Write your name on the dotted line: Key

1.6

AP Physics 1: Solving for Variables

Using your formula chart from the AP Physics 1 exam find the formulas then solve for the variable asked for.

1. Using the formula for momentum. Solve for v.

$$\frac{p}{m} = \frac{mv}{m}$$

$$\boxed{v = \frac{p}{m}}$$

2. Using the formula for angular momentum. Solve for ω.

$$\frac{L}{I} = \frac{I\omega}{I}$$

$$\boxed{\omega = \frac{L}{I}}$$

3. Using the formula for acceleration. Solve for v.

$$r \cdot a_c = \frac{v^2}{r} \cdot r$$

$$\sqrt{a_c r} = \sqrt{v^2} \Rightarrow \boxed{v = \pm\sqrt{a_c r}}$$

4. Using the formula for Kinetic energy. Solve for m.

$$2 \cdot K = \frac{1}{2}mv^2 \cdot 2$$

$$\frac{2K}{v^2} = \frac{mv^2}{v^2} \Rightarrow \boxed{m = \frac{2K}{v^2}}$$

5. Using the formula for angular speed. Solve for α.

$$\omega = \omega_0 + \alpha t$$
$$-\omega_0 \quad -\omega_0$$

$$\frac{\omega - \omega_0}{t} = \frac{\alpha t}{t} \Rightarrow \boxed{\alpha = \frac{\omega - \omega_0}{t}}$$

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6. Using the formula for speed. Solve for t.

$$V_x = V_{x0} + a_x t$$
$$-V_{x0} \quad -V_{x0}$$
$$\frac{V_x - V_{x0}}{a_x} = \frac{a_x t}{a_x} \Rightarrow \boxed{t = \frac{V_x - V_{x0}}{a}}$$

7. Using the formula for position. Solve for a_x.

$$x = x_0 + v_{x0}t + \frac{1}{2}a_x t^2$$
$$-x_0 - v_{x0}t$$
$$2\cdot(x - x_0 - v_{x0}t) = \frac{1}{2}a_x t^2 \cdot 2$$
$$\frac{2(x - x_0 - v_{x0}t)}{t^2} = \frac{a_x t^2}{t^2}$$
$$\boxed{a_x = \frac{2(x - x_0 - v_{x0}t)}{t}}$$

8. Using the formula for Angle. Solve for ω_0.

$$\theta = \theta_0 + \omega_0 t + \frac{1}{2}\alpha t^2$$
$$-\theta_0 \qquad -\frac{1}{2}\alpha t^2$$
$$\frac{\theta - \theta_0 - \frac{1}{2}\alpha t^2}{t} = \frac{\omega_0 t}{t}$$
$$\boxed{\omega_0 = \frac{\theta - \theta_0 - \frac{1}{2}\alpha t^2}{t}}$$

9. Using the formula for Potential energy. Solve for x.

$$2\cdot U_s = \frac{1}{2}kx^2 \cdot 2$$
$$\frac{2U_s}{k} = \frac{kx^2}{k} \Rightarrow \sqrt{x^2} = \sqrt{\frac{2U_s}{k}} \Rightarrow \boxed{x = \pm\sqrt{\frac{2U_s}{k}}}$$

10. Using the formula for Period. Solve for ℓ.

$$T_p = 2\pi\sqrt{\frac{\ell}{g}}$$
$$\frac{T_p}{2\pi} = \sqrt{\frac{\ell}{g}} \Rightarrow \left(\frac{T_p}{2\pi}\right)^2 = \frac{\ell}{g}$$
$$\boxed{\ell = g\left(\frac{T_p}{2\pi}\right)^2}$$

11. Using the formula for Period. Solve for k.

$$T_s = 2\pi\sqrt{\frac{m}{k}}$$
$$\frac{T_s}{2\pi} = \sqrt{\frac{m}{k}} \Rightarrow \left(\frac{T_s}{2\pi}\right)^2 = \frac{m}{k}$$
$$\boxed{k = \frac{m}{\left(\frac{T_s}{2\pi}\right)^2}}$$