Physics Grade 12 Unit 2

Oscillations (32 Questions)

18. The period of oscillation of a particle undergoing simple harmonic motion is:

(A) independent of the amplitude of the motion.
(B) directly proportional to the frequency of oscillation.
(C) independent of the frequency of oscillation.
(D) directly proportional to mass of oscillating object.

29. The position of a particle moving with simple harmonic motion is given by an expression $x(t)=(0.4\text{ m})\sin(30t)$. What is speed of the particle at $t = 2$ *sec*?

A) 24 m/s
B) 12 m/s
C) 30 m/s
D) 6 m/s

30. A simple pendulum of length **L** has frequency **f**. What must be the new length for the new frequency to be **2f**?

A) ¼ L
B) 4L
C) ½ L
D) 2L

31. The sound level at a distance of 5 m from a source is 160 dB. At what distance from the source will the sound level be 120 dB?

A) 50 m
B) 100 m
C) 500 m
D) 1000 m

32. A string has a mass per unit length of 10^{-2} kg/m and a length of 0.5 m. What must be the tension in the string if its first harmonic has the same frequency as the first harmonic of a 35 cm long pipe open at one end? Take speed of sound in air = 350 m/sec.

A) 500 N
B) 625 N
C) 750 N
D) 800 N

8. If the amplitude of a sine wave is doubled, the intensity

(A) remains the same.
(B) increases by a factor of 2.
(C) increases by a factor of 4.
(D) increases by a factor of 16.

16. A 1kg mass is attached to a spring of stiffness constant 100N/m. What is the maximum displacement of the mass from its equilibrium position if its speed is 3m/s at the equilibrium point?

(A) 0.1m
(B) 0.3m
(C) 3m
(D) 10m

17. A pipe, 68cm long, is open at one end and closed at the other. When air is blown across the open end sound is produced at 110Hz. What is the velocity of sound along the pipe?

(A) 598.4 m/s
(B) 334.6 m/s
(C) 299.2 m/s
(D) 149.6 m/s

30. The total energy of a particle executing Simple Harmonic Motion is

(A) zero.
(B) directly proportional to the amplitude.
(C) directly proportional to the square of the amplitude.
(D) inversely proportional to the square of the amplitude.

40. The loudness of sound changes from $L_1 = 30\text{db}$ to $L_2 = 60\text{db}$. What is the ratio of intensities I_2 / I_1 in the two cases?

(A) 2 (B) 4 (C) 600 (D) 1000

47. A point source broadcasts sound into a uniform medium. If the distance from the source is tripled, how does the intensity change?

(A) It remains unchanged.
(B) It becomes three times larger.
(C) It becomes one-third as large.
(D) It becomes one-ninth as large.

8. A wave has a speed of 50 m/s and a wavelength of 25,000 m. What is the frequency of the wave?

A. 2.0×10^{-3}HZ B. 5.0×10^{-2}HZ C. 6.0×10^{1}HZ D. 1.8×10^{6}HZ

9. An oscillating system is used to create a succession of wave on a water surface. The rate of wave generation is one every 0.33 seconds. What is the period of these wave?

A. 0.3 seconds B. 1.0 seconds C. 2.0 seconds D. 3.0 seconds

4. A transverse sinusoidal wave is traveling on a string. Which statement is correct about a point on the string?

A. The point moves in the same direction as the wave.
B. The point moves in simple harmonic motion with a different frequency than that of the wave.
C. The point moves in simple harmonic motion with the same angular frequency as the wave.
D. The point moves in uniform circular motion with a different angular speed than the wave.

17. A mass suspended from the end of a spring vibrates up and down 20 times in 36 s. What are the frequency and period of the vibration?

A. 1.5Hz, 0.67S
B. 0.67Hz, 1.5s
C. 0.0012Hz,864s
D. 864Hz, 0.0012s

28. An object of mass m is hung from a spring and set into oscillation. The frequency of the oscillation is measured and recorded as f. If the object of mass m is replaced with an object of mass 2m and set into oscillation, what will be the frequency of the motion?

A. $f/\sqrt{2}$ B. f C. $(\sqrt{2})f$ D. $2f$

41. The sound level at a distance of 4.00 m from a source is 120dB. At what distance is the sound level 100 dB?

A. 0.40m B. 4.80m C. 40m D. 48m

50. A block of mass 1.6 kg is attached to a horizontal spring that has a force constant of 200N/m. The spring is compressed 2.0 cm and is then released from rest. At what speed will the block pass through the equilibrium position if a constant friction force of 10.0N retards its motion from the moment it is released?

A. 70m/s B. 50m/s C. 70m/s D. 50cm/s

15. Which one of the following statements is true about a spring-mass system oscillation on a horizontal frictionless surface?

A. The kinetic and potential energies are equal at all times.
B. The kinetic and potential energies are both constant.
C. The maximum potential energies is achieved when the mass passes through its equilibrium position.
D. The maximum kinetic energy and maximum potential energy are equal.

31. The position of a particle moving with simple harmonic motion is given by an expression $x=A\cos(\omega t+\phi)$, where A is the amplitude of the oscillation, t is time, ω is angular frequency, and $\emptyset$ is the phase constant. If $\emptyset=\pi/2$, what will be the sign of the particle's position and velocity at $t=7T/8$, where T is the period of oscillation?

A. The position is positive, and the velocity is negative.
B. The position and velocity are both positive.
C. The position and velocity are both negative.
D. The position is negative, and the velocity is positive.

32. If a long rope of uniform linear density is hung from a ceiling and waves are sent up the rope from its lower end, which one of the following is true about the speed of the ascending waves?

A. The speed decreases as the waves ascend.
B. The speed increases as the waves ascend.
C. The waves ascend with a uniform speed.
D. The speed of the waves is larger around the middle of the rope than around the beginning and end.

33. A given minimum point (trough) of a sinusoidal wave is traveling 480 cm along a rope in 12 s. if the oscillator that generates the wave completes 48 vibrations in 30 s, what is the wave length of the wave?

A. 25 m B. 15 m C. 0.25 m D. 0.15 m

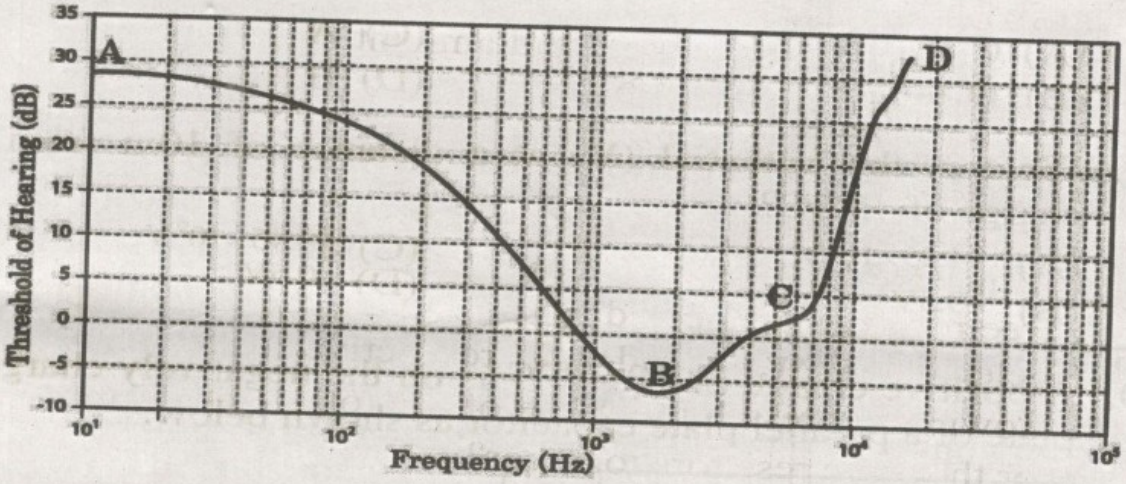
23. A simple pendulum is made using a long, thin metal wire. What happens to the period of the pendulum when the temperature drops?

(A) Increase
(B) Remain the same
(C) Decrease
(D) Period of oscillation has random dependence on temperature

34. What fundamental frequency can a string vibrate at if it is 30 cm long and the velocity of travelling waves along the string is 120 m/s?

(A) 400 Hz
(B) 600 Hz
(C) 800 Hz
(D) 200 Hz

35. The hearing curve, shown below, indicates the variation of the threshold of hearing with frequency. The ear is most sensitive at the point indicated by _____.



(A) A
(B) C
(C) B
(D) D

36. A wave length is:
(A) a line that represents the direction of propagation of light.
(B) the minimum distance between two points that are in phase.
(C) the locus of all points of a travelling wave that are in phase.
(D) the number of waves crossing a given plane in a unit time.

36. What makes the oscillatory motion a simple harmonic motion?
(A) The acceleration of the motion is directly proportional to the velocity.
(B) The velocity of the motion is directly proportional to the displacement.
(C) The acceleration of the motion is directly proportional in magnitude but opposite in direction to the displacement.
(D) The velocity of the motion is inversely proportional to the displacement.

37. The two end fixed string of length 0.5 m has a mass per unit length 2 g/m. If the tension in the string is 80 N, what is the second harmonic frequency?
(A) $100\sqrt{2}$ Hz (B) 200 Hz (C) 600 Hz (D) 400 Hz

38. Which one of the followings is **NOT** the use of Doppler effect?
(A) Energy transmission (C) Radar
(B) Blood flow measurement (D) Astronomy

31. Which one of the following is not an example of simple harmonic motion?
(A) A mass attached to a spring system oscillating in horizontal direction to the surface of the Earth
(B) Oscillation of simple pendulum
(C) Rotation of second pointer in hand watch
(D) A mass attached to a spring system oscillating in vertical direction to the surface of the Earth

32. Travelling wave is given by the equation $Y = A\cos(kx - \omega t)$, where k is the wave number and ω is the angular frequency. What is the distance that the wave travels in the time $t = T/2$?

(A) full wavelength

(B) half the wavelength

(C) a quarter of the wavelength

(D) at the origin

33. A 50 cm pipe is open at one end and closed at the other end. When air is blow at 150 Hz. What is the velocity of the sound along the pipe?

(A)150 m/s (B) 100 m/s (C) 330 m/s (D) 300 m/s