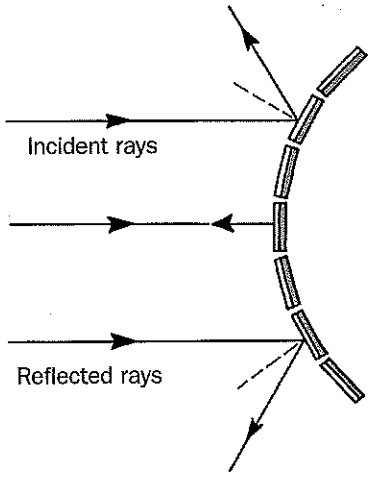
EXPLAINING REFLECTION FROM A CONVEX MIRROR

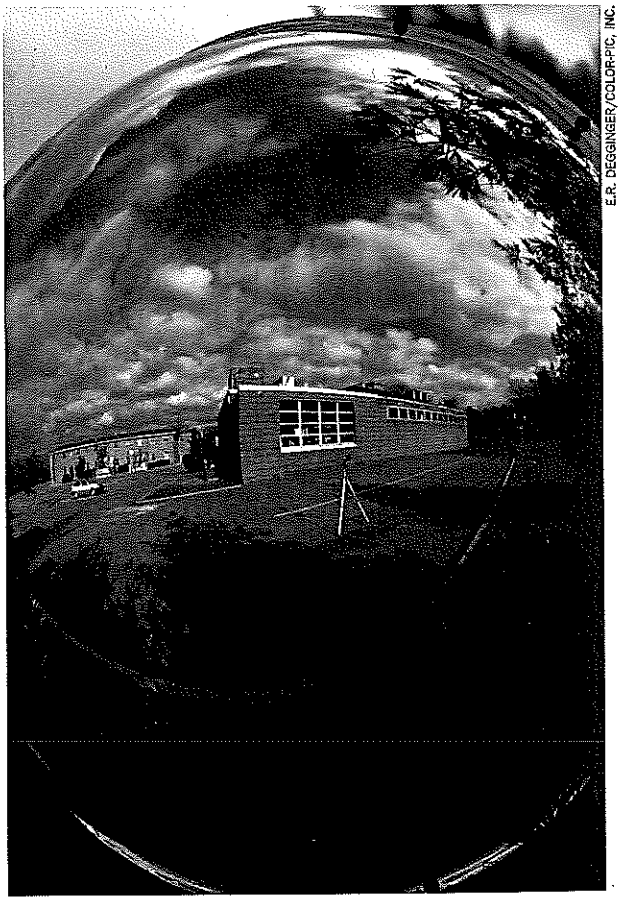
To understand what happens to light when it strikes a convex mirror, it is useful to think of a convex mirror as being a series of tiny plane mirrors connected together, as shown in the top diagram below.

As a ray strikes one of these tiny mirrors, it is reflected. Its angle of incidence equals the angle of reflection. However, because each mirror is tilted differently, the reflected rays go off in different directions. The reflected rays spread out—that is, they diverge.

Where is the image formed in a convex mirror? Use the photograph below and the diagram (bottom left) to decide whether the image is in front of or behind the mirror. How does the image shown in the photographed mirror compare with the object itself? Is it right-side up (upright) or upside down (inverted)? Is it bigger or smaller than the object?

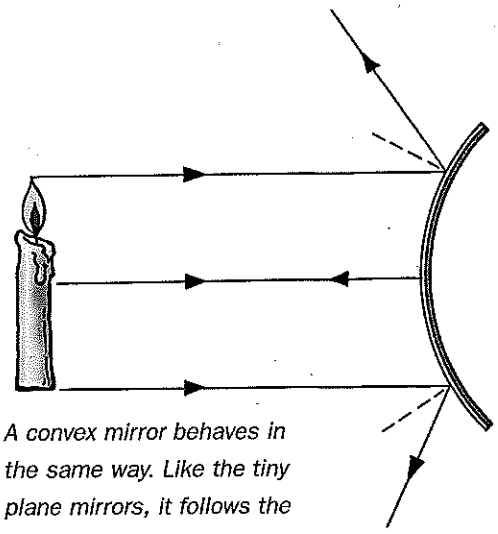


Think of a convex mirror as being made up of many tiny plane mirrors. Each ray that strikes one of these mirrors follows the same law of reflection you studied in Lesson 15.



E.R. DEGGINGER/COLOR-PIC, INC.

Is the image in this convex mirror inverted or upright? Bigger or smaller than the object?



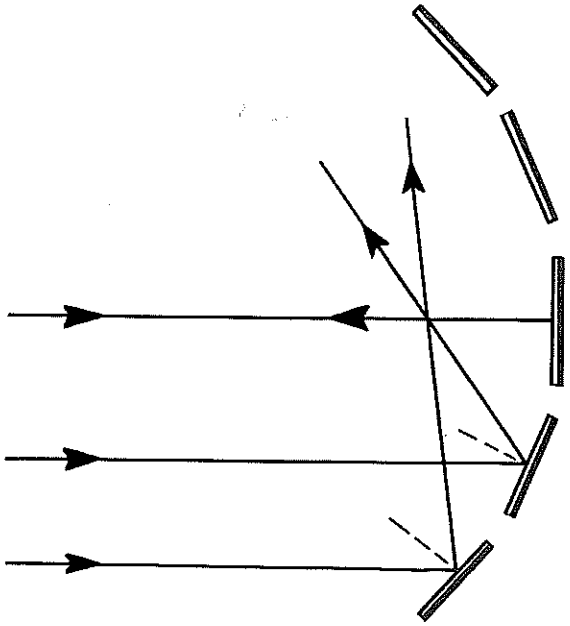
A convex mirror behaves in the same way. Like the tiny plane mirrors, it follows the law of reflection.

EXPLAINING REFLECTION FROM A CONCAVE MIRROR

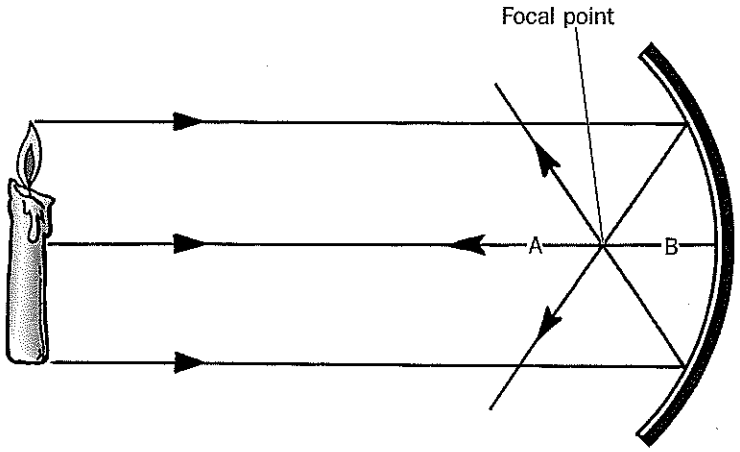
As you have observed, light rays striking the surface of a concave mirror are reflected inward. They are said to converge. Reflection from the surface of a concave mirror, like that from a convex mirror, can be explained by thinking of the surface of the concave mirror as a series of tiny plane mirrors. The angle of incidence equals the angle of reflection of rays for each of these imaginary plane mirrors.

Rays reflected from a concave mirror cross over one another. The point where they cross over is called the focal point of the mirror. This is called the focal point because parallel rays striking the mirror meet at this point—that is, they are focused at that point. The distance from the focal point to the reflective surface of the mirror is called the focal length of the mirror.

What you see in a mirror depends on your position in relation to the focal point. Look at the diagram below. What would be the orientation of the image of the candle—which way would be up—if you were looking at the mirror from point A? What would be the orientation of the image of the candle if you were looking at the mirror from point B?

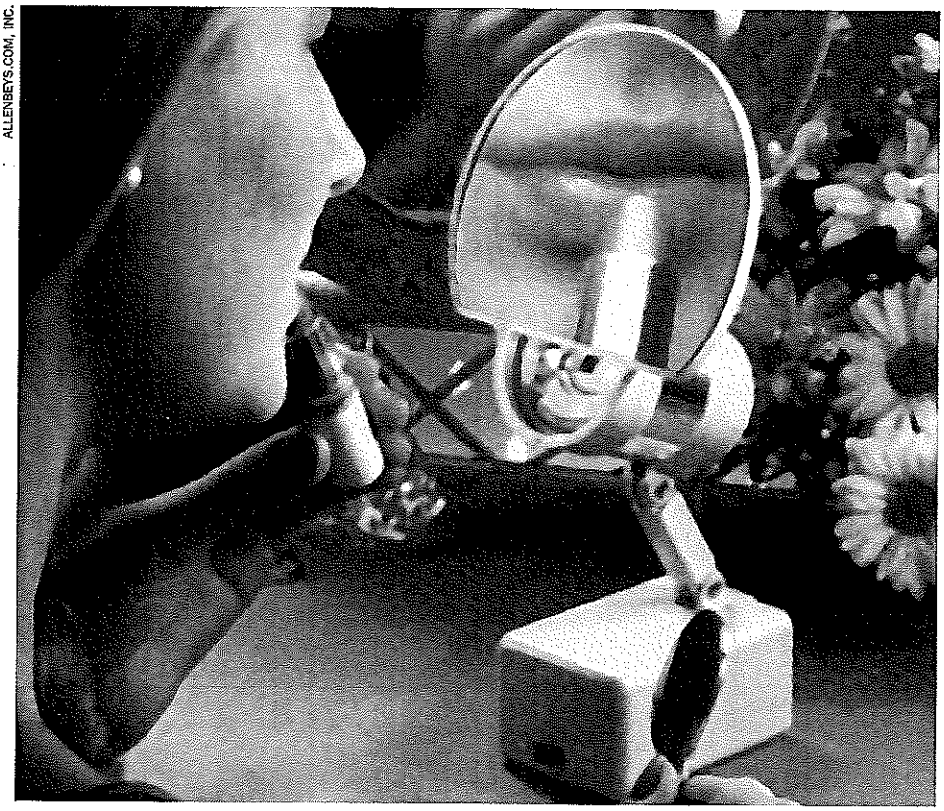


Reflection from a concave mirror can also be thought of as reflection from a series of tiny plane mirrors. With concave mirrors, as in all forms of reflection, the angle of the incident ray is equal to the angle of the reflected ray.

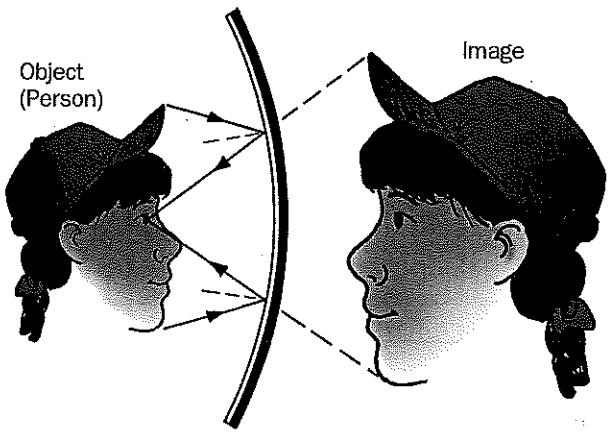


Predict the orientation of the image of the candle if you were looking at it from point A and then from point B.

The images you observe in a concave mirror depend on the distance of the object from the mirror. Some of these images are upright and others are inverted. Can you guess the point at which the images turn over? Makeup and shaving mirrors are concave mirrors. When you stand close to these mirrors, they provide a magnified image of your face—that is, the image of your face is bigger than it would be in a plane mirror in the same position.



Makeup mirrors are concave. When your face is close to the mirror, it appears magnified and upright. The image of your face is a virtual image.



When an object is within the focal length of a concave mirror, its image is magnified, upright, and virtual. Why is it a virtual image?