

Name: \_\_\_\_\_ Date: \_\_\_\_\_

## Blast Through the Wavefront: 10th Grade Wave Physics Gauntlet

Quantify the energy of the electromagnetic spectrum and analyze sonic interference patterns through rigorous mathematical application and conceptual synthesis.

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**1. A fiber optic cable utilizes total internal reflection to transmit data. Which condition must be met for this phenomenon to occur as light moves from the core to the cladding?**

- A. The angle of incidence must be less than the critical angle.
- B. The core must have a higher refractive index than the cladding.
- C. The light must be polarized vertically before entering the cable.
- D. The cladding must have a higher refractive index than the core.

**2. In the context of the Doppler Effect, if an observer moves toward a stationary sound source, the perceived \_\_\_\_\_ of the sound increases.**

- A. Amplitude
- B. Wavelength
- C. Frequency
- D. Speed

**3. Light waves are considered longitudinal waves because the oscillations of the electric and magnetic fields are parallel to the direction of energy transfer.**

- A. True
- B. False

**4. Two coherent sound sources produce waves that arrive at a point in space out of phase by exactly 180 degrees. What is the observable result at that specific point?**

- A. Constructive interference resulting in a louder sound.
- B. A 'beat' frequency equal to the difference of the two sources.
- C. Destructive interference resulting in a localized point of silence.
- D. The conversion of longitudinal waves into transverse waves.

**5. The bending of light as it passes through a narrow aperture or around the edge of an obstacle is known as \_\_\_\_\_.**

- A. Refraction
- B. Diffraction
- C. Dispersion
- D. Attenuation

**6. The speed of sound generally increases as it moves from a gas into a solid material like steel.**

- A. True
- B. False

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**7. Which of the following occurs when the frequency of an external force matches the natural frequency of an object?**

- A. Polarization
- B. Damping
- C. Resonance
- D. The Photoelectric Effect

**8. In the electromagnetic spectrum, as the wavelength of a wave decreases, the \_\_\_\_\_ of that wave must increase.**

- A. Velocity
- B. Period
- C. Amplitude
- D. Frequency

**9. A student notices that a straw appears 'broken' when submerged in a glass of water. Which wave property explains this visual distortion?**

- A. Reflection
- B. Refraction
- C. Specular scattering
- D. Rarefaction

**10. According to the wave model of light, brightness is directly related to the frequency of the light wave.**

- A. True
- B. False