

Extended Response

13.1 Types of Waves 63.

Why can light travel through outer space while sound cannot?

- a. Sound waves are mechanical waves and require a medium to propagate. Light waves can travel through a vacuum.
- b. Sound waves are electromagnetic waves and require a medium to propagate. Light waves can travel through a vacuum.
- c. Light waves are mechanical waves and do not require a medium to propagate; sound waves require a medium to propagate.
- d. Light waves are longitudinal waves and do not require a medium to propagate; sound waves require a medium to propagate.

64.

Do periodic waves require a medium to travel through?

- a. No, the requirement of a medium for propagation does not depend on whether the waves are pulse waves or periodic waves.
- b. Yes, the requirement of a medium for propagation depends on whether the waves are pulse waves or periodic waves.

65.

How is the propagation of sound in solids different from that in air?

- a. Sound waves in solids are transverse, whereas in air, they are longitudinal.
- b. Sound waves in solids are longitudinal, whereas in air, they are transverse.
- c. Sound waves in solids can be both longitudinal and transverse, whereas in air, they are longitudinal.
- d. Sound waves in solids are longitudinal, whereas in air, they can be both longitudinal and transverse.

13.2 Wave Properties: Speed, Amplitude, Frequency, and Period 66.

A seagull is sitting in the water surface and a simple water wave passes under it. What sort of motion does the gull experience? Why?

- a. The gull experiences mostly side-to-side motion and moves with the wave in its direction.
- b. The gull experiences mostly side-to-side motion but does not move with the wave in its direction.
- c. The gull experiences mostly up-and-down motion and moves with the wave in its direction.
- d. The gull experiences mostly up-and-down motion but does not move in the direction of the wave.

67.

Why does a good-quality speaker have a woofer and a tweeter?

- a. In a good-quality speaker, sounds with high frequencies or short wavelengths are reproduced accurately by woofers, while sounds with low frequencies or long wavelengths are reproduced accurately by tweeters.
- b. Sounds with high frequencies or short wavelengths are reproduced more accurately by tweeters, while sounds with low frequencies or long wavelengths are reproduced more accurately by woofers.

68.

The time difference between a 2 km/s S-wave and a 6 km/s P-wave recorded at a certain point is 10 seconds. How far is the epicenter of the earthquake from that point?

- a. 15 m
- b. 30 m
- c. 15 km
- d. 30 km

13.3 Wave Interaction: Superposition and Interference 69.

Why do water waves sometimes appear like a complex criss-cross pattern?

- a. The crests and the troughs of waves traveling in the same direction combine to form a criss-cross pattern.
- b. The crests and the troughs of waves traveling in different directions combine to form a criss-cross pattern.

70.

What happens when two dissimilar waves interfere?

- a. pure constructive interference
- b. pure destructive interference
- c. a combination of constructive and destructive interference

71.

Occasionally, during earthquakes, areas near the epicenter are not damaged while those farther away are damaged. Why could this occur?

- a. Destructive interference results in waves with greater amplitudes being formed in places farther away from the epicenter.
- b. Constructive interference results in waves with greater amplitudes being formed in places farther away from the epicenter.
- c. The standing waves of great amplitudes are formed in places farther away from the epicenter.
- d. The pulse waves of great amplitude are formed in places farther away from the epicenter.

72.

Why does an object appear to be distorted when you view it through a glass of water?

- a. The glass and the water reflect the light in different directions. Hence, the object appears to be distorted.
- b. The glass and the water absorb the light by different amounts. Hence, the object appears to be distorted.
- c. Water, air, and glass are media with different densities. Light rays refract and bend when they pass from one medium to another. Hence, the object appears to be distorted.
- d. The glass and the water disperse the light into its components. Hence, the object appears to be distorted.