



A Level

Data and Equations

v1.0 Jun 2021

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

SOH CAH TOA

$$A_{\text{sphere}} = 4\pi r^2$$

$$V_{\text{sphere}} = \frac{4}{3}\pi r^3$$

$$s = \left(\frac{u+v}{2}\right)t$$

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

$$g = F/m$$

$$p = mv$$

$$v = u + at$$

$$s = ut + \frac{1}{2}at^2$$

$$\Sigma F = ma$$

$$W = mg$$

$$M = Fx$$

$$F = Q_1Q_2 / 4\pi\epsilon_0 r^2 \quad E = F/Q$$

$$E = Q / 4\pi\epsilon_0 r^2 \quad E = V/d$$

$$V = Q / 4\pi\epsilon_0 r \quad C = Q/V$$

$$W = \frac{1}{2}QV = \frac{1}{2}CV^2 = \frac{1}{2}Q^2/C$$

$$Q = Q_0 e^{-t/RC} \quad \ln Q = \ln Q_0 - t/RC$$

$$I = I_0 e^{-t/RC} \quad \ln I = \ln I_0 - t/RC$$

$$V = V_0 e^{-t/RC} \quad \ln V = \ln V_0 - t/RC$$

$$F = BIl \sin \theta \quad F = Bqv \sin \theta$$

$$\epsilon = -d(N\phi) / dt$$

$$g = 9.81 \text{ N kg}^{-1} \text{ or } \text{m s}^{-2}$$

$$k = 1.38 \times 10^{-23} \text{ J K}^{-1}$$

$$k = 8.99 \times 10^9 \text{ N m}^2 \text{ C}^{-2}$$

($1 / 4\pi\epsilon_0$)

$$e = -1.60 \times 10^{-19} \text{ C}$$

$$m_e = 9.11 \times 10^{-31} \text{ kg}$$

$$1 \text{ eV} = 1.60 \times 10^{-19} \text{ J}$$

$$G = 6.67 \times 10^{-11} \text{ N m}^2 \text{ kg}^{-2}$$

$$\epsilon_0 = 8.85 \times 10^{-12} \text{ F m}^{-1}$$

$$h = 6.63 \times 10^{-34} \text{ J s}$$

$$m_p = 1.67 \times 10^{-27} \text{ kg}$$

$$c = 3.00 \times 10^8 \text{ m s}^{-1}$$

$$\sigma = 5.67 \times 10^{-8} \text{ W m}^{-2} \text{ K}^{-4}$$

$$1 \text{ u} = 1.66 \times 10^{-27} \text{ kg}$$

$$\rho = m/V$$

$$\Delta F = k\Delta x$$

$$\epsilon = \Delta x / x$$

$$\Delta E_{\text{el}} = \frac{1}{2}F\Delta x$$

$$F = \delta\pi\eta r v$$

$$\sigma = F/A$$

$$E = \sigma / \epsilon$$

$$v = f\lambda$$

$$I = P/A$$

$$n\lambda = d \sin \theta$$

$$n = c/v$$

$$v = \sqrt{\frac{T}{\mu}}$$

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

$$\sin C = 1/n$$

$$\lambda = h/p$$

$$hf = \phi + \frac{1}{2}mv_{\text{max}}^2$$

$$E = hf$$

$$I = \Delta Q / \Delta t$$

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

$$R = V/I$$

$$R = \rho l / A$$

$$V = W/Q$$

$$W = VIt$$

$$I = nqvA$$

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

$$v = \omega r$$

$$F = ma = mv^2/r$$

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

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

$$T = 2\pi / \omega$$

$$a = v^2 / r$$

$$a = r\omega^2$$

$$\Delta E = mc\Delta\theta$$

$$\frac{1}{2}m(c^2) = \frac{3}{2}kT$$

$$\Delta E = L\Delta m$$

$$pV = NkT$$

$$\Delta E = c^2\Delta m$$

$$dN/dt = -\lambda N$$

$$N = N_0 e^{-\lambda t}$$

$$A = \lambda N$$

$$\lambda = \ln 2 / t_{1/2}$$

$$A = A_0 e^{-\lambda t}$$

$$F = -kx$$

$$T = 1/f$$

$$T = 2\pi / \omega$$

$$\omega = 2\pi f$$

$$T = 2\pi \sqrt{\frac{m}{k}}$$

$$a = -\omega^2 x$$

$$x = A \cos \omega t$$

$$v = -A \omega \sin \omega t$$

$$a = -A \omega^2 \cos \omega t$$

$$T = 2\pi \sqrt{\frac{l}{g}}$$

$$g = F/m$$

$$g = Gm/r^2$$

$$L = \sigma AT^4$$

$$I = L / 4\pi d^2$$

$$z = \Delta\lambda / \lambda \approx \Delta f / f \approx v/c$$

$$F = Gm_1 m_2 / r^2$$

$$V_{\text{grav}} = -Gm/r$$

$$\lambda_{\text{max}} T = 2.898 \times 10^{-3} \text{ m K}$$

$$v = H_0 d$$

$$r = p/BQ$$

