

1. In the equation  $\sin q = \lambda/a$  for single-slit diffraction,  $q$  is:
  - A) the angle to the first minimum
  - B) the angle to the second maximum
  - C) the phase angle between the extreme rays
  - D)  $N\pi$  where  $N$  is an integer
  - E)  $(N + 1/2)\pi$  where  $N$  is an integer
2. Radio waves are readily diffracted around buildings whereas light waves are negligibly diffracted around buildings. This is because radio waves:
  - A) are plane polarized
  - B) have much longer wavelengths than light waves
  - C) have much shorter wavelengths than light waves
  - D) are nearly monochromatic (single frequency)
  - E) are amplitude modulated (AM)
3. No fringes are seen in a single-slit diffraction pattern if:
  - A) the screen is far away
  - B) the slit width is greater than a wavelength
  - C) the slit width is less than a wavelength
  - D) the wavelength is less than the distance to the screen
  - E) none of the above (fringes are always seen)
4. A plane wave with a wavelength of 500 nm is incident normally on a single slit with a width of  $5.0 \times 10^{-6}$  m. Consider waves that reach a point on a far-away screen such that rays from the slit make an angle of  $1.0^\circ$  with the normal. The difference in phase for waves from the top and bottom of the slit is:
  - A) 0
  - B) 0.55 rad
  - C) 1.1 rad
  - D) 1.6 rad
  - E) 2.2 rad
5. If we increase the wavelength of the light used to form a double-slit diffraction pattern:
  - A) the width of the central diffraction peak increases and the number of bright fringes within the peak increases
  - B) the width of the central diffraction peak increases and the number of bright fringes with the peak decreases
  - C) the width of the central diffraction peak decreases and the number of bright fringes within the peak increases
  - D) the width of the central diffraction peak decreases and the number of bright fringes within the peak decreases
  - E) the width of the central diffraction peak increases and the number of bright fringes within the peak stays the same

6. When 450-nm light is incident normally on a certain double-slit system the number of interference maxima within the central diffraction maximum is 5. When 900-nm light is incident on the same slit system the number is:
- A) 2
  - B) 3
  - C) 5
  - D) 9
  - E) 10
7. The resolving power of a telescope can be increased by:
- A) increasing the objective focal length and decreasing the eyepiece focal length
  - B) increasing the lens diameters
  - C) decreasing the lens diameters
  - D) inserting a correction lens between objective and eyepiece
  - E) none of the above
8. Monochromatic light is normally incident on a diffraction grating that is 1 cm wide and has 10,000 slits. The first order line is deviated at a  $30^\circ$  angle. What is the wavelength, in nm, of the incident light?
- A) 300
  - B) 400
  - C) 500
  - D) 600
  - E) 1000

**Answer Key --**

- 1. A
- 2. B
- 3. C
- 4. C
- 5. E
- 6. C
- 7. B
- 8. C