

Quiz.

1. Which of the following is a property of light waves, but not of sound waves?
 - a. frequency
 - b. wavelength
 - c. amplitude
 - d. polarization
 - e. none of these

2. In coherent light all the waves have the same
 - a. wavelength only.
 - b. initial phase only.
 - c. wavelength and initial phase.

3. Light behaves as a
 - a. particle only.
 - b. wave only.
 - c. particle and a wave.

4. Which type of waves can be polarized?
 - a. transverse only
 - b. longitudinal only
 - c. all types of waves

5. The different colors in soap bubbles are produced by
 - a. thin film interference.
 - b. interferometry.
 - c. single slit diffraction.

6. Interferometers are used to (Circle all that apply.)
 - a. amplify signals.
 - b. measure small shifts.
 - c. polarize light.

7. Interference is a phenomenon of all waves. It is essentially
 - a. the bending of light around an obstacle.
 - b. the interaction between two waves.
 - c. how we polarize light.

8. According to Huygens's principle,
 - a. light behaves as a particle.
 - b. only transverse waves can experience interference.
 - c. every point of a wave front can be the origin of another wave.

9. Some double-pane airplane windows darken when the inner pane is rotated. These panes are
- a. thin films.
 - b. Polaroid filters.
 - c. optical fibers.

Answer Key.

1. d)

Transverse waves can be polarized, but not longitudinal waves.

2. c)

In order for light to be made to have both perfectly constructive and perfectly destructive interference (after passing through a double-slit, for example) it must consist of waves with only one wavelength, and they must all be in phase.

3. c)

The duality or dual nature of light is that it behaves as a particle *and* a wave.

4. a)

Again, only transverse waves can be polarized.

5. a)

When white light reflects off of both surfaces of a thin film the two reflected rays converge in your eye. The destructive interference of one color subtracts that color from the white light so that you see the canceled light's complementary color.

6. a) & b)

Interferometers used in radio telescopes resolves and amplifies the weak signal while interferometers in gravity-wave detectors detect small shifts in the gravitational field.

7. b)

Interference occurs when two waves overlap, and diffraction is the bending of light around an obstacle, although diffraction allows one light wave to interfere with itself. Polarization is a filtering process that only allows light aligned with the orientation of the filter to pass through.

8. c)

Christian Huygens believed that light behaved as a wave and that every point of a wavefront was a potential spherical wavelet that could cause another wave.

9. b)

When light is passed through perpendicular polarizers with no polarizer in between, then all of the light will be cancelled since none of the light that passes through the first filter can pass through the second one.