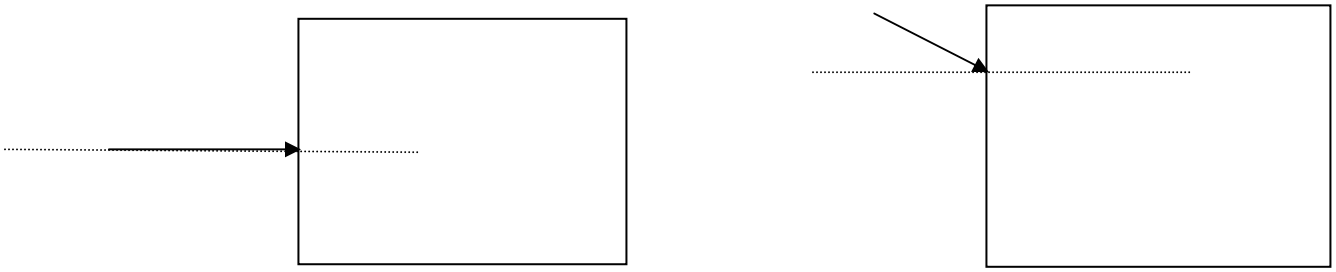
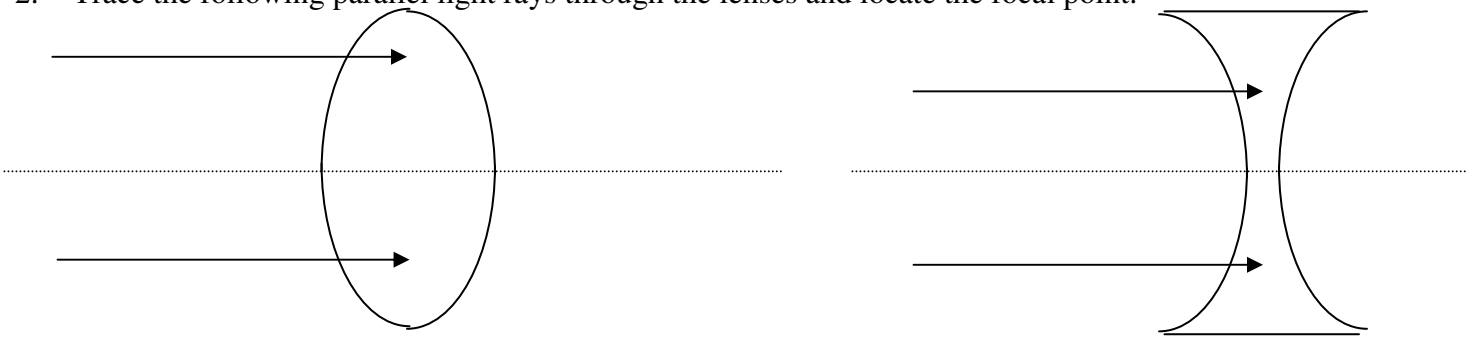
Name: _____ Date: _____

Physics
Lab: Blackboard Optics

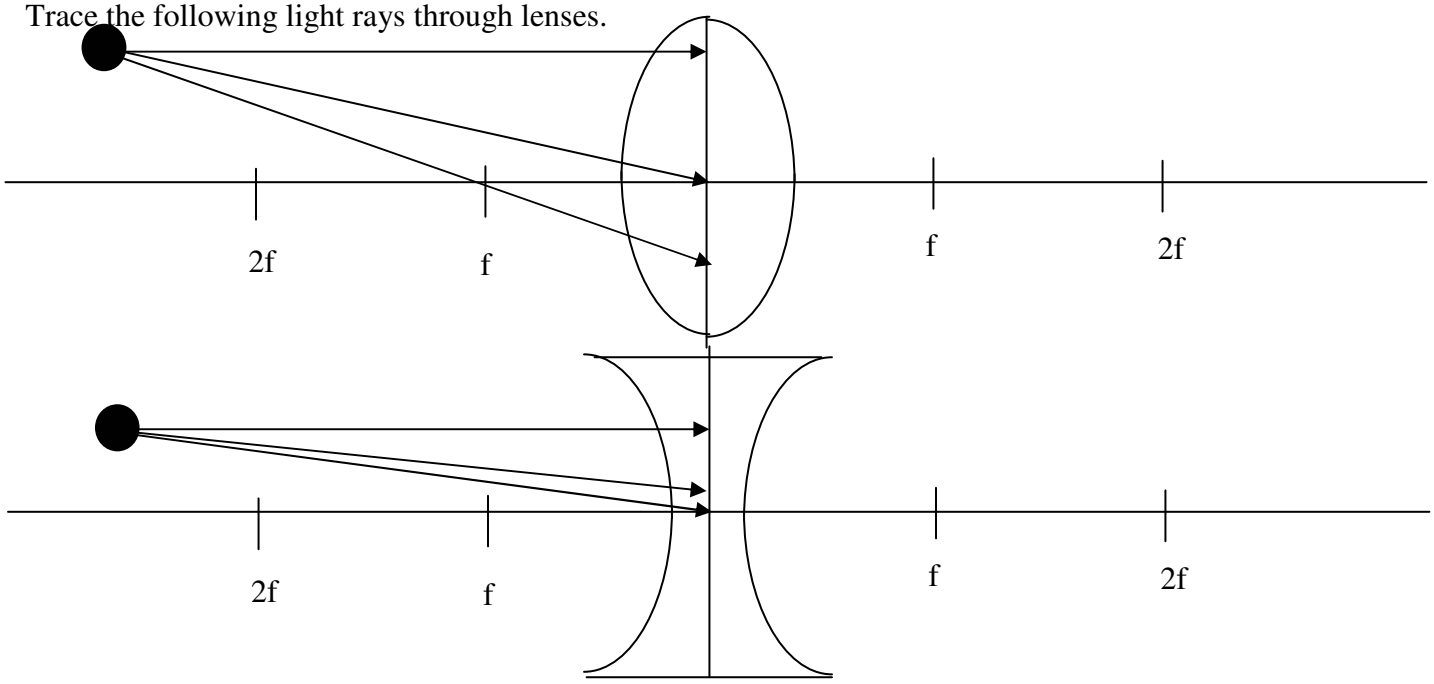
1. Trace the following light rays as they go from air through the rectangular glass object and back to air.



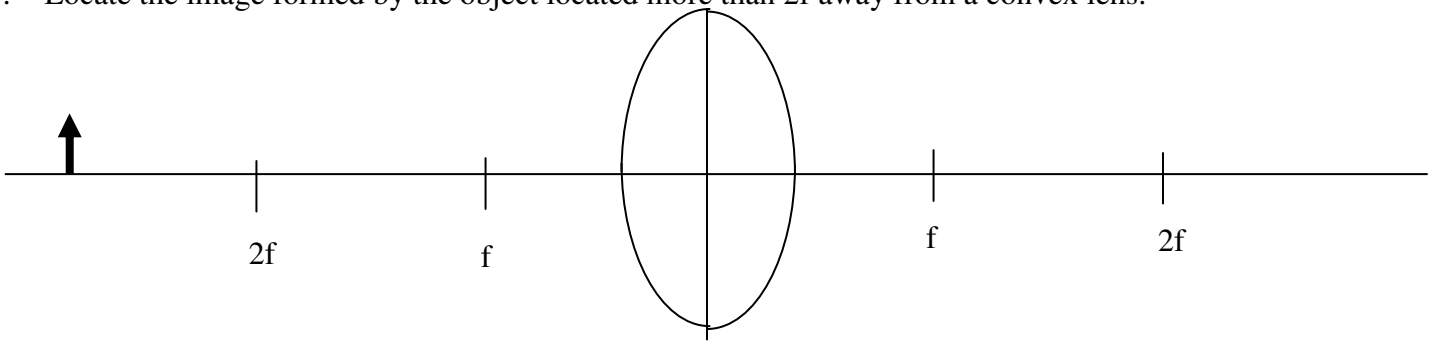
2. Trace the following parallel light rays through the lenses and locate the focal point.



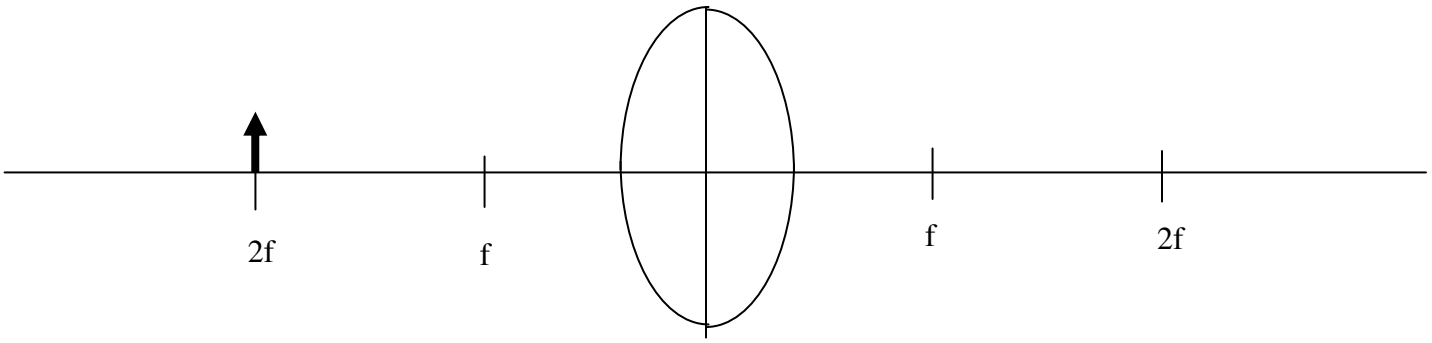
3. Trace the following light rays through lenses.



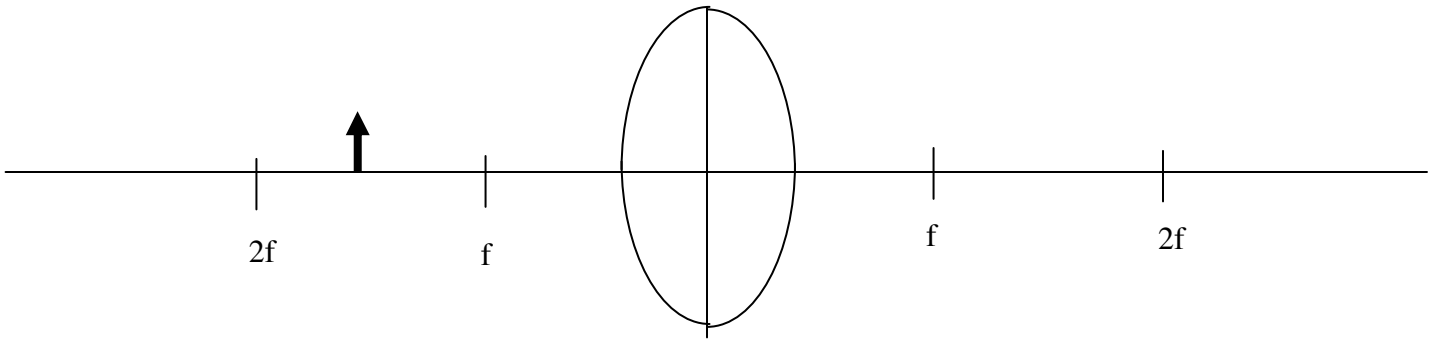
4. Locate the image formed by the object located more than 2f away from a convex lens.



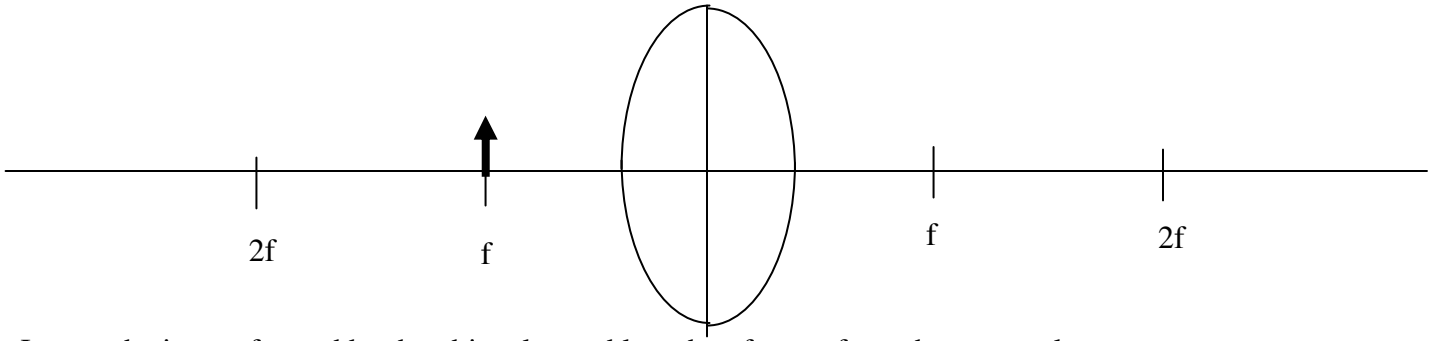
5. Locate the image formed by the object located exactly 2f away from the convex lens.



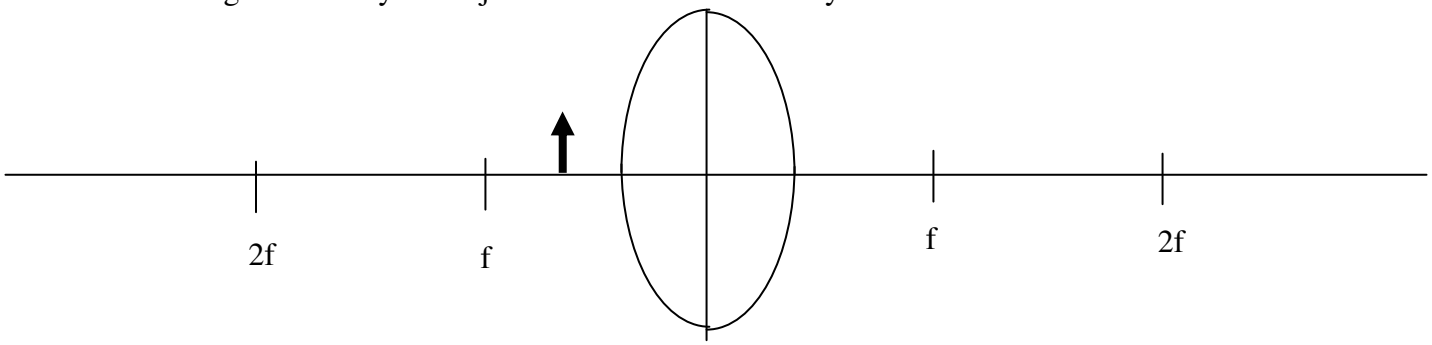
6. Locate the image formed by the object located between f and 2f away from the convex lens.



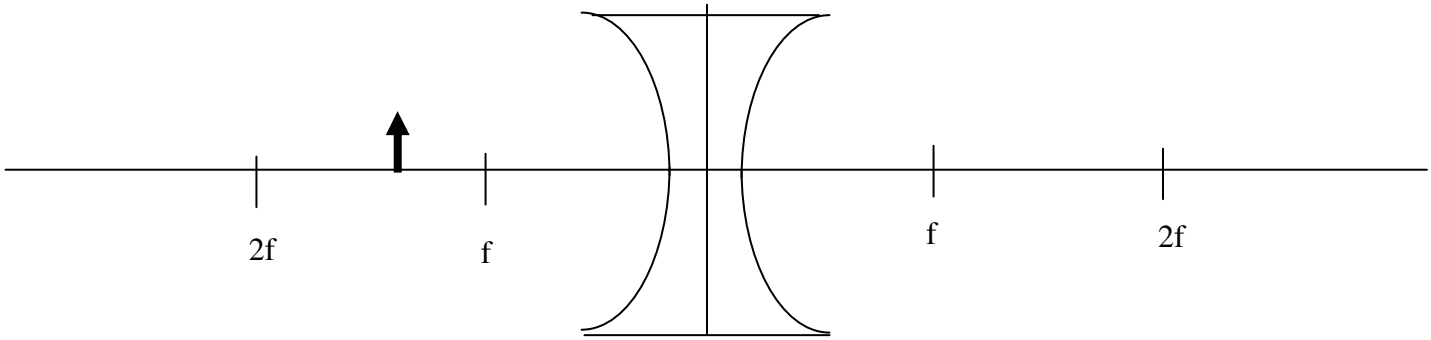
7. Locate the image formed by the object located exactly f away from the convex lens.



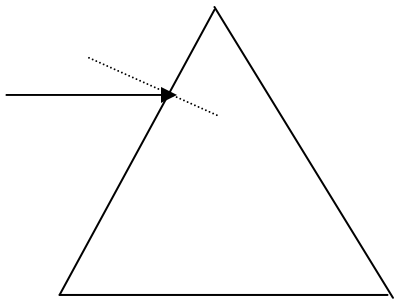
8. Locate the image formed by the object located less than f away from the convex lens.



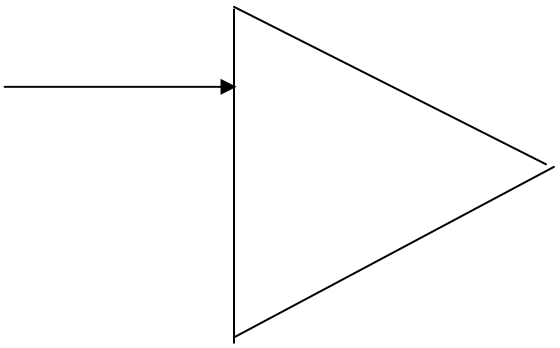
9. Locate the image formed by the object in front of the concave lens.



10. Trace the following light ray through the triangular piece of glass.



11. Trace the following light ray through the triangular piece of glass and explain why this phenomenon occurs.



12. Complete the following Chart.

Lens Type	Object Location	Image Type	Image Orientation	Image Size	Image Location	f	d_o	d_i	h_o	h_i	M
Concave	**Any**										
Convex	**Beyond 2f**										
Convex	**At 2f**										
Convex	**Between f & 2f**										
Convex	**At f**										
Convex	**Between f and lens**										

Sign Conventions for lenses

f = focal length + for convex - for concave

d_o = object distance + for all

d_i = image distance + for any on the other side of the lens (real image) - for any on the same side of the lens (virtual image)

h_o = object height + for all

h_i = image height + for upright (virtual image) - for inverted (real image)

M = magnification + for virtual images - for real images

Magnitude of magnification <1 for smaller =1 for same size >1 for larger