

Piecewise Functions

For AQA Level 2 Certificate in Further Mathematics (8365)

Name _____

Total marks: **24**

Answer **all** questions in the spaces provided. Show your working: marks are given for correct method. You may use a calculator.

1 A function f is given by

$$\begin{aligned} f(x) &= x^2 + 1 & x < 2 \\ &= 9 - 2x & x \geq 2 \end{aligned}$$

(a) Work out $f(-3)$

[1 mark]

Answer _____

(b) Work out $f(4)$

[1 mark]

Answer _____

2 A function f is given by

$$\begin{aligned} f(x) &= x + 3 & -3 \leq x < 0 \\ &= 3 - x^2 & 0 \leq x \leq 2 \end{aligned}$$

Circle the range of f .

[1 mark]

$0 \leq f(x) \leq 3$

$-1 \leq f(x) \leq 3$

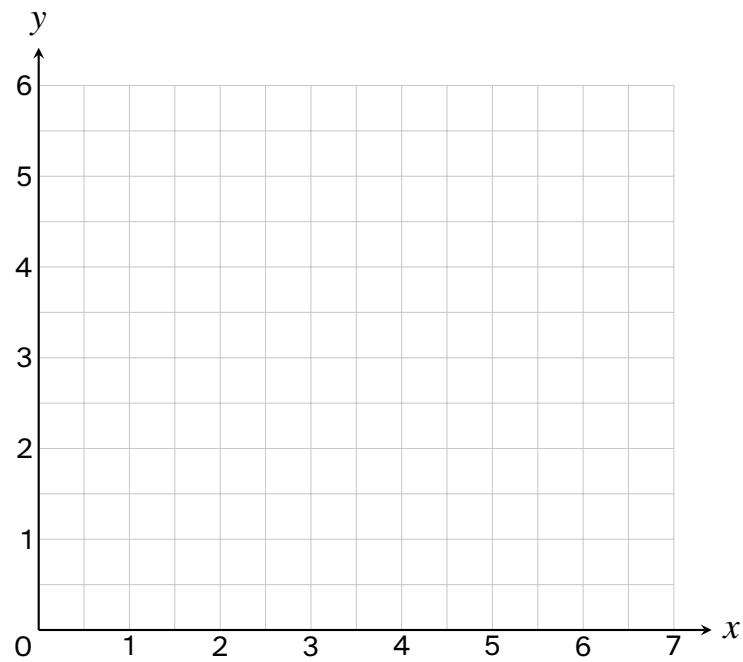
$-3 \leq f(x) \leq 2$

$-1 \leq f(x) < 3$

3 A function f is given by

$$\begin{aligned} f(x) &= 2x + 1 & 0 \leq x < 2 \\ &= 5 & 2 \leq x < 5 \\ &= 15 - 2x & 5 \leq x \leq 7 \end{aligned}$$

On the grid, draw the graph of $y = f(x)$ for $0 \leq x \leq 7$

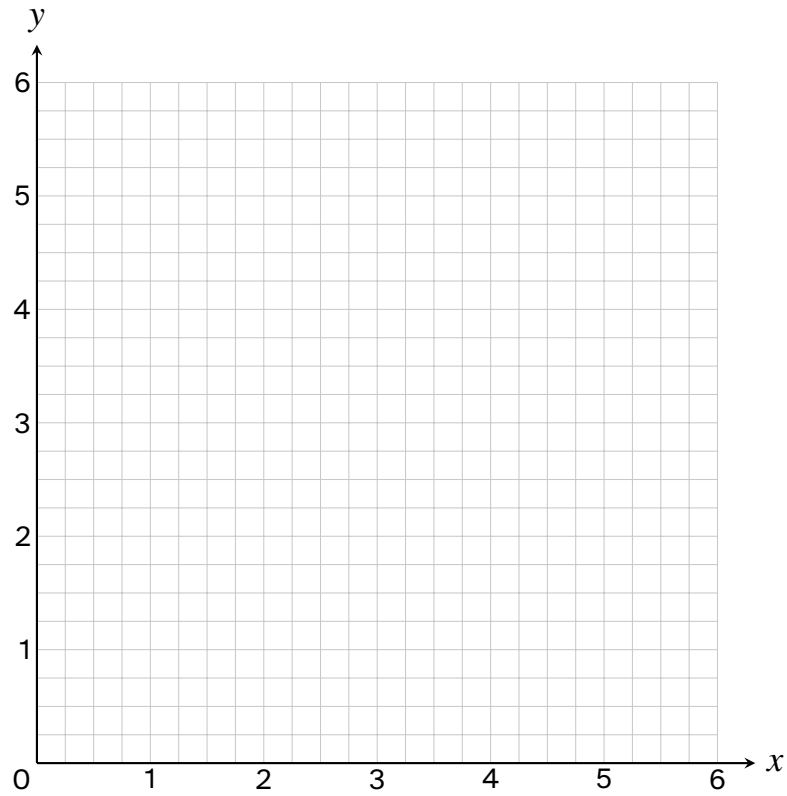


[3 marks]

4 A function f is given by

$$\begin{aligned} f(x) &= x^2 - 2x + 2 & 0 \leq x < 3 \\ &= 8 - x & 3 \leq x < 5 \\ &= 2x - 7 & 5 \leq x \leq 6 \end{aligned}$$

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



[4 marks]

(b) How many solutions does the equation $f(x) = 4$ have?

[1 mark]

Answer _____

- 5 A function f is given by

$$\begin{aligned} f(x) &= 2x + c & x < 3 \\ &= x^2 - 4 & x \geq 3 \end{aligned}$$

c is a constant.

The two parts of the graph of $y = f(x)$ join where $x = 3$

Work out the value of c .

[2 marks]

$c =$ _____

- 6 A function f is given by

$$\begin{aligned} f(x) &= 10 - 3x & x < 2 \\ &= x^2 & x \geq 2 \end{aligned}$$

Solve $f(x) = 7$

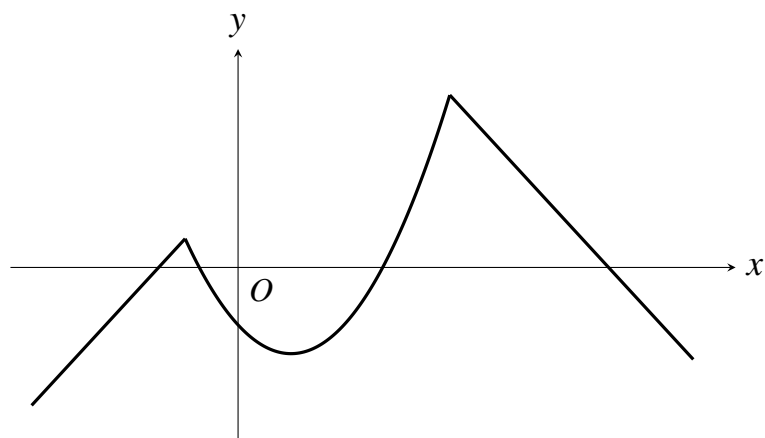
[3 marks]

Answer _____

7 A function f is given by

$$\begin{aligned} f(x) &= 2x + 3 & x < -1 \\ &= x^2 - 2x - 2 & -1 \leq x \leq 4 \\ &= 14 - 2x & x > 4 \end{aligned}$$

A sketch of $y = f(x)$ is shown.



Not drawn accurately

Solve $f(x) = 2$

You must show your working.

[4 marks]

Answer _____

8 A function f is given by

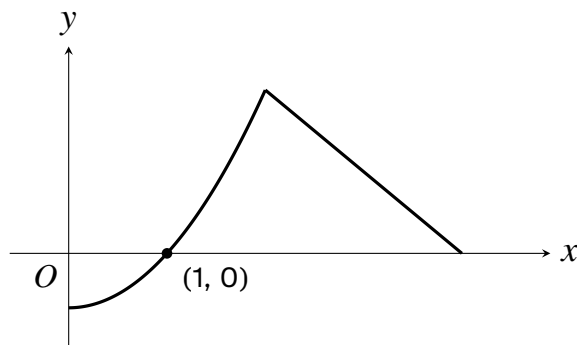
$$\begin{aligned} f(x) &= px^2 + q & 0 \leq x < 2 \\ &= 12 - 3x & 2 \leq x \leq 4 \end{aligned}$$

p and q are constants.

The two parts of the graph join where $x = 2$

The graph passes through the point $(1, 0)$

A sketch of $y = f(x)$ is shown.



Not drawn accurately

Work out the values of p and q .

[4 marks]

$p =$ _____ $q =$ _____