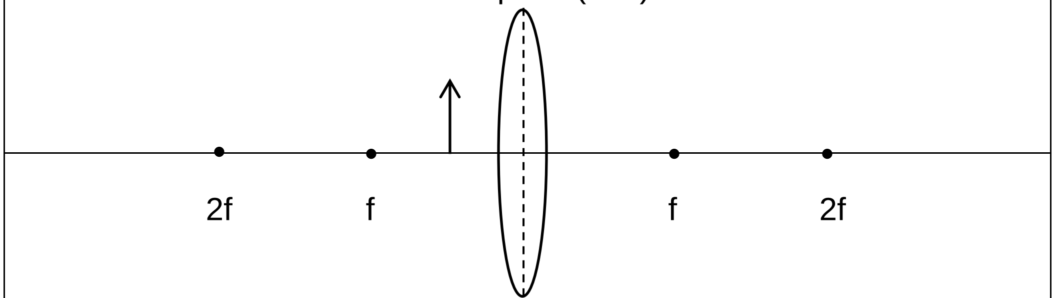
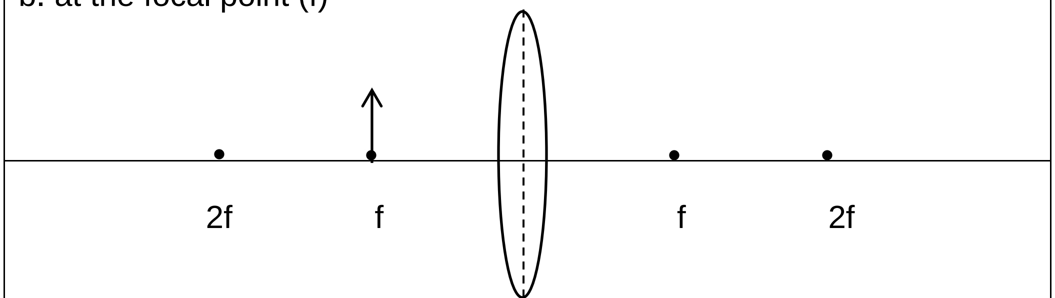
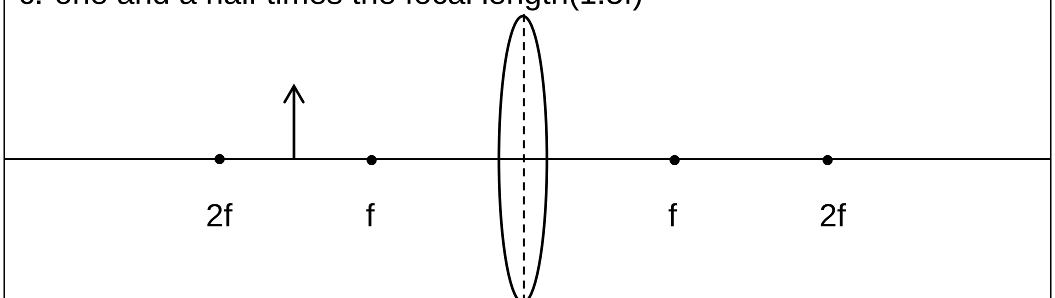
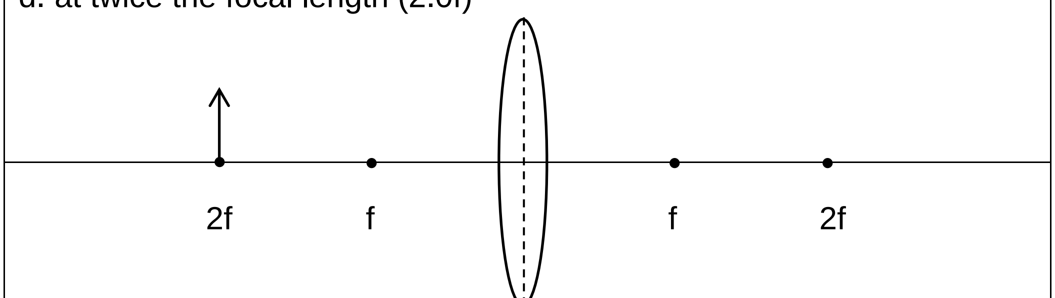
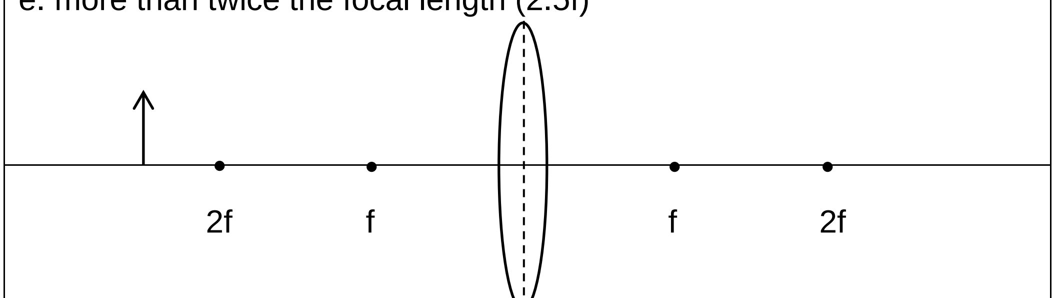
WODSS SCIENCE **/30** Name: ____________________

SNC 2DI Date: ______________

Lab: Images in Converging Lenses

Pre-lab **/10**

1. Draw a ray diagram to predict the characteristics of the image formed when the object is located…

a. between the lens and the focal point (0.5f) 	S: A: L: T:
b. at the focal point (f) 	S: A: L: T:
c. one and a half times the focal length(1.5f) 	S: A: L: T:
d. at twice the focal length (2.0f) 	S: A: L: T:
e. more than twice the focal length (2.5f) 	S: A: L: T:

Purpose: To determine if the thin lens (same as mirror equation) and magnification equations be used to determine the characteristics of the image formed by a converging lens

Thin lens equation

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

Magnification equation

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

Materials

- Support Stand
- Candle
- Lighter
- Converging Lens
- Screen

Procedure/Observations

Part A: Finding the focal point **/3**

1. Attach a lens to the support stand at the 0cm
2. Position the stand so that the 0cm mark is pointing towards the window.
3. Place a screen on the other end of the support stand and move it along the stand until you can see a clear image of the window on the screen.
   Describe the characteristics of the image you see on the screen

   S:________________ A:__________________ L:__________________ T:__________________

4. According to the thin lens equation when d_o is very large d_i is equal to f. Record the focal length of the lens.

   Focal Length (*f*) of the Lens: ________cm

Part B: Observing the image of a candle **/5**

1. Use the focal length you found in part A to calculate the following object to lens distances (d_o) and record them in the observation table: 0.5f, f 1.5f, 2.0f, and 2.5f
2. Place the candle (object) so that it is on the 0cm mark.
3. Place the lens 0.5f from the candle and look for the image
   - If the image is real it can be located by moving the screen along the stand until you see a sharp focused image
   - If the image is virtual it can be located by looking through the lens towards the object
4. Once you have located the image record the image characteristics in the observation table below. Measure the actual image distance for any real images.
5. Repeat steps 3 and 4 for each object distance.

Object Distance (cm)	Image Characteristics				Image Distance (cm)
	Size	Attitude	Location	Type	
0.5f =					
1.0f =					
1.5f =					
2.0f =					
2.5f =					

Analysis

Did the image characteristics you predicted using ray diagrams match the image characteristics you observed in the lab? If not suggest a reason for the discrepancy. **/2**

Use the thin lens equation to calculate the image distance (d_i) for each object distance (d_o) you observed in the lab and fill the table below. Show one sample calculation in the space provided

	Object distance (cm)	Focal length (cm)	Calculated image distance (cm)	Experimental image distance (cm)
0.5f				
1.0f				
1.5f				
2.0f				
2.5f				

Sample Calculation **/5**

Compare the calculated d_i with the experimental d_i for each d_o. Do the values calculated using the thin lens equation match the values you obtained experimentally? If not suggest a reason for the discrepancy. **/2**

Conclusion:

Using what you have learned from this lab predict the characteristics of an image produced by a converging lens with a focal point of 7.0 cm if the object is placed at the following distances from the lens **/3**

Object Distance	Size	Attitude	Location	Type
5.0 cm				
10.0 cm				
15.0 cm				