Foundation Physics Formula Sheet

Physical Constants

Acceleration due to gravity	$g = 9.81\ \mathrm{m \cdot s^{-2}}$
Speed of light in free space	$c = 3.00 \times 10^{8}\ \mathrm{m \cdot s^{-1}}$
Permittivity of free space	$\varepsilon_0 = 8.85 \times 10^{-12}\ \mathrm{F \cdot m^{-1}}$
Coulomb's Constant	$k = 8.99 \times 10^{9}\ \mathrm{m \cdot F^{-1}}$
Permeability of free space	$\mu_0 = 4\pi \times 10^{-7}\ \mathrm{H \cdot m^{-1}}$
Charge of an electron	$e = -1.60 \times 10^{-19}\ \mathrm{C}$
Mass of an electron	$m_e = 9.11 \times 10^{-31}\ \mathrm{kg}$
Mass of a proton	$m_p = 1.67 \times 10^{-27}\ \mathrm{kg}$
Density of water	$\rho_w = 997\ \mathrm{kg \cdot m^{-3}}$

Formulae

Impulse	$J = F\Delta t = \Delta mv$
Hooke's law	$F = -kx$
Elastic potential energy	$U_E = \frac{1}{2}kx^2$
Centripetal acceleration	$a = \frac{v^2}{r}$
Angular velocity	$\omega = \frac{v}{r}$
Time period of simple harmonic motion	$T = 2\pi\sqrt{\frac{m}{k}} = 2\pi\sqrt{\frac{l}{g}}$
Hydrostatic pressure	$p = \rho gh$
Bernoulli equation	$\frac{1}{2}\rho {v_1}^2 + \rho g y_1 + p_1 = \frac{1}{2}\rho {v_2}^2 + \rho g y_2 + p_2$

Coulomb's law	$F = \frac{kQ_1Q_2}{r^2}$
Gauss's Law	$\Phi_E = \oint EdA = \frac{Q_{encl}}{\varepsilon_0}$
Electric Potential	$V = Ed$
Electric potential energy	$U_E = qV$
Charging capacitor	$V = V_o\left(1 - e^{-\frac{t}{RC}}\right)$
Magnetic force	$F = BILsin\theta = qvBsin\theta$
Magnetic field of a straight wire	$B = \frac{\mu_0 I}{2\pi r}$
Magnetic field of a solenoid	$B = \frac{N\mu_0 I}{L}$
Magnetic Flux	$\Phi_M = BAcos\theta$
Faraday's law	$\varepsilon = -N\frac{d\Phi_M}{dt}$