

Quadratic functions

AS Pure Mathematics | Edexcel 8MA0 | 12 questions, 51 marks

A-level Maths topic practice



Scan for the solutions

Name: _____ **Date:** _____ **Score:** _____ / 51

1 Write $x^2 - 8x + 3$ in the form $(x + p)^2 + q$, where p and q are integers. (2 marks)

Answer _____

2 Write $2x^2 + 12x + 7$ in the form $a(x + b)^2 + c$, where a , b and c are integers. (3 marks)

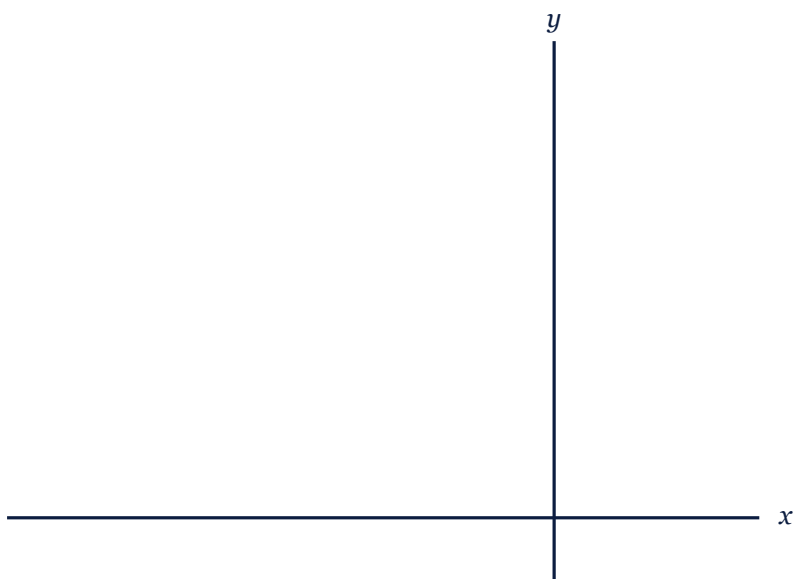
Answer _____

3 $f(x) = 3x^2 - 5x + 4$
Find the value of the discriminant of $f(x)$ and hence state the number of real roots of the equation $f(x) = 0$ (2 marks)

Answer _____

4 $f(x) = x^2 + 6x + 14$

- a. Write $f(x)$ in the form $(x + a)^2 + b$, where a and b are integers.
- b. Sketch the curve with equation $y = f(x)$, showing the coordinates of the turning point and of any point where the curve meets the coordinate axes.



(5 marks)

Answer _____

- 5 The equation $3x^2 - 6x + k = 0$, where k is a constant, has two distinct real roots. Find the range of possible values of k .

(3 marks)

Answer _____

- 6 Prove that $4x^2 - 12x + 11 > 0$ for all real values of x .

(3 marks)

Answer _____

7

$$g(x) = 5 + 8x - 2x^2$$

- Write $g(x)$ in the form $a - b(x - c)^2$, where a , b and c are integers.
- Hence state the maximum value of $g(x)$ and the value of x at which it occurs.

(5 marks)

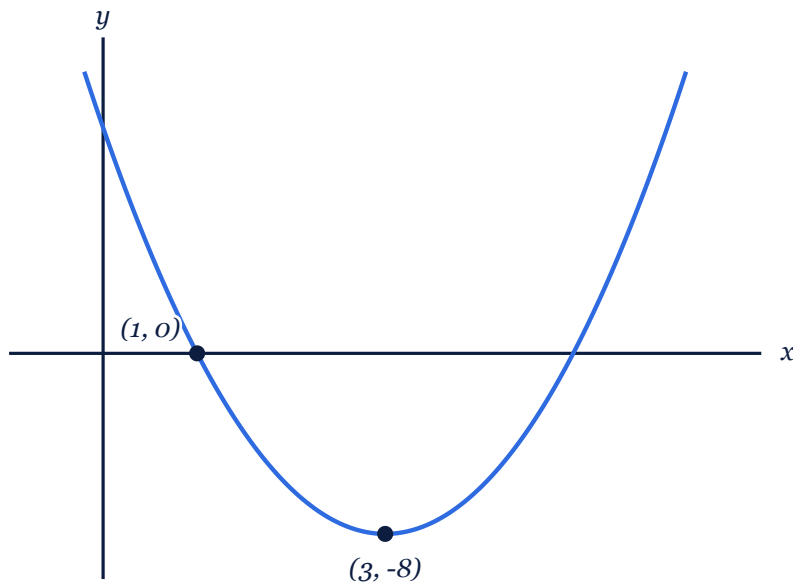
Answer _____

8

The figure shows a sketch of the curve with equation $y = ax^2 + bx + c$, where a , b and c are constants.

The curve has a minimum turning point at $(3, -8)$ and crosses the x -axis at $(1, 0)$.

- Find the values of a , b and c .
- Find the coordinates of the other point where the curve crosses the x -axis.



(4 marks)

Answer _____

9

The equation $x^2 + 2px + (3p + 4) = 0$, where p is a constant, has equal roots.

- Find the possible values of p .
- For each value of p , find the root of the equation.

(5 marks)

Answer _____

10

Amara kicks a ball from the top of a wall. The height of the ball above the ground, h metres, t seconds after it is kicked is modelled by

$$h = 2 + 12t - 5t^2$$

- Write h in the form $A - B(t - C)^2$, where A , B and C are constants.
- Hence find, according to the model, the maximum height of the ball and the time at which it reaches it.
- Find the time when the ball hits the ground, giving your answer to 3 significant figures.
- Give one limitation of the model.

(8 marks)

Answer _____

11

- a. Write $x^2 - 6x + 13$ in the form $(x + p)^2 + q$, where p and q are integers.
- b. Hence find the maximum value of $\frac{10}{x^2 - 6x + 13}$, the value of x at which it occurs, and the range of possible values of $\frac{10}{x^2 - 6x + 13}$ for real x .

(5 marks)

Answer _____

12

$f(x) = x^2 - 2kx + 3k + 4$, where k is a constant.

- a. Write $f(x)$ in the form $(x + a)^2 + b$, where a and b are given in terms of k .
- b. Given that the curve $y = f(x)$ lies entirely above the x -axis, find the range of possible values of k .
- c. When $k = 4$, write down the coordinates of the turning point of $y = f(x)$ and describe how the curve meets the x -axis.

(6 marks)

Answer _____

End of questions | Total 51 marks