IGCSE · Cambridge (CIE) · Further Maths   🕐 1 hour   ❓ 16 questions

Exam Questions

Quadratic Functions

Solving Quadratics by Factorising / Quadratic Formula / Completing the Square / Quadratic Equation Methods / Discriminants / Quadratic Graphs / Quadratic Inequalities

Medium (5 questions)	/20
Hard (6 questions)	/24
Very Hard (5 questions)	/27
Total Marks	**/71**

Medium Questions

1 (a) Write the expression $x^2 - 6x + 1$ in the form $(x + a)^2 + b$, where a and b are constants.

(2 marks)

(b) Hence write down the coordinates of the minimum point on the curve $y = x^2 - 6x + 1$.

(1 mark)

2 Solve the inequality $(x - 8)(x - 10) > 35$.

(4 marks)

3 Solve the equation $2x - 11\sqrt{x} + 12 = 0$.

(3 marks)

4 Find the values of k for which the equation $x^2 + (k + 9)x + 9 = 0$ has two distinct real roots.

5 (a) Find the values of the constant k for which the equation

$$2kx^2 + (k-6)x - 4 = 0$$

has no real solutions.

(5 marks)

(b) Hence determine the number of points of intersection, if any, between the line $y = 6x$ and the curve $y = 2kx^2 + kx - 4$ for $k > 0$.

(1 mark)

Hard Questions

1 Find the values of the constant k for which the equation $(2k - 1)x^2 + 6x + k + 1 = 0$ has real roots.

(5 marks)

2 Find the values of x for which $12x^2 - 20x + 5 < (2x + 1)(x - 1)$.

(4 marks)

3 (a) Write $9x^2 - 12x + 5$ in the form $p(x - q)^2 + r$, where p, q and r are constants.

(3 marks)

(b) Hence write down the coordinates of the minimum point of the curve $y = 9x^2 - 12x + 5$.

(1 mark)

4 Solve $2x^{\frac{2}{3}} - x^{\frac{1}{3}} - 10 = 0$.

(3 marks)

5 Find the set of values of k for which $4x^2 - 4kx + 2k + 3 = 0$ has no real roots.

(5 marks)

6 Solve $6x^{\frac{2}{3}} - 5x^{\frac{1}{3}} + 1 = 0$.

(3 marks)

Very Hard Questions

1 Find the values of k for which the line $y = kx + 3$ is a tangent to the curve $y = 2x^2 + 4x + k - 1$.

(5 marks)

2 Find the values of k for which the line $y = x - 3$ intersects the curve $y = k^2x^2 + 5kx + 1$ at two distinct points.

(6 marks)

3 Find the exact values of the constant k for which the line $y = 2x + 1$ is a tangent to the curve $y = 4x^2 + kx + k - 2$.

4 Find the values of k for which the line $y = kx - 7$ and the curve $y = 3x^2 + 8x + 5$ do not intersect.

(6 marks)

5 The curve $y = 2x^2 + k + 4$ intersects the straight line $y = (k+4)x$ at two distinct points. Find the possible values of k.

(4 marks)