

Grade B PROMPT sheet

B/1 Change recurring decimal to fraction

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

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

B/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
= $0.88^4 \times \text{£}50$

B/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

B/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 **$\times 10^x$**

B/4 Factorise a quadratic expression

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

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

Difference
of 2 squares

B/5 Expand 2 brackets

- Use FOIL

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

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

B/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

$$ax + bx = ay$$

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

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

B/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

$$-+ = -$$

$$-- = +$$

$$- \times + = -$$

$$- \times - = +$$

B8 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

$$19x = 76$$

$$\underline{x = 4}$$

Substitute $x = 4$ into one of the equations

$$5x + 2y = 18$$

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

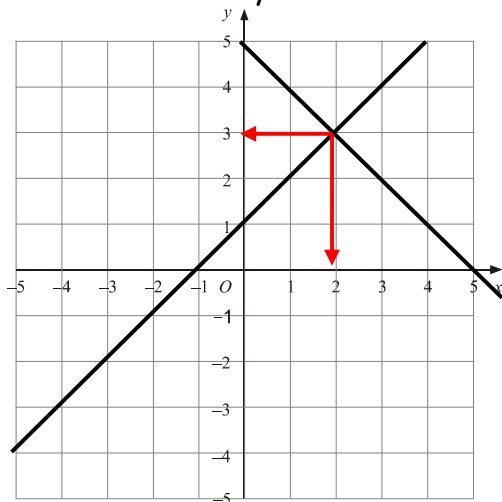
$$20 + 2y = 18$$

$$2y = -2$$

$$\underline{y = -1}$$

B8 Solve simultaneous equations graphically

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

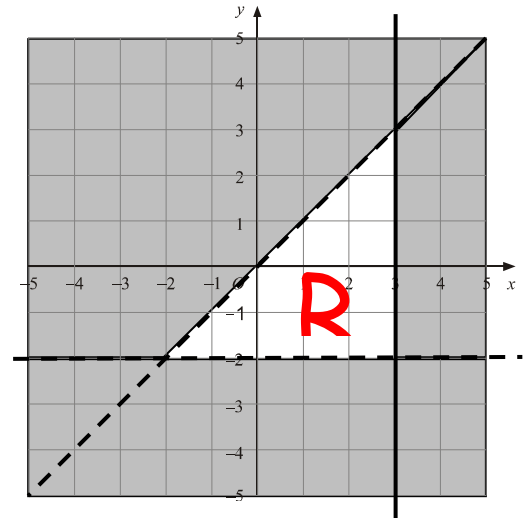


Solution is $x = 2, y = 3$

B/9 Represent inequalities graphically

First plot the straight line.
Decide which side of the line to shade.
Leave the region required unshaded.

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



B/10 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 $y = \frac{3}{x}$

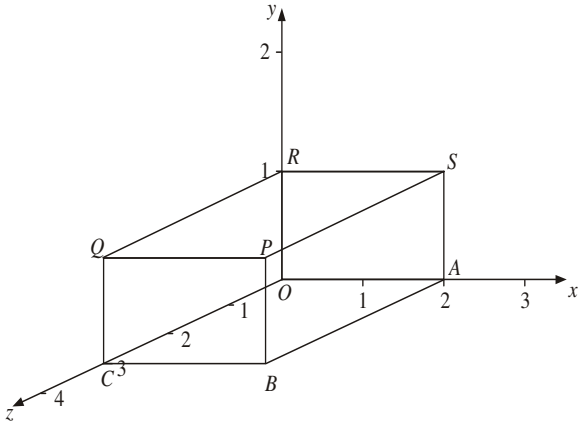
B/11 Effect of adding/multiplying by a constant on a graph

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 $\frac{1}{2}$

B/12 Coordinates in 3D

In 3D there are 3 axes, x, y and z
The coordinates of a point are (x, y, z)

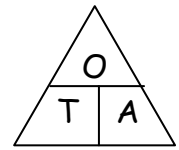
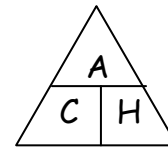
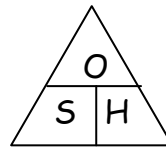
Example



On the grid the vertex P is (2, 1, 3)

B/14 Trigonometry

SOH CAH TOA



EXAMPLES

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

$$\sin x = 0.8$$

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

$$x = \underline{53.1^\circ}$$

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

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

$$x = \underline{4.4}$$

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

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

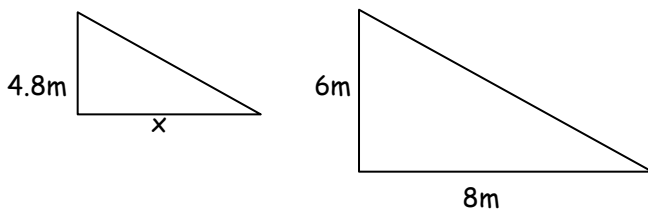
$$x = \underline{9.4}$$

B13 Similarity

If one shape is an enlargement of the other, we say they are similar.

- Corresponding angles are equal
- Corresponding sides have proportional lengths

Example - these 2 triangles are similar



$$\text{Scale factor} = 6 \div 4.8 = 1.25$$

$$X = 8 \div 1.25 = 6.4\text{cm}$$

N.B.

Always draw the 2 triangles separately and the same way up - it is easier to spot the sides that correspond to each other

B/15 Difference between formulae for length, area and volume

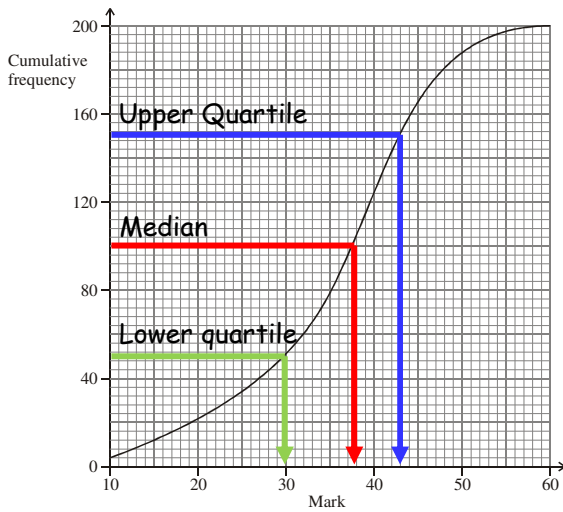
- Numbers and π have no dimensions
- Length x length = area
- Length x length x length = volume

Example:

$$5abc + 3a^2b \text{ (Ignore the numbers)}$$

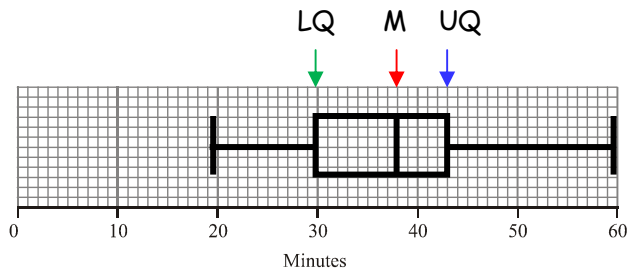
- a x b x c + a x a x b
- volume + volume
- volume

B/16 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

B/16 Box plot



B/17 Compare distributions.0000

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

B/18 Add or multiply two probabilities

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

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

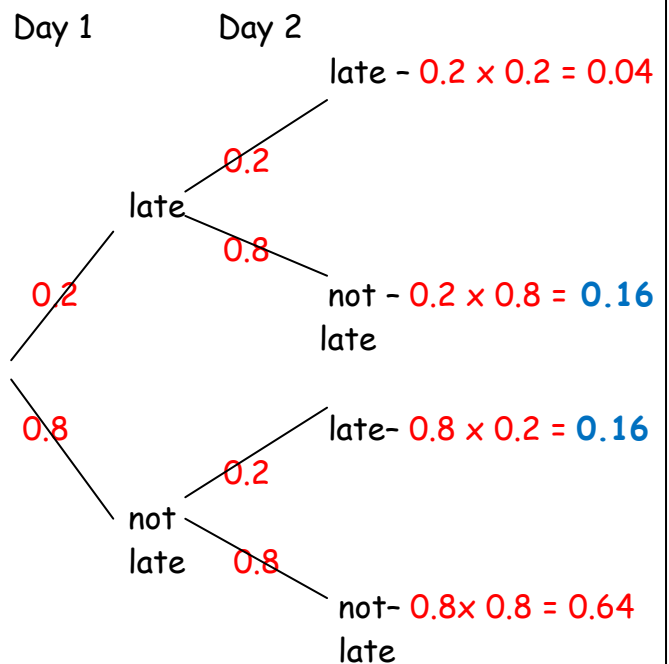
If you get an answer to a probability question that is more than one, you have most certainly added instead of multiplied

B/19 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 & day2 not late late
------------------------------	----	------------------------------

= 0.16 + 0.16
 = 0.32