Name ____________________

Basic Thin Lens Optics

1. Measure the focal length of the three lenses provided.

   Large diameter lens f = ________

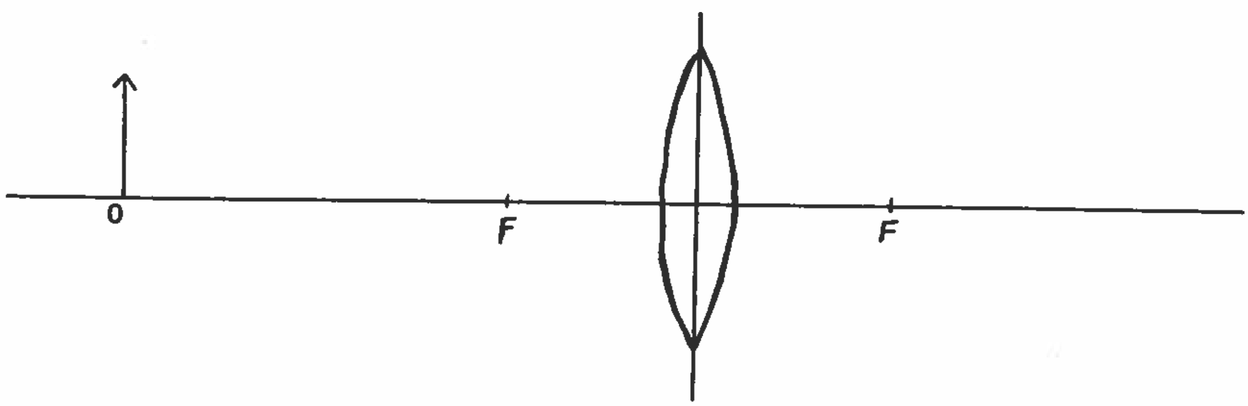
   Thickest lens f = ________

   Small thin lens f = ________

2. Use the lens with a focal length of 10 to 20 cm for the following procedure.

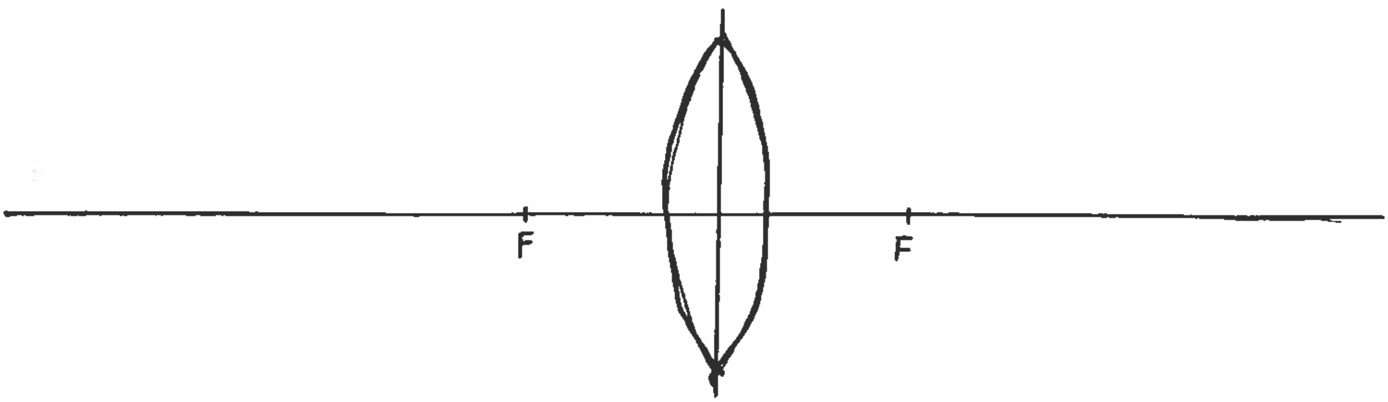
   Start with the illuminated object a distance of 6 times the lens focal length and observe what happens to the image distance and size as the object is moved toward the lens. Complete the table provided.

3. Draw a ray diagram which locates the image when the object distance is 3f.



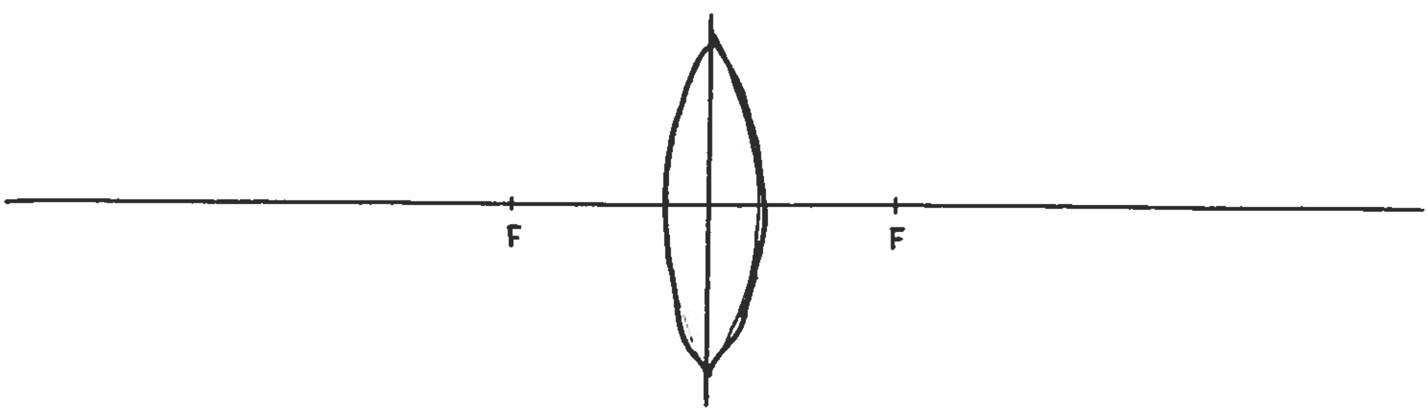
4. If the object is at F, where will the image be?

Draw the ray diagram for this case.



5. If the object distance approaches infinity, where will the image be?

Draw the ray diagram for this case.



Object size (h_O) = ____________________ Lens Focal length (f) = ____________________

Object - to - lens distance O (cm)	Lens - to - image distance i (cm)	Image size (h_i) (if upside down, $h_i < 0$) (cm)	Linear magnification use $M = h_i/h_o$	Predicted i use $1/i = 1/f - 1/o$ (cm)	Predicted M use $M = -i/o$
6f =					
4f =					
2f = **See Below**					
f =					

Use paper to block half the lens. Describe what happened to the image:

6. Using the two larger focal length lenses, how far apart should the lenses be placed to make the telescope?

7. Calculate the theoretical angular magnification for your telescope. By using your telescope on objects and walls, does it appear to have this magnification? Why or why not?

8. Calculate the f-value for the telescope.

9. Calculate the "speed" of the telescope.

10. Use a thick (approximately 15 cm focal length lens) as a field lens. Describe what happens to the image.

11. Was the angular magnification changed by adding in the field lens?

12. Using a non-permanent marker, add a set of cross-hairs to the field lens. What does your image now look like?

13. What good are the cross-hairs?