

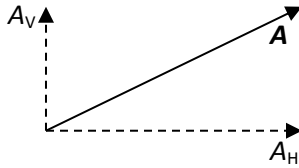
Physics 12 Formula Sheet

Vectors and scalars

$$A_H = A \cos \theta$$

$$A_V = A \sin \theta$$

$$\tau = rF \sin \theta$$



$$c^2 = a^2 + b^2 - 2ab \cos C$$

$$\sin A/a = \sin B/b$$

Mechanics

Motion

$$v = u + at$$

$$s = ut + (1/2)at^2$$

$$v^2 = u^2 + 2as$$

$$s = (1/2)(v + u)t$$

Forces

$$F = ma$$

$$F_f \leq \mu_s R$$

$$F_f = \mu_d R$$

Work, energy and power

$$W = Fs \cos \theta$$

$$E_k = (1/2)mv^2$$

$$E_p = (1/2)k\Delta x^2$$

$$\Delta E_p = mg\Delta h$$

$$\text{power} = Fv$$

$$\text{Efficiency} = W_{\text{out}}/W_{\text{in}} = P_{\text{out}}/P_{\text{in}}$$

Momentum and impulse

$$p = mv$$

$$F = \Delta p / \Delta t$$

$$E_k = p^2 / 2m$$

Electricity and magnetism

Electric fields

$$I = \Delta q / \Delta t$$

$$F = kq_1q_2/r^2$$

$$R = V/I$$

$$V = W/q$$

$$E = F/q$$

Electric currents

$$\Sigma V = 0 \text{ (loop)}$$

$$\Sigma I = 0 \text{ (junction)}$$

$$P = VI = I^2R = V^2/R$$

$$R_{\text{total}} = R_1 + R_2 + \dots$$

$$1/R_{\text{total}} = 1/R_1 + 1/R_2 + \dots$$

Electric cells

$$\varepsilon = I(R + r)$$

Magnetic effects

$$F = qvB \sin \theta$$

$$F = BIL \sin \theta$$

Circular motion and gravitation

Circular motion

$$v = \omega r$$

$$a = v^2/r = 4\pi^2 r/T^2$$

$$F = mv^2/r = m\omega^2 r$$

Newton's law of gravitation

$$F = GMm/r^2$$

$$g = F/m$$

$$g = GM/r^2$$

Fields

Describing fields

$$W = q\Delta V_e$$

$$W = m\Delta V_g$$

Fields at work

$$V_g = -GM/r;$$

$$g = -\Delta V_g / \Delta r;$$

$$E_p = mV_g = -GMm/r$$

$$F_G = Gm_1m_2/r^2$$

$$V_{\text{esc}} = \text{sqrt}(2GM/r)$$

$$V_{\text{orbit}} = \text{sqrt}(GM/r)$$

$$V_e = kq/r$$

$$E = -\Delta V_e / \Delta r$$

$$E_p = qV_e = kq_1q_2/r$$

$$F_E = kq_1q_2/r^2$$

Electromagnetic induction

Induction

$$\Phi = BA \cos \theta$$

$$\varepsilon = -N \Delta \Phi / \Delta t$$

$$\varepsilon = Bv\ell$$

Power generation

$$\varepsilon_p / \varepsilon_s = N_p / N_s = I_s / I_p$$