Name: _____

Class: _____

Due Date: _____

Physics Topic 33 – One Slit Diffraction

Answer the following questions. The solutions to this worksheet can be found on the YouTube channel Go Physics Go.

1. C: Define *diffraction*. Give two examples.

2. C: **Use a pencil!** Draw the lab setup and the *intensity vs. distance* graph for single slit diffraction.

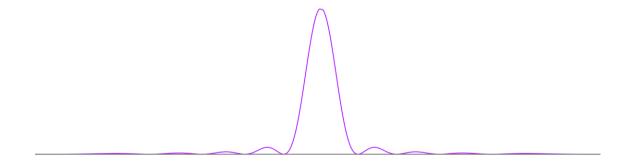3. C: Derive the equation $\theta = \frac{\lambda}{b}$. Define each variable.

4. C: What will happen to the thickness of the central maximum $2\theta = \frac{2\lambda}{b}$ if

   a. the wavelength λ of a wave passing through a single slit is increased?

   b. the wavelength λ of a wave passing through a single slit is decreased?

   c. the opening of a single slit b is increased?

   d. the opening of a single slit b is decreased?

5. C: What happens when white light passes through a single slit?

6. C: Play with the following simulation. Draw and record what you learn.

   https://sciencesims.com/sims/single-slit/
   ■ Describe the interference pattern as the wavelength increases. What happens to the distance between the maximums? Does this agree with the equation?
   ■ Describe the interference pattern as the slit width increases. What happens to the distance between the maximums? Does this agree with the equation?

7. E: A monochromatic light source with a wavelength of 5,500 Angstroms is shined through a single slit onto a screen placed 75.0 cm from the slit. The distance between the center of the central antinode (central maximum) and the first node (first minimum) is measured to be 1.10 mm.

   a. What is the width of the single slit?

b. How far from the center of the central antinode (central maximum) will the fourth order node (fourth minimum) be found?

c. How far from the center of the central antinode (central maximum) will the second order antinode (second maximum) be found?