

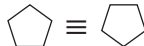


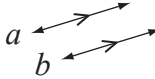
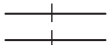


MATHS FACTS

SYMBOLS

Number

+	plus or add
-	minus or subtract
×	multiplied by, times, lots of
÷	divided by, into groups of
=	equals, is equal to
≠	is not equal to
≈	is approximately equal to
<	is less than, $4 < 6$
>	is greater than, $8 > 5$
≤	is less than or equal to
≥	is greater than or equal to
()	brackets, a grouping symbol
%	percentage, $12\% = \frac{12}{100}$
.	decimal point as in 7.9
-3	negative 3
6^3	6 raised to the 3 rd power, $6 \times 6 \times 6$
$\sqrt{9}$	square root of 9
$\frac{4}{7}$	fraction, $4 \div 7$, four sevenths
$a:b$ or $\frac{a}{b}$	ratio of a to b
$2.\dot{4}$ or $2.\dot{1}\dot{3}$	recurring decimal

Geometry

π (pi)	≈ 3.14 or $\frac{22}{7}$
°	degree (a right angle measures 90°)
\equiv	is congruent to, 
\sim	is similar to, 
	is parallel to
\perp	is perpendicular to
$\triangle ABC$	triangle with vertices A, B and C
	right angle
\overleftrightarrow{AD}	line AD
\overline{BC}	segment BC
	parallel lines (line a is parallel to line b)
	congruent segments
	equal angles
	equal side lengths

Algebra

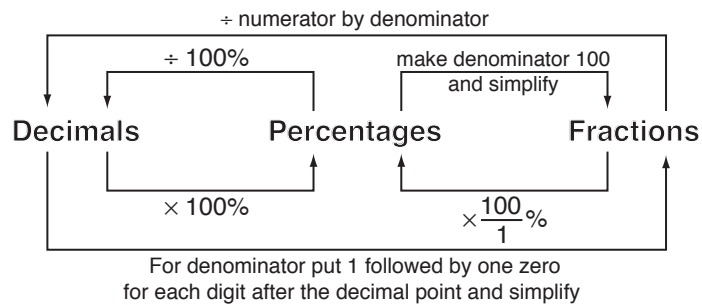
$3x$	3 times x , 3 lots of x , $3 \times x$, $3x$
x^2	x raised to the 2 nd power, $x \times x$
$-x$	opposite of x
$\frac{1}{x}$	reciprocal of x
(x,y)	coordinates in a Cartesian plane

NUMBER FACTS (1)

Place Value

millions	hundreds of thousands	tens of thousands	thousands	hundreds	tens	units	↓ decimal point	tenths	hundredths	thousandths
1 000 000	100 000	10 000	1 000	100	10	1		$\frac{1}{10}$	$\frac{1}{100}$	$\frac{1}{1000}$

Decimals / Fractions / Percentages



Fraction	Decimal	Percentage
$\frac{1}{1}$	1	100%
$\frac{1}{2}$	0.5	50%
$\frac{1}{3}$	0. $\dot{3}$	33.33%
$\frac{2}{3}$	0. $\dot{6}$	66.66%
$\frac{1}{4}$	0.25	25%
$\frac{3}{4}$	0.75	75%
$\frac{1}{5}$	0.2	20%
$\frac{2}{5}$	0.4	40%
$\frac{3}{5}$	0.6	60%
$\frac{4}{5}$	0.8	80%
$\frac{1}{8}$	0.125	12.5%
$\frac{1}{9}$	0. $\dot{1}$	11.11%

0

Subtraction $a - 0 = a$

Multiplication $a \times 0 = 0$ and $0 \times a = 0$

Division $0 \div a = 0$

1

Multiplication $a \times 1 = a$ and $1 \times a = a$

Division $a \div 1 = a$

Prime numbers < 100

2, 3, 5, 7, 11, 13, 17, 19, 23, 29, 31, 37, 41, 43, 47, 53, 59, 61, 67, 71, 73, 79, 83, 89 and 97

Perfect squares of numbers 0 to 30

0, 1, 4, 9, 16, 25, 36, 49, 64, 81, 100, 121, 144, 169, 196, 225, 256, 289, 324, 361, 400, 441, 484, 529, 576, 625, 676, 729, 784, 841 and 900

NUMBER FACTS (2)

Real Numbers \mathbb{R}

IRRATIONAL

π , ϕ , e , $\sqrt{2}$, $\sqrt{3}$, $\sqrt{5}$,
2.6293045632....
 $\cos 30^\circ$

 \mathbb{Q}

RATIONAL

$-2\frac{3}{7}$, 3.010101...,
 $\frac{4}{10}$, 0.56, $\sqrt{\frac{4}{9}}$

 \mathbb{Z}

Integers

..., -3, -2, -1, 0, 1, 2, 3, ...

 \mathbb{N}

Natural (Whole Numbers)
0, 1, 2, 3, 4, 5, 6, ...

Operation terminology

Addition: sum, all together, in total, more than

Subtraction: difference, less than, change

Multiplication: product, times, lots of

Division: a fraction (half, third, quarter) of,
quotient

Sign rules

$$++ = +$$

$$-- = +$$

$$+- = -$$

$$-+ = -$$

Order of operations

- 1) Simplify inside all brackets first.
- 2) Evaluate powers and square roots.
- 3) Do all multiplications or divisions in order from left to right.
- 4) Do all additions or subtractions in order from left to right.

Ratios and Proportions

$$a : b = \frac{a}{b}$$

$$a : b = c : d$$

$$\frac{a}{b} \times \frac{c}{d}$$

$$a \times d = b \times c$$

$$ad = bc$$

ALGEBRA FACTS

Identity properties

Additive identity $a + 0 = 0 + a = a$

Multiplicative identity $a \times 1 = 1 \times a = a$

Commutative properties

Addition $a + b = b + a$

Multiplication $a \times b = b \times a$

Associative properties

Addition $(a + b) + c = a + (b + c)$

Multiplication $(a \times b) \times c = a \times (b \times c)$

Distributive properties

$$a(b + c) = ab + ac$$

$$a(b - c) = ab - ac$$

Inverse operation rules

Operation +	Inverse Operation −	Operation −	Inverse Operation +	Operation ×	Inverse Operation ÷	Operation ÷	Inverse Operation ×
$x + 3 = 6$		$x - 3 = 6$		$3x = 6$		$\frac{x}{3} = 6$	
$x + 3 - 3 = 6 - 3$		$x - 3 + 3 = 6 + 3$		$\frac{3x}{3} = \frac{6}{3}$		$\frac{x}{3} \times 3 = 6 \times 3$	
$x = 3$		$x = 9$		$x = 2$		$x = 18$	

Inverse properties

Addition $a + (-a) = a - a = 0$

Multiplication $a \times \frac{1}{a} = \frac{1}{a} \times a = 1, a \neq 0$

MEASUREMENT FACTS (1)

CONVERSIONS

Length

10 millimetres (mm) = 1 centimetre (cm)

$$\begin{array}{l} 100 \text{ cm} = \\ 1000 \text{ mm} = \end{array} \left. \vphantom{\begin{array}{l} 100 \\ 1000 \end{array}} \right] 1 \text{ metre (m)}$$

1000 m = 1 kilometre (km)

Temperature - degrees Celsius (°C)

0°C = freezing point of water

37°C = human body temperature

100°C = boiling point of water

Mass

1000 milligrams (mg) = 1 gram (g)

1000 g = 1 kilogram (kg)

1000 kg = 1 tonne (t)

Area

100 square mm (mm²) = 1 square cm (cm²)

10 000 cm² = 1 square metre (m²)

1 000 000 m² = 1 square km (km²)

Liquid capacity

$$\begin{array}{l} 1000 \text{ millilitres (mL)} = \\ 1000 \text{ cm}^3 = \end{array} \left. \vphantom{\begin{array}{l} 1000 \\ 1000 \end{array}} \right] 1 \text{ litre (L)}$$

1000 L = 1 kilolitre (kL)

Volume

1000 cubic mm (mm³) = 1 cubic cm (cm³)

1 000 000 cm³ = 1 cubic metre (m³)

Time

60 seconds (s) = 1 minute (min)

60 minutes (min) = 1 hour (h)

24 hours = 1 day

7 days = 1 week

4 weeks (approx.) = 1 month

$$\begin{array}{l} 365 \text{ or } 366 \text{ days} = \\ 52 \text{ weeks (approx.)} = \\ 12 \text{ months} = \end{array} \left. \vphantom{\begin{array}{l} 365 \\ 52 \\ 12 \end{array}} \right] 1 \text{ year}$$

10 years = 1 decade

100 years = 1 century

Conversion factors: capacity ↔ volume

1 millilitre (mL) = 1 cubic centimetre (cm³)

1000 litre (L) = 1 cubic metre (m³)

METRIC PREFIXES

giga (G) = 1 billion = 1 000 000 000

mega (M) = 1 million = 1 000 000

kilo (k) = 1 thousand = 1000

hecto (h) = 1 hundred = 100

deca (da) = 1 ten = 10

micro (μ) = 1 millionth = $\frac{1}{1\,000\,000}$

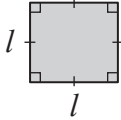
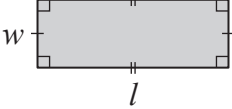
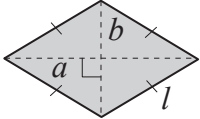
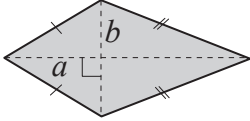
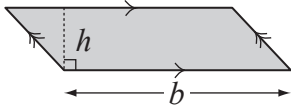
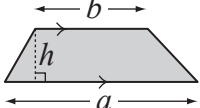
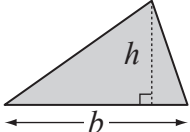

milli (m) = 1 thousandth = $\frac{1}{1000}$

centi (c) = 1 hundredth = $\frac{1}{100}$

deci (d) = 1 tenth = $\frac{1}{10}$

MEASUREMENT FACTS (2)

2D shapes - Formulae

Name	Shape	Perimeter	Area
Square		$P = 4 \times l$ $= 4l$	$A = l \times l$ $= l^2$
Rectangle		$P = 2l + 2w$ $= 2(l + w)$	$A = l \times w$ $= lw$
Rhombus		$P = 4 \times l$ $= 4l$	$A = \frac{a \times b}{2}$ $= \frac{1}{2}ab$
Kite		$P = \text{Sum of all sides}$	$A = \frac{a \times b}{2}$ $= \frac{1}{2}ab$
Parallelogram		$P = \text{Sum of all sides}$	$A = b \times h$ $= bh$
Trapezium		$P = \text{Sum of all sides}$	$A = \frac{1}{2}(a + b)h$
Triangle		$P = \text{Sum of all sides}$	$A = \frac{b \times h}{2}$ $= \frac{1}{2}bh$
Circle		$C = 2\pi r$	$A = \pi r^2$ where $\pi \approx 3.14$ or $\frac{22}{7}$

Prefixes

poly - many
equi - equal
hedra - face
gon - angle
lateral - side

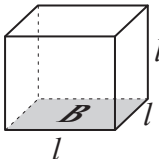
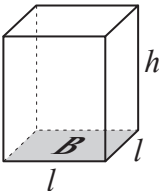
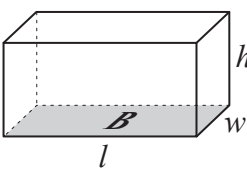
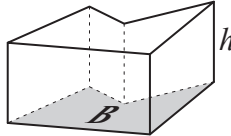
mono - one
bi or **di** - two
tri - three
quad or **tetra** - four
penta - five
hexa - six
hepta - seven
octa - eight
nona - nine
deca - ten

Abbreviations

l length
w width
h height
b base length
P perimeter
r radius
C circumference
A area

MEASUREMENT FACTS (3)

3D shapes - Formulae

Name	Shape	Volume
Cube		$V = l^3$ or $= Bh$
Square Prism		$V = l^2h$ or $= Bh$
Rectangular Prism		$V = lwh$ or $= Bh$
Prism - (All)		$V = Bh$

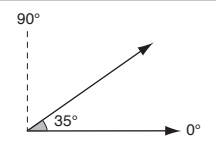
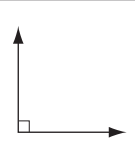
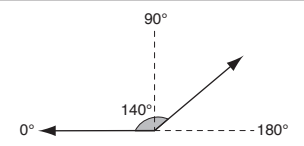
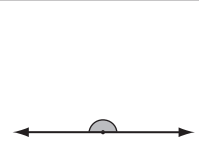
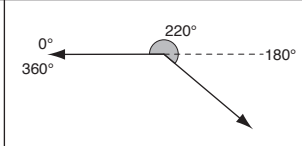
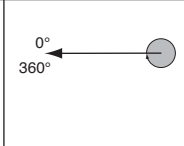
Abbreviations

l length
 w width
 h height
 b base length
 r radius

A area
 P perimeter
 V volume
 B base area
 C circumference

GEOMETRY FACTS

2D shapes

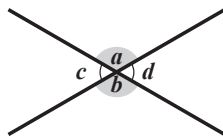
Acute $< 90^\circ$	Right 90°	Obtuse more than 90° less than 180°	Straight 180°	Reflex more than 180° less than 360°	Revolution 360°
					

Properties of angles

Vertically opposite angles

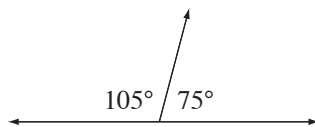
Are equal

$$\angle a = \angle b, \angle c = \angle d$$



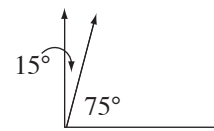
Supplementary angles

Add to 180°



Complementary angles

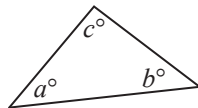
Add to 90°



Properties of angles in a triangle

The sum of interior angles of a triangle is 180° .

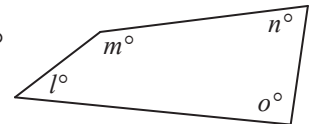
$$a^\circ + b^\circ + c^\circ = 180^\circ$$



Properties of angles in a quadrilateral

The sum of interior angles of a quadrilateral is 360° .

$$l^\circ + m^\circ + n^\circ + o^\circ = 360^\circ$$



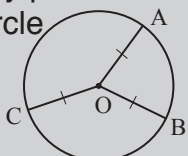
Triangle types

Sides and angles	Triangle type
no equal sides/angles	scalene
two equal sides/angles	isosceles
three equal sides/angles	equilateral

Angles	Triangle type
all acute angles	acute-angled
one right angle	right-angled
one obtuse angle	obtuse-angled

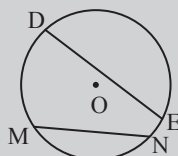
Properties of circles

Radius - joins the centre with any point on the circle

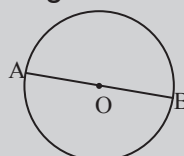


$$OA = OB = OC$$

Chord - joins any two points on the circle

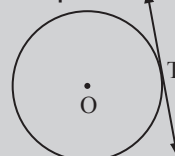


Diameter - a chord passing through the centre



$$AB = 2OA$$

Tangent - a line touching the circle in one point



Circumference - the distance around the circle

