

$$F_G = G \frac{m_1 m_2}{r^2} \qquad F_e = k \frac{|q_1||q_2|}{r^2} \qquad a_c = \frac{v^2}{r}$$

$$F_{net} = ma \qquad E = mc^2 \qquad KE = \frac{1}{2}mv^2$$

$$PE_G = mgh \qquad W = Fd \qquad \text{watts} = \frac{\text{joules}}{\text{second}}$$

$$I = \left(\frac{1}{R}\right)V \qquad \text{amperes} = \frac{\text{coulombs}}{\text{second}} \qquad \text{volts} = \frac{\text{joules}}{\text{coulomb}}$$

$$B = \left(\frac{2k}{c^2}\right)\left(\frac{I}{r}\right) \qquad F_{mag} = |q|vB \qquad \text{teslas} = \frac{\text{newtons/coulomb}}{\text{meters/second}}$$

$$\text{Hertz} = \frac{\text{cycles}}{\text{second}} \qquad f = \frac{E}{h}$$

### Physical Constants

Quantity	Approximate Value
acceleration due to gravity	$g=9.8 \text{ m/s}^2$
Gravitation constant	$G=6.67 \times 10^{-11} \text{ N}\cdot\text{m}^2/\text{kg}^2$
Earth radius (mean)	$6.38 \times 10^6 \text{ m}$
Earth mass	$5.97 \times 10^{24} \text{ kg}$
mean Earth-Sun distance	$1.50 \times 10^{11} \text{ m}$
mean Earth-Moon distance	$3.84 \times 10^8 \text{ m}$
fundamental charge	$1.60 \times 10^{-19} \text{ C}$
Coulomb's constant	$k=9.00 \times 10^9 \text{ N}\cdot\text{m}^2/\text{C}^2$
electron rest mass	$9.11 \times 10^{-31} \text{ kg}$
proton rest mass	$1.6726 \times 10^{-27} \text{ kg}$
neutron rest mass	$1.6750 \times 10^{-27} \text{ kg}$
Bohr radius	$5.29 \times 10^{-11} \text{ m}$
Avogadro's number	$6.022045 \times 10^{23} \text{ molecules/mole}$
Planck's constant	$6.62 \times 10^{-34} \text{ J}\cdot\text{s/cycle}$
speed of light (vacuum)	$3.00 \times 10^8 \text{ m/s}$
pi	$\pi=3.1415926536$

### Metric Prefixes

Prefix	Symbol	Meaning	Multiplier
exa-	E	quintillion	$10^{18}$
peta-	P	quadrillion	$10^{15}$
tera-	T	trillion	$10^{12}$
giga-	G	billion	$10^9$
mega-	M	million	$10^6$
kilo-	k	thousand	$10^3$
hecto-	h	hundred	$10^2$
deka-	da	ten	$10^1$
		one	$10^0$
deci-	d	one-tenth	$10^{-1}$
centi-	c	one-hundredth	$10^{-2}$
milli-	m	one-thousandth	$10^{-3}$
micro-	$\mu$	one-millionth	$10^{-6}$
nano-	n	one-billionth	$10^{-9}$
pico-	p	one-trillionth	$10^{-12}$
femto-	f	one-quadrillionth	$10^{-15}$
atto-	a	one-quintillionth	$10^{-18}$