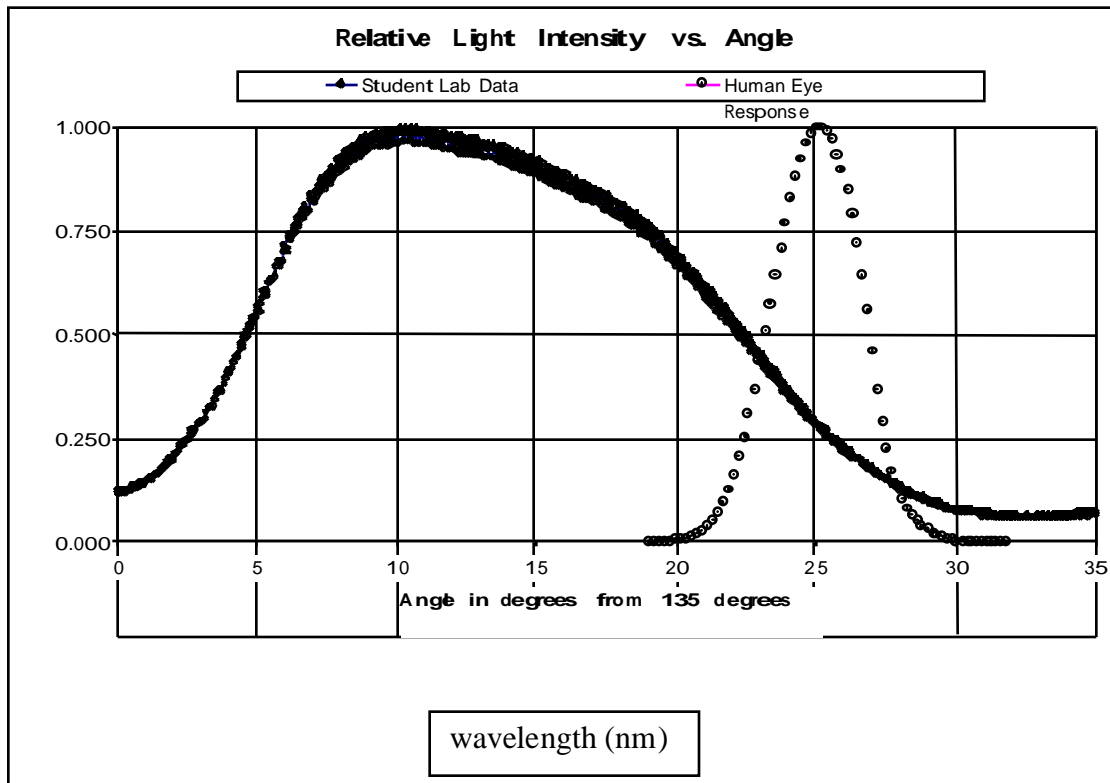


You may earn up to 12 points based on your work.

Shown on the graph below are two sets of light intensity data. One was taken by students in the Physics 142 lab using a spectrophotometer and one represents the response of the human eye to the same light source.



1. Add a new scale (wavelength in nanometers) to the graph shown above. The diffraction grating in the spectrophotometer you used has 600 lines/mm. Remember how the angle you measured in lab (between zero and 35 degrees on the graph) relates to the diffraction angle. In the experimental setup, 180 degrees corresponds to light passing straight through the grating. You began each run at 135 degrees (measured as zero) and moved toward 180 degrees (which would have been measured as 45 degrees). **Show your work for at least three wavelength calculations.**
2. Estimate the wavelengths of the two peaks shown in the graph.
  - What wavelength was measured as most intense by the spectrophotometer?
  - What wavelength appeared most intense to the human eye?
3. Check for overlapping fringes. The peak intensity measured by the spectrophotometer is in the infrared range, so it is invisible to the human eye. But diffraction gratings make more than one bright fringe for each color.
  - What wavelength has a second-order fringe at the spectrometer's peak reading?
  - Is that wavelength visible to the human eye?
  - Do you think the spectrometer is sensitive to that wavelength? (If so, the peak intensity reading is really the sum of the intensities for two wavelengths of light!)
4. Re-compute lab data as wavelengths. In your first laboratory experiment, you recorded the angles of 5-7 bright lines of a mercury-vapor lamp. When you get a chance, copy those angles from your lab notebook.
  - Calculate the wavelength for each line.
  - Compare your calculated wavelengths with the expected wavelengths for mercury lines (found in the instructions for lab 1). Are your calculated values close to those expected?