

First Year Maths and Further Maths combined Test A4

Quadratics

29 minutes

Throughout the entire test all working must be shown and solutions based entirely on graphical or numerical methods may not be acceptable.

1.

- (a) Express $x^2 + 3x + 2$ in the form $(x + p)^2 + q$, where p and q are rational numbers. [2 marks]

- (b)** A curve has equation $y = x^2 + 3x + 2$.

- (i) Use the result from part (a) to write down the coordinates of the vertex of the curve. **[2 marks]**

- (ii) State the equation of the line of symmetry of the curve.

[1 mark]

[illegible]

[illegible]

2.

- (i) Sketch the curve $y = 2x^2 - x - 3$, giving the coordinates of all points of intersection with the axes. [4]
- (ii) Hence, or otherwise, solve the inequality $2x^2 - x - 3 > 0$. [2]
- (iii) Given that the equation $2x^2 - x - 3 = k$ has no real roots, find the set of possible values of the constant k . [3]

[illegible]

[illegible]

3.

- (a) Express $4x^2 - 24x - 189$ in the form $a(x + b)^2 + c$, where the values of the constants a , b and c are to be found. [3]

- (b) Using your answer to part (a), solve the equation**

$$4x^2 - 24x - 189 = 0.$$

[3]

[illegible]

[illegible]

4.

A line has equation $y = k(x + 4)$, where k is a constant.

- (i) Show that the x -coordinates of any points of intersection of the line with the curve $y = 8 - 4x - 2x^2$ satisfy the equation

$$2x^2 + (k + 4)x + 4(k - 2) = 0$$

[1 mark]

- (ii)** Find the values of k for which the line is a tangent to the curve $y = 8 - 4x - 2x^2$.

[3 marks]

[illegible]

[illegible]