

Flat Mirrors

SECTION 2

REFLECTION OF LIGHT

Suppose you have just had your hair cut and you want to know what the back of your head looks like. You can do this seemingly impossible task by using two mirrors to direct light from behind your head to your eyes. Redirecting light with mirrors reveals a basic property of light's interaction with matter.

Light traveling through a uniform substance, whether it is air, water, or a vacuum, always travels in a straight line. However, when the light encounters a different substance, its path will change. If a material is opaque to the light, such as the dark, highly polished surface of a wooden table, the light will not pass into the table more than a few wavelengths. Part of the light is absorbed, and the rest of it is deflected at the surface. This change in the direction of the light is called **reflection**. All substances absorb at least some incoming light and reflect the rest. A good mirror can reflect about 90 percent of the incident light, but no surface is a perfect reflector. Notice in **Figure 5** that the images of the person get successively darker.

The texture of a surface affects how it reflects light

The manner in which light is reflected from a surface depends on the surface's smoothness. Light that is reflected from a rough, textured surface, such as paper, cloth, or unpolished wood, is reflected in many different directions, as shown in **Figure 6(a)**. This type of reflection is called *diffuse reflection*. Diffuse reflection will be discussed further in Section 4.

Light reflected from smooth, shiny surfaces, such as a mirror or water in a pond, is reflected in one direction only, as shown in **Figure 6(b)**. This type of reflection is called *specular reflection*. A surface is considered smooth if its surface variations are small compared with the wavelength of the incoming light. For our discussion, reflection will be used to mean only specular reflection.

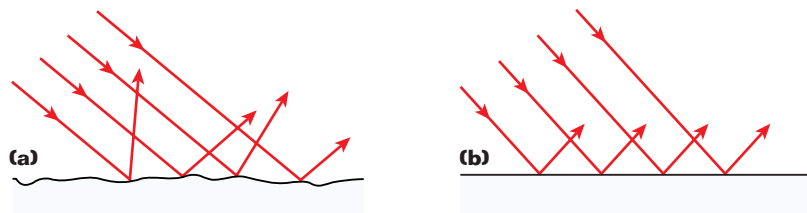


Figure 6

Diffusely reflected light is reflected in many directions **(a)**, whereas specularly reflected light is reflected in the same forward direction only **(b)**.

SECTION OBJECTIVES

- Distinguish between specular and diffuse reflection of light.
- Apply the law of reflection for flat mirrors.
- Describe the nature of images formed by flat mirrors.

reflection

the change in direction of an electromagnetic wave at a surface that causes it to move away from the surface



Figure 5

Mirrors reflect nearly all incoming light, so multiple images of an object between two mirrors are easily formed.