

# Physics Reference Tables

Physical Constant	Symbol	Value
Acceleration due to gravity on Earth	$g$	9.8 m/s/s
Coulomb's law constant	$k$	$9.0 \times 10^9 \frac{\text{Nm}^2}{\text{C}^2}$
Elementary charge	$e$	$1.6 \times 10^{-19} \text{ C}$
Electron rest mass	$m_e$	$9.11 \times 10^{-31} \text{ kg}$
Gravitational constant	$G$	$6.67 \times 10^{-11} \frac{\text{Nm}^2}{\text{kg}^2}$
Proton rest mass	$m_p$	$1.67 \times 10^{-27} \text{ kg}$
Speed of light in a vacuum	$c$	$3.00 \times 10^8 \text{ m/s}$
Speed of sound in air at STP		331 m/s

<b>The Index of Refraction for Common Substances</b>	
Air	1.00
Alcohol	1.36
Corn Oil	1.47
Diamond	2.42
Glass, Crown	1.52
Glass, Flint	1.61
Glycerol	1.47
Quartz, Fused	1.46
Water	1.33

## Mechanics

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

$v$  = velocity

$$x_f = x_i + vt$$

$t$  = time

$x$  = position

$$x_f = x_i + v_i t + \frac{1}{2} a t^2$$

$a$  = uniform  
acceleration

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

$F$  = force

$m$  = mass

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

$F_g$  = weight

$$F = ma$$

$g$  = acceleration due to  
gravity on Earth

$$F_g = mg$$

$G$  = gravitational  
constant

$$F = \frac{Gm_1m_2}{d^2}$$

$d$  = distance between  
centers of mass

$$F\Delta t = \Delta p = m\Delta v$$

$p$  = momentum

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

$a_c$  = centripetal  
acceleration

$$F_c = \frac{mv^2}{r}$$

$F_c$  = centripetal force

$r$  = radius

## Energy

$$W = F\Delta x$$

$W$  = work

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

$F$  = force

$x$  = position

$$PE_g = mgh$$

$P$  = power

$t$  = time

$$KE = \frac{1}{2}mv^2$$

$v$  = velocity

$$F = -kx$$

$PE_g$  = gravitational  
potential energy

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

$m$  = mass

$h$  = height

$KE$  = kinetic energy

$k$  = spring constant

$PE_s$  = potential energy  
stored in a spring

## Electricity

$$F = \frac{kq_1q_2}{d^2}$$

$$V = IR$$

$$P = VI = I^2R = \frac{V^2}{R}$$

$F$  = force

$k$  = Coulomb's law constant

$q$  = charge

$d$  = distance between centers

$V$  = electrical potential difference

$I$  = current

$R$  = resistance

$P$  = power

### Series Circuits

$$I_t = I_1 = I_2 = I_3 = \dots$$

$$V_t = V_1 + V_2 + V_3 + \dots$$

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

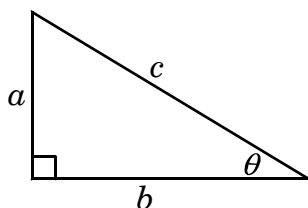
### Parallel Circuits

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

$$V_t = V_1 = V_2 = V_3 = \dots$$

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

## Mathematical Formulas



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

$$\sin \theta = \frac{a}{c}$$

$$\cos \theta = \frac{b}{c}$$

$$\tan \theta = \frac{a}{b}$$

Circumference of a circle =  $2\pi r$

Area of a rectangle = length  $\times$  width

Area of a triangle =  $\frac{1}{2}$  base  $\times$  height

## Wave Phenomena

$$T = \frac{1}{f}$$

$$v = f\lambda$$

$$n = \frac{c}{v}$$

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

$$\sin \theta_c = \frac{n_2}{n_1}$$

$$n_1 v_1 = n_2 v_2$$

$T$  = period

$f$  = frequency

$v$  = speed

$\lambda$  = wavelength

$n$  = index of refraction

$c$  = speed of light in a vacuum

$\theta$  = angle

$\theta_c$  = critical angle of incidence

# Electromagnetic Spectrum

(measurement in meters)

