Kinematics

$$\vec{v} = \frac{\Delta \vec{d}}{\Delta t} \qquad \vec{d} = \vec{v}_f t - \frac{1}{2}\vec{a}t^2$$

$$\vec{a} = \frac{\Delta \vec{v}}{\Delta t} \qquad \vec{d} = \left(\frac{\vec{v}_f + \vec{v}_i}{2}\right)t$$

$$\vec{d} = \vec{v}_i t + \frac{1}{2}\vec{a}t^2 \qquad \vec{v}_f{}^2 = \vec{v}_i{}^2 + 2\vec{a}\vec{d}$$

$$\vec{v}_c = \frac{2\pi r}{T} \qquad |\vec{a}_c| = \frac{\vec{v}^2}{r} = \frac{4\pi^2 r}{T^2}$$

Dynamics

$$\vec{a} = \frac{\vec{F}_{net}}{m} \qquad |F_g| = \frac{G m_1 m_2}{r^2}$$

$$|\vec{F}_f| = \mu\,|\vec{F}_N| \qquad |\vec{g}| = \frac{G m_1}{r^2}$$

$$\vec{F}_s = -k\vec{x} \qquad \vec{g} = \frac{\vec{F}_g}{m}$$

Energy

$$W = \vec{F}\,\vec{d}\cos\theta \qquad E_k = \frac{1}{2}mv^2$$

$$W = \Delta E \qquad E_p = mgh$$

$$P = \frac{W}{t} \qquad E_p = \frac{1}{2}kx^2$$

Waves and Simple Harmonic Motion

$$T = 2\pi\sqrt{\frac{m}{k}} \qquad v_{max} = A\sqrt{\frac{k}{m}}$$

$$T = 2\pi\sqrt{\frac{l}{g}} \qquad f = \left(\frac{v}{v \pm v_s}\right)f_s$$

$$T = \frac{1}{f} \qquad v = f\lambda$$

Constants

Acceleration Due to Gravity **or**
Gravitational Field Near Earth..... $|a_g| = 9.81$ m/s^2 or 9.81 N/kg

Gravitational Constant..... G = 6.67 x 10^{-11} N▪m^2/kg^2

Radius of Earth..... r_e = 6.37 x 10^6 m

Mass of Earth..... M_e = 5.98 x 10^{24} kg

Speed of Light in Vacuum..... c = 3.00 x 10^8 m/s

Mass of an Alpha Particle..... m_α = 6.65 x 10^{-27} kg

Mass of an Electron..... m_e = 9.11 x 10^{-31} kg

Mass of a Proton..... m_p = 1.67 x 10^{-27} kg

Mass of a Neutron..... m_n = 1.67 x 10^{-27} kg

Physics Principles

Uniform motion (balanced forces)
Uniformly accelerated motion (unbalanced forces)
Circular motion (unbalanced forces)
Work-energy theorem
Conservation of energy

Trigonometry and Geometry

$$\sin\theta = \frac{opposite}{hypotenuse} \qquad \frac{a}{\sin A} = \frac{b}{\sin B} = \frac{c}{\sin C}$$

$$\cos\theta = \frac{adjacent}{hypotenuse} \qquad c^2 = a^2 + b^2 - 2ab\cos\theta$$

$$\tan\theta = \frac{opposite}{adjacent} \qquad c^2 = a^2 + b^2 \qquad slope = \frac{\Delta y}{\Delta x}$$

Area
Rectangle = $l\,w$
Triangle = ½ ab
Circle = πr^2

Circumference
Circle = $2\pi r$

Prefixes Used With SI Units

Prefix	Symbol	Exponential Value
atto	a	10^{-18}
femto	f	10^{-15}
pico	p	10^{-12}
nano	n	10^{-9}
micro	μ	10^{-6}
milli	m	10^{-3}
centi	c	10^{-2}
deci	d	10^{-1}

Prefix	Symbol	Exponential Value
tera	T	10^{12}
giga	G	10^9
mega	M	10^6
kilo	k	10^3
hecto	h	10^2
deka	da	10^1