Unit 16: Interference of light, both constructive, & destructive via single, and double slits.

Name: _____
Per _____ Date _____

What to do: These questions will give you practice in handling data about the two-slit experiment.

1. The third-order fringe of 650 nm light is observed at an angle of 15 degrees when the light falls on two narrow slits. How far apart are the slits? *Ans: 7.5 μm*

2. A parallel beam of light from a He-Ne laser, with a wavelength 656 nm, falls on two very narrow slits 0.05 mm apart. How far apart are the fringes in the center of the pattern if the screen is 2.6 m away? *Ans: 3.4 cm*

3. In a water tank experiment, water waves are generated with their crests 2.5 cm apart and parallel. They pass through two openings 5.0 cm apart in a long wooden board. If the end of the tank is 2.0 m beyond the boards, where would you stand, relative to the "straight-through" direction, so that you received little or no wave action? *Ans: stand 0.52 m, or 2.3 m away from the line perpendicular to the board midway between the openings.*

4. In a double-slit experiment it is found that blue light of wavelength 460 nm give a second-order maximum at a certain location on the screen. What wavelength of visible light would have a minimum at the same location? *Ans: 613 nm*

Unit 16: Interference of light, both constructive, & destructive via single, and double slits.

Name: _____
Per _____ Date _____

5. If 520-nm light falls on a single slit 0.0440 mm wide, what is the angular width of the central diffraction peak? *Ans: 1.35 degrees*

6. Light of wavelength 550-nm falls on a slit that is 3.5×10^{-3} mm wide. How far from the central maximum will the first diffraction maximum fringe be if the screen is 10 m away? *Ans: 2.4 m*

7. Monochromatic light of wavelength 633 nm falls on a slit. If the angle between the first bright fringes on either side of the central maximum is 19.5 degrees, what is the slit width? *Ans: 5.61 μm*

8. How many lines per centimeter does a grating have if the third-order occurs at a 23 degree angle for 630-nm light? *Ans: 2.07×10^3 lines/cm.*