

# IMPORTANT JEE-NEET FORMULAS

## Simple Harmonic Motion

<u>Topics</u>	<u>Formulas</u>
<u>General equation of SHM</u>	$x = A \sin(\omega t + \phi)$ <p>Here, x is the position, A is the amplitude, <math>\omega</math> is the angular frequency, t is time and <math>\phi</math> is the phase difference.</p>
<u>Angular frequency</u>	<p>The angular frequency is given by the formula:</p> $\omega = \frac{2\pi}{T}$ <p>Or <math>\omega = 2\pi f</math> Here, T is the time period and f is the frequency.</p>
<u>Time period</u>	<p>The time period of the motion is given by the formula:</p> $T = \frac{2\pi}{\omega}$ <p>or <math>T = 2\pi \sqrt{\frac{m}{k}}</math> Here, <math>\omega</math> is the angular frequency, m is the mass and k is the spring constant.</p>
<u>Speed</u>	<p>The speed of the motion is given as:</p> $v = \omega \sqrt{A^2 - x^2}$ <p>Here, <math>\omega</math> is the angular frequency, A is the amplitude and x is the position at which the speed is to be calculated.</p>
<u>Acceleration of the motion</u>	<p>The acceleration at point x is given as:</p> $a = -\omega^2 x$
<u>Kinetic energy of the particle</u>	<p>The kinetic energy of the particle executing SM is given as:</p> $KE = \frac{1}{2} m \omega^2 (A^2 - x^2)$ <p>Here, m is the mass, <math>\omega</math> is the angular frequency, A is the amplitude and x is the position at which kinetic energy is to be calculated.</p>
<u>Potential energy of the particle</u>	<p>The potential energy of the particle is given as:</p> $PE = \frac{1}{2} K x^2$ <p>Where, K is spring constant and x is the distance from mean position.</p>
<u>Time period for vertical spring mass system</u>	$T = 2\pi \sqrt{\frac{m}{k}}$ <p>Here, m is the mass and k is the spring constant.</p>

Time period for simple pendulum

$$T = 2\pi \sqrt{\frac{l}{g}}$$

Here,  $l$  is the length of the pendulum and  $g$  is the gravitational acceleration.



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