

Yet More Practice Of Algebra & Manipulation

1. Factorise

(a) $9x^2 - 16$.

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

(b) $15x^2 - 17x - 4$.

$$(3x - 4)(5x + 1)$$

(c) $(3x - 1)^7(2x - 1)^5 - (2x - 1)^4(3x - 1)^8$.

$$-x(2x - 1)^4(3x - 1)^7$$

2. Complete the square

(a) $x^2 + 4\sqrt{3}x - 1$.

$$(x + 2\sqrt{3})^2 - 13$$

(b) $3x^2 - 12x - 1$.

$$3(x - 2)^2 - 13$$

(c) If we were to draw $y = 3x^2 - 12x - 1$ what would the coordinate of the vertex be and what is its nature.

$$\text{Minimum } (2, -13)$$

3. (a) Solve $2x^2 + 5x - 3 = 0$.

$$x = \frac{1}{2} \text{ or } x = -3$$

(b) Hence solve $2y^4 + 5y^2 - 3 = 0$.

$$y = \pm \frac{1}{\sqrt{2}}$$

4. Solve

(a) $x^2 > 64$.

$$x > 8 \text{ or } x < -8$$

(b) $(x - 3)(x + 2) < 0$.

$$-2 < x < 3$$

(c) $2(x^2 + 6) > x^2 + 7x$.

$$x > 4 \text{ or } x < 3$$

5. Solve

(a) $\begin{cases} y = 2x - 4 \\ x^2 - y^2 = 5 \end{cases}$.

$$(3, 2) \text{ or } \left(\frac{7}{3}, \frac{2}{3}\right)$$

(b) $\begin{cases} y = 2x \\ x^2 + xy + y^2 = 7 \end{cases}$.

$$(1, 2) \text{ or } (-1, -2)$$

6. Find the value of k which makes the equation $9x^2 = kx - 1$ have exactly one root. $k = \pm 6$

7. Simplify fully

(a) $\frac{x^2 + 3x + 2}{2x^2 + 10x + 12}$.

$$\frac{x+1}{2(x+3)}$$

(b) $\frac{4x^3 - 9x}{2x^2 + 5x + 3}$.

$$\frac{x(2x-3)}{x+1}$$

8. Write as a single fraction

(a) $\frac{1}{x-1} + \frac{1}{x}$.

$$\frac{2x-1}{x(x-1)}$$

(b) $1 + \frac{3}{2x+1}$.

$$\frac{2x+4}{2x+1}$$