

Name _____
Lab Partner(s): _____
Date Performed: _____
Date Due: February 28, 2017
Physics 111 Laboratory
Experiment #5
Geometric Optics

Attach your fully labeled and captioned data tables for each part along with any fully labeled and captioned graphical representations of your data that you may have created to the end of this handout.

Honor Code Statement:

1. What assumptions do you need to make to perform this experiment?
2. From your plot, what are the focal lengths of the converging lenses? The actual values of the lenses you used were: $f_A = 127\text{mm}$ & $f_B = 252\text{mm}$. Calculate a percent difference ($\% \text{ difference} = \left| \frac{\text{your value} - \text{actual value}}{\text{actual value}} \right| \times 100\%$) for each of the lenses.

- What are the slopes of your lines? Are they all equal to -1 ? Should they be? Explain? What is the value for the correction to the object distance that you determined? Does it seem like a reasonable value? Comment on your value.
- List your object distance, distance between your lenses, and the distance from the converging lens to the screen on which a real image was formed. What is the value of the virtual object distance for the converging lens? Is it larger than the distance between the lenses? Should it be? Explain. Next, what is the location of the virtual image from the diverging lens? Lastly, what is the focal length of the diverging lens? Show each of these calculations. How does your value for the focal length of the diverging lens compare to the actual value of $f_D = -22\text{mm}$?

- From your scale drawing using the actual value of the focal length of the diverging lens, measure (from the converging lens) the location of the real image that was produced and how does this number correspond to what you actually measured? Comment on your results? If the two values are not reasonably close to each other, explain why they are not.
- Describe your procedure that you used to determine the size of the light bulb filament. From this procedure, what is the size of the light bulb filament? Show all of your calculations below. How reasonable is the value that you determined? Explain.

7. Derive the relationship that you used to determine the focal length of the converging lenses that relates the variables D , s and f . What is the average value of the focal length f for each of your converging lenses? Calculate a percent difference

(% difference = $\left| \frac{\text{your value} - \text{actual value}}{\text{actual value}} \right| \times 100\%$) for each of the lenses and compare to the values given in question 2 above?