Maths-it Podcast AS-03

AS Core Revision

Quadratics

Topics

Factorising quadratics – Completing the square – The graph of a quadratic inc. translations
Solving quadratic equations by factorising and using the formula – Quadratic inequalities
Using the discriminant – Linear/quadratic simultaneous equations

Questions

1. (a) Express $x^2 - 4x + 18$ in the form $(x - p)^2 + q$.

(2)

(b) A curve has equation $y = x^2 - 4x + 18$.
Using your answer to part (a) or otherwise,

(i) Find the coordinates of the vertex (minimum point) of the curve.

(2)

(ii) Sketch the curve, indicating its intersection with the *y*-axis.

(2)

(iii) Write down the equation of the line of symmetry of the curve.

(1)

(c) Describe geometrically the transformation that maps the graph of $y = x^2$ onto the graph of $y = x^2 - 4x + 18$.

(3)

(Total 8 marks)

2. (a) Simplify $(k-6)^2 - 4(k+1)(k+2)$

(2)

(b) The quadratic equation $(k+1)x^2 + (k-6)x + (k+2) = 0$ has equal real roots.

(i) Show that, $(k+4)(7-3k) = 0$.

(5)

(ii) Hence find the possible values of *k*.

(3)

(Total 10 marks)

3. The line L has equation $y = 3x - 5$. The curve C has equation $y = 2(x^2 - 5x + 5)$.

(a) Show that the *x*-coordinates of the intersection points of L and C satisfy the equation,

$$(2x-3)(x-5) = 0$$

(2)

(b) Hence find the coordinates of the intersection points of L and C.

(4)

(b) Hence or otherwise solve the inequality $2(x^2 - 5x + 5) \geq 3x - 5$

(2)

(Total 8 marks)

4. The equation $kx^2 + 2kx + 1 = 0$ has solutions $x = -1 \pm \frac{\sqrt{6}}{3}$. Find *k*.

(Total 4 marks)