

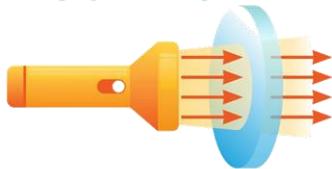
Sound, Light, Mirrors, & Lenses

Section 3: Reflection & Refraction of Light

Light is needed to see things around us, and how well we see them depends on the amount of light and the color of an object. Unfortunately, most objects don't produce their own light, so almost everything we see is reflecting light. The reflected light travels to the retina of our eyes, where an image is received and sent to the brain.

TRANSPARENT

ALL light passes through



TRANSLUCENT

SOME light passes through



OPAQUE

NO light passes through



Objects must reflect light to be seen. Something **opaque** does not allow light to pass through. It only absorbs and reflects light. If something is **translucent**, some light passes through. The frosted glass reflects some sunlight and also lets some light pass through. As a result, light is scattered in different directions. A **transparent** item transmits almost all light, absorbing and reflecting only a little bit. For example, a glass of water is transparent because most light passes through it.

When you look in a mirror, you see your reflection. This happens because light reflects off of you, hits the mirror, and then reflects off the mirror to your eye. Reflection occurs when a light wave strikes an object and bounces off it. When light is reflected from a flat mirror, the incoming ray of light is called the incidence ray. The **law of reflection** states that the angle of incidence (i), or where light strikes a surface, is equal to the angle of reflection (r). Regular reflection occurs when light waves are reflected on a smooth surface, such as a shiny car. Diffuse reflection occurs on a rough surface, such as a brick wall.

Refraction of light occurs when waves of light pass from one medium to another, and the light wave is bent or refracted. Light travels slower through water than air. When light hits the water at an angle, the slowing down makes it bend as it changes its direction. The **index of refraction** indicates how much a material reduces the speed of light; the more the light is slowed, the greater the index of refraction.

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Section 3: Reflection & Refraction of Light Continued



A prism separates light into colors because of refraction. The amount of bending depends on the wavelength of the light. Colors always appear in the same order: red, orange, yellow, green, blue, indigo, and violet. Light refracted through air layers of different densities can result in mirages.

Review:

1. Compare opaque, translucent, and transparent.
2. What is the law of reflection?
3. Explain the index of refraction.