2026 PhysicsBowl Exam Equations

$$\Delta x = v_0 t + \frac{1}{2} a t^2 \qquad v = v_0 + at \qquad v^2 = v_0^2 + 2a\Delta x$$

$$\sum \vec{F} = m\vec{a} \qquad F_{fric} \le \mu F_N \qquad F_g = G\frac{m_1 m_2}{r^2}$$

$$F_g = mg \qquad \vec{p} = m\vec{v} \qquad a = \frac{v^2}{r}$$

$$v_t = r\omega \qquad a_t = r\alpha \qquad \tau = RF\sin\theta = R_\perp F = RF_\perp$$

$$\sum \vec{\tau} = I\vec{\alpha} \qquad KE = \frac{1}{2}mv^2 \qquad \Delta PE_g = mg\Delta y$$

$$W = Fd\cos\theta = F_\parallel d = Fd_\parallel \qquad PE_s = \frac{1}{2}kx^2 \qquad P = \frac{W}{\Delta t}$$

$$\vec{F} = -k\vec{x} \qquad T = 2\pi\sqrt{\frac{m}{k}} \qquad T = 2\pi\sqrt{\frac{L}{g}}$$

$$\rho = \frac{m}{V} \qquad F_{buoy} = \rho g V \qquad P_1 + \frac{1}{2}\rho v_1^2 + \rho g y_1 = P_2 + \frac{1}{2}\rho v_2^2 + \rho g y_2$$

$$P = \frac{F}{A} \qquad PV = nRT = Nk_B T \qquad \Delta U = Q + W_{on\ system}$$

$$Q = mc\Delta T \qquad Q = \pm mL \qquad \Delta S = \frac{Q}{T}$$

$$v = f\lambda \qquad f_o = f_s\left(\frac{v_{snd} \pm v_{obs}}{v_{snd} \mp v_{src}}\right) \qquad n = \frac{c}{v}$$

$$n_1 \sin\theta_1 = n_2 \sin\theta_2 \qquad m\lambda = d\sin\theta \qquad \frac{1}{f} = \frac{1}{d_o} + \frac{1}{d_i}$$

$$m = -\frac{d_i}{d_o} \qquad F_e = k\frac{q_1 q_2}{r^2} \qquad \vec{E} = \frac{\vec{F}}{q}$$

$$V = \frac{kq}{r} \qquad V = \frac{W}{q} \qquad \Delta V = -Ed\cos\theta = -E_\parallel d = -Ed_\parallel$$

$$PE_e = \frac{kq_1 q_2}{r} \qquad Q = CV \qquad PE = \frac{1}{2}CV^2$$

$$V = RI \qquad P = IV \qquad F = qvB\sin\theta = qvB_\perp$$

$$B = \frac{\mu_0 I}{2\pi r} \qquad B = \mu_0 nI \qquad F = ILB\sin\theta = ILB_\perp$$

$$\varepsilon = vBL = \left(\frac{B\Delta A}{t}\right)$$

Continued on next page…

$E = \gamma m_0 c^2 = mc^2$ $E = hf$ $p = \frac{h}{\lambda}$

$hf = KE_e + W_0$ $Q = e\sigma T^4 At$

$p = \frac{mv}{\sqrt{1-\frac{v^2}{c^2}}}$ $E = \frac{mc^2}{\sqrt{1-\frac{v^2}{c^2}}}$

Moments of Inertia:

Hoop with a perpendicular axis through its center: $I = MR^2$

Solid disk or cylinder with a perpendicular axis through its center: $I = \frac{1}{2}MR^2$

Solid sphere about a diameter: $I = \frac{2}{5}MR^2$

Thin rod about the center, perpendicular to rod: $I = \frac{1}{12}ML^2$

Thin rod about the end: $I = \frac{1}{3}ML^2$