Name(s) > _____

Images From Lenses

Part 1: Intro to Lenses

You should have 4 different lenses. Try using each as a magnifying glass and describe your results.

Lens A  f = _____ cm

Lens B  f = _____ cm

Lens C  f = _____ cm

Lens D  f = _____ cm

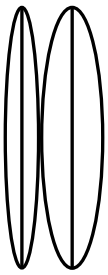
Part 2: Estimating the focal length of each lens.

Use the view out an open window as your object. Place the lens into the lens holder and slowly move the screen away until a bright image appears on your screen. The distance from the lens to the screen is approximately the focal length of the lens. Record the values on the sketch above

Write a statement that describes the relation between the curvature of the lens to the focal length.

Place lens A and B next to each other as show here.

Predict the combined focal length and explain your prediction.



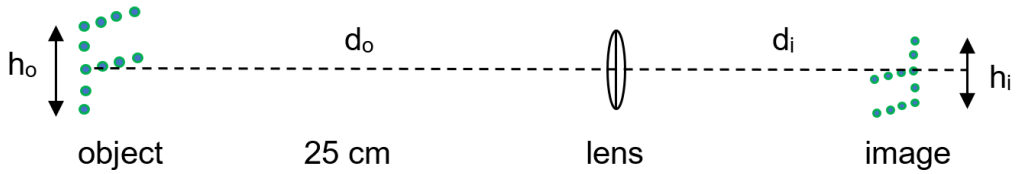
What is the measured combination focal length?

Part 3: Measuring Real Images

Select Lens A or Lens B for this part.

Place the "F" shaped object at the 0 cm position and the lens at the 25 cm position as shown below. ($\mathbf{d_o}$ = 25 cm)

Start the screen next to the lens and slowly move the screen away until a bright and sharp image appears on the screen. Measure d_i and also h_i and record in the data table below. Repeat this procedure to complete the data table below.



$\mathbf{h_o}$ = _____ cm

d_o (cm)	$\mathbf{d_i}$ (cm)	$\mathbf{h_i}$ (cm)
25		
35		
45		
55		

Write a statement that describes how the image distance ($\mathbf{d_i}$) depends on the value of $\mathbf{d_o}$.

Write a statement that describes how the height of the image ($\mathbf{h_i}$) depends on the image distance ($\mathbf{d_i}$).

Recall the pinhole image equation:

$$\frac{h_i}{h_o} = \frac{d_i}{d_o}$$

Substitute the values from one trial to see if this pinhole equation is valid for your lens.

Part 4: How Lenses Produce Images

Keep the object at 0 cm and the lens holder at the 25 cm position. Now **remove the lens and replace it with a notecard with 3 holes (card B)**.

Place the screen next to card B and slowly move the screen away from the card. Describe what happens on the screen:

Return the screen next to the card. Now return the lens to its holder. Slowly move the screen away from the lens/card B and observe the screen. Describe what you see.

Watch the screen closely as you remove card B from the holder. What do you see?

Does the lens produce a taller image than the pinholes? Explain.

What would happen if the notecard had 10 times as many holes?

Watch closely as you continue to move the screen farther from the lens. Describe your results:

Part 5: Predictions and Conclusions

Suppose that a converging lens produces a bright, focused image on a screen.
Suppose that you now used your hand to block the top half of the lens.

Predict all of the changes in the image and explain each change.