

Laws of indices and surds

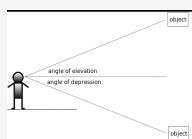
Law of Indices

- $a^m \times a^n = a^{m+n}$
- $\frac{a^m}{a^n} = a^{m-n}$
- $(a^m)^n = a^{mn}$
- $(ab)^n = a^n b^n$
- $\left(\frac{a}{b}\right)^n = \frac{a^n}{b^n}$
- $a^0 = 1$

Law of Surds

- $\sqrt[n]{a} = a^{\frac{1}{n}}$
- $\sqrt[n]{a} \sqrt[n]{b} = \sqrt[n]{a \times b}$
- $\sqrt[n]{\frac{a}{b}} = \frac{\sqrt[n]{a}}{\sqrt[n]{b}}$
- $(\sqrt[n]{a})^n = a$
- $\sqrt[n]{a^m} = a^{\frac{m}{n}}$
- $(\sqrt[n]{a})^m = \sqrt[n]{a^m}$

Angles of elevation and depression



Probability

Experimental probability = The frequency of the outcome / total number of trials

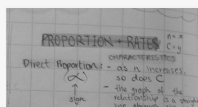
Relative frequency = frequency of the outcome / total number of trials

Financial maths

Dividing annual salary Weekly = 52 | Fortnightly = 26 | Monthly = 12

Calculating percentage of \$ 0.12 * \$ | EG. 12% of 150 = 0.12 X 150 = 18

Proportional and rates



Extra probability

Probability

Joint Probability

The probability of events A and B occurring

$P(A \text{ and } B) = P(A) \times P(B)$ when events A and B are independent

Union of Events

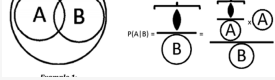
The probability of either event A or event B occurring

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

Conditional Probability

The probability of event A occurring given that event B has occurred

$P(A|B) = \frac{P(A \text{ and } B)}{P(B)}$ or $P(A|B) = \frac{P(B|A) \times P(A)}{P(B)}$



Algebra

Factorising

Form	Factorisation
$a^2 - b^2$	$(a - b)(a + b)$
$a^2 + b^2$	PRIME
$a^2 + b^2$	$(a - b)(a^2 + ab + b^2)$
$a^2 + b^2$	$(a + b)(a^2 - ab + b^2)$

Linear and Non-linear graphs

Gradient Gradient = M | M=Rise divided by run

Gradient M = $y_2 - y_1 / x_2 - x_1$

through two points

Gradient Y=mx + c | Find gradient + x intercept
intercept and y intercept
method

x and y To solve X, Y = 0 | To solve Y, X = 0, Then plot the x and y intercepts

Intercepts Y = C | X = A

Statistics

Mean = $\frac{\text{sum of all values}}{\text{total number of values}}$

Median = middle value (when the data are arranged in order)

Mode = most common value

Measurement

TSA Area of all sides added up

Volume Area X Height

SA of cylinder SA = $2\pi r^2 + 2\pi rh$

SA of sphere and volume A= $4\pi r^2$ | V= $\frac{4}{3}\pi r^3$ (volume)

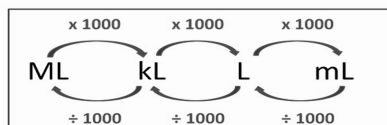
TSA of Cone $\pi rl + \pi r^2$

Capacity

Converting CAPACITY Units

The Volume of Liquids and Solids is usually measured as a "Capacity".

In the Metric System, Capacity is based on the Litre or "L" unit.



CAPACITY conversions use 1000's, and usually create fairly large results.

32ML = ? L Need to x 1000 twice 32 x 1000 x 1000 = 32 000 000 L ✓

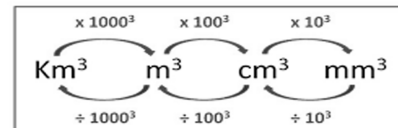
Area

Volume

Converting VOLUME Units

VOLUME is how much 3D space is occupied, and is measured in cubes.

VOLUME consists of Cube Units, so we need to CUBE all our Lengths.



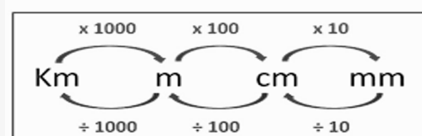
VOLUME conversions use powers of 3, and usually create very large results.

3m³ = ? cm³ Need to x 100³ 3 x 100 x 100 x 100 = 3 000 000 cm³ ✓

Length

Converting LENGTH Units

It is easiest to use a conversion look-up diagram like the one below.



5km = ? m Need to x 1000 5 x 1000 = 5000m ✓
120cm = ? m Need to ÷ 100 120 ÷ 100 = 1.2m ✓

Coefficient	The number in front 5y, y's coefficient is 5
Terms	A term is separated by a + or - sign 5x-3y+2 there are 3 terms there
Constant	Constant is the single number which doesn't have any letters behind it



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Converting AREA Units

AREA consists of Square Units, so we need to SQUARE all our Lengths.

Km^2	m^2	cm^2	mm^2
$\div 1000^2$	$\div 100^2$	$\div 10^2$	
	$\times 1000^2$	$\times 100^2$	$\times 10^2$

$5\text{km}^2 = ? \text{m}^2$ Need to $\times 1000^2$ $5 \times 1000 \times 1000 = 5\,000\,000 \text{m}^2 \checkmark$
 $1200\text{cm}^2 = ? \text{m}^2$ Need to $\div 100^2$ $1200 \div 100 \div 100 = 0.12 \text{m}^2 \checkmark$

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 Page 1 of 2.

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