Physics Formula Sheet

Chapter by chapter, topic by topic. Written by the PadhoNa team for quick revision.

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CHAPTER 16

Oscillations

Simple harmonic motion

$$x = A\sin(\omega t + \phi), \qquad a = -\omega^2 x, \qquad v = \omega\sqrt{A^2 - x^2}$$

$$\omega = \frac{2\pi}{T}, \qquad v_{\max} = A\omega, \qquad a_{\max} = A\omega^2$$

Energy in SHM

$$K = \tfrac{1}{2}m\omega^2(A^2 - x^2), \qquad U = \tfrac{1}{2}m\omega^2 x^2, \qquad E = \tfrac{1}{2}m\omega^2 A^2$$

Springs and pendulums

SPRING

$$T = 2\pi\sqrt{\frac{m}{k}}; \qquad \text{series } \frac{1}{k} = \frac{1}{k_1} + \frac{1}{k_2}; \qquad \text{parallel } k = k_1 + k_2$$

SIMPLE PENDULUM

$$T = 2\pi\sqrt{\frac{l}{g}}; \qquad \text{in a lift } g \to g \pm a$$

PHYSICAL PENDULUM

$$T = 2\pi\sqrt{\frac{I}{mgd}}$$

TWO-BODY SPRING

$$T = 2\pi\sqrt{\frac{\mu}{k}}, \qquad \mu = \frac{m_1 m_2}{m_1 + m_2}$$

LIQUID IN U-TUBE

$$T = 2\pi\sqrt{\frac{L}{2g}} \quad (L = \text{total liquid length})$$

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