

Maths Grade 6 Knowledge Organiser

6.1 Change recurring decimal to fraction

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

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

6.2 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
= $0.88^4 \times \text{£}50$

6.2 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

6.3 Standard Form

~ $a \times 10^n$

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

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 **$\times 10^x$**

6.4 Factorise a quadratic expression

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

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

Difference
of 2 squares

6.5 Expand 2 brackets

- Use FOIL

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

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

6.6 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

$$ax + bx = ay$$

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

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

6.7 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

$$-+ = -$$

$$-- = +$$

$$- \times + = -$$

$$- \times - = +$$

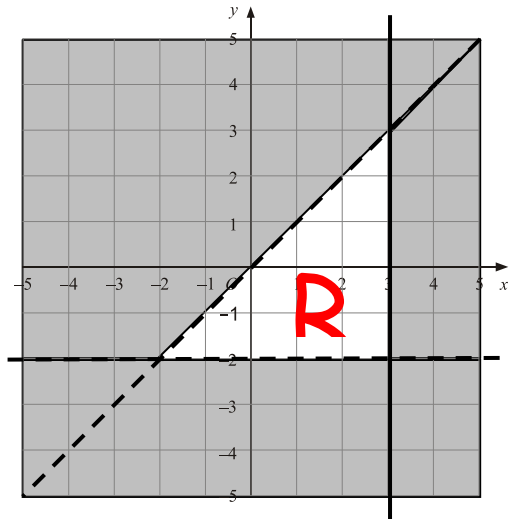
6.8 Represent inequalities graphically

First plot the straight line.

Decide which side of the line to shade.

Leave the region required unshaded.

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



6.9 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. $y = \frac{3}{x}$

6.10 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 $\frac{1}{2}$

6.11 Solve simultaneous equations by an algebraic method

- Make the number of ys the same
- Add or subtract to eliminate the ys
Same signs ~ subtract
Different signs ~ add
- Find the value of x
- Substitute the value of x to find y

e.g. $2x - 3y = 11$ (x2)
 $5x + 2y = 18$ (x3)

$$4x - 6y = 22$$

$$15x + 6y = 54$$

Add the two equations to eliminate y

$$19x = 76$$

$$x = 4$$

Substitute $x = 4$ into one of the equations

$$5x + 2y = 18$$

$$5 \times 4 + 2y = 18$$

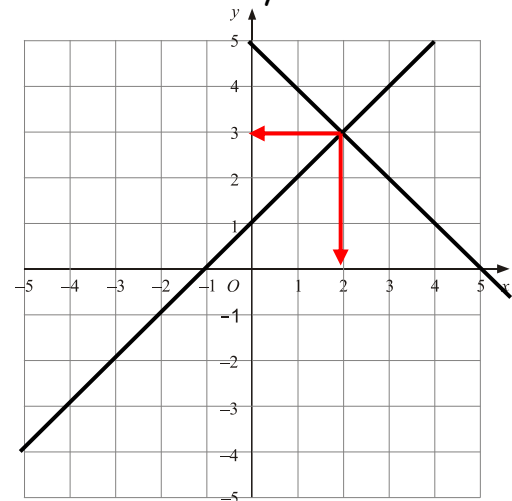
$$20 + 2y = 18$$

$$2y = -2$$

$$y = -1$$

6.11 Solve simultaneous equations graphically

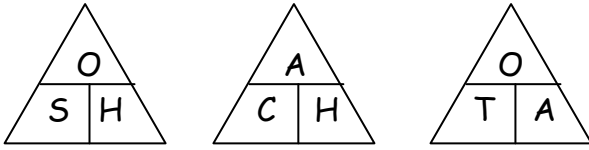
- Draw the graphs of the equations
- Find where they cross



Solution is $x = 2, y = 3$

6.12 Trigonometry

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EXAMPLES

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

$$\sin x = 0.8$$

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

$$x = 53.1^\circ$$

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

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

$$x = 4.4$$

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

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

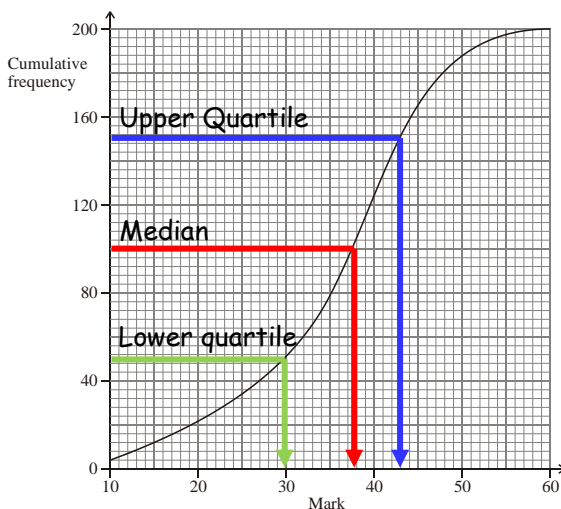
$$\tan 28$$

$$x = 9.4$$

6.13 Difference between formulae for length, area and volume

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

6.14 Median, quartiles & interquartile range from cumulative frequency graph



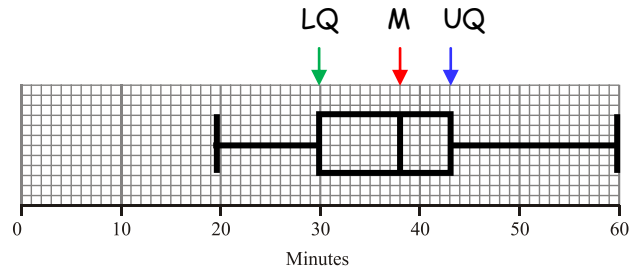
Median = 38 marks

Upper quartile = 43 marks

Lower quartile = 30 marks

Interquartile range = $43 - 30 = 13$ marks

6.14 Box plot



6.15 Compare distributions.0000

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

6.16 Add or multiply two probabilities

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

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

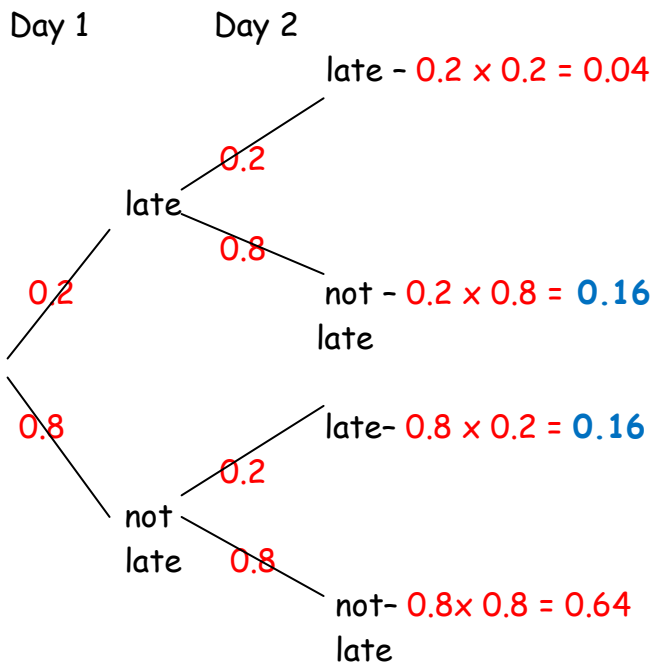
If you get an answer to a probability question that is more than one, you have most certainly added instead of multiplied

6.17 Tree Diagrams

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

Example:

The probability that Jane is late = 0.2



To find the probability of late on only one day:

day1 & day2 late not late	OR	day1 & day 2 not late late
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$$= 0.16 + 0.16$$
$$= \underline{0.32}$$