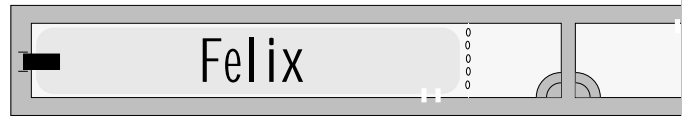
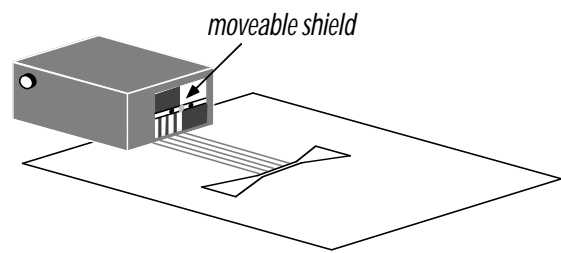


# PHYZLAB SPRINGBOARD: NEGATIVE LENSES



## • Apparatus •

- \_\_\_ PASCO Basic Optics System:
  - \_\_\_ light source
  - \_\_\_ power supply (plug)
  - \_\_\_ trapezoidal prism
  - \_\_\_ concave lens
- \_\_\_ Negative Lens Sheet (one per group)

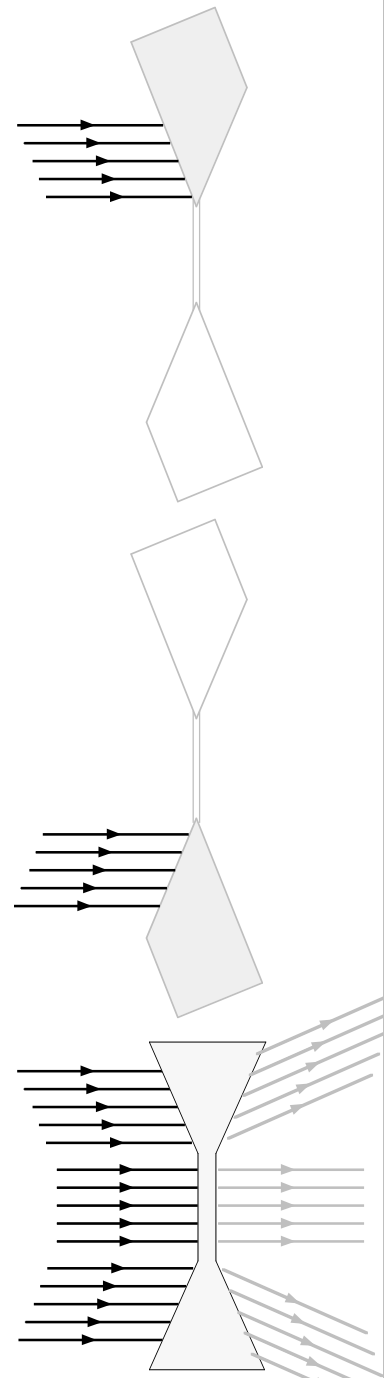


## • Set-Up •

1. Attach the power supply to the light source and plug it in.
2. Arrange the light source to be a ray box and adjust the moveable plastic shield so that five beams are emitted.

## • Procedure •

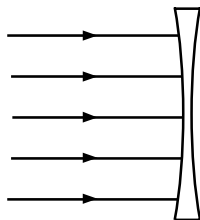
1. Complete the ray tracings on Configuration 1 of the Lens Sheet as follows.
  - a. Place the trapezoidal prism in the first position (as shown above to the right) on Configuration 1. Arrange the ray box so that the five beams travel toward the prism as shown in the diagram to the right. The incident beams should be parallel to the parallel gray lines on the Lens Sheet. Trace the beams onto the paper as follows. Place two dots (as far apart as you can) on each beam before and after it passes through the prism (two dots before the prism and two dots after the prism). Remove the prism and use a straight edge to connect appropriate dots to construct the five rays.
  - b. Place the trapezoidal prism in the second position (as shown below to the right) on Configuration 1. Repeat the remaining steps in part a.
  - c. Trace five beams that pass through the center region (between the two prism locations).



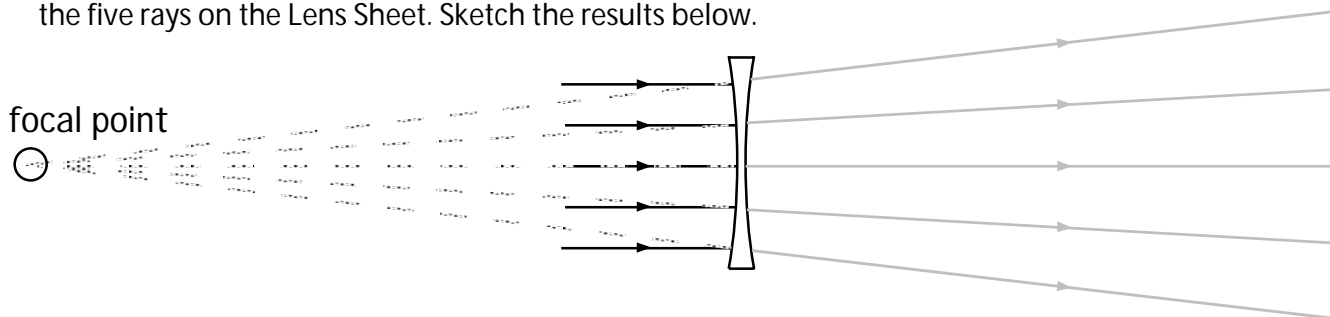
2. Complete and consider the resulting pattern. If there were one piece of acrylic in the shape shown to the right, would you characterize it as a

- \_\_\_ converging optical device or a
- diverging optical device?

3. Prediction. What pattern will the five rays form when they pass through the concave lens? Show your prediction on the diagram below.



4. Arrange the ray box and convex lens as shown in Configuration 2 of the Lens Sheet (on the back of the Lens Sheet). Observe the resulting pattern. Use the "two-dot" described previously to construct the five rays on the Lens Sheet. Sketch the results below.



5. On the completed diagram of Configuration 2 and on the sketch above,  
 a. circle the region at which all the rays meet. (Hint: Where the **lines** meet; unless they're parallel, they do meet somewhere!)

b. What is the name of this point? The focal point.

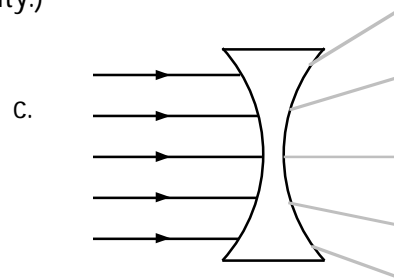
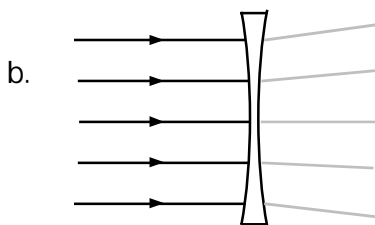
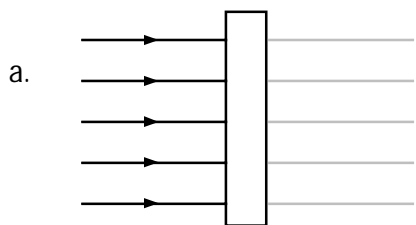
c. How far is the point from the center of this lens (as measured on Configuration 2 of the Lens Sheet)? Is this distance considered positive or negative?

From about 13cm to 16cm; the distance is considered negative.

d. What is the name of that distance?

The focal length

6. What would the five ray box beams do when encountering each device shown below. Sketch the beams in each diagram. (The lens shown in b. is the one used in this activity.)



7. a. Which lens above has the longest focal length (focal length closest to  $\pm\infty$ )?

Lens a.

b. Which lens above has the shortest focal length (focal length closest to 0)?

Lens c.