



INDIAN SCHOOL DARSAIT DEPARTMENT OF PHYSICS



Subject : Physics	Topic : Oscillations and Waves	Worksheet No. 13
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Name of the Student : _____	Class & Division : XI A/B	Roll Number : ____

- 1 A body executes 40 oscillations per minute. Its maximum speed is 36 cm/s. Calculate the amplitude of oscillation.
- 2 The SHM of a particle is given by the equation :
$$y = 3 \sin \omega t + 4 \cos \omega t$$
Find its amplitude.
- 3 A particle executes SHM of amplitude a
 - (i) At what distance from the mean position is its kinetic energy equal to half its potential energy?
 - (ii) At what points is its speed half the maximum speed?
- 4 The time period of a body executing S.H.M is 1s. After how much time will its displacement be $\frac{1}{\sqrt{2}}$ of its amplitude.
- 5 A 40 gm mass produces an extension of 4 cm in a vertical spring. A mass of 200 gm is suspended at its bottom and left pulling down. Calculate the frequency of its vibration.
- 6 The equation of a plane progressive wave is given by the equation -
$$y = 10 \sin 2\pi (t - 0.005x)$$
where y and x are in cm and t in seconds.
Calculate the amplitude, frequency, wave length and velocity of the wave.
- 7 A police siren (S) emitting a sinusoidal wave with frequency 300 Hz is moving away from the observer (O) with a speed of 45 m/s relative to the air and the observer is moving toward the siren with a speed of 15 m/s relative to the air. What frequency does the observer hear? (Take speed of sound = 340 m/s)
- 8 The fifth crest on the surface of water is 35 m from the centre of the disturbance. The ninth crest is 63 m away from the centre of the disturbance. It takes 3 seconds to travel from the 5th to the 9th crest. Calculate –
 - (a) the wavelength
 - (b) the speed of disturbance
 - (c) the frequency of disturbance

9 Here are the equations of three waves –

(a) $y(x, t) = 2 \sin(4x - 2t)$,

(b) $y(x, t) = \sin(3x - 4t)$,

(c) $y(x, t) = 2 \sin(3x - 3t)$,

Rank the waves according to their (a) wave speed, (b) maximum transverse speed, greatest first.

10 A body executes SHM under the influence of one force with a time period of 0.8 s. It has a time period of 0.6 s under the action of another force. Calculate the time period when both the forces act in the same direction.

11 A particle of mass 1 kg is moving with SHM. Its greatest velocity is 20 m/s and its amplitude is 10 m. Find the period and force of attraction towards the centre when the particle is its greatest distance.

12 Two pendulums whose lengths differ by 22 cm oscillate at the same place so that one of them makes 30 oscillations and the other 36 oscillations during the same time. Find the lengths of the pendulum.

13 A pendulum clock gives correct time. What is the error length in time per day if the length increases by 0.05%?

14 For plane waves in air, of frequency 1000 Hz and displacement amplitude 0.2×10^{-7} m, deduce the velocity amplitude.

15 The acceleration due to gravity on the surface of Moon is 1.7 m/s^2 . What is the time period of a simple pendulum on the surface of Moon if its time period on the surface of Earth is 3.5 s? (Take g on Earth = 9.81 m/s^2)

16

17