Name:_____

Converging Lens Activity

Problem: What are the characteristics and locations of the images formed by an object located at various positions in front of a converging lens?

Materials:

- optical bench
- converging lens
- light source
- white paper screen

Procedure:

1. Hold the lens in a dark part of the room so that light from a distant object passes through it and onto the screen. Move the screen back and forth until the image is clearly focused. Measure the distance between the lens and the screen. This distance is the focal length (f) of the lens. Your value should match the number on the plastic housing.

Focal Length = _____ cm

2. Repeat step 1, this time turning the lens around so that the other side of it faces the screen. Compare the numerical values of the focal length, measured on both sides of the lens. How do the two focal lengths compare?

3. Using the value of the focal length obtained in step 1, calculate the following object distances: 2.5 f, 2.0 f, 1.5 f, 1.0 f, and 0.5 f. Record your answer in cm in the Object Distance column.

	Object Distance (cm)	Image Distance (cm)	Characteristics		
			size	orientation	type
2.5 f					
2.0 f					
1.5 f					
1.0 f					
0.5 f					

4. Place the lens such that the distance from the centre of the lens to the object is as listed in the table.

5. Locate the image by carefully moving a screen back and forth until the image is in focus. Note the characteristics of the image and complete the table.

6. If you cannot locate the image, do your best to determine the characteristics by using your eye instead of the screen and leave the image location blank

7. Return all equipment and precede to the drawing and concluding questions.

Drawings and Concluding Questions:

1. Drawn one drawing to try to match each observation. This means that you will need to complete five separate drawings. Use the templates provided. Follow these guidelines:

Use the scale provided (1cm on the paper = 5 cm in real life).
Show F and F′ (primary and secondary focal points).
Draw your object in the correct location relative to the centre of the lens. Draw the object to the left of the lens. Draw your object as an arrow with a height of 2 cm (10 cm to scale).
Ray 1: parallel to principle axis refracts in line with F
Ray 2: in line with F′ refracts parallel to the principle axis
Ray 3: ray through the centre of the lens goes straight
Treat the lens as though it were ultimately thin. *All refraction occurs at the axis of symmetry for the lens.*

2. What is true about the image that is created by an object that is closer to the lens than the secondary focal point?

3. What is true about the image that is created by an object that is at the secondary focal point?

4. What is true about the image that is created by an object that is further from the lens than the secondary focal point?

5. What will happen to the image location as the objects distance from the lens is gradually increase beyond the secondary focal point of the lens?