

Quick Quiz 36.1

In the overhead view of Figure 36.4, the image of the stone seen by observer 1 is at *C*. Where does observer 2 see the image—at *A*, at *B*, at *C*, at *D*, at *E*, or not at all?

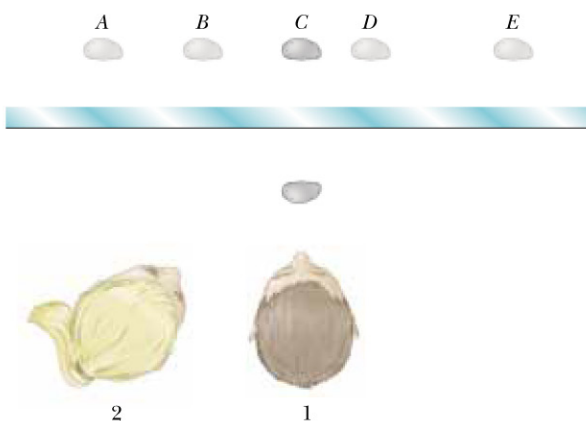


Figure 36.4

CONCEPTUAL EXAMPLE 36.1 Multiple Images Formed by Two Mirrors

Two flat mirrors are at right angles to each other, as illustrated in Figure 36.5, and an object is placed at point *O*. In this situation, multiple images are formed. Locate the positions of these images.

Solution The image of the object is at *I*₁ in mirror 1 and at *I*₂ in mirror 2. In addition, a third image is formed at *I*₃. This third image is the image of *I*₁ in mirror 2 or, equivalently, the image of *I*₂ in mirror 1. That is, the image at *I*₁ (or *I*₂) serves as the object for *I*₃. Note that to form this image at *I*₃, the rays reflect twice after leaving the object at *O*.

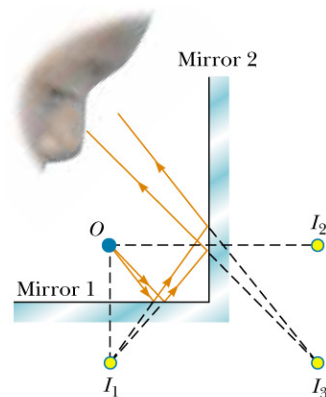


Figure 36.5 When an object is placed in front of two mutually perpendicular mirrors as shown, three images are formed.

CONCEPTUAL EXAMPLE 36.2 The Levitated Professor

The professor in the box shown in Figure 36.6 appears to be balancing himself on a few fingers, with his feet off the floor. He can maintain this position for a long time, and he appears to defy gravity. How was this illusion created?

Solution This is one of many magicians' optical illusions that make use of a mirror. The box in which the professor stands is a cubical frame that contains a flat vertical mirror positioned in a diagonal plane of the frame. The professor straddles the mirror so that one foot, which you see, is in front of the mirror, and one foot, which you cannot see, is behind the mirror. When he raises the foot in front of the mirror, the reflection of that foot also rises, so he appears to float in air.



Figure 36.6 An optical illusion.