Physics 12 Formulae

Vector Kinematics in Two Dimensions

$$v = v_0 + at$$
$$\bar{v} = \frac{v + v_0}{2}$$
$$v^2 = v_0^2 + 2ad$$
$$d = v_0 t + \frac{1}{2}at^2$$

Vector Dynamics

$$F_{net} = ma$$
$$F_g = mg$$
$$F_f = \mu F_N$$
$$F_s = -kx$$

Gravitation

$$F_g = G\frac{m_1 m_2}{r^2}$$
$$E_p = -G\frac{m_1 m_2}{r}$$

Work, Energy, Power

$$W = Fd$$
$$E_p = mgh$$
$$P = \frac{W}{t}$$
$$E_k = \frac{1}{2}mv^2$$
$$E_s = \frac{1}{2}kx^2$$
$$e(\%) = efficiency = \frac{P_{out}}{P_{in}} \times 100\% = \frac{W_{out}}{W_{in}} \times 100\%$$

Momentum

$$p = mv$$
$$I = \Delta p = F\Delta t$$

Torque and Equilibrium

$$\tau = F_\perp d = Fd_\perp$$

Circular Motion

$$T = \frac{1}{f}$$
$$a_c = \frac{v^2}{r} = \frac{4\pi^2 r}{T^2} = 4\pi^2 r f^2$$

Electrostatics

$$F = k\frac{Q_1 Q_2}{r^2}$$
$$E = \frac{F}{Q}$$
$$E = \frac{kQ}{r^2}$$
$$\Delta V = \frac{\Delta E_P}{Q}$$
$$E = \frac{\Delta V}{d}$$
$$E_p = k\frac{Q_1 Q_2}{r}$$
$$V = \frac{kQ}{r}$$

Electric Circuits

$$I = \frac{Q}{\Delta t}$$

$$V = IR$$

$$V_t = \mathcal{E} \pm Ir$$

$$P = VI$$

Electromagnetism

$$F = BIl$$

$$F = QvB$$

$$B = \mu_0 nI = \mu_0 \frac{N}{l} I$$

$$B = \frac{\mu_0 I}{2\pi d}$$

$$\mathcal{E} = Blv$$

$$\Phi = BA$$

$$\mathcal{E} = -N\frac{\Delta\Phi}{\Delta t}$$

$$V_{back} = \mathcal{E} - Ir$$

$$\frac{V_s}{V_p} = \frac{N_s}{N_p} = \frac{I_p}{I_s}$$

Special Relativity

$$\Delta t = \frac{\Delta t_0}{\sqrt{1 - \frac{v^2}{c^2}}}$$

$$L = L_0\sqrt{1 - \frac{v^2}{c^2}}$$

$$m = \frac{m_0}{\sqrt{1 - \frac{v^2}{c^2}}}$$