



Figure 1.20 Simple mirror reflex viewfinder system.
A. With the mirror shutter open, all light is directed to the film. **B.** With the mirror shutter closed, all light is directed to the eyepiece. (Courtesy of ARRI Inc.)

look through the eyepiece if the lens focus is set correctly. To adjust the diopter, it is best to remove the lens, but it can be done with the lens in place. You then point the camera at a bright light source or white surface. While looking through the eyepiece, turn the diopter adjustment ring until the crosshair or grains of the ground glass in the viewfinder are sharp and in focus. A further discussion of the viewfinder adjustment is located in Chapter 4.

Lens

A *lens* may be defined as a device that contains one or more pieces of optically transparent material, such as glass, which bends the rays of light passing through it, causing them to focus at a point. In a motion picture camera this point is called the film plane or focal plane, and the light creates an exposure on the film's emulsion at this point. All lenses are referred to by their focal length, and it is the focal length

that determines the size of the image. The technical definition of *focal length* is the distance from the optical center of the lens to the film plane when the lens is focused at infinity. The *optical center* is a mathematical point within the lens that is determined by the lens manufacturer. The focal length of the lens is always measured in millimeters (mm).

When discussing focal length, I often say that there are three general categories: telephoto, normal, and wide angle. When filming in the 35 mm film format, it is generally accepted that a lens with a focal length of 50 mm is considered to be a normal lens because it approximates an image size that is the same as that seen by the human eye. Of course, this depends on who you ask about it. There have been many opinions over the years as to what lens may be called a "normal" lens. Many of the professionals whom I have worked with and spoken to about this topic agree that it is a 50 mm lens, so that is the number I am using here. In the 35 mm film format, as a general rule, any lens that has a focal length less than 50 mm may be called *wide angle*, and any lens that has a focal length more than 50 mm may be called *telephoto*. When filming in the 16 mm film format, it is generally accepted that a lens with a focal length of 25 mm is considered to be a normal lens. In 16 mm, as a general rule any lens that has a focal length less than 25 mm may be called wide angle, and any lens that has a focal length more than 25 mm may be called telephoto. A wide-angle lens will distort the image because it exaggerates distances and makes small rooms seem larger than they actually are. Wide-angle lenses are ideally suited for filming any handheld-type shots. A telephoto lens compresses objects together and makes them appear closer than they actually are; they are ideally suited for filming pleasing close-up shots.

Primes and Zooms

While wide angle, normal, and telephoto are categories of focal lengths, when we speak of the physical lens itself we refer to two basic types. *Prime lenses* have a single, fixed focal length that cannot be changed. Some examples of prime lenses are 18 mm, 25 mm, 32 mm, 75 mm, and so on. *Zoom lenses* have variable or adjustable focal lengths that can be changed during shooting. By turning a ring on the barrel of the zoom lens, you can change the focal length. Zoom lenses are most often referred to by their range of focal lengths, such as 12 mm to 120 mm (12 to 120), 25 mm to 250 mm (25 to 250), etc. These may also be referred to as 10 to 1 (10-1) zooms. You may also have a 5 to 1 zoom, 4 to 1 zoom, etc. (see Figure 1.21). A further discussion of lenses can be found in Chapter 4.