Formula Reference

1 General

slope: $m = \frac{\Delta y}{\Delta x} \rightarrow \Delta y = m\Delta x \rightarrow \Delta x = \frac{\Delta y}{m}$

line: $y = mx + b$, $b = yintercept$

circumference: $c = 2\pi r \rightarrow r = \frac{c}{2\pi}$

area: $a = \pi r^2 \rightarrow r = \sqrt{\frac{a}{\pi}}$

triangle area: $a = \frac{1}{2}bh \rightarrow h = \frac{2a}{b} \rightarrow b = \frac{2a}{h}$

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

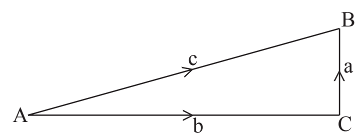
pendulum: $T = 2\pi\sqrt{\frac{L}{g}}$

2 Trigonometry

$\sin A = \frac{a}{c}$, $\cos A = \frac{b}{c}$

$a = c\sin\theta$, $b = c\cos\theta$

$a^2 = b^2 + c^2 - 2b\cos A$, $\frac{\sin C}{c} = \frac{\sin A}{a}$



3 Motion

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

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

instantaneous = slope of tangent

average = slope of connecting line

$v_{avg} = \frac{v_o + v_f}{2} \rightarrow v_o = 2v_{avg} - v_f \rightarrow v_f = 2v_{avg} - v_o$

$a = \frac{v_f - v_o}{t}$

$d = \frac{1}{2}at^2 \rightarrow t = \sqrt{\frac{2d}{a}} \rightarrow a = \frac{2d}{t^2}$

$v_f^2 = 2ad$

$v_f = at$

$d = v_o t + \frac{1}{2}at^2$

$v_f^2 = v_o^2 + 2ad$

$v_f = v_o + at$

4 Forces

$F = ma \rightarrow a = \frac{F}{m} \rightarrow m = \frac{F}{a}$

$\mu = \frac{F_f}{F_N} \rightarrow F_f = \mu F_N \rightarrow F_N = \frac{F_f}{\mu}$

$weight = mg \rightarrow m = \frac{weight}{g} \rightarrow g = weightm$

$g = 9.80\frac{m}{s^2}$ or $\frac{N}{kg}$

5 Gravitation

$F_1 r_1^2 = F_2 r_2^2$

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

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

6 Momentum

$p = mv \rightarrow m = \frac{p}{v} \rightarrow v = \frac{p}{m}$

Impulse: $Ft = \Delta(mv)$

$m_1 v_1 + m_2 v_2 = (m_1 + m_2)v_f$

$m_1 v_1 + m_2 v_2 = m_1 v_1' + m_2 v_2'$

$\frac{1}{2}m_1 v_1^2 + \frac{1}{2}m_2 v_2^2 = \frac{1}{2}m_1 v_1^{2\prime} + \frac{1}{2}m_2 v_2^{2\prime}$

7 Power

$work = Fd \rightarrow F = \frac{work}{d} \rightarrow d = \frac{work}{F}$

$power = \frac{Fd}{t}$

8 Energy Joules

$E_p = mgh \rightarrow h = \frac{E_p}{mg} \rightarrow m = \frac{E_p}{gh} \rightarrow g = \frac{E_p}{mh}$

$E_k = \frac{1}{2}mv^2 \rightarrow v = \sqrt{\frac{2E_k}{m}} \rightarrow m = \frac{2E_k}{v^2}$

$v = \sqrt{2gh} \rightarrow h = \frac{v^2}{2g} \rightarrow g = \frac{v^2}{2h}$

9 Heat

$\Delta E_h = mc(T_f - T_e)$

$C for H_2O = 4200 \frac{J}{kg^{\circ}C}$

10 Waves

In Hz $f = \frac{1}{T} \rightarrow T = \frac{1}{f}$

$\frac{\sin i}{\sin r} = \frac{v_x}{v_r} = \frac{\lambda_x}{\lambda_r}$, $f = constant$

$n_{max} = \frac{d}{\lambda}$

$\sin\theta_n = \frac{n_\theta}{d}$, anti-nodal lines, sources in phase

11 Light

$c = 299792458\frac{m}{s}, \approx 3.00 \times 10^8 \frac{m}{s}$

Snell's Law: $n = \frac{\sin 1}{\sin r}$, ENTERING dense medium

$n_1 \sin\theta_1 = n_2 \sin\theta_2$

$\sin(critical angle) = \frac{n_1}{n_2}$ n_1 must be $< n_2$

$\frac{h_i}{h_o} = \frac{d_i}{d_o} = magnification ratio$

$\frac{h_o}{h_i} = \frac{d_o}{d_i}$