

PHYSICS 11 EQUATIONS

KINEMATICS

$$v_{ave} = \frac{\Delta d}{\Delta t} \quad a = \frac{\Delta v}{\Delta t} \quad d = \frac{1}{2}(v_f + v_o) \times t \quad d = v_o t + \frac{1}{2} a t^2 \quad v_f = v_o + a t$$
$$v_f^2 = v_o^2 + 2 a d$$

FORCES

$$F_g = mg \quad F_g = \frac{G m_1 m_2}{r^2} \quad F_e = kx \quad F_{net} = ma \quad F_f = \mu F_N$$

MOMENTUM

$$p = mv \quad I = \Delta p = m \Delta v = F \Delta t$$

WORK, POWER, ENERGY

$$E_p = mg \Delta h \quad E_k = \frac{1}{2} m v^2 \quad E_h = mc \Delta T \quad Eff = \frac{useful \text{ - } out}{total \text{ - } input} \times 100\% \quad W = Fd \quad P = \frac{w}{t}$$
$$W = \Delta E$$

RELATIVITY

$$E = mc^2 \quad m = \frac{m_o}{\sqrt{1 - \frac{v^2}{c^2}}} \quad t = \frac{t_o}{\sqrt{1 - \frac{v^2}{c^2}}}$$
$$L = L_o \sqrt{1 - \frac{v^2}{c^2}}$$

WAVES & OPTICS

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

$$M = \frac{h_i}{h_o} = - \frac{d_i}{d_o} \quad \frac{1}{f} = \frac{1}{d_o} + \frac{1}{d_i} \quad n_1 \sin \theta_1 = n_2 \sin \theta_2$$

$$n = \frac{v_{vacuum}}{v_{medium}}$$

SOUND WAVES

$$v_{sound} = (332 + .6T) \text{ m/s} \quad \text{Mach number} = \frac{v_{object}}{v_{sound}}$$

CONSTANTS

$$g = 9.8 \text{ m/s}^2$$

$$G = 6.67 \times 10^{-11} \text{ Nm}^2/\text{kg}^2$$

$$c = 3.00 \times 10^8 \text{ m/s}$$

$$m_e = 5.98 \times 10^{-24} \text{ kg}$$

$$r_e = 6.38 \times 10^6 \text{ m}$$

$$c_{\text{H}_2\text{O}} = 4200 \text{ J/kg C}$$

$$1 \text{ kWh} = 3.6 \times 10^6 \text{ J}$$

INDICES OF REFRACTION

Medium	<i>n</i>
Vacuum	1.00
Air	1.0003
Water	1.33
Ethanol	1.36
Crown Glass	1.52
Quartz	1.54
Flint Glass	1.61
Diamond	2.42