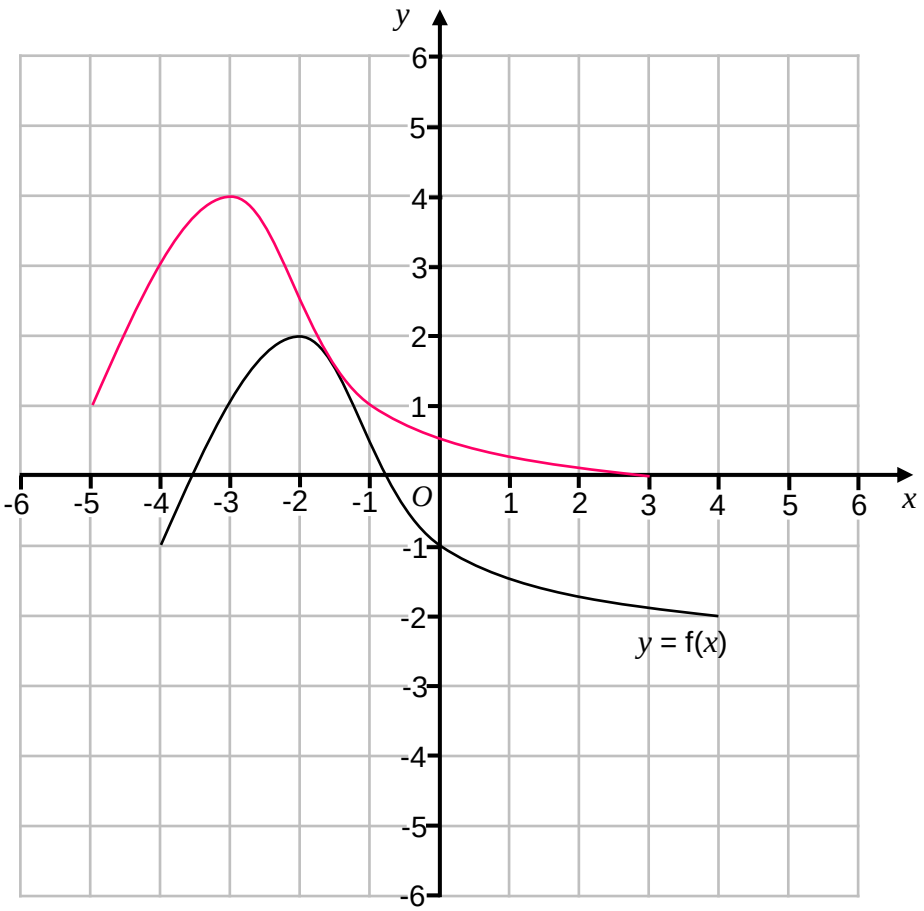


3 (a) Draw the graph of $y = -f(x)$ onto the first grid. **[1 mark]**

3 (b) Draw the graph of $y = g(-x)$ onto the second grid. **[1 mark]**

4

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



4 (a) Draw the graph of $y = f(x + 1) + 2$ onto the grid above. **[2 marks]**

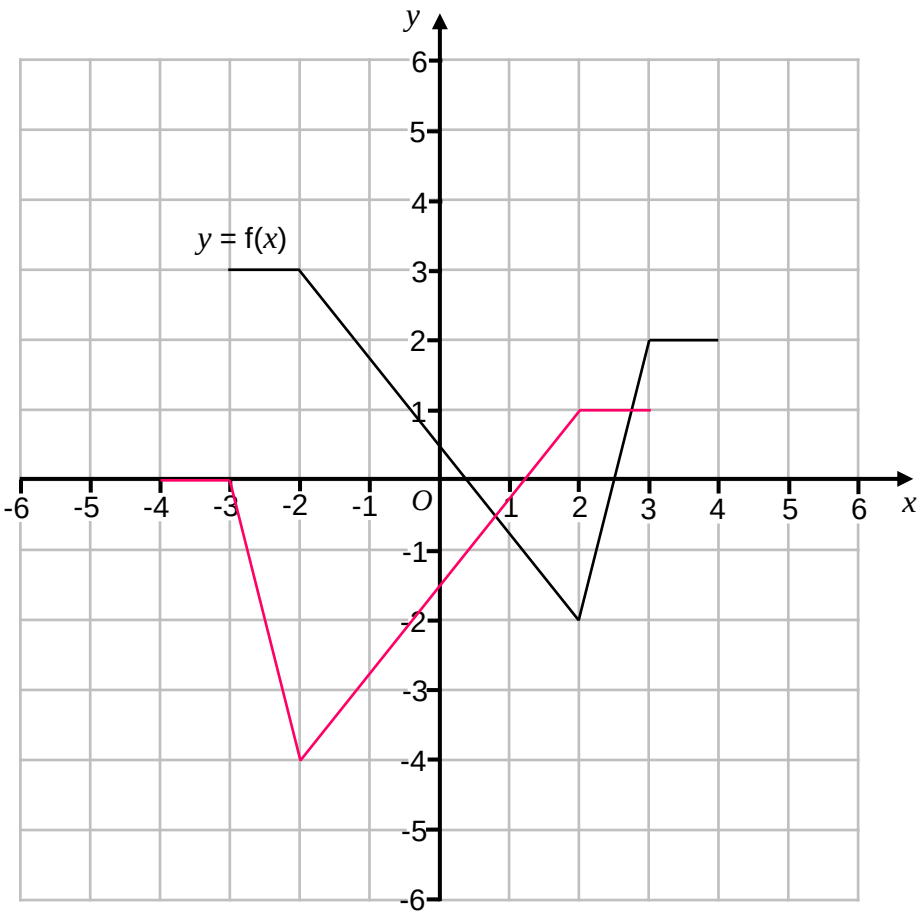
4 (b) Point $A(-2, 2)$ is on the graph $y = f(x)$

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

Write down the coordinates of point B. **[1 mark]**

Answer (2 , 2)

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



5 (a) Draw the graph of $y = f(-x) - 2$ onto the grid above. **[2 marks]**

5 (b) Point $A(4, 2)$ is on the graph $y = f(x)$

When the graph of $y = f(x)$ is transformed to the graph with equation $y = -f(x + 7)$ the point A is mapped to point B.

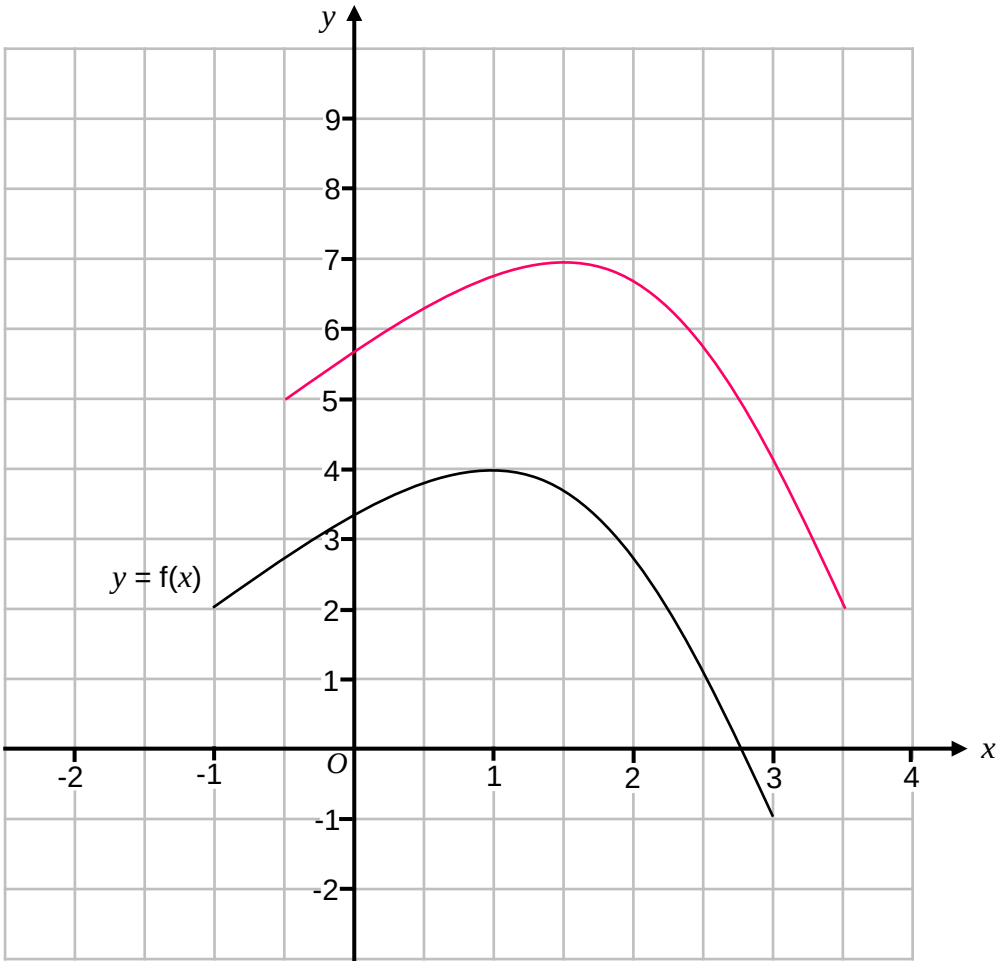
Write down the coordinates of point B. **[2 marks]**

Answer (−3 , −2)

7

Turn over ►

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



6 (a) Draw the graph of $y = f(x - 1) + 3$ onto the grid above. **[2 marks]**

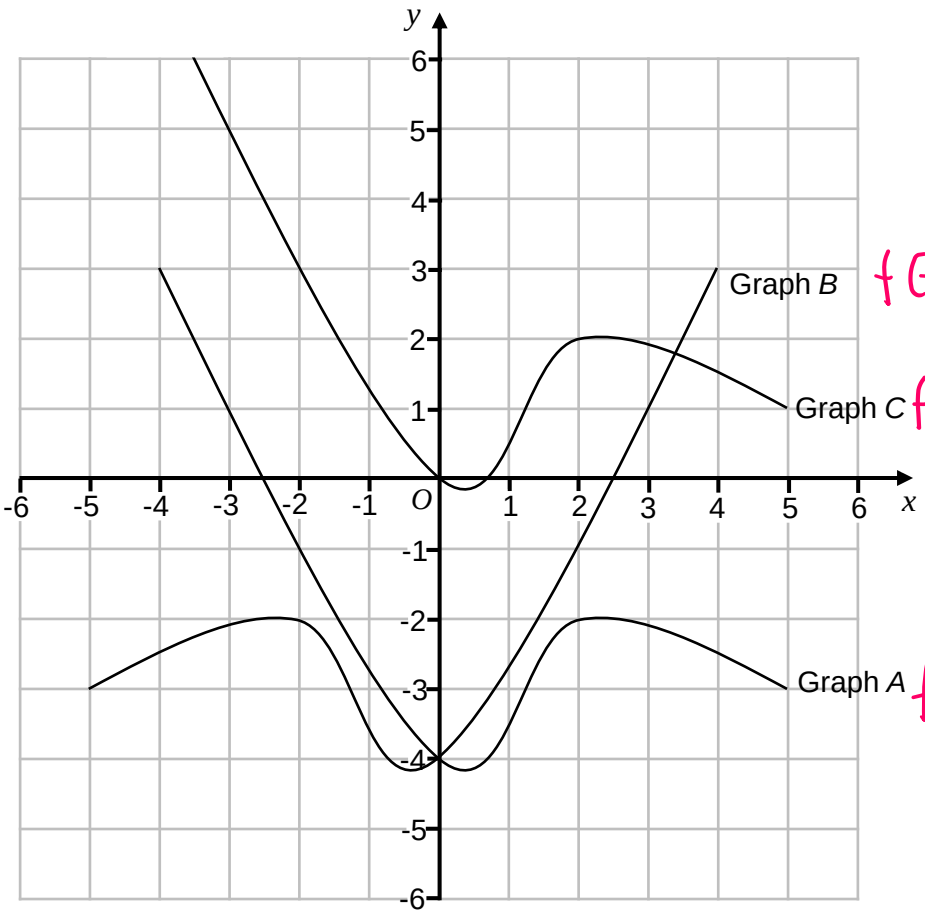
6 (b) Point $A(3, -1)$ is on the graph $y = f(x)$

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

Write down the coordinates of point B. **[2 marks]**

Answer (-3 , 1)

7 The grid below shows the graphs *A*, *B* and *C*.



On the grid above

graph *A* has been reflected to give graph *B*.
graph *A* has been translated to give graph *C*.

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

7 (a) Write down an equation of graph *B*. **[1 mark]**

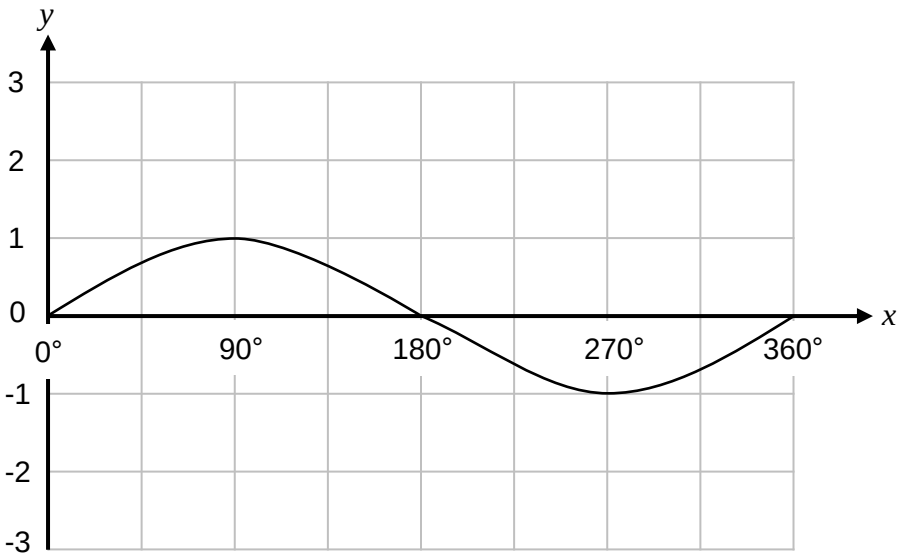
Answer f(−x)

7 (b) Write down an equation of graph *C*. **[2 marks]**

Answer f(x) + 4

7

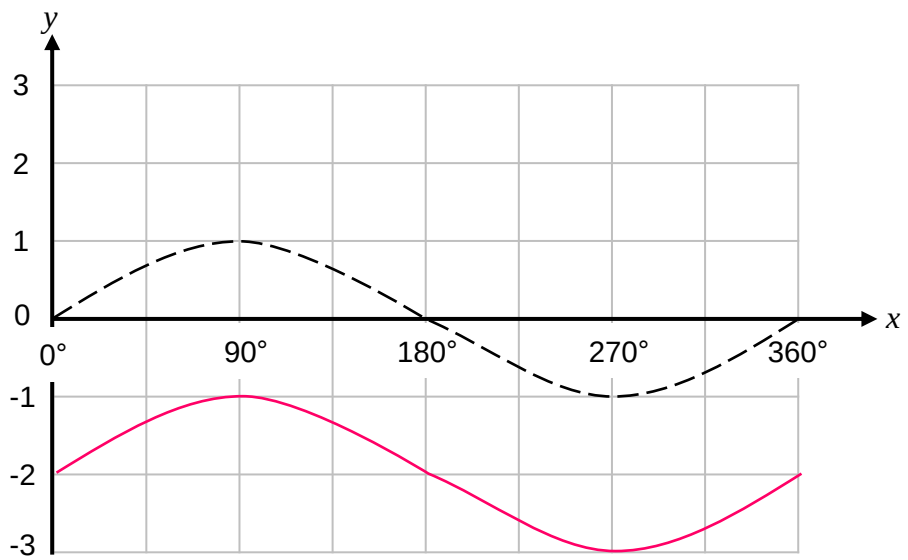
8 Here is the graph of $y = \sin x$ for $0° \leqslant x \leqslant 360°$



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

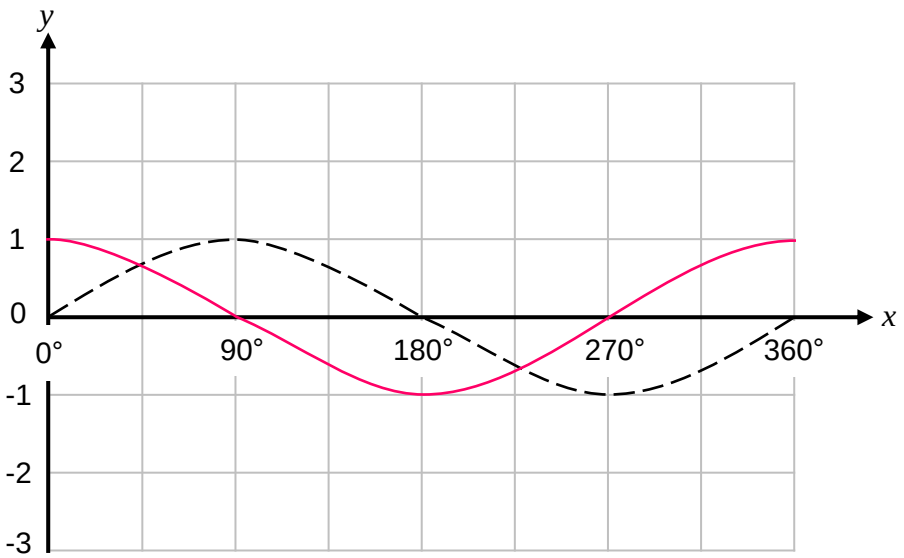
8 (a) On the grid below sketch the graph of $y = \sin x - 2$ for $0° \leqslant x \leqslant 360°$

[1 mark]



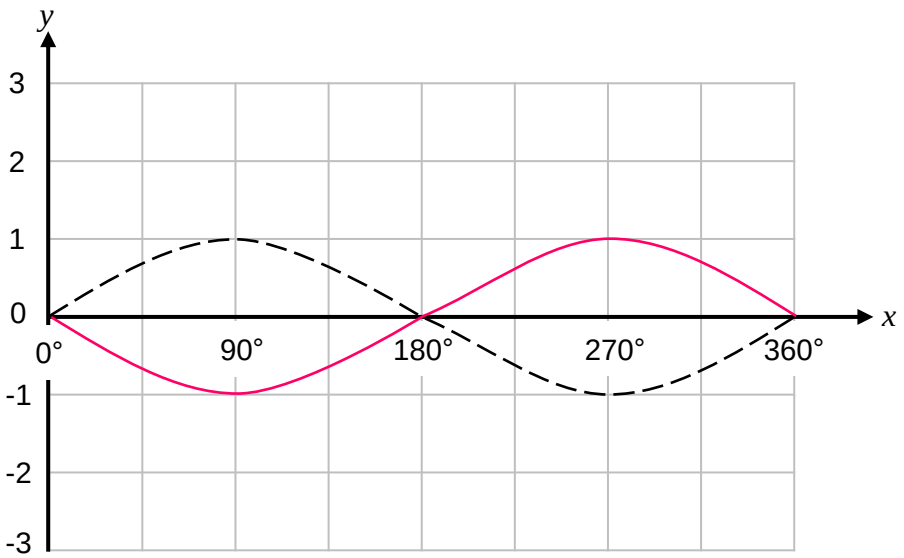
8 (b) On the grid below sketch the graph of $y = \sin(x + 90°)$ for $0° \leqslant x \leqslant 360°$

[1 mark]



8 (c) On the grid below sketch the graph of $y = -\sin x$ for $0° \leqslant x \leqslant 360°$

[1 mark]



3

9 The graph of $y = 3x^2 + 2x - 5$ is reflected in the x-axis.
The reflected graph has equation $y = f(x)$

$\uparrow -f(x)$

Work out $f(x)$.

Give your answer in the form $ax^2 + bx + c$ where a, b and c are integers. **[2 marks]**

$-(3x^2 + 2x - 5)$

$= -3x^2 - 2x + 5$

Answer $-3x^2 - 2x + 5$

10 The graph of $y = x^2 + 5$ is translated 3 units to the left.
The translated graph has equation $y = f(x)$

$\uparrow f(x+3)$

Work out $f(x)$.

Give your answer in the form $x^2 + ax + b$ where a and b are integers. **[3 marks]**

$(x+3)^2 + 5$

$= x^2 + 6x + 9 + 5$

$= x^2 + 6x + 14$

Answer $x^2 + 6x + 14$

11 The graph of $y = 2x^2 - 5x + 3$ is reflected in the y-axis.
The reflected graph has equation $y = f(x)$

↑ $f(-x)$

Work out $f(x)$.

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

[2 marks]

$2(-x)^2 - 5(-x) + 3$

$= 2x^2 + 5x + 3$

Answer $2x^2 + 5x + 3$

12 The graph of $y = x^3 - 5$ is translated 2 units to the right.
The translated graph has equation $y = f(x)$

↑ $f(x-2)$

Work out $f(x)$.

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

[4 marks]

$(x-2)^3 - 5$

$= (x^2 - 4x + 4)(x-2) - 5$

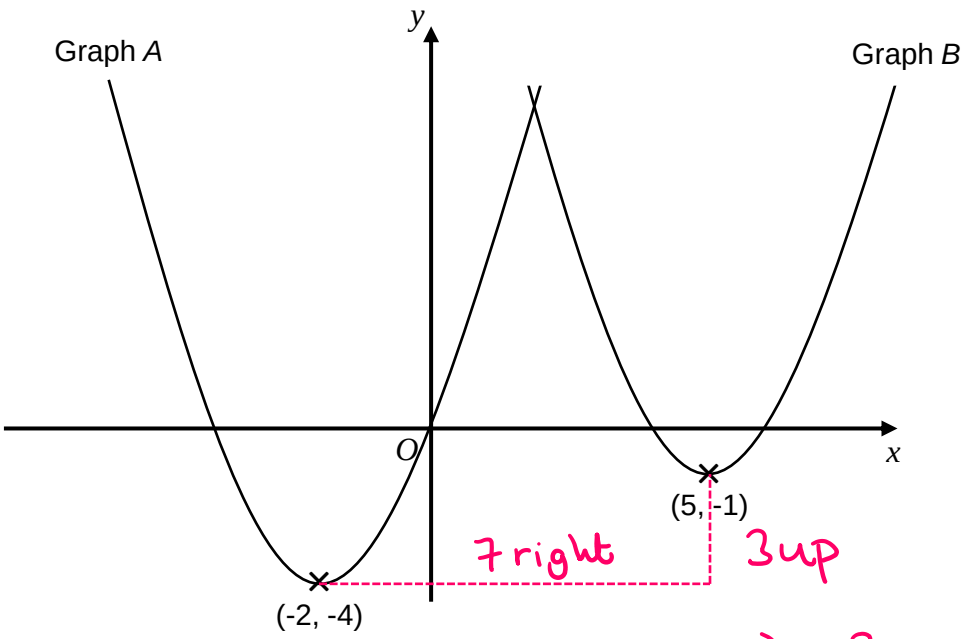
$= x^3 - 4x^2 + 4x - 2x^2 + 8x - 8 - 5$

$= x^3 - 6x^2 + 12x - 13$

Answer $x^3 - 6x^2 + 12x - 13$

11

13 Here are sketches of two graphs.



Graph A has equation $y = x^2 + 4x$

$f(x-7)+3$

Graph A is translated to give graph B so that the turning point (-2, -4) on graph A is mapped to the point (5, -1) on graph B.

Work out an equation for graph B.

Give your answer in the form $x^2 + ax + b$ where a and b are integers. **[4 marks]**

$(x-7)^2 + 4(x-7) + 3$

$= x^2 - 14x + 49 + 4x - 28 + 3$

$= x^2 - 10x + 24$

Answer $x^2 - 10x + 24$

14 The graph of $y = 10 - 2x^2$ is translated 3 units to the right and 1 unit up.
The translated graph has equation $y = f(x)$

$f(x-3)+1$

Work out $f(x)$.

Give your answer in the form $x^2 + ax + b$ where a and b are integers. **[4 marks]**

$10 - 2(x-3)^2 + 1$

$= 10 - 2(x^2 - 6x + 9) + 1$

$= 10 - 2x^2 + 12x - 18 + 1$

$= -2x^2 + 12x - 7$

Answer $-2x^2 + 12x - 7$

8