

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

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

Factorising

Form	Factorisation
$a^2 - b^2$	$(a - b)(a + b)$
$a^2 + b^2$	PRIME
$a^2 + b^2$	$(a - b)(a^2 + ab + b^2)$
$a^3 + b^3$	$(a + b)(a^2 - ab + b^2)$

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

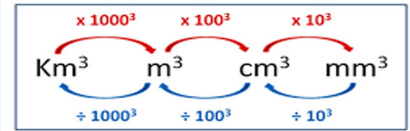
x and y To solve X, Y = 0 | To solve Y, X = 0, Then plot the x and y intercepts
intercept method

Intercepts Y = C | X = A

Volume

Converting VOLUME Units

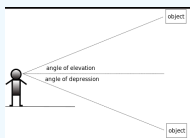
VOLUME is how much 3D space is occupied, and is measured in cubes. VOLUME consists of Cube Units, so we need to CUBE all our Lengths.



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

$3m^3 = ? cm^3$ Need to $\times 100^3$ $3 \times 100 \times 100 \times 100 = 3\,000\,000\,cm^3$ ✓

Angles of elevation and depression



Probability

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

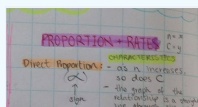
Relative frequency of the outcome / total number of trials

Financial maths

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

Calculating percentage of 0.% * \$ | EG. 12% of 150 = 0.12 X 150 \$

Proportional and rates

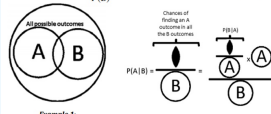


Extra probability

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



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)

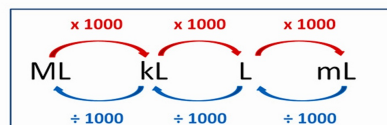
TSA of Cone $\pi rl + \pi r^2$

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 $\times 1000$ twice $32 \times 1000 \times 1000 = 32\,000\,000\,L$ ✓

Algebra

Area

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.

$5 \text{ km}^2 = ? \text{ m}^2$ **Need to x 1000²** $5 \times 1000 \times 1000 = 5\,000\,000 \text{ m}^2$ ✓
 $1200 \text{ cm}^2 = ? \text{ m}^2$ **Need to ÷ 100²** $1200 \div 100 \div 100 = 0.12 \text{ m}^2$ ✓

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