

Factorising

Fully factorise:

- a) $4x + 20 = 4x + 5$
- b) $6x - 9 = 3(2x - 3)$
- c) $4ab + 6ac = 2a(2b + 3c)$

Completing the squareWrite in the form $a(x + b)^2 + c$:

- a) $x^2 - 4x + 3 = (x - 2)^2 - 1$
- b) $x^2 + 5x + 6 = (x + \frac{5}{2})^2 - \frac{1}{4}$
- c) $2x^2 + 4x + 9 = 2(x + 1)^2 + 7$

Algebraic fractions

Simplify:

- a) $\frac{1}{x+3} + \frac{3}{2-x} = \frac{2x+11}{(x+3)(2-x)}$
- b) $\frac{x^2+11x+30}{x^2-36} = \frac{x+5}{x-6}$

Solve for x :

- c) $\frac{2}{x-5} = \frac{x}{x-3} \quad x = 1, x = 6$

Iterationa) Show that $x^3 + 4x = 2$ can be written as

$$x = \frac{1}{2} - \frac{x^3}{4} \quad 4x = 2 - x^3$$

$$x = \frac{2 - x^3}{4}$$

b) Use the formula $x_{n+1} = \frac{1}{2} - \frac{x_n^3}{4}$ with $x_0 = 0$ to find a solution accurate to 3 decimal places to $x^3 + 4x = 2$

$x = 0.473$

Simplifying expressions

Simplify:

- a) $2a \times 3b \times 4c = 24abc$
- b) $28xy \div 4y = 7x$
- c) $4a + 3b - 5a = 3b - a$

Expanding brackets

Remove the brackets by multiplying:

- a) $3(x + 2) = 3x + 6$
- b) $-2(3x - 5) = -6x + 10$
- c) $x(x - 4) = x^2 - 4x$

Changing the subjecta) Given $v = u + at$ make a the subject

$$a = \frac{v-u}{t}$$

b) Given $P = I^2 R$ make I the subject.

$$I = \sqrt{\frac{P}{R}}$$

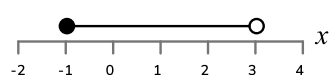
Product of binomials

Expand and simplify:

- a) $(x + 3)(x + 5) = x^2 + 8x + 15$
- c) $(x - 1)(x + 1)(x - 3) = x^3 - 3x^2 - x + 3$
- b) $(2x + 1)(3x - 1) = 6x^2 + x - 1$
- d) $(2x - 3)^3 = 8x^3 - 36x^2 + 54x - 27$

Inequalities

a) Write the inequality that is described by the number line:



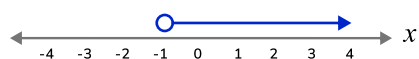
$$1 \leq x < 3$$

b) Find the set of integers satisfying the inequality:

$$-3 \leq n < 2$$

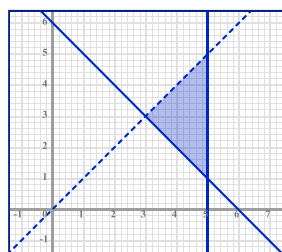
$$n = -3, -2, -1, 0, 1$$

c) Solve the inequality $2x + 7 > 5$, representing your solution on the number line:



$$x > -1$$

d) Shade the region that simultaneously satisfies the inequalities $x < y$, $x + y \geq 6$ and $x \leq 5$



e) Solve the inequality:

$$x^2 - 2 \geq 23$$

$$x \leq -5 \text{ and } x \geq 5$$

SubstitutionLet $a = 4$, $b = -1$, $c = 5$, $d = -2$

Evaluate:

- a) $d - 3b = 1$
- b) $ab = -4$
- c) $ad - bc = -3$
- d) $\frac{abc}{d} = 10$
- e) $d^2 - a = 0$
- f) $(a + b)^2 - d = 11$

Simultaneous equationsSolve each pair of equations for x and y :

- a) $x + y = 21$
 $x - y = 9$ $x = 15, y = 6$
- b) $4x + 3y = 23$
 $3x - 2y = -4$ $x = 2, y = 5$
- c) $y = 2x^2 - 4x + 1$
 $y = 5 - 2x$ $x_1 = -1, y_1 = 7$
 $x_2 = 2, y_2 = 1$

Solving quadratic equations

Solve by factorising:

- a) $x^2 + x - 6 = 0$
 $x = -3, x = 2$
- b) $x^2 - 64 = 0$
 $x = -8, x = 8$

Solve by factorising:

$$x^2 - 5x - 13 = 0$$

$$x \approx -1.8875, x \approx 6.8875$$

Solve by completing the square:

$$x^2 + 3x - 7 = 0$$

$$x \approx 1.541, x \approx -4.541$$

Factorising quadratics

Factorise:

- a) $x^2 - 7x + 12 = (x - 3)(x - 4)$
- b) $x^2 - 25 = (x + 5)(x - 5)$
- c) $6x^2 + 17x + 12 = (3x + 4)(2x + 3)$
- d) $8x^2 - 52x + 24 = 4(x - 6)(2x - 1)$

Equations of one unknownSolve for x :

- a) $17 - x = 9$ $x = 8$
- b) $3x + 7 = 22$ $x = 5$
- c) $5x + 2 = 16 - x$ $x = \frac{7}{2}$
- d) $18 - 7x = 31 - 9x$ $x = \frac{13}{2}$