PHYSICS IN MOTION
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Unit 6N
Spherical Lenses

Determining the Focal Point of a Convex Lens Lab

Name:

Date:

Objective:

To experimentally determine the focal point of a convex lens.

Materials:

- double convex lens
- lens holder
- index card
- screen holder
- meter stick
- candle

Procedure:

1. Place the lens in the lens holder, light the candle, and put the screen on the opposite side of the lens.
2. The candle will be the object in this laboratory.
3. Adjust the position of the screen so that a clear image of the candle flame is projected onto the screen. *It should clearly be a candle- not just light!*
4. If no image can be formed, your candle may be inside the focal length of your lens. Increase the position of the candle from the lens if no image can be formed.
5. Measure the positions of the candle and the screen from the lens.

   distance to candle = _____ cm distance to screen = _____ cm
6. Repeat the process by changing the position of the candle, and then adjusting the position of the screen so that a clear image is formed. Enter these values in the columns for d_o and d_i in the data table below.

Sample Data:

Trail	d_o (cm)	$1/d_o$ (1/cm)	d_i (cm)	$1/d_i$ (1/cm)	1/f (1/cm)	f (cm)
1						
2						
3						
4						
5						

questions continued on next page

7. Next, use the thin lens equation to determine the focal length of the lens. The equation is:

$$\frac{1}{d_i} + \frac{1}{d_o} = \frac{1}{f}$$

so, the values you will need are $1/d_o$ and $1/d_i$, which are two other columns in the data table above. Use these values and the equation above to then solve for 1/f, and then the focal length of the lens.

Questions to consider:

1. Draw a ray diagram of a real image being formed by the double convex lens.

2. How close to each other were the calculated focal lengths? If you were given a known value of the focal length of the lens, were some values closer than others to this value?

3. Find the average of the focal length values for the five trials. If you were provided a known value, calculate the percent difference between the known value and the average value.

4. Did the size of the flame on the screen change based on where the candle was located? Be specific with your description on where the candle was located relative to the focal length and the center of curvature (twice the focal length).