**Physics**

**Group quiz on Diffraction, Resolution, and Resolvance**

Name

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**12F1 – Double Slit Diffraction**

12F1.1. A Parallel beam of light from a laser with a wavelength of 632.8 **nm** falls on two very narrow slits 0.0320 **mm** apart.

A. The bright fringes are 6.7 cm apart on a screen some distance away. What is the distance to the screen?

B. What angle separates the central fringe, and the third order fringe? What distance is this on the screen?

12F1.2. Two narrow slits are separated by 0.0895 mm are illuminated by 320. nm light.

A. Find the distance between adjacent bright fringes on a screen 2.10 m away.

B. What angle separates the central bright spot and the 4th order fringe?

**12F2-Single Slit Diffraction**

12F2.1. If 410. nm light falls on a slit 0.00320 mm wide,

A. What is the full angular width of the central diffraction peak?

B. What is its width on a screen that is 4.50 m away?

C. What distance separates the central maximum from the second minimum on a screen 7.10 m away?

**12F3 – Diffraction Gratings**

12F3.1. A diffraction grating produces a third order spectral line at 23.0o for 815 nm light.

A. What is the distance between the slits or lines?

B. How many lines are there per cm?

**12N – Rayleigh Criterion**

12N.1. What is the angular resolution of an 8 inch (0.203 m) telescope? (use 550 nm as the wavelength)

12N.2. You are trying to resolve two objects 1.20 mm apart (1.20x10-3 m) on a hill that is 5000. m away. What diameter telescope do you need to resolve them. (use 550 nm as the wavelength)

hint θ = s/r = (1.20x10-3 m)/(5000. m)

**12O – Diffraction Grating Resolvance**

12O.1. A diffraction grating is used to resolve two lines in a spectrum in the first order. The two lines have wavelengths of 632.185 nm and 631.341 nm. Determine the minimum number of slits in the grating that will enable the two lines to be resolved.

12O.2. Some 432.7 nm light illuminates 1,112 slits in a diffraction grating. What is the smallest difference in wavelength from this wavelength that the grating can resolve in the second order?