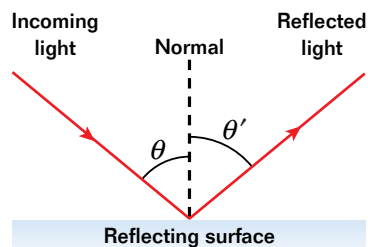


(a)



(b)

Figure 7

The symmetry of reflected light (a) is described by the law of reflection, which states that the angles of the incoming and reflected rays are equal (b).

Incoming and reflected angles are equal

You probably have noticed that when incoming rays of light strike a smooth reflecting surface, such as a polished table or mirror, at an angle close to the surface, the reflected rays are also close to the surface. When the incoming rays are high above the reflecting surface, the reflected rays are also high above the surface. An example of this similarity between incoming and reflected rays is shown in **Figure 7(a)**.

If a straight line is drawn perpendicular to the reflecting surface at the point where the incoming ray strikes the surface, the **angle of incidence** and the **angle of reflection** can be defined with respect to the line. Careful measurements of the incident and reflected angles θ and θ' , respectively, reveal that the angles are equal, as illustrated in **Figure 7(b)**.

$$\theta = \theta'$$

angle of incoming light ray = angle of reflected light ray

The line perpendicular to the reflecting surface is referred to as the *normal* to the surface. It therefore follows that the angle between the incoming ray and the surface equals $90^\circ - \theta$, and the angle between the reflected ray and the surface equals $90^\circ - \theta'$.

FLAT MIRRORS

The simplest mirror is the *flat mirror*. If an object, such as a pencil, is placed at a distance in front of a flat mirror and light is bounced off the pencil, light rays will spread out from the pencil and reflect from the mirror's surface. To an observer looking at the mirror, these rays appear to come from a location on the other side of the mirror. As a convention, an object's image is said to be at this location behind the mirror because the light appears to come from that point. The relationship between the *object distance* from the mirror, which is represented as p , and the *image distance*, which is represented as q , is such that the object and image distances are equal. Similarly, the image of the object is the same size as the object.

angle of incidence

the angle between a ray that strikes a surface and the line perpendicular to that surface at the point of contact

angle of reflection

the angle formed by the line perpendicular to a surface and the direction in which a reflected ray moves