

- 1 Sketch the graphs of each of the following:
 - a $y = -x^2 + 8$
 - b $y = (x - 3)^2 - 5$
 - c $y = 5 - (x + 3)^2$
 - d $y = x^2 - x - 8$

- 2 Use the quadratic formula to solve each of the following:
 - a $x^2 - 6x - 2 = 0$
 - b $2x^2 - 3x - 7 = 0$

- 3 A rectangle has a perimeter of 80 m and the square of the length of the diagonal is 1000. Find its dimensions.

- 4 A parabola that has its vertex at the point with coordinates $(-1, 6)$ passes through the point $(2, 10)$. Find the equation of the parabola.

- 5 Solve the simultaneous equations for x and y :
$$y = x^2 + 7x - 11$$
$$y = x - 1$$

- 6 A lawn a metres long and b metres wide has a path of uniform width x metres around it.
 - a Find the area of the path in terms of a , b and x .
 - b
 - i If $a = 28$ and $b = 50$ find the area of the path in terms of x .
 - ii If the area of the path is 160 m^2 find the value of x .

- 7 Consider the quadratic equation $2px^2 + 6x + 2 = 0$.
 - a Find the discriminant.
 - b Find the values of p for which there are two solutions.
 - c Find the values of p for which there are no solutions.
 - d Find the value of p for which there is one solution.

- 8 Using the discriminant, show that the graph of $y = 2x^2 + 6px - 2$ touches or crosses the x -axis for all values of p .

- 9 Consider the quadratic equation $(-2p + 1)x^2 + (p - 2)x + 6p = 0$.
 - a Find the discriminant.
 - b Show that the discriminant is a perfect square.
 - c For $p \neq \frac{1}{2}$, show that there are always two rational solutions and find these solutions.

- 10** Consider the quadratic equation $ax^2 + 10x + (a - 5) = 0$.
- a** Find the discriminant.
 - b** Find the values of a for which there are two solutions.
 - c** Find the values of a for which there are no solutions.
 - d** Find the value of a for which there is one solution.
- 11** Consider the quadratic rule $a^2x^2 - 2ax - a + 1$.
- a** Find the discriminant.
 - b** Find the values of a for which the graph $y = a^2x^2 - 2ax - a + 1$:
 - i** crosses the x -axis
 - ii** does not cross the x -axis.
 - c** Show that $a^2x^2 - 2ax - a + 1 = (ax + \sqrt{a} - 1)(ax - \sqrt{a} - 1)$.