1 Multiply out the brackets and simplify where possible

  a $-3(3x - 4)$

  b $4x + 3(x + 2) - (x + 2)$

  c $(x + 3)(2x - 1)(3x + 5)$

2 **a** Factorise the expression $2x^2 + 7x - 4$.

  b Solve the equation $2x^2 + 7x - 4 = 0$.

3 Simplify

  a $(2x^2y)^3$ **c** $\frac{15a^3b}{3a^3b^2}$

  b $2x^{-3} \times 3x^4$

4 Solve the simultaneous equations

  $3x + 2y = 8$

  $5x + y = 11$

5 **a** Show that $\frac{3}{x + 7} = \frac{2 - x}{x + 1}$ can be written as $x^2 + 8x - 11 = 0$.

  b Hence solve the equation $\frac{3}{x + 7} = \frac{2 - x}{x + 1}$, giving your answers to 2 decimal places.

6 Make x the subject of $\frac{3y - x}{z} = ax + 2$.

7 The function f is such that $f(x) = \frac{x}{3} + 5$.

  a Find $f^{-1}(x)$.

  b The function g is such that $g(x) = 2x^2 + k$, where k is a constant.

    Given that $fg(2) = 10$, work out the value of k.

8 The nth term of a sequence is $30 - 4n$.

  a Write down the first three terms of this sequence.

  b Work out the value of the first term of this sequence that is negative.

9 A circle has the equation $x^2 + y^2 = 21$. Determine whether the point (4, 3) lies inside or outside this circle.

10 Simplify fully $(\sqrt{x} + \sqrt{9y})(\sqrt{x} - 3\sqrt{y})$.

11 **a** Write $2x^2 + 8x + 1$ in the form $a(x + b)^2 + c$, where a, b and c are integers.
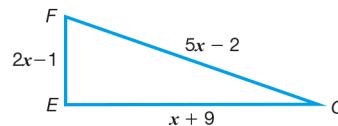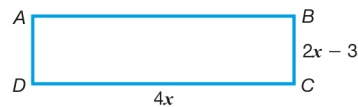
  b Hence or otherwise, for the graph $y = 2x^2 + 8x + 1$:

    i find the coordinates of the turning point

    ii find the roots to 1 decimal place.

  c Sketch the graph of $y = 2x^2 + 8x + 1$.

12 The perimeters of rectangle *ABCD* and triangle *EFG* are the same.

All measurements are in centimetres.

Work out the area of the triangle.

13 $A(-5, 2)$, $B(-2, -2)$, $C(2, 1)$ and $D(-1, k)$ are the vertices of a square.

Find the equation of the diagonal *BD*.

14 Solve algebraically the simultaneous equations

  $x^2 + y^2 = 4$

  $2y - x = 2$