Do not copy or attach or print out this manual for your lab report. Follow the instruction.

Thin Lenses

Your name _____ Instructor's sign _____

Go at https://phet.colorado.edu/en/simulation/geometric-optics.

1. Conceptual comprehension of the properties of a convex lens

- Check "Virtual Image" in the menu.
- By keeping other parameters same, move the object back and fourth to change the object distance.

◆ **Question 1**: Write down two of your discoveries from the above experiment, and explain them to your instructor.

➢ _____

➢ _____

2. Changing the curvature radius, refractive index, and diameter

- By keeping other parameters same, change curvature radius, refractive index, and diameter.

◆ **Question 2**: How is the focal length changed by increasing/decreasing the curvature radius of the lens?

_____

◆ **Question 3**: How is the focal length changed by increasing/decreasing the refractive index of the lens?

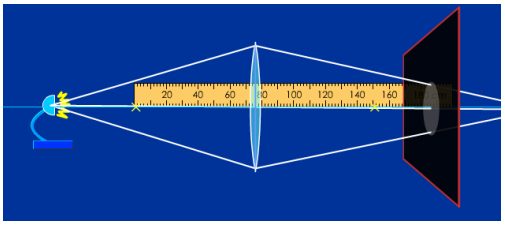
_____

◆ **Question 4**: How is the focal length changed by increasing/decreasing the diameter of the lens?

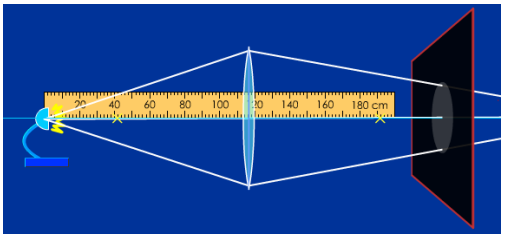
_____

3. Thin lens equation

- Check "Screen" and "Ruler. (The default curvature radius, refractive index, and diameter are 0.8 m, 1.53, and 0.8 m.)

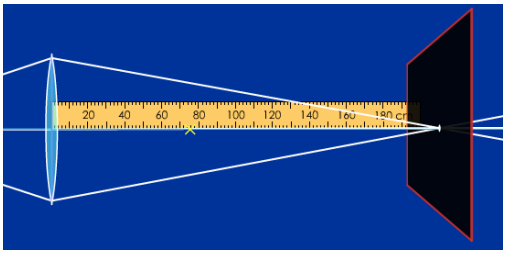


- Measure the focal length from the cross mark to the center of the lens as shown.



- Move the light source to determine the object distance. Then, measure it as shown.

- Then, move the screen to project the smallest spot. Measure the image distance as shown.



Use one focal length (default) and four different object distances. Then, calculate the fourth column using the measured object and image distances.

1	2	3	4
Focal length, f	Object distance, d_o	Image distance, d_i	$d_o d_i/(d_o+d_i)$

◆ **Question 2**: Is the measured focal length (in column **1**) approximately equal to the theoretical one (in column **4**) in the above table?

You are not allowed to leave until you and your partners answer all of the above questions!! All of the group member must have consensus to the answers.

For the lab report

① Write the introduction. ② Write the discussions and conclusion including the answers of the questions above. ③ Show the result (data table) for the 3rd part.