

Physics Standard X: Sound Waves MCQ Questions

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1 Multiple-Choice Questions and Answers

1. What type of motion does a swing exhibit?

- a) Circular
- b) Linear
- c) Oscillatory
- d) Rotational

Answer: c) Oscillatory

Explanation: A swing moves to and fro about its equilibrium position, defining oscillatory motion.

2. What is the initial position of a swing when it starts oscillating?

- a) Extreme position A
- b) Equilibrium position O
- c) Extreme position B
- d) Midpoint between A and B

Answer: b) Equilibrium position O

Explanation: The swing begins at its resting position (O) before moving to extremes.

3. What is the maximum displacement from equilibrium called?

- a) Period
- b) Frequency
- c) Amplitude
- d) Wavelength

Answer: c) Amplitude

Explanation: Amplitude is the maximum displacement from equilibrium, in meters.

4. When does a swing complete one oscillation starting from O?

- a) O to A
- b) O to A and back to O
- c) O to A to B and back to O
- d) O to B

Answer: c) O to A to B and back to O

Explanation: A full oscillation includes both extremes and return to O.

5. If a pendulum completes 30 oscillations in 60 s, what is its period?

- a) 0.5 s

- b) 2 s
- c) 30 s
- d) 60 s

Answer: b) 2 s

Explanation: Period = $\frac{60}{30} = 2$ s.

6. What is the frequency of a pendulum with 30 oscillations in 60 s?

- a) 0.5 Hz
- b) 2 Hz
- c) 30 Hz
- d) 60 Hz

Answer: a) 0.5 Hz

Explanation: Frequency = $\frac{30}{60} = 0.5$ Hz.

7. What is the SI unit of frequency?

- a) Meter
- b) Second
- c) Hertz
- d) Joule

Answer: c) Hertz

Explanation: Hertz measures oscillations per second.

8. How does pendulum frequency change with increased length?

- a) Increases
- b) Decreases
- c) Remains constant
- d) Doubles

Answer: b) Decreases

Explanation: Longer pendulums have a longer period, reducing frequency.

9. What is the relation between period (T) and frequency (f)?

- a) $f = T^2$
- b) $f = \frac{1}{T}$
- c) $f = T$
- d) $f = \frac{T}{2}$

Answer: b) $f = \frac{1}{T}$

Explanation: Frequency is the reciprocal of period.

10. What does a 256 Hz marking on a tuning fork indicate?

- a) Amplitude
- b) Period
- c) Natural frequency
- d) Wavelength

Answer: c) Natural frequency

Explanation: It shows the fork's vibration rate per second.

11. Which does NOT affect natural frequency?

- a) Length
- b) Elasticity
- c) Color
- d) Material

Answer: c) Color

Explanation: Length, elasticity, and material influence frequency; color does not.

12. What happens when a tuning fork is pressed on a table?

- a) Table vibrates
- b) Sound stops
- c) Frequency decreases
- d) Amplitude decreases

Answer: a) Table vibrates

Explanation: The table undergoes forced vibration, amplifying sound.

13. What is resonance?

- a) Low amplitude vibration
- b) Matching natural frequencies
- c) Sound reflection
- d) Energy loss

Answer: b) Matching natural frequencies

Explanation: Resonance maximizes amplitude when frequencies align.

14. Which uses resonance? (Application)

- a) Battery charging
- b) MRI scanning
- c) Lens focusing
- d) Data storage

Answer: b) MRI scanning

Explanation: MRI uses nuclear resonance for imaging.

15. In a hacksaw blade experiment, why do blades C and E vibrate maximally? (Application)

- a) Different lengths
- b) Same natural frequency as A
- c) Higher amplitude
- d) External force

Answer: b) Same natural frequency as A

Explanation: Resonance occurs when frequencies match.

16. What is wave motion?

- a) Particle displacement
- b) Energy transfer via oscillations
- c) Medium movement
- d) Source vibration

Answer: b) Energy transfer via oscillations

Explanation: Waves transfer energy without moving the medium.

17. Which wave requires a medium?

- a) Radio wave
- b) Light wave
- c) Sound wave
- d) X-ray

Answer: c) Sound wave

Explanation: Sound is a mechanical wave needing a medium.

18. In longitudinal waves, particles vibrate:

- a) Perpendicular to direction
- b) Parallel to direction
- c) In circles
- d) Randomly

Answer: b) Parallel to direction

Explanation: Sound waves are longitudinal.

19. What are compressions in sound waves?

- a) Low-pressure regions
- b) High-pressure regions
- c) Crests
- d) Troughs

Answer: b) High-pressure regions

Explanation: Compressions occur where air molecules are close.

20. **Which is a transverse wave?**

- a) Sound
- b) Seismic
- c) Light
- d) Ultrasound

Answer: c) Light

Explanation: Light has perpendicular particle vibration.

21. **What is wavelength?**

- a) Time for one oscillation
- b) Distance between crests
- c) Maximum displacement
- d) Oscillations per second

Answer: b) Distance between crests

Explanation: Wavelength is the distance between consecutive same-phase points.

22. **What is the speed of a wave traveling 700 m in 2 s? (Application)**

- a) 350 m/s
- b) 1400 m/s
- c) 175 m/s
- d) 700 m/s

Answer: a) 350 m/s

Explanation: Speed = $\frac{700}{2} = 350$ m/s.

23. **A sound wave (175 Hz, 2 m wavelength) has what speed? (Application)**

- a) 350 m/s
- b) 175 m/s
- c) 87.5 m/s
- d) 700 m/s

Answer: a) 350 m/s

Explanation: Speed = $175 \times 2 = 350$ m/s.

24. **What is the frequency of a wave with 50 crests in 0.5 s? (Application)**

- a) 25 Hz
- b) 50 Hz
- c) 100 Hz

d) 200 Hz

Answer: c) 100 Hz

Explanation: Frequency = $\frac{50}{0.5} = 100$ Hz.

25. **Frequency-wavelength relation at constant speed?**

- a) Directly proportional
- b) Inversely proportional
- c) Equal
- d) Unrelated

Answer: b) Inversely proportional

Explanation: $f \propto \frac{1}{\lambda}$ when $v = f\lambda$.

26. **Minimum distance for echo in air (speed = 350 m/s)? (Application)**

- a) 17.5 m
- b) 35 m
- c) 70 m
- d) 10 m

Answer: a) 17.5 m

Explanation: Distance = $\frac{350 \times 0.1}{2} = 17.5$ m.

27. **Distance to reflecting surface if echo is heard after 1 s (350 m/s)? (Application)**

- a) 175 m
- b) 350 m
- c) 87.5 m
- d) 700 m

Answer: a) 175 m

Explanation: Distance = $\frac{350 \times 1}{2} = 175$ m.

28. **Why are cinema hall walls rough? (Application)**

- a) Increase echo
- b) Reduce reverberation
- c) Amplify sound
- d) Block sound

Answer: b) Reduce reverberation

Explanation: Rough walls scatter sound for clearer audio.

29. **What is the human audible frequency range?**

- a) 20 Hz to 200 Hz

- b) 20 Hz to 20 kHz
- c) 200 Hz to 200 kHz
- d) 2 kHz to 20 kHz

Answer: b) 20 Hz to 20 kHz

Explanation: This is the human hearing range.

30. **A SONAR wave (1522 m/s) returns in 0.4 s. Distance to object? (Application)**

- a) 152.2 m
- b) 304.4 m
- c) 608.8 m
- d) 76.1 m

Answer: b) 304.4 m

Explanation: Distance = $\frac{1522 \times 0.4}{2} = 304.4 \text{ m}$.

31. **Which instrument uses resonance to amplify sound? (Application)**

- a) Telescope
- b) Guitar
- c) Microscope
- d) Thermometer

Answer: b) Guitar

Explanation: The guitar's body resonates with strings to amplify sound.