Name: _____ **Date:** _____

Wave Interference and Wavefront Analysis: 11th Grade Physics Quiz

Junior physics students calculate beat frequencies, analyze thin-film interference, and determine refractive indices during this formal summative assessment.

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1. An observer moving at a high velocity toward a stationary monochromatic light source will perceive a change in the light's color toward the blue end of the spectrum. Which physical principle explains this shift?

A. Total internal reflection within the observer's frame
B. Quantization of energy levels in the source atoms
C. Relativistic Doppler effect causing frequency compression
D. Constructive interference of the incoming wavefronts

2. A piano tuner hears 4 beats per second when striking a 440 Hz tuning fork and a slightly out-of-tune piano string simultaneously. If the string is too sharp, its frequency is _____ Hz.

A. 436
B. 444
C. 110
D. 1760

3. According to Huygens' Principle, every point on a wavefront can be considered a secondary source of spherical wavelets.

A. True
B. False

4. A thin film of oil (n = 1.45) floats on water (n = 1.33). When viewed from above, certain colors are missing from the reflected light. This phenomenon is primarily caused by:

A. Destructive interference based on path length difference
B. Diffuse reflection from the water's surface
C. Polarization by scattering within the oil layer
D. The photoelectric effect at the oil-air interface

5. In a Young's Double Slit experiment, if the distance between the two slits is decreased while keeping the light source the same, the spacing between the fringes on the screen will _____.

A. Decrease
B. Increase
C. Remain constant
D. Become invisible

6. Diffraction is much more noticeable in sound waves than in light waves in everyday life because sound waves have much larger wavelengths.

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A. True
B. False

7. When a light ray enters a diamond (n=2.42) from air (n=1.00) at an angle, which of the following remains constant?

A. Wavelength
B. Velocity
C. Frequency
D. Amplitude

8. Consider a standing wave in an open-ended organ pipe. The locations where the air molecules experience the maximum displacement are called _____.

A. Nodes
B. Antinodes
C. Harmonics
D. Overtones

9. Light waves must travel through a medium like the luminiferous ether to propagate through the vacuum of space.

A. True
B. False

10. A technician uses an oscilloscope to analyze a sound wave and notices the period of the wave has halved. What has happened to the pitch?

A. It has decreased by an octave
B. It has become quieter
C. It has increased by an octave
D. It has become louder