Advanced High School Optics

Physics · Answer Key · 10 Questions

1. When light passes from a medium with a higher refractive index to a lower refractive index, what is the 'critical angle' defined as?

A) The angle of incidence where the angle of refraction is 90 degrees
B) The angle at which light undergoes total internal reflection
C) The angle of refraction equal to the angle of incidence
D) The maximum angle of deviation for a prism

2. In Young's Double Slit Experiment, if the distance between the two slits is decreased while keeping the distance to the screen constant, what happens to the fringe width?

A) It remains unchanged
B) It decreases
C) It increases
D) It fluctuates randomly

3. Which phenomenon is responsible for the 'twinkling' of stars as viewed from Earth's surface?

A) Atmospheric dispersion
B) Atmospheric refraction
C) Diffraction of light by air molecules
D) Reflection off high-altitude ice crystals

4. What is the primary condition required for constructive interference of light waves reflecting off a thin film?

A) The path difference must be an odd multiple of half the wavelength
B) The path difference must be an integer multiple of the wavelength
C) The refractive index of the film must be lower than the surrounding medium
D) The film must be perfectly opaque

5. According to Malus's Law, if the intensity of polarized light passing through an analyzer is proportional to the square of the cosine of the angle between the transmission axes, what is the intensity if the angle is 90 degrees?

A) Maximum
B) Half of the initial intensity
C) Zero
D) One-fourth of the initial intensity

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6. Which type of lens aberration occurs because different wavelengths of light are refracted by different amounts by a single lens?

A) Spherical aberration
B) Coma
C) Chromatic aberration
D) Astigmatism

7. For a concave mirror, where must an object be placed to produce a real, inverted, and diminished image?

A) At the focal point
B) Between the focal point and the mirror
C) Beyond the center of curvature
D) At the center of curvature

8. What is the relationship between the refractive index 'n' of a material and the speed of light 'v' in that material?

A) n is inversely proportional to v
B) n is directly proportional to v
C) n is proportional to the square of v
D) n is independent of v

9. In the context of the electromagnetic spectrum, what is the approximate wavelength range of visible light in a vacuum?

A) 100 nm to 300 nm
B) 400 nm to 700 nm
C) 800 nm to 1200 nm
D) 10 nm to 100 nm

10. What happens to the frequency of light when it enters a denser medium from a vacuum?

A) It increases
B) It decreases
C) It remains the same
D) It becomes zero

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