

- 1) Which theory of light, the **wave** or **particle** theory, best explains the following phenomena?
  - a) the diffraction of light when light is sent through a pin-sized hole? \_\_\_\_\_
  - b) the photoelectric effect? \_\_\_\_\_
  - c) the emission of electromagnetic radiation by an excited atom? \_\_\_\_\_
  
- 2) The minimum threshold frequency of zinc for the photoelectric effect is in the ultraviolet range. Which of the following will occur if x-rays are shined on a zinc metal surface?
  - (A) No electrons will be emitted from the metal.
  - (B) Electrons will be released from the metal but have no kinetic energy.
  - (C) Electrons will be released from the metal and have kinetic energy.
  - (D) Electrons will be released from the metal but then will immediately be recaptured by the zinc atoms.
  
- 3) The metal sodium has a threshold frequency which corresponds to yellow light. Describe what will happen to the electrons in the sodium metal if....
  - (a) yellow light is shined on the sodium surface:
  
  - (b) red light is shined on the metal surface:
  
  - (c) green light is shined on the metal surface:
  
  - (d) green light with a greater intensity (than in previous question) is shined on the metal surface.
  
- 4) Which of the following is true of the energy of a photon?
  - (A) It is proportional to the wavelength of the photon.
  - (B) It is inversely proportional to the wavelength of the photon.
  - (C) It is inversely proportional to the square of the wavelength of the photon.
  - (D) It is proportional to the mass of the photon.
  
- 5) Describe why the photoelectric effect gives evidence that light can exhibit properties of particles.