**Formulas**

(you need very few of these!!)

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|---|---|---|---|---|
| $v_{avg} = \frac{\Delta l}{\Delta t}$ | $a_{avg} = \frac{\Delta v}{\Delta t}$ | | | |
| $x = x_0 + v_0 t + \frac{1}{2}at^2$ | $v_f = v_i + at$ | $v_f^2 = v_i^2 + 2a(x_f - x_i)$ | $s = \frac{1}{2}(v_i + v_f)t$ | |
| $\sin = \frac{o}{h}$ | $\cos = \frac{a}{h}$ | $\tan = \frac{o}{a}$ | $\tan 45° = 1$ | |
| $\sin 30° = 0.5 = \cos 60°, \cos 30° = 0.866 = \sin 60°$ | | | $\sin 45° = 0.707 = \cos 45°$ | |
| **use** $g = 10\frac{m}{\sec^2}$ | 1in = 2.5cm | $2\pi\ rad = 360°$ | $x = \frac{-b \pm \sqrt{b^2 - 4ac}}{2a}$ | |
| $\sum \vec{F} = m\vec{a}$ | $f_s = \mu_s N$ | $f_k = \mu_k N$ | $a_c = \frac{v^2}{r}$ | $F_g = mg$ |
| $F_g = \frac{GMm}{r^2}$ | $\vec{p} = m\vec{v}$ | $v_{1f} = \frac{m_1 - m_2}{m_1 + m_2} v_{1i}$ | $v_{2f} = \frac{2m_1}{m_1 + m_2} v_{1i}$ | |
| $C = 2\pi r$ | $A_{cylinder} = \pi r^2 h$ | $V = \frac{4}{3}\pi r^3$ | $A_{sphere} = 4\pi r^2$ | $A = \pi r^2$ |
| $s = \theta r$ | $v = \omega r$ | $a = \alpha r$ | $T = \frac{1}{f} = \frac{2\pi}{\omega}$ | |
| $\theta = \omega_i t + \frac{1}{2}\alpha t^2$ | $\omega = \omega_0 + \alpha t$ | $\omega_f^2 = \omega_i^2 + 2\alpha\theta$ | $L = I\omega$ | |
| $I = \sum m_i R_i^2$ | $I_{hoop} = MR^2$ | $I_{disk} = \frac{1}{2}MR^2$ | $I_{sphere} = \frac{2}{5}MR^2$ | $\tau = Fr_\perp$ |
| $W = Fd\cos\theta$ | $KE = \frac{1}{2}mv^2$ | $KE = \frac{1}{2}I\omega^2$ | $\sum \vec{\tau} = I\vec{\alpha}$ | $U_g = mgh$ |

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|---|---|---|---|---|
| $P_0 + \frac{1}{2}\rho v^2 + \rho gh = const.$ | | $Av = const.$ | $W_s = -\frac{1}{2}kx^2$ | $P = \frac{F}{A}$ |
| $y = y_{\max}\cos\omega t$ | $\omega = \frac{2\pi}{T} = 2\pi f$ | $v = \sqrt{\frac{\tau}{\mu}}$ | $\omega = \sqrt{\frac{k}{m}}$ | $F_s = -kx$ |
| $\omega = \sqrt{\frac{g}{L}}$ | $v = f\lambda = \frac{\lambda}{T}$ | $I = \frac{P_s}{4\pi r^2}$ | $\beta = (10\,dB)\log\frac{I}{I_0}$ | |
| $\Delta L = L_0\alpha\Delta T$ | $\Delta V = V_0\beta\Delta T$ | $T_K = T_c + 273°$ | $T_F = \frac{9}{5}T_C + 32°$ | |
| $Q = cm(T_f - T_i)$ | $Q = Lm$ | $\Delta U = Q + W$ | $H = \frac{Q}{t} = kA\frac{T_h - Tc}{L}$ | |
| $pV = nRT$ | $\mathrm{N}_A = 6.02\times10^{23}\,\mathrm{mol}^{-1}$ | $W = -P\Delta V$ | $W_{isothermal} = nRT\ln(\frac{V_f}{V_i})$ | |
| 1cal = 4.186J | $\varepsilon = 1 - \frac{\lvert Q_c\rvert}{\lvert Q_h\rvert} = 1 - \frac{T_c}{T_h}$ | $\Delta S = \frac{Q}{T}$ | | |