

Topic: Equations and Inequalities

- 1
 - (i) Express $y = 3x^2 - 6x + 11$ in the form $y = a(x + h)^2 + k$, where a , h and k are constants. [2]
 - (ii) State the minimum value of y and the corresponding value of x . [2]
 - (iii) Sketch the graph $y = 3x^2 - 6x + 11$ showing clearly the coordinates of the minimum point of the curve and y -intercept. [3]

- 2
 - (i) Find the range of values of x for which $x(10 - x) \geq 24$. [2]
 - (ii) Find the value of k for which the line $2y + x = k$ is a tangent to the curve $y^2 + 4x = 20$. [3]
 - (iii) Show that the equation $x^2 + (2a - 2)x + (2a - 3) = 0$ has real roots for all real values of a . [3]

- 3 Find the range of values of c for which $3x^2 + cx + 7 > 4$. [4]

- 4
 - (i) Find the range of values of p for which the line $y = x - 2p$ does not intersect the curve $x^2 = 3y - 1$. [4]
 - (ii) Hence state the value of p for which the line $y = x - 2p$ is tangent to the curve $x^2 = 3y - 1$. [1]

- 5
 - (i) Solve the simultaneous equations. [5]
 $x = 1 + 2y$
 $x = 6xy - 2y - 3$
 - (ii) Explain the geometrical meaning of this solution. [1]

Answer Key

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|--------|---|
| 1(i) | $y = 3(x - 1)^2 + 8$ |
| 1(ii) | Minimum value of $y = 8$ Corresponding $x = 1$ |
| 1(iii) | Sketch Graph |
| 2(i) | $4 \leq x \leq 6$ |
| 2(ii) | $k = 9$ |
| 2(iii) | The equations has real roots |
| 3 | $-6 < c < 6$ |
| 4(i) | $p > \frac{5}{24}$ |
| 4(ii) | $p = \frac{5}{24}$ |
| 5(i) | $x = -\frac{1}{3}, y = -\frac{2}{3}$ $x = 2, y = \frac{1}{2}$ |
| 5(ii) | The line intersects the curve at the points $\left(2, \frac{1}{2}\right)$ and $\left(-\frac{1}{3}, -\frac{2}{3}\right)$ |