

Algebra Revision

No calculators allowed. If $ax^2 + bx + c = 0$ then $x = \frac{-b \pm \sqrt{b^2 - 4ac}}{2a}$. (If you haven't learnt this yet, give yourself a clip round the ear please!)

1. Expand and collect like terms in $(x + 3)(2x - 1)(x + 2)$.

$$2x^3 + 9x^2 + 7x - 6$$

2. Factorise fully

(a) $x^2 + x - 12$.

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

(b) $6x^2 + x - 2$.

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

(c) $px + py + qx + qy$.

$$(p + q)(x + y)$$

(d) $4a^5x^2 - 25a^5$.

$$a^5(2x + 5)(2x - 5)$$

(e) $20ax^3 - 50ax^2 + 30ax$.

$$10ax(2x - 3)(x - 1)$$

(f) $2(x + 1)^3a^6 + 6(x + 1)^2a^7$.

$$2a^6(x + 1)^2(x + 3a + 1)$$

3. Solve

(a) $\frac{x}{2} + \frac{2x - 1}{3} - \frac{3 - x}{4} = 2$.

$$x = 37/17$$

(b) $\frac{6}{x - 5} + \frac{15}{x - 4} = 8$.

$$x = 7 \text{ or } x = 4\frac{5}{8}$$

(c) $\frac{8}{3x - 4} + \frac{9}{x + 1} = 7$.

$$x = 0 \text{ or } x = 2$$

(d) $x^2 < 9$.

$$-3 < x < 3$$

(e) $x^2 + 12 \geq 7x$.

$$x \geq 4 \text{ or } x \leq 3$$

4. Complete the square

(a) $y = x^2 + 4x$.

$$(x + 2)^2 - 4$$

(b) $y = 2x^2 - 8x + 1$.

$$2(x - 2)^2 - 7$$

(c) $-4x^2 + 16x + 7$.

$$-4(x - 2)^2 + 23$$

5. Solve by the formula $x^2 - 5x + 2 = 0$, simplifying your answer fully in surd form.

$$x = \frac{5 \pm \sqrt{17}}{2}$$

6. For what value(s) of k does $x^2 + kx + 1 = 0$ have one root only?

$$k = 2 \text{ or } k = -2$$

7. Simplify $\frac{6(3xy)^3x^3y}{9x^2y(x^2y)^2}$.

$$18y$$

8. Simplify $\frac{12x^2 - 14x - 6}{4x^2 - 9}$. [Don't forget the three rules of factorisation!]

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

9. Simplify $\frac{(x + 5)^2 - 1}{x^2 + 9x + 20}$.

$$\frac{x+6}{x+5}$$