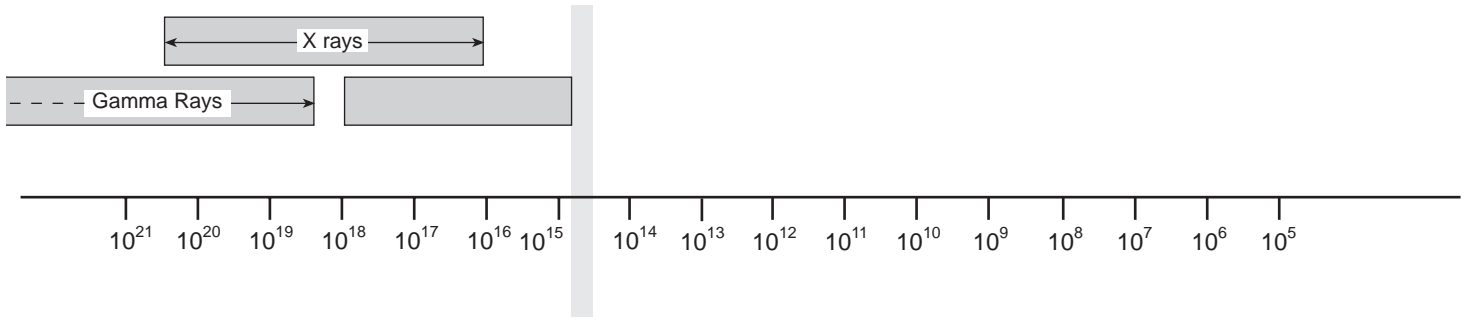


N	S	V
Universal gravitational constant	G	$6.67 \times 10^{-11} \text{ N}\cdot\text{m}^2/\text{kg}^2$
Acceleration due to gravity	g	9.81 m/s^2
Speed of light in a vacuum	c	$3.00 \times 10^8 \text{ m/s}$
Speed of sound in air at STP		$3.31 \times 10^2 \text{ m/s}$
Mass of Earth		$5.98 \times 10^{24} \text{ kg}$
Mass of the Moon		$7.35 \times 10^{22} \text{ kg}$
Mean radius of Earth		$6.37 \times 10^6 \text{ m}$
Mean radius of the Moon		$1.74 \times 10^6 \text{ m}$
Mean distance—Earth to the Moon		$3.84 \times 10^8 \text{ m}$
Mean distance—Earth to the Sun		$1.50 \times 10^{11} \text{ m}$
Electrostatic constant	k	$8.99 \times 10^9 \text{ N}\cdot\text{m}^2/\text{C}^2$
1 elementary charge	e	$1.60 \times 10^{-19} \text{ C}$
1 coulomb (C)		$6.25 \times 10^{18} \text{ elementary charges}$
1 electronvolt (eV)		$1.60 \times 10^{-19} \text{ J}$
Planck's constant	h	$6.63 \times 10^{-34} \text{ J}\cdot\text{s}$
1 universal mass unit (u)		$9.31 \times 10^2 \text{ MeV}$



$$F_e = \frac{kq_1q_2}{r^2}$$

$$E = \frac{F_e}{q}$$

$$= \frac{1}{q}$$

$$I = \frac{\Delta q}{t}$$

$$= \bar{I}$$

$$= \frac{\rho L}{A}$$

$$P = I^2 R = I^2 \frac{\rho L}{A}$$

$$= Pt = I^2 R t = \frac{I^2 \rho L t}{A}$$

Series Circuits

$$I = I_1 = I_2 = I_3 = \dots$$

$$= I_1 + I_2 + I_3 + \dots$$

$$\frac{1}{R_{eq}} = \frac{1}{R_1} + \frac{1}{R_2} + \frac{1}{R_3} + \dots$$

A = cross-sectional area

E = electric field strength

F_e = electrostatic force

I = current

k = electrostatic constant

L = length of conductor

P = electrical power

q = charge

R = resistance

R_{eq} = equivalent resistance

r = distance between centers

t = time

V = potential difference

W = work (electrical energy)

Δ = change

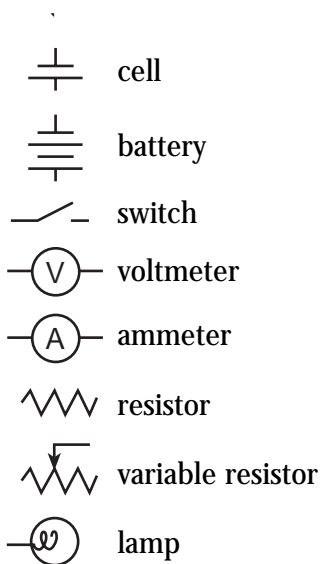
ρ = resistivity

Parallel Circuits

$$I = I_1 + I_2 + I_3 + \dots$$

$$= I_1 + I_2 + I_3 + \dots$$

$$\frac{1}{R_{eq}} = \frac{1}{R_1} + \frac{1}{R_2} + \frac{1}{R_3} + \dots$$



20	
Material	Resistivity (Ω·m)
Aluminum	2.82×10^{-8}
Copper	1.72×10^{-8}
Gold	2.44×10^{-8}
Nichrome	$150. \times 10^{-8}$
Silver	1.59×10^{-8}
Tungsten	5.60×10^{-8}

$$= f \lambda$$

$$T =$$

$$\theta_i = \theta_r$$

$$=$$

$$n_1 \sin \theta_1 = n_2 \sin \theta_2$$

$$= \quad =$$

$$E_{\text{refl}} = E_i - E_t$$

$$E_{\text{refl}} = E_i - E_t$$

$$E = n^2 c^2$$

$$\bar{v} = \frac{\Delta d}{t}$$

$$a = \frac{\Delta v}{t}$$

$$v_f = v_i + at$$

$$\Delta d = v_i t + \frac{1}{2} at^2$$

$$v_f^2 = v_i^2 + 2a\Delta d$$

$$A_y = A \sin \theta$$

$$A_x = A \cos \theta$$

$$a = \frac{F_{\text{net}}}{m}$$

$$F_f = \mu F_N$$

$$F_g = \frac{G m_1 m_2}{r^2}$$

$$g = \frac{F_g}{m}$$

$$v_f = v_i$$

$$v_f r = v_i r$$

$$J = F_{\text{net}} t = \Delta p$$

$$F = kx$$

$$PE = \frac{1}{2} kx^2$$

$$F_c = ma_c$$

$$a_c = \frac{v^2}{r}$$

$$\Delta PE = m g \Delta h$$

$$KE = \frac{1}{2} m v^2$$

$$= F \Delta d = \Delta E_T$$

$$E_T = PE + KE + Q$$

$$P = \frac{W}{t} = \frac{F \Delta d}{t} = F \bar{v}$$

a = acceleration

a_c = centripetal acceleration

A = any vector quantity

Δd = displacement or distance

E_T = total energy

F = force

F_c = centripetal force

F_f = force of friction

F_g = weight or force due to gravity

F_N = normal force

F_{net} = net force

F = force on a spring

g = acceleration due to gravity or gravitational field strength

G = universal gravitational constant

h = height

J = impulse

k = spring constant

KE = kinetic energy

m = mass

p = momentum

P = power

PE = potential energy

PE = potential energy stored in a spring

Q = internal energy

r = radius or distance between centers

t = time interval

v = velocity or speed

\bar{v} = average velocity or average speed

W = work

x = change in spring length from the equilibrium position

Δ = change

θ = angle

μ = coefficient of friction