

1 Substitution

- a) Find the exact value of $\frac{a^2-b}{a+b}$ when $a = \frac{2}{3}$ and $b = -\frac{1}{2}$.
- b) $T = 2\pi\sqrt{\frac{l}{9.8}}$. Find l when $T = 3$, to 3 significant figures.

$$a) \frac{17}{18} \div \frac{1}{6} = \frac{17}{3}$$

$$b) l = 9.8 \times \left(\frac{3}{2\pi}\right)^2 = 2.23$$

2 Rearranging formulae

- a) Make x the subject of $y = \sqrt{\frac{x-a}{b}}$
- b) Make t the subject of $\frac{1}{s} = \frac{1}{t} + \frac{1}{u}$

$$a) y^2 = \frac{x-a}{b}, x = by^2 + a$$

$$b) \frac{1}{t} = \frac{u-s}{su}, t = \frac{su}{u-s}$$

3 The subject appears twice

- a) Make x the subject of $y = \sqrt{\frac{x+3}{x-2}}$
- b) Make a the subject of $\frac{a+b}{c} = \frac{a-b}{d}$

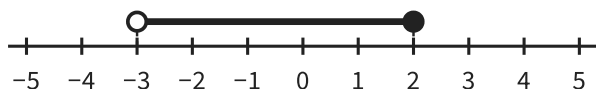
$$a) xy^2 - 2y^2 = x + 3, x = \frac{2y^2 + 3}{y^2 - 1}$$

$$b) ad + bd = ac - bc$$

$$a = \frac{b(c+d)}{c-d}$$

4 Inequalities on a number line

- a) The number line shows the solution of $p < 3x + 5 \leq q$. Find p and q .
- b) For the integers n on the line, find the largest $n^2 - n$.



$$a) p = 3(-3) + 5 = -4, q = 3(2) + 5 = 11$$

$$b) n = -2: 4 + 2 = 6$$

Inequalities and formulae revision mat answers

5 Solving inequalities

- a) Solve $\frac{5-3x}{4} > x - 2$
- b) List the integers n for which $2n - 3 < 5n + 9 \leq 3n + 14$.

$$a) 5 - 3x > 4x - 8, 13 > 7x, x < \frac{13}{7}$$

$$b) n > -4 \text{ and } n \leq 2.5$$

$$-3, -2, -1, 0, 1, 2$$

6 Solving inequalities: forming

Three numbers are $2x + 1$, $x + 7$ and $4x - 3$.

- a) Their mean is less than 12. Show that $7x < 31$.
- b) $4x - 3$ is the largest of the three and x is an integer. Find x .

$$a) \frac{7x+5}{3} < 12, 7x + 5 < 36, 7x < 31$$

$$b) x > 2 \text{ and } x > \frac{10}{3}, x < 4.4...$$

$$x = 4$$

7 Quadratic inequalities

- a) Solve $3x^2 + 5x \leq 2$
- b) Solve $x^2 - 4x - 3 > 0$, giving the limits in surd form.

$$a) (3x-1)(x+2) \leq 0: -2 \leq x \leq \frac{1}{3}$$

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

$$x < 2 - \sqrt{7} \text{ or } x > 2 + \sqrt{7}$$

8 Using the formulae sheet

Use your formulae sheet.

- a) £2000 is invested at $r\%$ compound interest a year. After 5 years it is worth £2433.31. Find r .
- b) A sphere has the same volume as a cylinder of radius 3 cm and height 4 cm. Find the radius of the sphere.

$$a) (1 + r/100)^5 = 2433.31 \div 2000 = 1.216655$$
$$1 + r/100 = 1.04, r = 4$$

$$b) \frac{4}{3}\pi r^3 = 36\pi, r^3 = 27, r = 3 \text{ cm}$$