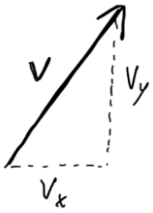
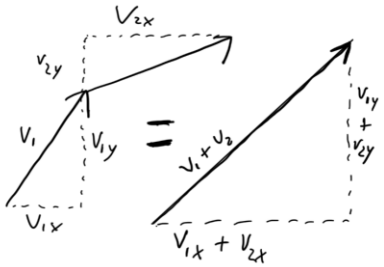
Physics 12 Formula Sheet

Vectors



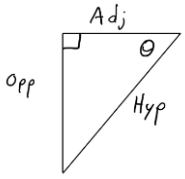


Right Angle Trig

$\sin\theta = \frac{Opp}{Hyp}$

$\cos\theta = \frac{Adj}{Hyp}$

$\tan\theta = \frac{Opp}{Adj}$



Sine Law

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

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

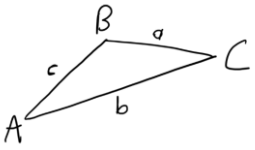
If finding an angle greater than 90° using sine law need to take

$180° - \theta_{ref}$

Cosine Law

$a^2 = b^2 + c^2 - 2bc \cdot \cos A$

$\cos A = \frac{a^2 - b^2 - c^2}{-2bc}$



Kinematics

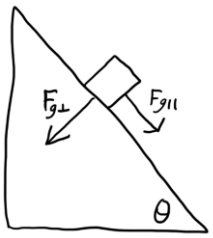
$\bar{v} = \frac{\Delta d}{\Delta t}$ $\quad d = \bar{v}t$ $\quad \bar{v} = \frac{v_f + v_0}{2}$ $\quad a = \frac{\Delta v}{\Delta t}$

$v_f^2 = v_0^2 + 2ad$ $\quad d = v_0 t + \frac{1}{2}at^2$ $\quad v_f = v_0 + at$

Forces

$F_{net} = ma$ $\quad F_{net} = winners - losers$ $\quad F_g = mg$ $\quad F_{fric} = \mu F_N$

Inclines



$F_{g||} = \sin\theta \times F_g$

$F_{g\perp} = \cos\theta \times F_g$

Energy

$W = Fd = \Delta E$ $\quad E_P = mgh$ $\quad E_k = \frac{1}{2}mv^2$

$P = \frac{W}{t} = F\bar{v}$ $\quad \text{Eff} = \frac{P_{out}}{P_{in}}$ or $\frac{W_{out}}{W_{in}}$ $\quad E_h = mc\Delta\text{T}$

Physics 12 Formula Sheet

Momentum

$$p = mv \qquad \Delta p = F_{net}t$$

Equilibrium

$$\tau = Fd \qquad \tau_{cc} = \tau_c$$

Circular Motion

$$C = 2\pi r \qquad v = \frac{2\pi r}{T} = 2\pi rf \qquad T = \frac{1}{f}$$

$$a_c = \frac{v^2}{r} = \frac{4\pi^2 r}{T^2} \qquad F_c = ma_c = \frac{mv^2}{r} = \frac{4\pi^2 rm}{T^2} \qquad f = \frac{1}{T}$$

Gravitation

$$F_g = mg = G\frac{m_1 m_2}{r^2} \qquad g = \frac{Gm}{r^2} \qquad E_p = -\frac{Gm_1 m_2}{r} \qquad G \approx 6.674 \times 10^{-11}\frac{N \cdot m^2}{kg^2}$$

Static Electricity

$$F_E = Eq = \frac{kq_1 q_2}{r^2} \qquad E = \frac{kq}{r^2} = \frac{F_E}{q} \qquad E_p = \frac{kq_1 q_2}{r} \qquad V = \frac{E_p}{q} = \frac{kq}{r} \qquad \Delta E_p = q\Delta V$$

$$k \approx 8.988 \times 10^9 \frac{N \cdot m^2}{C^2} \qquad 1\mu C = 10^{-6} C$$

Between plates: $E = \frac{\Delta V}{r}$

Electromagnetism

In solenoid: $B = \mu_0 In$ $\qquad n = \frac{N}{\ell}$ $\qquad \mu_o = 4\pi \times 10^{-7}$

Force on wire: $F_m = B \cdot I \cdot \ell \cdot sin\theta$

Force on moving object: $F_m = B \cdot q \cdot v \cdot sin\theta$

$\Phi = BA$ perpendicular to field $\qquad \varepsilon = N\frac{\Delta\Phi}{t}$ $\qquad \frac{\boldsymbol{V_p}}{V_s} = \frac{\boldsymbol{N_p}}{N_s} = \frac{I_s}{\boldsymbol{I_p}}$

Circuit Electricity

$$I = \frac{q}{t} \qquad V = IR \qquad P = IV = \frac{V^2}{R}$$

General

100 cm = 1m 1000 g = 1 kg 1000 m = 1 km 1T = 1000 mT $A_{circle} = \pi r^2$