Quiz Interference

Name___________________________

1) Which one of the following properties of light is evidence of the wave nature of light?
   A) Reflection of light
   B) Diffraction of light
   C) Dispersion of light
   D) Interference of light
   Answer: D

2) Which one of the following is true of two waves to meet constructively?
   A) The phase difference between the two waves is \( \frac{\pi}{4} \).
   B) The phase difference between the two waves is \( 2\pi \).
   C) The phase difference between the two waves is \( \frac{\pi}{2} \).
   D) The phase difference between the two waves is \( \frac{5\pi}{2} \).
   Answer: B

3) Which one of the following mathematical expressions is correct for destructive interference for two beams of light in the double slit experiment?
   A) Path Difference = \((m - 1/2)\lambda\), \(m = 0, \pm1, \pm2, \ldots\)
   B) Path Difference = \(\lambda/m\), \(m = 0, \pm1, \pm2, \ldots\)
   C) Path Difference = \(m\lambda\), \(m = 0, \pm1, \pm2, \ldots\)
   D) Path Difference = \(m/\lambda\), \(m = 0, \pm1, \pm2, \ldots\)
   Answer: A

4) In the two-slit experiment, for the condition of dark fringes, the value of \( m = \pm4 \) corresponds to a path difference of
   A) \((1/2)\lambda\)
   B) \((3/2)\lambda\)
   C) \((5/2)\lambda\)
   D) \((7/2)\lambda\)
   Answer: D

5) In a two-slit experiment, the slit separation is \(2.20 \times 10^{-5}\) m. The interference pattern is created on a screen that is 2.00 m away from the slits. If the 7th bright fringe on the screen is a linear distance of 10.0 cm away from the central fringe, what is the wavelength of the light?
   A) 147 nm
   B) 157 nm
   C) 167 nm
   D) 177 nm
   Answer: B

6) Estimate the distance (in cm) between the central bright region and the third dark fringe on a screen 5.00 m from two double slits 0.500 mm apart illuminated by 500-nm light.
   a. 3.47
   b. 2.15
   c. 1.75
   d. 1.50
   e. 1.25
   e

7) For small angle approximations
a. the angle must be 10° or less
b. the angle must be 10 radians or less
c. the angle must be 1° or less
d. the angle must be 1 radian or less
e. the angle must be 45° or less

8) Two slits separated by 0.10 mm are illuminated with green light (\(\lambda = 540\) nm). Calculate the distance (in cm) from the central bright-region to the fifth bright band if the screen is 1.0 m away.

a. 2.3
b. 2.5
c. 2.7
d. 2.1
e. 2.0

9) In a double slit experiment, the distance between the slits is 0.2 mm and the distance to the screen is 150 cm. What is the phase difference (in degrees) between the waves from the two slits arriving at a point P when the angular distance of P is 10° relative to the central peak, and the wavelength is 500 nm? (Convert your result so the angle is between 0 and 360°.)

a. 145°
b. 155°
c. 165°
d. 135°
e. 95°

10) If the wavelength of light in Young's two-slit experiment is increased, which one of the following statements is true of the interference pattern?
A) The distance between the maxima stays the same.
B) The distance between the minima stays the same.
C) The distance between the maxima increases.
D) The distance between the minima increases.
Answer: C

11) If the distance between the slits and the screen is increased in Young's two-slit experiment, which one of the following statements is true of the interference pattern?
A) The distance between the minima stays the same.
B) The distance between the minima decreases.
C) The distance between the maxima stays the same
D) The distance between the maxima increases.
Answer: D