The Practise Ground

Class 11 Physics

Simple Harmonic Motion

Oscillations of springs and pendulums

1

$$x = A \sin(\omega t + \varphi)$$

Displacement in SHM

A is amplitude, ω angular frequency, φ phase

2

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

Acceleration in SHM

Always directed towards the mean position

3

$$T = 2\pi \sqrt{(m / k)}$$

Spring-mass time period

Heavier mass is slower. Stiffer spring is faster.

4

$$T = 2\pi \sqrt{(L / g)}$$

Simple pendulum time period

Independent of mass; valid for small angles

A	T	f	ω	k
amplitude	**time period**	**frequency**	**angular freq.**	**spring constant**
metre (m)	second (s)	hertz (Hz)	rad/s	N/m

Key ideas

$f = 1 / T$ and $\omega = 2\pi f$.

Maximum speed = $A\omega$, reached at the mean position.

Quick example

A pendulum of length 1 m, $g = 9.8$ m/s^2

$T = 2\pi \sqrt{(1 / 9.8)}$

T = about 2.0 s

Think you've got it? Test yourself.

Scan for a free Class 11 Physics quiz.

thepractiseground.in

Free for every class. Print and display it anywhere.