

Light ▪ Skills Lab

## Looking at Images

### Problem

How does the distance between an object and a convex lens affect the image formed?

### Skills Focus

controlling variables, interpreting data

### Materials

tape

convex lens

cardboard stand



blank sheet of paper

light bulb and socket

clay, for holding the lens

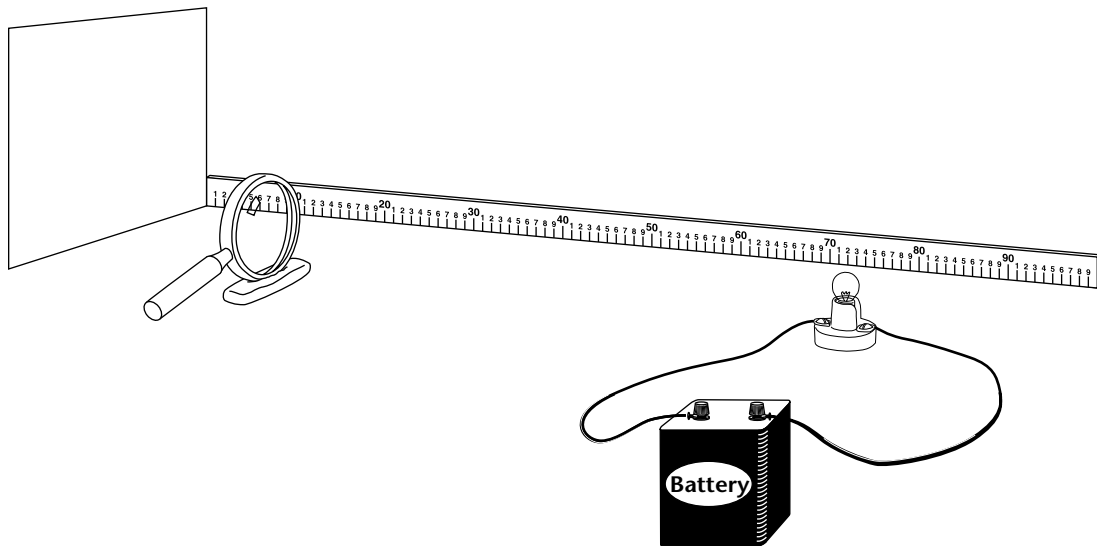
battery and wires

meter stick

**Procedure**   Review the safety guidelines in Appendix A.

1. Tape the paper onto the cardboard stand.
2. Place a lit bulb more than 2 m from the paper. Use the lens to focus light from the bulb onto the paper. Measure the distance from the lens to the paper. This is the approximate focal length of the lens you are using.
3. Record your data in the data table.
4. Now place the bulb more than twice the focal length away from the lens. Adjust the cardboard until the image is focused. Record the size of the image on the paper and note the orientation of the image. Record the distance from the bulb to the lens and from the lens to the cardboard.
5. Now, move the bulb so that it is just over one focal length away from the lens. Record the position and size of the image.

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**Data Table**

Focal Length of Lens: _____ cm		Height of Bulb: _____ cm	
Distance From Bulb to Lens (cm)	Distance From Lens to Cardboard (cm)	Image Orientation (upright or upside down)	Image Size (height in cm)

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## **Looking at Images** *(continued)*

### **Analyze and Conclude**

*Write your answers on a separate sheet of paper.*

1. **Controlling Variables** Make a list of the variables in this experiment. Which variables did you keep constant? Which was the manipulated variable? Which were the responding variables?
2. **Observing** What happened to the position of the image as the bulb moved toward the lens?
3. **Interpreting Data** Was the image formed by the convex lens always enlarged? If not, under what conditions was the image reduced?
4. **Predicting** What would happen if you look through the lens at the bulb when it is closer to the lens than the focal point? Explain your prediction.
5. **Communicating** Write a paragraph explaining how the distance between an object and a convex lens affects the image formed. Use ray diagrams to help you summarize your results.

### **Design an Experiment**

Design an experiment to study images formed by convex lenses with different thicknesses. How does the lens thickness affect the position and size of the images? *Obtain your teacher's permission before carrying out your investigation.*