Mixed Exercise - 2

1. The quadratic equation $x^2 - 6x + k = 0$ has two distinct real roots.

    Find the set of possible values of the constant k.

2. Given that the quadratic equation $2x^2 + 7x + k = 0$, where k is a constant, has no real solutions, find the set of possible values of k.

3. (a) Find the discriminant of $kx^2 + 5x + 8k$ in terms of k.

    (b) For what values of the constant k does the equation $kx^2 + 5x + 8k = 0$ have equal roots?

4. The quadratic equation $2x^2 + kx - 3k = 0$ has two distinct real roots.

Find the set of possible values of the constant k.

5. The quadratic equation $kx^2 + 4kx - 3 = 0$, where k is a constant, has no real solutions.

(a) Show that k satisfies the inequality,

$$4k(4k + 3) < 0$$

(b) Hence, find the set of possible values of k.

6. Sketch the following quadratic graphs. In each case find the coordinates of the turning points.

(a) $y = x^2 - 12x + 32$

(b) $y = x^2 - 10x$

(c) $y = x^2 - 36$

(d) $y = x^2 + 4x + 20$

7. Solve the following equations.

   (a) $x^4 - 10x^2 + 16 = 0$

   (b) $x^{\frac{1}{2}} - x^{\frac{1}{4}} - 6 = 0$

8. Solve the following quadratic inequalities.

   (a) $x^2 - 8x + 15 > 0$

(b) $x^2 - 8x - 20 < 0$

(c) $x^2 + 7x + 12 > 0$

(d) $x^2 + 6x - 40 < 0$

(e) $x^2 - 3x > 0$

(f) $2x^2 - 8x < 0$