Gen. Phys. II Exam 4 - Chs. 27,28,29 - Wave Optics, Relativity, Quantum Physics April, 2020

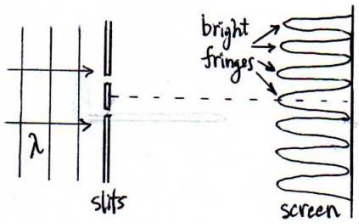
Rec. Time Name

This shows **some** of the possible questions you encountered on the online test. Point values here are arbitrary.

For full credit, make your work clear. Show formulas used, essential steps, and results with correct units and significant figures. Points shown in parenthesis. For TF and MC, choose the *best* answer. Bonus points possible by correctly using prefixes like 2.0 mV, 7.8 MW, 1.6 kΩ, 3.4 μT, etc., in lieu of scientific notation like 2.0×10^{-3} V.

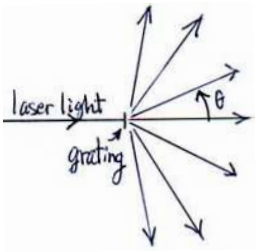
OpenStax Ch. 27 - Wave Properties of Light

1. (5) Two slits separated by 0.240 mm are used in Young's double slit experiment, with light of wavelength 684 nm. What is the spacing (in mm) of adjacent bright fringes on a screen 2.50 m away?



2. (10) Laser light of wavelength 445 nm is passed through a diffraction grating with 8.50×10^3 lines/cm.

a) (5) Determine the linear spacing between the lines on the grating.



b) (5) At what angle from the centerline does the highest order bright fringe appear?

3. (10) Using your eyes with the pupils / irises open to 7.5 mm, you try read a sign 240 m in the distance, using light of wavelength 550 nm.

a) (5) Using Rayleigh's diffraction limit, $\Delta\theta = 1.22\lambda/D$, what is the minimum angular separation of two points that are barely distinguishable, in milliradians?

b) (5) What is the minimum linear separation of two points on the sign that you could resolve? Note that this is also called the "resolving power." It is a length, not an angle!

---

4. (5) What angle is needed between the polarization direction of a light beam and the axis of a polarizing filter to make the emerging intensity 2.50% of the incoming intensity?