



O LEVELS EMATH MUST KNOW



3 SPECIAL ALGEBRAIC IDENTITIES

$$(a + b)^2 = a^2 + 2ab + b^2$$

$$(a - b)^2 = a^2 - 2ab + b^2$$

$$(a + b)(a - b) = a^2 - b^2$$

SAFECOM

- S - special algebraic identities
- A - add or subtract fractions
- F - factorise by grouping or window/ cross multiply
- E - expand by rainbow
- C - changing subject of formula
- O - order of operations BODMAS
- M - multiply or divide fractions

6 CIRCLE PROPERTIES

tangent of a circle

angles in a semi circle

Angle at centre equals twice angle at circumference

angles in the same segment

alternate segment theorem

cyclic quad

$a + b = 180$
 $c + d = 180$

9 RULES OF INDICES

Same base different power
Different base same power

$$a^m \times a^n = a^{n+m}$$

$$a^m \div a^n = a^{m-n}$$

$$a^m \times b^m = (ab)^m$$

$$a^m \div b^m = \left(\frac{a}{b}\right)^m$$

Zero power
Negative power
Power power

$$a^0 = 1$$

$$a^{-m} = \frac{1}{a^m}$$

$$(a^m)^n = a^{mn}$$

Fraction power

$$a^{\frac{1}{m}} = \sqrt[m]{a}$$

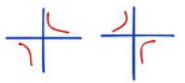
$$a^{\frac{n}{m}} = \sqrt[m]{a^n}$$

12 GRAPH PATTERNS

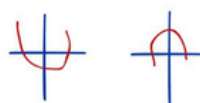
$y = mx + c$
Straight line



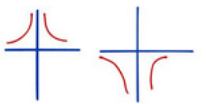
$y = \frac{1}{x}$
DBS Bank logo



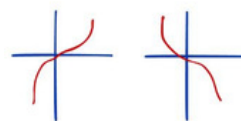
$y = x^2$
U or N shape



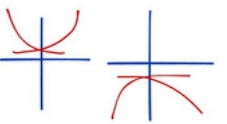
$y = \frac{1}{x^2}$
Volcano



$y = x^3$
S shape



$y = ka^x$
Bowl



2

Coordinate geometry

$$m = \frac{y_2 - y_1}{x_2 - x_1}$$

$$d = \sqrt{(y_2 - y_1)^2 + (x_2 - x_1)^2}$$

2

Direct Inverse Proportion

$$y = kx$$

$$y = \frac{k}{x}$$

2

Polygons

Sum of interior $(n - 2)180^\circ$

Sum of exterior 360°

3M STATISTICS

Mean = average

Median = middle

Mode = most

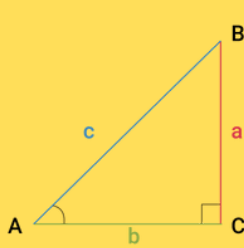


O LEVELS EMATH MUST KNOW



TRIGONOMETRY SOH - CAH - TOA

90 DEGREES TRIANGLES



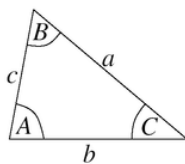
sine of $\angle A = \sin A = \frac{\text{Opposite}}{\text{Hypotenuse}} = \frac{a}{c}$

cosine of $\angle A = \cos A = \frac{\text{Adjacent}}{\text{Hypotenuse}} = \frac{b}{c}$

tangent of $\angle A = \tan A = \frac{\text{Opposite}}{\text{Adjacent}} = \frac{a}{b}$

NON - 90 DEGREES TRIANGLES

Area = $\frac{1}{2} ab \sin C$



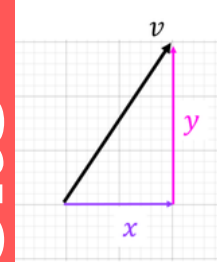
Sine Rule

$\frac{a}{\sin(A)} = \frac{b}{\sin(B)} = \frac{c}{\sin(C)}$ or $\frac{\sin(A)}{a} = \frac{\sin(B)}{b} = \frac{\sin(C)}{c}$
(for finding sides) (for finding angles)

Cosine Rule

$a^2 = b^2 + c^2 - 2bc \cos(A)$ or $\cos(A) = \frac{b^2 + c^2 - a^2}{2bc}$
(for finding sides) (for finding angles)

VECTORS

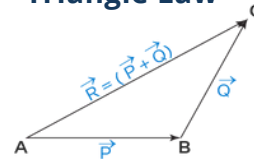


For any vector: $v = \begin{pmatrix} x \\ y \end{pmatrix}$

its magnitude is

$|v| = \sqrt{x^2 + y^2}$

Triangle Law



$\vec{AC} = (\vec{AB} + \vec{BC})$



Points A, B and C are collinear if

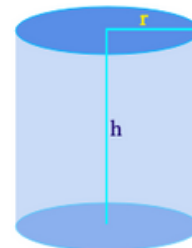
$\vec{AB} = k\vec{BC}$

MATRIX MULTIPLY

$$\begin{bmatrix} a & b \\ c & d \end{bmatrix} \times \begin{bmatrix} e & f \\ g & h \end{bmatrix} = \begin{bmatrix} ae + bg & af + bh \\ ce + dg & cf + dh \end{bmatrix}$$

A B C

SHAPES

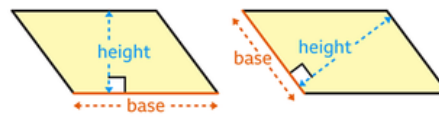


Cylinder

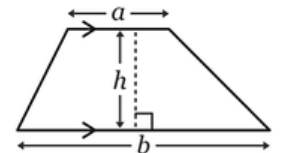
Volume = $\pi r^2 h$

Surface Area = $2\pi r^2 + 2\pi rh$

$A = \frac{1}{2} (a + b)h$

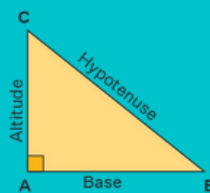


Area of Parallelogram



Area of Trapezium

PYTHAGORA'S THEOREM



$BC^2 = AB^2 + AC^2$

INTEREST

Simple Interest

$SI = \frac{PRT}{100}$

P = principal

I = interest

R/r = rate

T = time

Compound Interest

$P + I = P \left(1 + \frac{r}{100}\right)^n$

n = number of times compounded

RADIAN - CIRCLE

arc length = $r\theta$

area of sector = $\frac{1}{2} r^2 \theta$

180 degrees = π radian

