



Curved Mirrors

You may have noticed a big curved mirror high in a corner at a local store (Figure 1). The store owner uses the convex mirror to watch for shoplifters. A **convex** mirror has the reflecting surface on the outside curve. Why do the images you see in a convex mirror that make it effective for surveillance?

INQUIRY SKILLS	
<input checked="" type="radio"/> Questioning	<input checked="" type="radio"/> Hypothesizing
<input type="radio"/> Predicting	<input type="radio"/> Planning
<input checked="" type="radio"/> Conducting	<input checked="" type="radio"/> Recording
<input checked="" type="radio"/> Analyzing	<input checked="" type="radio"/> Evaluating
<input checked="" type="radio"/> Communicating	

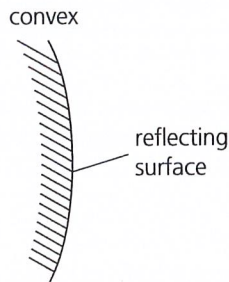
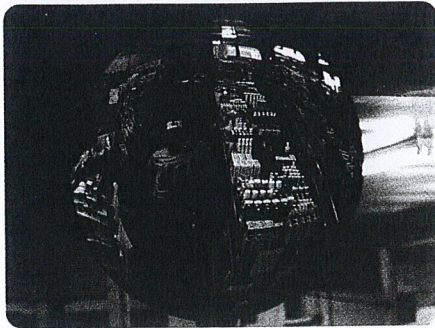


Figure 1

A convex mirror is like the back of a spoon.

The next time you visit a dentist, look closely at the lamp that the dentist uses (Figure 2). A concave mirror in the lamp focuses the light into your mouth so that the dentist can work on your teeth. A **concave** mirror has the reflecting surface on the inside curve. What makes a concave mirror effective for working on teeth?

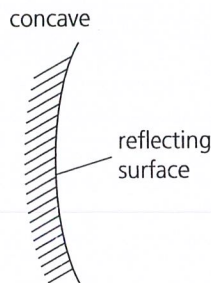
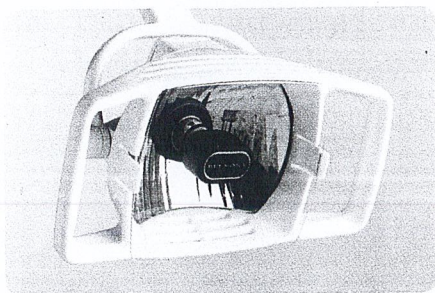


Figure 2

A concave mirror is like the inside of a spoon.

The images you see in curved mirrors look different from the images you see in plane mirrors. In this Investigation, you will explore these differences.



▷ LEARNING TIP

For help with writing a question and a hypothesis, see "Questioning" and "Hypothesizing" in the Skills Handbook section **Conducting an Investigation**.



Do not touch the ray box the light bulb in or look directly into the light. Handle mirrors carefully to avoid breakage. ^

Question

- (a) What question is being investigated?

Hypothesis

- (b) Create a hypothesis for this Investigation.

Experimental Design

You will use a ray box to investigate the properties of curved mirrors.

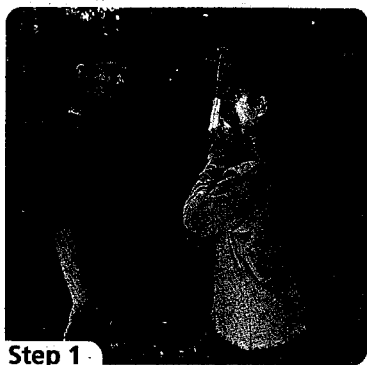
Materials

- curved mirrors for viewing
- curved mirrors to use with the ray box
- ray box with multiple-slit window and single-slit window
- plain paper
- sharp pencil
- ruler
- protractor

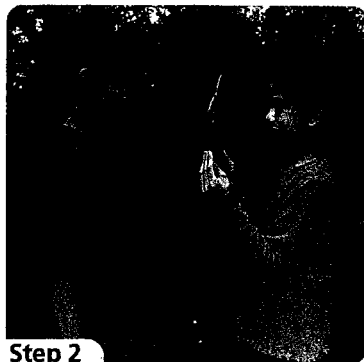


Procedure

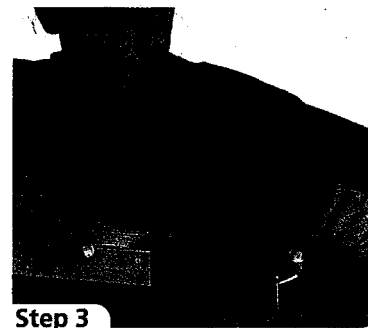
1. Have a partner hold a concave viewing mirror close to your eyes. Describe the image you see. Observe the image carefully as your partner slowly moves the mirror away from your eyes. Describe any changes you observe in the image.
2. Have a partner hold a convex viewing mirror close to your eyes. Describe the image you see. Observe the image carefully as your partner slowly moves the mirror away from your eyes. Describe any changes you observe. How is the image produced by the convex mirror different from the image produced by the concave mirror in step 1?
3. Use a ray box to aim a narrow ray of light at the surface of a concave mirror. Observe where each ray is reflected. Try several different angles. Record where each ray came from and where it was reflected. Do the laws of reflection apply to concave mirrors?



Step 1



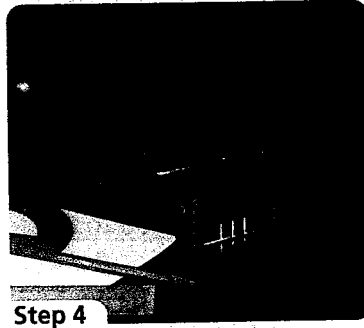
Step 2



Step 3

► Procedure (continued)

4. Use the ray box with the multiple-slit window to shine three or more parallel rays of light at a concave mirror. Draw a diagram of what you observe. Can a concave mirror focus light rays?



5. Repeat steps 3 and 4 using a convex mirror. Can a convex mirror focus light rays?

Analysis

- (c) Use your observations and the characteristics of images to describe the images seen in each mirror. Is each image real or virtual?
- (i) a concave mirror when the object is close to the mirror
 - (ii) a concave mirror when the object is far away from the mirror
 - (iii) a convex mirror when the object is close to the mirror
 - (iv) a convex mirror when the object is far away from the mirror
- (d) In part (c), you had to decide whether the image in each mirror was real or virtual. What evidence did you use to support your decision? Describe how you could demonstrate whether or not each mirror produced a real image. Draw a diagram of the set-up.

Evaluation

- (e) Did your observations enable you to answer your question at the beginning of this Investigation? Why or why not?
- (f) Did your observations support your hypothesis? Explain.

PERFORMANCE TASK

Concave mirrors can be used to focus light. Are concave mirrors used in your optical device? Are convex mirrors used?

