

PHYSICS DATA SHEET

Useful Constants

Acceleration due to gravity	$a_g = 9.81 \text{ m/s}^2$
Gravitational constant	$G = 6.67 \times 10^{-11} \frac{\text{N}\cdot\text{m}^2}{\text{kg}^2}$
Mass of the Earth	$M_E = 5.98 \times 10^{24} \text{ kg}$
Radius of the Earth.....	$R_E = 6.37 \times 10^6 \text{ m}$
Speed of Light in Vacuum	$c = 3.00 \times 10^8 \text{ m/s}$

Trigonometry and Geometry

$$\sin \theta = \frac{\textit{opposite}}{\textit{hypotenuse}}$$

$$\cos \theta = \frac{\textit{adjacent}}{\textit{hypotenuse}}$$

$$\tan \theta = \frac{\textit{opposite}}{\textit{adjacent}}$$

$$\frac{a}{\sin A} = \frac{b}{\sin B} = \frac{c}{\sin C}$$

$$c^2 = a^2 + b^2 - 2ab \cos C$$

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

Slope

$$m = \frac{\Delta y}{\Delta x}$$

Area

$$\text{Rectangle} = lw$$

$$\text{Triangle} = \frac{1}{2} ab$$

$$\text{Circle} = \pi r^2$$

$$\text{Sphere} = 4\pi r^2$$

Circumference

$$\text{Circle} = 2\pi r$$

Prefixes Used With SI Units

Exponential

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

EQUATIONS

Kinematics

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

$$\bar{a} = \frac{\vec{v}_f - \vec{v}_i}{\Delta t}$$

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

$$\Delta \vec{d} = \frac{\vec{v}_i + \vec{v}_f}{2} \Delta t$$

$$\vec{v}_f^2 = \vec{v}_i^2 + 2 \bar{a} \Delta \vec{d}$$

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

Dynamics

$$\bar{a} = \frac{\vec{F}_{net}}{m}$$

$$F_f = \mu F_N$$

$$\vec{F}_s = -k\vec{x}$$

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

$$a_g = G \frac{m_1}{r^2}$$

$$\vec{F}_g = m\vec{g}$$

Circular Motion

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

$$F_c = \frac{4\pi^2 m r}{T^2}$$

$$v = \frac{2\pi r}{T}$$

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

$$a_c = \frac{4\pi^2 r}{T^2}$$

Waves

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

$$v = f \lambda$$

$$L = \frac{(2n-1)\lambda}{4}$$

$$f_o = f_s \left(\frac{v}{v \mp v_s} \right)$$

$$T = 2\pi \sqrt{\frac{l}{g}}$$

$$\frac{\sin \theta_1}{\sin \theta_2} = \frac{\lambda_1}{\lambda_2} = \frac{v_1}{v_2}$$

$$L = \frac{n\lambda}{2}$$

$$f_o = f_s \left(\frac{v \pm v_o}{v} \right)$$

$$T = 2\pi \sqrt{\frac{m}{k}}$$

Energy

$$W = F \Delta d \cos \theta$$

$$W = \Delta E$$

$$P = \frac{W}{t}$$

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

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

$$E_p = mgh$$