

Some Electric Circuits Constants

Important constants and Tables

Electric charge: Fundamental property of sub-atomic particles.

Positive charge: Proton

Negative charge: Electron

No charge: Neutron

Like charges repel & opposite charges attract.

Unit of charge coulomb

The SI prefixes.

Factor	Name	Symbol	Factor	Name	Symbol
10^{-24}	yocto	y	10^{24}	yotta	Y
10^{-21}	zepto	z	10^{21}	zetta	Z
10^{-18}	atto	a	10^{18}	exa	E
10^{-15}	femto	f	10^{15}	peta	P
10^{-12}	pico	p	10^{12}	tera	T
10^{-9}	nano	n	10^9	giga	G
10^{-6}	micro	μ	10^6	mega	M
10^{-3}	milli	m	10^3	kilo	k
10^{-2}	centi	c	10^2	hecto	h
10^{-1}	deci	d	10^1	deka	da

Powers of Ten

$$\frac{1}{10^n} = 10^{-n} \quad \frac{1}{10^{-n}} = 10^n$$

$$\frac{1}{1000} = \frac{1}{10^{+3}} = 10^{-3}$$

$$\frac{1}{0.00001} = \frac{1}{10^{-5}} = 10^{+5}$$

$$(10^n)(10^m) = 10^{(n+m)}$$

$$(1000)(10,000) = (10^3)(10^4) = 10^{(3+4)} = 10^7$$

$$(0.00001)(100) = (10^{-5})(10^2) = 10^{(-5+2)} = 10^{-3}$$

$$\frac{10^n}{10^m} = 10^{(n-m)}$$

$$\frac{100,000}{100} = \frac{10^5}{10^2} = 10^{(5-2)} = 10^3$$

$$\frac{1000}{0.0001} = \frac{10^3}{10^{-4}} = 10^{(3-(-4))} = 10^{(3+4)} = 10^7$$

$$(10^n)^m = 10^{(nm)}$$

$$(100)^4 = (10^2)^4 = 10^{(2)(4)} = 10^8$$

$$(1000)^{-2} = (10^3)^{-2} = 10^{(3)(-2)} = 10^{-6}$$

$$(0.01)^{-3} = (10^{-2})^{-3} = 10^{(-2)(-3)} = 10^6$$

$$A \times 10^n \pm B \times 10^n = (A \pm B) \times 10^n$$

$$6300 + 75,000 = (6.3)(1000) + (75)(1000)$$

$$= 6.3 \times 10^3 + 75 \times 10^3$$

$$= (6.3 + 75) \times 10^3$$

$$= 81.3 \times 10^3$$

$$0.00096 - 0.000086 = (96)(0.00001) - (8.6)(0.00001)$$

$$= 96 \times 10^{-5} - 8.6 \times 10^{-5}$$

$$= (96 - 8.6) \times 10^{-5}$$

$$= 87.4 \times 10^{-5}$$

$$(A \times 10^n)(B \times 10^m) = (A)(B) \times 10^{n+m}$$

$$(0.0002)(0.000007) = [(2)(0.0001)][(7)(0.000001)]$$

$$= (2 \times 10^{-4})(7 \times 10^{-6})$$

$$= (2)(7) \times (10^{-4})(10^{-6})$$

$$= 14 \times 10^{-10}$$

$$(340,000)(0.00061) = (3.4 \times 10^5)(61 \times 10^{-5})$$

$$= (3.4)(61) \times (10^5)(10^{-5})$$

$$= 207.4 \times 10^0$$

$$= 207.4$$

$$\frac{A \times 10^n}{B \times 10^m} = \frac{A}{B} \times 10^{n-m}$$

$$\frac{0.00047}{0.002} = \frac{47 \times 10^{-5}}{2 \times 10^{-3}} = \left(\frac{47}{2}\right) \times \left(\frac{10^{-5}}{10^{-3}}\right)$$

$$= 23.5 \times 10^{-2}$$

$$\frac{690,000}{0.00000013} = \frac{69 \times 10^4}{13 \times 10^{-8}} = \left(\frac{69}{13}\right) \times \left(\frac{10^4}{10^{-8}}\right)$$

$$= 5.31 \times 10^{12}$$

$$(A \times 10^n)^m = A^m \times 10^{nm}$$

$$(0.00003)^3 = (3 \times 10^{-5})^3 = (3)^3 \times (10^{-5})^3$$

$$= 27 \times 10^{-15}$$

$$(90,800,000)^2 = (9.08 \times 10^7)^2 = (9.08)^2 \times (10^7)^2$$

$$= 82.4464 \times 10^{14}$$

$$(10^3)(10^3) \neq (10^3)^3$$

$$(10^3)(10^3) = 10^6 = 1,000,000$$

$$(10^3)^3 = (10^3)(10^3)(10^3) = 10^9 = 1,000,000,000$$



Standard of Electrical Units

Parameter	Symbol	Measuring Unit	Description
Voltage	Volt	V or E	Unit of Electrical Potential $V = I \times R$
Current	Ampere	I or i	Unit of Electrical Current $I = V \div R$
Resistance	Ohm	R or Ω	Unit of DC Resistance $R = V \div I$
Conductance	Siemen	G or $\mathcal{U}$	Reciprocal of Resistance $G = 1 \div R$
Capacitance	Farad	C	Unit of Capacitance $C = Q \div V$
Charge	Coulomb	Q	Unit of Electrical Charge $Q = C \times V$
Inductance	Henry	L or H	Unit of Inductance $V_L = -L(di/dt)$
Power	Watts	W	Unit of Power $P = V \times I$
Impedance	Ohm	Z	Unit of AC Resistance $Z^2 = R^2 + X^2$
Frequency	Hertz	Hz	Unit of Frequency $f = 1 \div T$

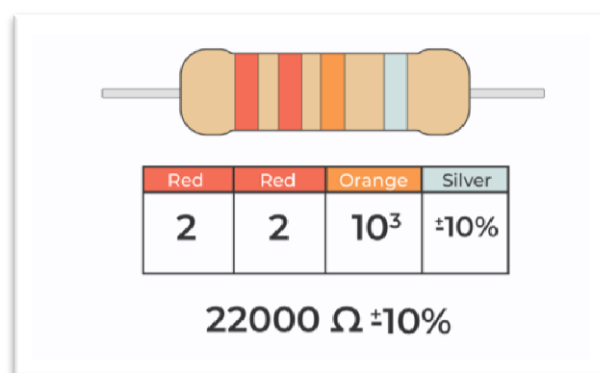
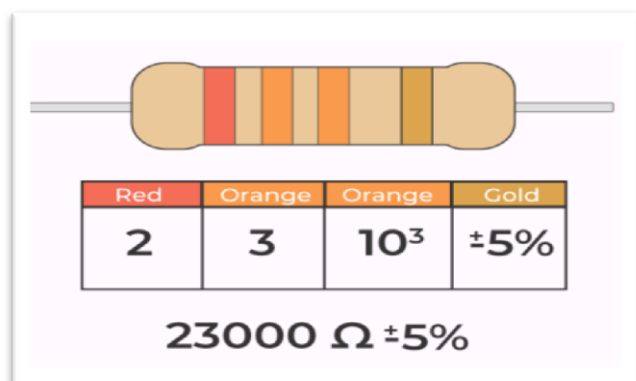
Mass of Electron, Proton, Neutron, Charge in G, KG, MEV, AMU

Particle	Relative Mass	Relative Charge	Charge / C	Mass / kg
Protons	1	+ 1	+ 1.6×10^{-19}	1.67×10^{-27}
Neutrons	1	neutral	0	1.67×10^{-27}
Electrons	0.0005	- 1	- 1.6×10^{-19}	9.11×10^{-31}

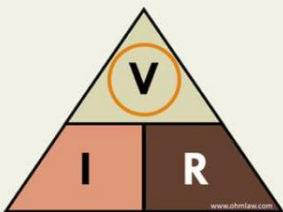
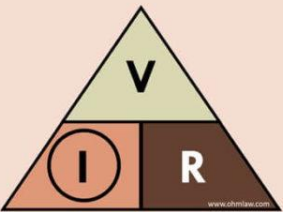
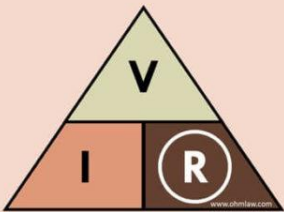
Resistivity and Temperature Coefficients

<i>Material</i>	<i>Resistivity in ohm-metre at 20°C ($\times 10^{-8}$)</i>	<i>Temperature coefficient at 20°C ($\times 10^{-4}$)</i>
Aluminium, commercial	2.8	40.3
Brass	6 – 8	20
Carbon	3000 – 7000	–5
Constantan or Eureka	49	+0.1 to –0.4
Copper (annealed)	1.72	39.3
German Silver (84% Cu; 12% Ni; 4% Zn)	20.2	2.7
Gold	2.44	36.5
Iron	9.8	65
Manganin (84% Cu ; 12% Mn ; 4% Ni)	44 – 48	0.15
Mercury	95.8	8.9
Nichrome (60% Cu ; 25% Fe ; 15% Cr)	108.5	1.5
Nickel	7.8	54
Platinum	9 – 15.5	36.7
Silver	1.64	38
Tungsten	5.5	47
Amber	5×10^{14}	
Bakelite	10^{10}	
Glass	$10^{10} - 10^{12}$	
Mica	10^{15}	
Rubber	10^{16}	
Shellac	10^{14}	
Sulphur	10^{15}	

Resistor Colour Coding



Ohms Law Triangle

To Find Voltage	To find current	To find voltage
		
$V = IR$	$I = \frac{V}{R}$	$R = \frac{V}{I}$

Ohm's Law and Electric Power

