

Level 8 PROMPT sheet

8/1 Change recurring decimal to fraction

$$\begin{aligned}\text{If } x &= 0.4444444 \\ 10x &= 4.4444444 \\ 9x &= 4 \\ x &= \frac{4}{9}\end{aligned}$$

$$\begin{aligned}\text{If } x &= 0.54545 \\ 100x &= 54.545454 \\ 99x &= 54 \\ x &= \frac{54}{99}\end{aligned}$$

8/2 Repeated percentage change

To increase £12 by 5% per year for 4 yr
= $1.05^4 \times \text{£}12$

To decrease £50 by 12% per year for 4 yr
= $0.88^4 \times \text{£}50$

8/2 To find the original quantity

~If an amount has been increased by 5%

Original amount = new amount \div 1.05

~If an amount has been decreased by 12%

Original amount = new amount \div 0.88

8/3 Standard Form

$$\sim a \times 10^n$$

a is between 1 & 10; n is an integer

~ When mult/div in standard form, work out number part separate from the power of 10 part

$$\text{e.g. } 3 \times 10^5 \times 4 \times 10^3 = 12 \times 10^8 = 1.2 \times 10^9$$

~ With a calculator use **EXP** or **$\times 10^x$**

8/4 Factorise a quadratic expression

$$x^2 - 3x - 4 = (x - 4)(x + 1)$$

$$x^2 - 25 = (x - 5)(x + 5)$$

Difference
of 2 squares

8/5 Expand 2 brackets

- Use **F O I L**

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

$$\begin{aligned}&\text{F} \quad \text{O} \quad \text{I} \quad \text{L} \\&x^2 - 2x + 3x - 6 \\&= x^2 + x - 6\end{aligned}$$

8/6 Change the subject of a formula

- Isolate the new subject
- Use balancing

Make c new subject

$$f = 3c - 4$$

$$3c - 4 = f \quad (+4)$$

$$3c = f + 4 \quad (\div 3)$$

$$c = \frac{f + 4}{3}$$

Make x new subject

$$ax + bx = ay$$

$$x(a + b) = ay$$

$$x = \frac{ay}{a + b}$$

8/7 Evaluate algebraic formulae

Rewrite the formula with numbers replacing letters

- WITH A CALCULATOR

Use fraction key  or 

Use (-) key for negative numbers

- WITHOUT A CALCULATOR

Remember the rules for negative numbers

$$-+ = -$$

$$-- = +$$

$$- \times + = -$$

$$- \times - = +$$

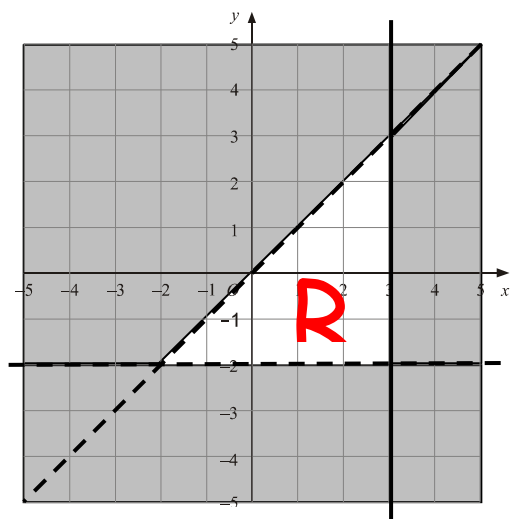
8/8 Represent inequalities graphically

First plot the straight line.

Decide which side of the line to shade.

Leave the region required unshaded.

e.g. $x \leq 3$ $y > -2$ $y < x$



8/9 Identify graphs

- Learn the basic shapes of graphs

Linear graphs - straight line - equation in x

Quadratic graph - parabola - equation in x^2

Cubic graph - S-shape - equation in x^3

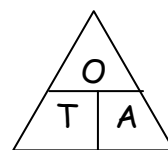
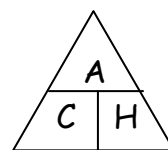
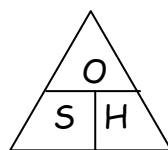
Reciprocal graph - equation e.g. $y = \frac{3}{x}$

8/10 Effect of adding/multiplying by a constant on a graph

Original graph $y = x^2$	
New equation	Change in graph
$y = x^2 + 2$	Move up 2
$y = x^2 - 2$	Move down 2
$y = 2x^2$	Stretch from x-axis in y-direction - scale factor 2
$y = \frac{1}{2}x^2$	Stretch from x-axis in y-direction - scale factor $\frac{1}{2}$

8/12 Trigonometry

SOH CAH TOA



EXAMPLES

$$\sin x = \frac{4}{5}$$

$$\sin x = 0.8$$

$$x = \sin^{-1}(0.8)$$

$$x = 53.1^\circ$$

$$\cos 28^\circ = \frac{x}{5}$$

$$x = 5 \cos 28^\circ$$

$$x = 4.4$$

$$\tan 28 = \frac{5}{x}$$

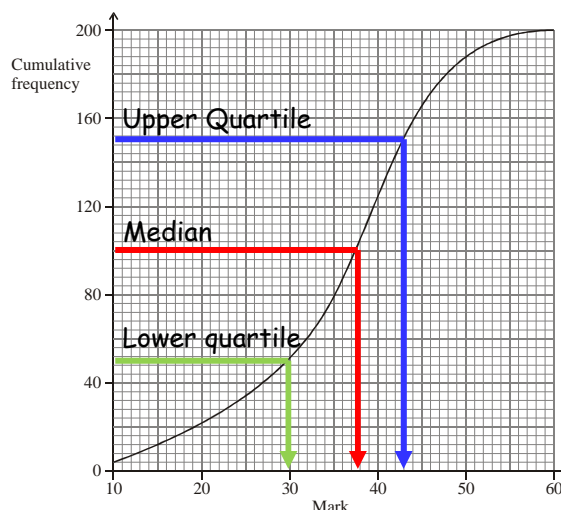
$$x = \frac{5}{\tan 28}$$

$$x = 9.4$$

8/13 Difference between formulae for length, area and volume

- Numbers and π have no dimensions
- Length \times length = area
- Length \times length \times length = volume

8/14 Median, quartiles & interquartile range from cumulative frequency graph



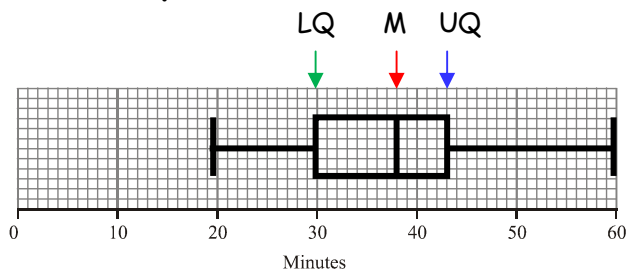
Median = 38 marks

Upper quartile = 43 marks

Lower quartile = 30 marks

Interquartile range = $43 - 30 = 13$ marks

8/14 Box plot



8/15 Compare distributions.0000

- Mean, median & mode compare size
- Range & interquartile range compare spread
- Distributions can be compared visually using a box plot

8/16 Add or multiply two probabilities

$$P(A \text{ or } B) = p(A) + p(B)$$

$$P(A \text{ and } B) = p(A) \times p(B)$$

If you get an answer to a probability question that is more than one, you have most certainly added instead of multiplied

8/17 Tree Diagrams

- When going along the branches. MULTIPLY the probabilities
- If more than one route is wanted, ADD the probabilities