Name: _____ **Date:** _____

Answer Key: A Sonic Boom in the Kitchen: 10th Grade Wave Physics Quiz

Identify core differences between seismic mechanical waves and electromagnetic radiation while calculating basic wave speed and frequency relationships.

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1. When a specialized sonar device pulses underwater to map the seafloor, what type of wave is primarily being utilized?

Answer: B) Mechanical longitudinal wave

Sound waves, including sonar, are mechanical waves that require a medium (like water) and transport energy through longitudinal compressions.

2. Light waves from a remote star are capable of traveling through the vacuum of space because they do not require a physical medium.

Answer: A) True

Light is an electromagnetic wave consisting of oscillating electric and magnetic fields, allowing it to propagate through a vacuum.

3. The _____ of a wave is defined as the number of complete cycles that pass a stationary point in one second.

Answer: C) Frequency

Frequency measures the rate of oscillation and is typically expressed in Hertz (Hz), representing cycles per second.

4. Why does a straw appearing in a glass of water look 'broken' at the water's surface?

Answer: D) Refraction due to change in wave speed

Refraction occurs when light changes speed as it moves from one medium (air) into another (water), causing the light path to bend.

5. In a transverse wave, the individual particles of the medium move _____ to the direction of the wave's energy transfer.

Answer: B) Perpendicular

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Transverse waves, like those on a plucked violin string, feature displacement that is at a right angle (perpendicular) to the path of the wave.

6. Increasing the amplitude of a sound wave will directly result in a higher pitch heard by the human ear.

Answer: B) False

Amplitude corresponds to the loudness or intensity of a sound; frequency is what determines the perceived pitch.

7. Which of these represents the correct relationship between wave speed (v), frequency (f), and wavelength (λ)?

Answer: C) $v = f * \lambda$

The wave equation states that speed is the product of frequency and wavelength.

8. When an opera singer maintains a note that causes a crystal glass to vibrate and eventually shatter, the phenomenon is called _____.

Answer: A) Resonance

Resonance occurs when the frequency of an external force matches the natural frequency of an object, increasing its amplitude of vibration.

9. Blue light has a shorter wavelength and higher frequency compared to red light on the visible spectrum.

Answer: A) True

In the visible spectrum, red has the longest wavelength/lowest frequency, while violet and blue have the shortest wavelengths/highest frequencies.

10. If you are standing on a train platform and a whistling train speeds away from you, how does the sound change for you?

Answer: C) The pitch appears to drop

According to the Doppler Effect, as a source moves away, the sound waves are stretched, resulting in a lower observed frequency or pitch.