






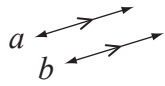



MATH FACTS

SYMBOLS

Number

+	plus or add
-	minus or subtract
\times, \cdot	multiplied by, times, lots of
\div	divided by, into groups of
=	equals, is equal to
\neq	is not equal to
\approx	is approximately equal to
<	is less than, $4 < 6$
>	is greater than, $8 > 5$
\leq	is less than or equal to
\geq	is greater than or equal to
()	brackets, a grouping symbol
%	percent, $12\% = \frac{12}{100}$
.	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
$2.\bar{4}$ or $2.\bar{13}$	repeating decimal
$ a $	absolute value of a

Geometry

π (pi)	≈ 3.14 or $\frac{22}{7}$
$^\circ$	degree (a right angle measures 90°)
\cong	is congruent to,  \cong 
\sim	is similar to,  \sim 
\parallel	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

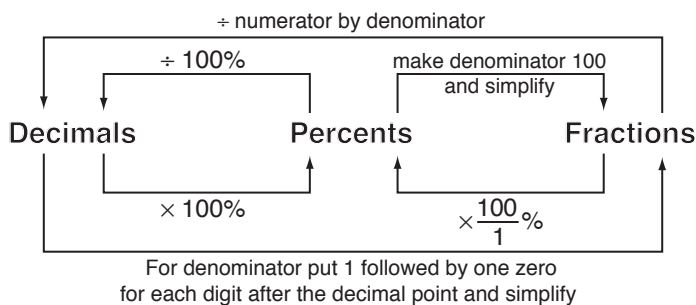
$3x$	3 times x , 3 lots of x , $3 \cdot x$, $3x$
x^2	x raised to the 2 nd power, $x \cdot x$
$-x$	opposite of x
$\frac{1}{x}$	reciprocal of x
(x,y)	coordinates in a coordinate plane

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	1000	100	10	1		$\frac{1}{10}$	$\frac{1}{100}$	$\frac{1}{1000}$

Decimals / Fractions / Percents



Fraction	Decimal	Percent
$\frac{1}{1}$	1	100%
$\frac{1}{2}$	0.5	50%
$\frac{1}{3}$	$0.\bar{3}$	33.33%
$\frac{2}{3}$	$0.\bar{6}$	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%
$\frac{1}{9}$	$0.\bar{1}$	11.11%

0

Subtraction $a - 0 = a$

Multiplication $a \cdot 0 = 0$ and $0 \cdot a = 0$

Division $0 \div a = 0$

1

Multiplication $a \cdot 1 = a$ and $1 \cdot a = a$

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

$\pi, \phi, e, \sqrt{2}, \sqrt{3}, \sqrt{5},$
 $2.6293045632\dots$
 $\cos 30^\circ$

 \mathbb{Q}

RATIONAL

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

 \mathbb{Z}

Integers

$\dots, -3, -2, -1, 0, 1, 2, 3, \dots$

 \mathbb{N}

Natural (Whole Numbers)
 $0, 1, 2, 3, 4, 5, 6, \dots$

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 $a \cdot 1 = 1 \cdot a = a$

Commutative Properties

Addition $a + b = b + a$

Multiplication $a \cdot b = b \cdot a$

Associative Properties

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

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

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 $a \cdot \frac{1}{a} = \frac{1}{a} \cdot a = 1, a \neq 0$

MEASUREMENT FACTS (1)**CONVERSIONS - Customary****Length**

$$12 \text{ inches (in.)} = 1 \text{ foot (ft)}$$

$$\begin{array}{l} 3 \text{ ft} = \\ 36 \text{ in.} = \end{array} \left. \vphantom{\begin{array}{l} 3 \text{ ft} = \\ 36 \text{ in.} = \end{array}} \right] 1 \text{ yard (yd)}$$

$$\begin{array}{l} 5280 \text{ ft} = \\ 1760 \text{ yd} = \end{array} \left. \vphantom{\begin{array}{l} 5280 \text{ ft} = \\ 1760 \text{ yd} = \end{array}} \right] 1 \text{ mile (mi)}$$

Mass

$$16 \text{ ounces (oz)} = 1 \text{ pound (lb)}$$

$$2000 \text{ lb} = 1 \text{ ton}$$

Liquid Capacity

$$8 \text{ fluid ounces (fl oz)} = 1 \text{ cup (c)}$$

$$2 \text{ c} = 1 \text{ pint (pt)}$$

$$2 \text{ pt} = 1 \text{ quart (qt)}$$

$$4 \text{ qt} = 1 \text{ gallon (gal)}$$

Temperature - degrees Fahrenheit (°F)

$$32^{\circ}\text{F} = \text{freezing point of water}$$

$$98.6^{\circ}\text{F} = \text{human body temperature}$$

$$212^{\circ}\text{F} = \text{boiling point of water}$$

Area

$$144 \text{ square inch (in.}^2\text{)} = 1 \text{ square foot (ft}^2\text{)}$$

$$9 \text{ ft}^2 = 1 \text{ square yard (yd}^2\text{)}$$

CONVERSIONS - Metric**Length**

$$10 \text{ millimeters (mm)} = 1 \text{ centimeter (cm)}$$

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

$$1000 \text{ m} = 1 \text{ kilometer (km)}$$

Mass

$$1000 \text{ milligrams (mg)} = 1 \text{ gram (g)}$$

$$1000 \text{ g} = 1 \text{ kilogram (kg)}$$

$$1000 \text{ kg} = 1 \text{ tonne (t)}$$

Liquid Capacity

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

$$1000 \text{ L} = 1 \text{ kiloliter (kL)}$$

Temperature - degrees Celsius (°C)

$$0^{\circ}\text{C} = \text{freezing point of water}$$

$$37^{\circ}\text{C} = \text{human body temperature}$$

$$100^{\circ}\text{C} = \text{boiling point of water}$$

Area

$$100 \text{ square mm (mm}^2\text{)} = 1 \text{ square cm (cm}^2\text{)}$$

$$10,000 \text{ cm}^2 = 1 \text{ square meter (m}^2\text{)}$$

$$1,000,000 \text{ m}^2 = 1 \text{ square km (km}^2\text{)}$$

Volume

$$1000 \text{ cubic mm (mm}^3\text{)} = 1 \text{ cubic cm (cm}^3\text{)}$$

$$1,000,000 \text{ cm}^3 = 1 \text{ cubic meter (m}^3\text{)}$$

MEASUREMENT FACTS (2)

Time

$$60 \text{ seconds (s)} = 1 \text{ minute (min)}$$

$$60 \text{ minutes (min)} = 1 \text{ hour (h)}$$

$$24 \text{ hours} = 1 \text{ day}$$

$$7 \text{ days} = 1 \text{ week}$$

$$4 \text{ weeks (approx.)} = 1 \text{ month}$$

$$365 \text{ or } 366 \text{ days} =$$

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

$$12 \text{ months} =$$

$$10 \text{ years} = 1 \text{ decade}$$

$$100 \text{ years} = 1 \text{ century}$$

Conversion factors: metric \leftrightarrow customary

Length

$$1 \text{ inch} \approx 2.54 \text{ centimeters}$$

$$1 \text{ kilometer} \approx 0.62 \text{ miles}$$

Mass

$$1 \text{ ounce} \approx 28 \text{ grams}$$

$$1 \text{ kilogram} \approx 2.2 \text{ pounds}$$

Liquid Capacity

$$1 \text{ liter} \approx 1.06 \text{ quarts}$$

Liquid Capacity

$$1 \text{ milliliter (mL)} = 1 \text{ cubic centimeter (cm}^3\text{)}$$

$$1000 \text{ liter (L)} = 1 \text{ cubic meter (m}^3\text{)}$$

METRIC PREFIXES

$$\text{giga (G)} = 1 \text{ billion} = 1,000,000,000$$

$$\text{mega (M)} = 1 \text{ million} = 1,000,000$$

$$\text{kilo (k)} = 1 \text{ thousand} = 1000$$

$$\text{hecto (h)} = 1 \text{ hundred} = 100$$

$$\text{deca (da)} = 1 \text{ ten} = 10$$

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

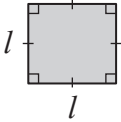
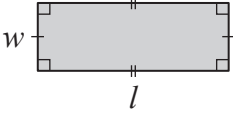
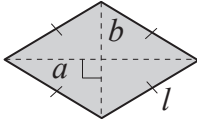
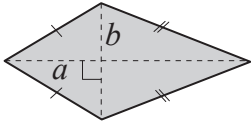
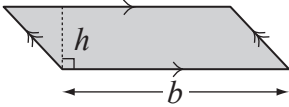
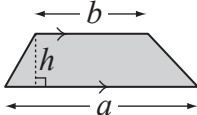
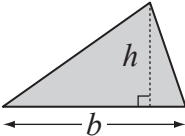

$$\text{milli (m)} = 1 \text{ thousandth} = \frac{1}{1000}$$

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

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

MEASUREMENT FACTS (3)

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		$P = \text{Sum of all sides}$	$A = b \times h$ $= bh$
Trapezoid		$P = \text{Sum of all sides}$	$A = \frac{1}{2}(a + b)h$
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

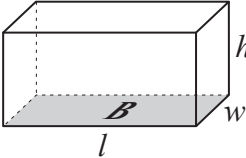
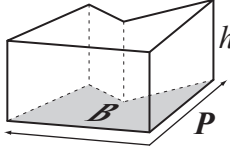
mono - one
bi or **di** - two
tri - three
quad or **tetra** - four
penta - five
hexa - six
hepta - seven
octa - eight
nona - nine
deca - ten

Abbreviations

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

MEASUREMENT FACTS (4)

3D shapes - Formulae

Name	Shape	Volume
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

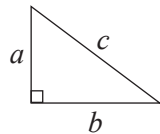
V volume

B base area

C circumference

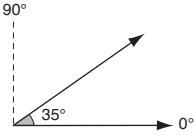
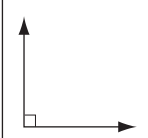
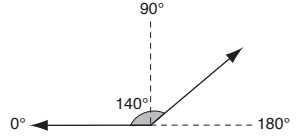
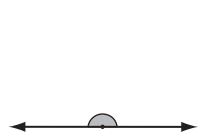
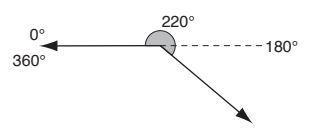
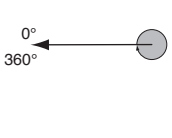
Pythagorean theorem

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



GEOMETRY FACTS

Angle Types

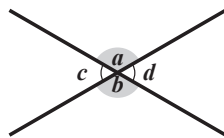
Acute $< 90^\circ$	Right 90°	Obtuse more than 90° less than 180°	Straight 180°	Reflex more than 180° less than 360°	Revolution 360°
					

Properties of angles

Vertically Opposite Angles

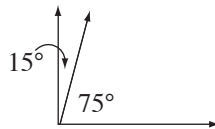
Are equal

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



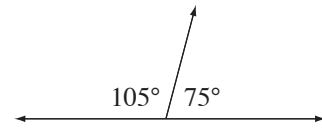
Complementary Angles

Add to 90°



Supplementary Angles

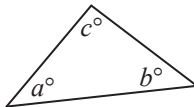
Add to 180°



Properties of angles in a triangle

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

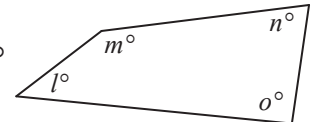
$$a^\circ + b^\circ + c^\circ = 180^\circ$$



Properties of angles in a quadrilateral

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

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



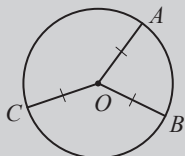
Triangle types

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
one right angle	right
one obtuse angle	obtuse

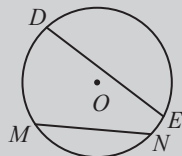
Properties of circles

Radius - joins the center with any point on the circle

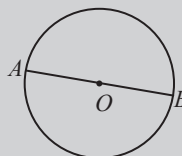


$$OA = OB = OC$$

Chord - joins any two points on the circle

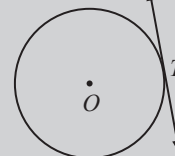


Diameter - a chord passing through the center



$$AB = 2OA$$

Tangent - a line touching the circle in one point



Circumference - the distance around the circle

