Basic Algebra

Algebraic Transposition

$$a+b=c \quad a=c-b \quad b=c-a \quad a+b-c=0$$

$$\frac{a}{b}=\frac{c}{d} \quad ad=bc \quad a=\frac{bc}{d} \quad c=\frac{ad}{b} \quad b=\frac{ad}{c} \quad d=\frac{bc}{a}$$

$$a=\frac{b}{c} \quad b=ac \quad c=\frac{b}{a}$$

Quadratic Equation

$$x=\frac{-b\pm\sqrt{b^2-4ac}}{2a}$$

Exponents & Logarithms

Laws of Exponent

$$\left(\frac{a}{b}\right)^x=\frac{a^x}{b^x} \quad \frac{a^x}{a^y}=a^{x-y} \quad \frac{1}{a^x}=a^{-x}$$

$$\left(a^x\right)\left(a^y\right)=a^{x+y} \quad \left(a^x\right)^y=a^{xy} \quad a^{\frac{x}{y}}=\sqrt[y]{a^x}$$

Laws of Logarithm

$$y=\log_b x, \quad b^y=x$$

$$\log_b b=1 \quad \log_b 1=0 \quad \log_b b^x=x$$

$$\log_b\left(x^r\right)=r\log_b x$$
$$\log_b(xy)=\log_b x+\log_b y$$
$$\log_b\left(\frac{x}{y}\right)=\log_b x-\log_b y$$

Decibel Table

dB	Power Ratio	V/I Ratio	dB	Power Ratio	V/I Ratio
0	1.00	1.00	**10**	10	3.2
0.5	1.12	1.06	**15**	31.6	5.6
1	1.26	1.12	**20**	100	10
2	1.58	1.26	**30**	1k	32
3	2.00	1.41	**40**	10k	100
4	2.51	1.58	**50**	10^5	316
5	3.16	1.78	**60**	10^6	1k
6	3.98	2.00	**70**	10^7	3.16k
7	5.01	2.24	**80**	10^8	10k
8	6.31	2.51	**90**	10^9	31.6k
9	7.94	2.82	**100**	10^{10}	10^5

Common Conversions

Metric to Metric

$x10^6$	mega-	Length: meter (m)
$x10^3$	kilo-	
$x10^2$	hecto-	Area: meter^2 (m^2)
$x10^1$	deka-	
$x10^0$	base + unit	Volume: liter (L) meter^3 (m^3)
$x10^{-1}$	deci-	
$x10^{-2}$	centi-	
$x10^{-3}$	milli-	Mass: gram (g)
$x10^{-6}$	micro-	

English to Metric/English

Length
1 in = 2.54 cm
1 ft = 12 in

Area
1 ft^2 =144 in^2
1 acre = 43,560 ft^2

Mass
1 lb = 454 g
1 lb = 16 oz

Volume
1 ft^3 = 1728 in^2
1 yd^3 = 27 ft^3

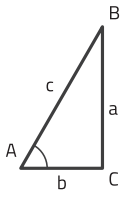
Abbrev: inch (in), feet (ft), pound (lb), yard (yd), ounce (oz)

Trigonometry

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

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

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



$$\csc A=\frac{1}{\sin A} \quad \sec A=\frac{1}{\cos A} \quad \cot A=\frac{1}{\tan A}$$

Boolean Algebra

Basic Rules

$$A+0=A \quad A+1=1 \quad A+A=A \quad A+\bar{A}=1$$

$$A\cdot 0=0 \quad A\cdot 1=A \quad A\cdot A=A \quad A\cdot\bar{A}=0$$

$$\bar{\bar{A}}=A \quad A+AB=A \quad A+\bar{A}B=A+B$$

$$(A+B)(A+C)=A+BC$$

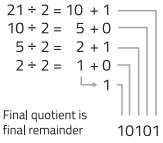
De Morgan's

$$\overline{(AB)}=(\bar{A}+\bar{B}) \quad \overline{(A+B)}=(\bar{A}\bar{B})$$

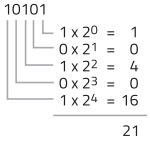
Number System Equivalent

Decimal	Binary	Octal	Hex.
0	0	0	0
1	1	1	1
2	10	2	2
3	11	3	3
4	100	4	4
5	101	5	5
6	110	6	6
7	111	7	7
8	1000	10	8
9	1001	11	9
10	1010	12	A
11	1011	13	B
12	1100	14	C
13	1101	15	D
14	1110	16	E
15	1111	17	F
16	1 0000	20	10
17	1 0001	21	11
18	1 0010	22	12
19	1 0011	23	13
20	1 0100	24	14
32	10 0000	40	20
64	100 0000	100	40
96	110 0000	140	60
99	110 0011	143	63

Decimal to Binary



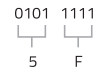
Binary to Decimal



Binary, Octal & Hex

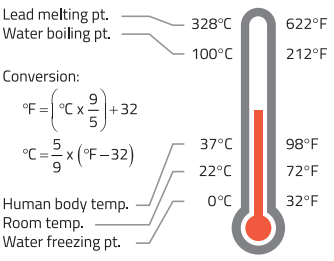
Group binary to 3 to convert to Octal

Group binary to 4 to convert to Hex



Convert back by doing the reverse (ungrouping).

Temperature



Math Formulas and Constants

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VISUAL REFERENCE for MAKERS & LEARNERS