1   Solve the simultaneous equations $x + y = 4$ and $x^2 + y^2 = 40$.

2   If $x^2 + 3x - 1 = (x + a)^2 + b$, find the values of a and b.

3   Find the coordinates of the points of intersection of the circle with $(x - 1)^2 + y^2 = 9$ and the line $y = 3x$.

4   Find the coordinates of the points of intersection of the parabola with equation $y = 2(x - 1)^2 + 4$ and the line with equation $y = 4x$.

5   Express each of the following in partial fractions.

    a $\dfrac{x}{x^2 - 4}$

    b $\dfrac{5x}{(2x + 1)(x^2 + 1)}$

    c $\dfrac{2x^2 + 1}{x(x - 1)^2}$

6   Solve each of the following quadratic functions for x.

    a $tx^2 - x + 1 = 0$

    b $x^2 - 16x = t$

    c $(1 + t)x^2 + t - 1 = 0$

7   **a**   A man starts at 2 p.m. to walk to a place 26 km away. He walks at a constant speed until 4 p.m. when he increases his speed by 2 km/h. He reaches his destination at 5:30 p.m. At what speed did he walk for the first two hours?

    b   A man walks for 12 km at x km/h and then jogs for another 12 km at $(x + 2)$ km/h. He walks for a total of 5 hours. Find the value of x.

8   If $x^3 = a(x + 1)^3 + b(x + 1)^2 + c(x + 1) + d$, find the values of a, b, c and d.

9   If a particle goes 20 m at x m/s and a second particle takes 9 seconds less to travel 20 m travelling at $(x + 2)$ m/s, find the value of x.

10   **a**   Find the coordinates of the points of intersection of the parabola with equation $y = x^2 - x - 12$ and the line $y = x + a$.

    b   Find the coordinates of the points of intersection when:

      i $a = 3$

      ii $a = -4$.

11   The difference between the reciprocals of two consecutive, positive, even numbers is $\dfrac{1}{144}$. Find the two numbers.

12 **a** Express in partial fractions $\dfrac{-4x + 5}{(x + 4)(x - 3)}$.

 b Prove that if $ax^3 + bx^2 + cx + d = (x + 1)^2(px + q)$, then $b = 2a + d$ and $c = a + 2d$.

 c Express in partial fractions $\dfrac{-2x + 8}{(x + 4)(x - 3)}$.

 d Prove that if $ax^3 + bx^2 + cx + d = (x - 2)^2(px + q)$, then $b = -4a + \dfrac{1}{4}d$ and $c = 4a - d$.

13 Find the coordinates of the point(s) where the line $x + 3y = -11$ intersects the circle $x^2 + y^2 - 10x + 4y + 19 = 0$.