

Name _____
SI Physics
Period _____

Date _____
Lab #41 (85 pts)
Mrs. Nadworny

Partners:

Due Date _____

Converging Lens

NO Lab Write-Up Required
attach diagram and conclusion

Purpose

- To calculate the focal length of a convex lens.

Research Question

- What is the effect of object distance on image distance?
- What is the effect of object distance on image size?

Materials

- Candle
- Cardboard screen
- Lens holder
- Convex lens
- Screen mount
- Optical bench – Meter Stick and 2 supports
- Scrap paper

Variables (6 pts)

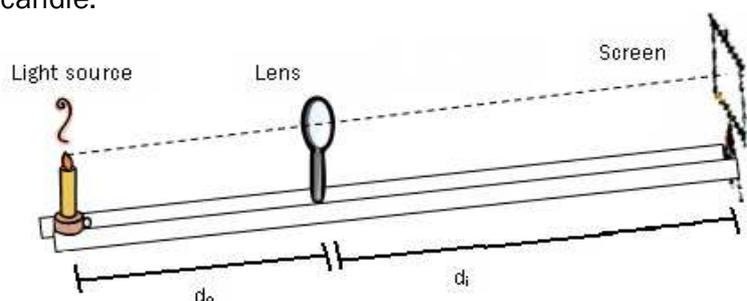
- Independent –
- Dependent –
- Constants/Control –

Hypothesis (2 pts)

Procedure

***Safety concern – all long hair needs to be tied back. Watch your hair and clothing near the candle!**

1. Begin by determining the focal length of the lens. Use the lens to focus the light of a very distant object (parking lot, gym roof) onto the screen.
2. Move the screen back and forth until the image of the distant object is as clear as possible.
3. Measure the distance between the lens and the screen, estimating to the nearest tenth. This is the accepted focal length. Record in the space provided.
4. Arrange your convex lens, meter stick and screen as shown in the diagram. Mount the candle (serving as the object) to one end of the meter stick. **Place scrap paper under the candle to catch any wax drippings.** Light the candle.



- Place your lens at the **center** of the meter stick. Move the candle more than two focal lengths away from the lens. Measure the distance between the object and the lens. Record as *object distance*. Estimate to the nearest tenth.
- On the other side of the lens, focus the image (candle flame) on the screen. Measure the distance between the image (screen) and the lens. Record as *image distance*. Estimate to the nearest tenth.
- Repeat steps 5 – 6 moving the candle successively to positions listed in the data table. Record all data in the table. For any values that cannot be determined, place an X in the box.
- For the last data set**, between F and lens, hold the convex lens in front of a page in a book or this lab. Make sure the distance is less than the focal length. *The image is virtual in this arrangement*. Study the image of the page as seen through the lens. Record your observations in the data table.
- Using the measured values of object and image distance and the lens equations, compute the focal length for each trial. Record your values to the tenths place in the data table.

Data Collection (23 pts) Record Lens Letter _____ (A or B or C)

Accepted focal length _____ (cm) \pm _____ (cm) 2F _____ (cm)

Light Placement	Object distance (cm)	Image distance (cm)	Size (larger/same/smaller)	Type (real/virtual)	Orientation (upright/inverted)	Calculated focal length (cm)
	\pm _____	\pm _____				
Beyond 2F						
At 2F						
Between 2F & F						
At F						X
Between F & lens		X				X

Data Analysis (5 pts)

Show a sample calculation for focal length for **one** trial using the GUESS method and appropriate significant figures. Calculate for the remaining trials and record your data in the table above.

Conclusion (20 pts)

- Using full, complete English sentences, type a conclusion which relates to the purpose of this lab. Your conclusion should be written in paragraphs, following the format below.
 - Paragraph One
 - Restate the purpose of the lab.
 - Restate the research questions. Restate your two hypotheses.
 - Were your hypotheses correct? Use evidence from the lab to support this.
 - Summarize your results, including measured focal length, three calculated focal lengths and three percent errors.
 - Paragraph Two
 - Summarize ideas that were reinforced and/or new concepts that you learned.
 - How does the size of the image change as the object is brought closer to the lens?
 - Anything else?
 - Paragraph Three
 - State two sources of error with the data collection portion of the lab Explain how the errors occurred. Explain how they affected your data (accepted F , d_o , d_i). Explain how they affected your results (calculated F). Do not blame your calculations.