Curved Mirrors

SECTION 3

SECTION OBJECTIVES

- Calculate distances and focal lengths using the mirror equation for concave and convex spherical mirrors.
- Draw ray diagrams to find the image distance and magnification for concave and convex spherical mirrors.
- Distinguish between real and virtual images.
- Describe how parabolic mirrors differ from spherical mirrors.

CONCAVE SPHERICAL MIRRORS

Small, circular mirrors, such as those used on dressing tables, may appear at first glance to be the same as flat mirrors. However, the images they form differ from those formed by flat mirrors. The images for objects close to the mirror are larger than the object, as shown in **Figure 10(a),** whereas the images of objects far from the mirror are smaller and upside down, as shown in **Figure 10(b).** Images such as these are characteristic of curved mirrors. The image in **Figure 10(a)** is a virtual image like those created by flat mirrors. In contrast, the image in **Figure 10(b)** is a *real* image.

Concave mirrors can be used to form real images

One basic type of curved mirror is the spherical mirror. A spherical mirror, as its name implies, has the shape of part of a sphere's surface. A spherical mirror with light reflecting from its silvered, concave surface (that is, the inner surface of a sphere) is called a **concave spherical mirror.** Concave mirrors are used whenever a magnified image of an object is needed, as in the case of the dressing-table mirror.

One factor that determines where the image will appear in a concave spherical mirror and how large that image will be is the radius of curvature, R, of the mirror. The radius of curvature is the same as the radius of the spherical shell of which the mirror is a small part; R is therefore the distance from the mirror's surface to the center of curvature, C.

concave spherical mirror

a mirror whose reflecting surface is a segment of the inside of a sphere

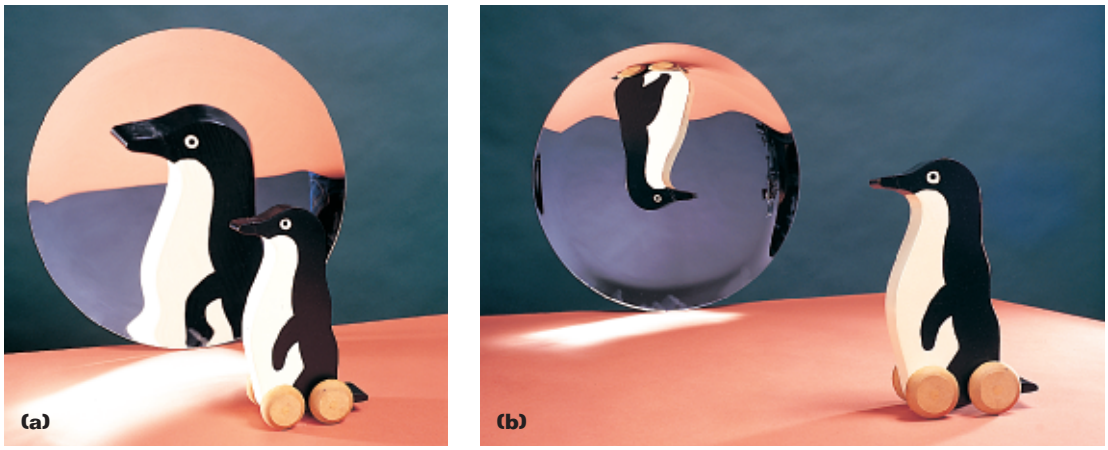

Figure 10
Curved mirrors can be used to form images that are larger **(a)** or smaller **(b)** than the object.