AP Physics B, Name: _____
Experiment, Interference and Diffraction

The purpose of this experiment is to measure the wavelength of the light emitted from a laser. We will use both multiple-slit and single-slit interference to make this measurement. For each, the pattern of antinodes and nodes obey

$$d \sin \theta = m\lambda$$

or

$$a \sin \theta = m\lambda$$

Where *d* is the distance between the slits for the mulit-slit and *a* is the slit width for the single-slit.

First, find the multiple-slit accessory and mount it on the optics bench. Determine the distance between the slits and the screen and note the distance between the slits for the grating with 5 slits. Also record the wavelength of the laser (written on the back near the switch). Turn on the laser and create an interference pattern on the screen. Trace the pattern onto a sheet of paper.

Second, find the single-slit accessory and mount it on the optics bench. Determine the distance between the slits and the screen and note the width of the slit. Turn on the laser and create an interference pattern on the screen. Trace the pattern onto a piece of paper.

For each pattern that you traced, measure the distance from the central bright spot to corresponding bright or dark spots. Make a data table with these x values and the corresponding m values. Finally, using graphs, find the wavelength of the laser from your two sets of data.

(1) Title, Names, etc.
(2) Purpose
(3) Method
(4) Data
(5) Analysis
Include your graphs with appropriate regression equations, etc. Also, show your calculations for the wavelength and compare your calculated value with the given value printed on the laser.
(6) Conclusion
You have measured the same quantity in two different ways. Evaluate the two procedures. Which method is more reliable? Why? Did you make any approximations in your calculations? If so, can you justify them?

Congratulations! You have completed the final experiment in AP Physics B ☺.