Name: _____ **Date:** _____

Solve the Invisible Pulse: Your 9th Grade Wave Mechanics Forensic

Analyze acoustic impedance in medical imaging and calculate photonic energy shifts in astronomical spectrographs to bridge the gap between abstract physics and real-world application.

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1. In medical ultrasonography, why is a specialized gel applied to the skin before the transducer emits high-frequency sound waves?

A. To increase the frequency of the sound waves through the Doppler effect
B. To minimize reflection caused by the change in acoustic impedance between air and skin
C. To convert longitudinal mechanical waves into electromagnetic transverse waves
D. To slow down the wave speed so the computer can process the image faster

2. A photon of ultraviolet light carries more energy than a photon of infrared light because its frequency is higher.

A. True
B. False

3. When a light wave moves from a vacuum into a denser medium like diamond, its speed decreases and its _____ changes, while its frequency remains constant.

A. Period
B. Amplitude
C. Wavelength
D. Polarization

4. An astronomer notices a 'redshift' in the light from a distant galaxy. This phenomenon is an application of which wave principle?

A. Destructive Interference
B. Specular Reflection
C. The Doppler Effect
D. Total Internal Reflection

5. Sound waves can travel through the vacuum of outer space if their amplitude is high enough.

A. True
B. False

6. In an auditorium, why are soft panels often placed on the back walls to prevent a 'muddy' sound?

A. To increase constructive interference
B. To reduce reverberation caused by multiple reflections
C. To polarize the sound waves before they reach the audience
D. To bend the sound waves around the corners of the room

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7. The property of a light wave that determines its color is its _____, while the property that determines its brightness is its amplitude.

A. Frequency
B. Velocity
C. Medium
D. Mass

8. In a fiber optic cable used for high-speed internet, light stays inside the glass core due to which specific phenomenon?

A. Diffraction
B. Rarefaction
C. Total Internal Reflection
D. The Photoelectric Effect

9. Polarization is a property that can be observed in sound waves as well as light waves.

A. True
B. False

10. Noise-canceling headphones utilize the principle of _____ interference to create a wave that is 180 degrees out of phase with ambient noise.

A. Constructive
B. Destructive
C. Electromagnetic
D. Harmonic