

Facts and Formulae to MEMORISE for Mathematics National 5 Exam

Area & Perimeter

Rectangle: $Area = l \times b$
 $Perimeter = 2 \times (l + b)$

Parallelogram: $Area = b \times h$

Kite/Rhombus: $Area = \frac{1}{2} \times d_1 \times d_2$

Trapezium: $Area = \frac{1}{2} (a + b) \times h$

Triangle: $Area = \frac{1}{2} \times b \times h$

Circle: $Area = \pi \times r^2$
 $Circumference = \pi \times d$
 $Sector Area = \frac{x}{360^\circ} \times \pi \times r^2$
 $Arc Length = \frac{x}{360^\circ} \times \pi \times d$

Indices

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

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

$$(a^m)^n = a^{m \times n}$$

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

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

$$a^0 = 1, \quad a^1 = a, \quad a^{\frac{1}{2}} = \sqrt{a}, \quad a^{\frac{1}{3}} = \sqrt[3]{a}$$

Surds

$$\sqrt{a} \times \sqrt{b} = \sqrt{a \times b}$$

$$\sqrt{a} \div \sqrt{b} = \sqrt{\frac{a}{b}}$$

$$\sqrt{a} \times \sqrt{a} = a$$

Squares and Cubes

1, 4, 9, 16, 25, 36, 49, 64, 81, 100, 121, 144, 169, 196, 225

1, 8, 27, 64, 125

Straight Line

Gradient: $m = \frac{y_2 - y_1}{x_2 - x_1}$ or $gradient = \frac{Vertical}{Horizontal}$

Equation: $y = mx + c$ or $y - b = m(x - a)$

Volume & Surface Area

Cuboid: $V = l \times b \times h$

Prism: $V = A \times h$

Cylinder: $V = \pi \times r^2 \times h$

Curved surface area of a cylinder: $CSA = 2 \times \pi \times r \times h$

Quadratic equations

Factorising: Highest common factor, Difference of two squares, Trinomial

Discriminant: $b^2 - 4ac > 0$ Two Real and distinct roots

$b^2 - 4ac = 0$ Real and equal roots

$b^2 - 4ac < 0$ No real roots

Completing the square: $y = (x - a)^2 + b$ Turning point (a, b)

Similar Shapes

Length scale factor: $\frac{new}{old}$

Area Scale factor: $(length\ scale\ factor)^2$

Volume Scale factor: $(length\ scale\ factor)^3$

Pythagoras

Theorem: $c^2 = a^2 + b^2$

Angle properties

Sum of angles in any triangle – always 180°

Sum of angles in any quadrilateral – always 360°

Complementary angles (right angle) – always add up to 90°

Supplementary angles (straight line) – always add up to 180°

Vertically opposite angles (2 or more straight lines) – always equal

Corresponding angles (F shape) – always equal

Alternate angles (Z shape) – always equal

Vectors

Component Vector $\overrightarrow{AB} = \underline{b} - \underline{a}$

Magnitude: If $\underline{a} = \begin{pmatrix} x \\ y \end{pmatrix}$ then $|\underline{a}| = \sqrt{x^2 + y^2}$

If $\underline{b} = \begin{pmatrix} x \\ y \\ z \end{pmatrix}$ then $|\underline{b}| = \sqrt{x^2 + y^2 + z^2}$

Numbers

Scientific Notation: $a \times 10^n$ where $0 < a < 10$ and n is an integer

Percentages, Decimals and Fractions:

$$50\% = 0.5 = \frac{1}{2}$$

$$25\% = 0.25 = \frac{1}{4}$$

$$10\% = 0.1 = \frac{1}{10}$$

$$100\% = 1 = \frac{1}{1}$$

$$75\% = 0.75 = \frac{3}{4}$$

$$30\% = 0.3 = \frac{3}{10}$$

$$70\% = 0.7 = \frac{7}{10}$$

$$90\% = 0.9 = \frac{9}{10}$$

$$20\% = 0.2 = \frac{1}{5}$$

$$1\% = 0.01 = \frac{1}{100}$$

$$40\% = 0.4 = \frac{2}{5}$$

$$33\frac{1}{3}\% = 0.333\ldots = \frac{1}{3}$$

$$60\% = 0.6 = \frac{3}{5}$$

$$5\% = 0.05 = \frac{1}{20}$$

$$66\frac{2}{3}\% = 0.666\ldots = \frac{2}{3}$$

$$80\% = 0.8 = \frac{4}{5}$$

Statistics

Range: *Highest - Lowest*

Interquartile Range: *Quartile₃ - Quartile₁*

Semi-Interquartile Range: *(Quartile₃ - Quartile₁) ÷ 2*

Mean Average: $\bar{x} = \frac{\sum x}{n}$

Median Average: *Quartile₂*

Mode Average: *Most common value or category*

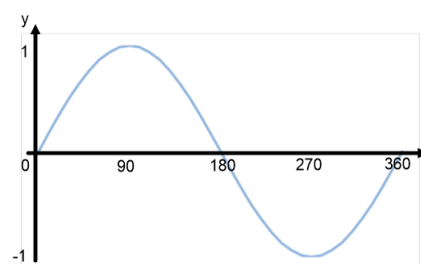
5 Figure Summary: *Highest, Lowest, Quartile₁, Quartile₂, Quartile₃*

Trigonometry

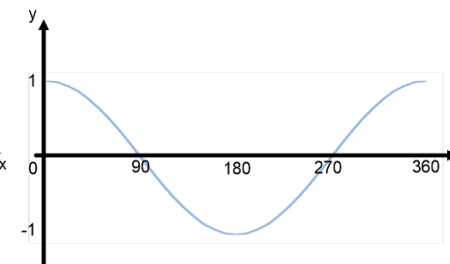
Right angled Triangles:

$$S^O_H C^A_H T^O_A \quad \sin x^\circ = \frac{Opp}{Hyp}, \quad \cos x^\circ = \frac{Adj}{Hyp}, \quad \tan x^\circ = \frac{Opp}{Adj}$$

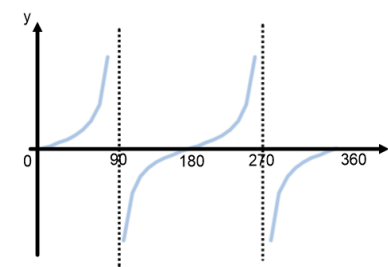
Sine graph:



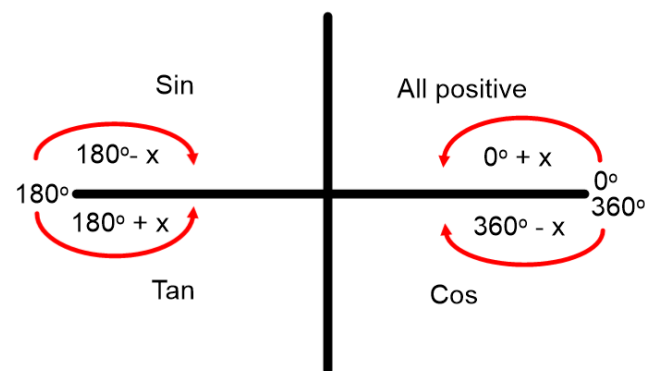
Cos graph:



Tan graph:



CAST diagram:



Trig identities: $\tan x = \frac{\sin x}{\cos x}$ and $\sin^2 x + \cos^2 x = 1$