



Image from: [The top diagram shows the reflection of an image... in Philip's Encyclopedia](#)

### Summary Article: **reflection**

From *The Columbia Encyclopedia*

return of a wave from a surface that it strikes into the medium through which it has traveled. The general principles governing the reflection of light and sound are similar, for both normally travel in straight lines and both are wave phenomena. Objects are visible because of the light reflected from their surfaces, and their color depends on their ability to reflect light of a certain wavelength and to absorb that of other wavelengths. The reflection of sound waves from a surface is called an echo.

### **The Laws of Reflection**

The reflection of light follows certain definite laws. A ray of light striking a reflecting surface at right angles to it is returned directly along the path it has followed in reaching the surface. When, however, a ray strikes a reflecting surface at any other angle, it is reflected at an angle in an opposite direction. The incoming ray is called the incident ray. Its direction is usually described by the angle of incidence, which is the angle that it makes with the normal, or line perpendicular to the reflecting surface at the point of reflection. The angle formed by the reflected ray and the normal is called the angle of reflection and is equal to the angle of incidence. Furthermore, the reflected ray is always in the same plane as the incident ray, and this plane is perpendicular to the surface.

### **The Degree and Types of Reflection**

Not all surfaces reflect light in the same way or to the same degree. The measure of the fraction of light that is reflected by a material is called its reflectance. Metals in general have high values of reflectance; silver, for example, has a reflectance of about 96%. Smooth surfaces give regular reflection, also called specular reflection, in which incident parallel rays remain parallel after reflection. Rough or uneven surfaces give diffuse reflection, since the reflected rays are scattered and not parallel. For example, reflection by a mirror is regular; by a highly polished but uneven piece of metal, it is diffused. Reflection of light is also brought about under certain conditions by the surfaces of transparent media through which light normally passes. An example is seen in the blazing glare of sunlight on a window or an automobile windshield when the sun's rays strike it at a very oblique angle.

A corner reflector returns a ray that is exactly parallel to the incident ray back to the incident ray's point of origin, or very close to it. The reflector is formed by intersecting three mutually perpendicular planes, with the centerpoint therefore being located at the mutual point of intersection. Such a device can be utilized as a radar target or marker for range finding and surveying. For increased visibility at night microscopic corner reflectors can be incorporated into reflective paint for road signs and incorporated into the lenses of bicycle and motorcycle reflectors. Several U.S. Apollo missions and one Soviet Lunakhod lunar probe deployed corner reflector arrays on the lunar surface. When the arrays are illuminated by laser beams originating from the earth, precise measurements of the roundtrip travel time of the light permit the calculation of the earth-moon distance to an accuracy of 6 in. (15 cm). Such measurements also are used to determine the moon's orbit with greater accuracy, to record perturbations in the moon's motion caused by meteorite impacts, and to ascertain the length of an earth day.

The phenomenon called total internal reflection is observed when light passing from one medium (e.g., a glass prism or water) to a less dense medium (e.g., air) reaches the boundary between the two media and is thrown back into the denser medium instead of passing outward as would be expected. This occurs when the light strikes at an oblique angle, greater than a certain degree. Up to that degree, refraction (not reflection) takes place, and the greatest angle at which refraction is possible is called the critical angle; if the angle of incidence exceeds this angle, total reflection occurs. The fire of a faceted diamond is due to total internal reflection. Internal reflection accounts in part for a number of natural phenomena. Rays of sunlight striking raindrops are refracted on entering them and then undergo internal reflection; since the sunlight is broken up into its colors, a rainbow appears. A mirage is also partially the result of internal reflection.

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## MLA

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