

How do waves behave?

By NASA, adapted by Newsela staff on 08.17.20

Word Count **558**

Level **480L**



Waves can behave in different ways. Diffraction is when light waves are bent, like this. Photo by Mila Drumeva/ Shutterstock

A wave transfers energy. There are many different types of energy. One type is light energy. Light energy travels in waves. There are many kinds of light energy. Scientists call the entire range of all light the electromagnetic spectrum. The electromagnetic spectrum includes light we can see. It also includes light we cannot see.

Visible light is the type of light we can see. It includes the colors that we can see with our eyes. Invisible light is the type of light we cannot see. There are many types. One type is ultraviolet (UV) light.

Different types of light energy have different wavelengths. A wavelength is the distance from a point on one wave to the same point on the next.

All light waves behave the same way. When a light wave hits an object, they are reflected. Or, they are absorbed. Or, they are refracted. They can also be diffracted or scattered. It depends on the object. It also depends on the wavelength of the light.

Reflection

Reflection is when light hits an object. Then, the light bounces off. Very smooth surfaces reflect almost all light. Mirrors are one example of reflection.

Color is the wavelengths of visible light that we can see. All objects reflect some wavelengths. They absorb the others. We see the reflected wavelengths as color. Which colors get reflected depends on the object.

Absorption

All light contains tiny particles called photons. Absorption happens when photons hit other molecules. This causes the molecules to vibrate. The vibrating molecules make the object hot. This heat is then released from the object.

Darker colored objects absorb light energy. Lighter colored objects absorb less energy. Black pavement absorbs most light energy. It reflects very little. But a light-colored sidewalk reflects energy. It absorbs very little. The pavement will be hotter than the sidewalk in the sun.

Diffraction

Diffraction is the bending of light. Shining light through a prism diffracts light. This creates a rainbow.

A spectrometer is a tool. It diffracts light. It separates light into different wavelengths. Scientists call this range of wavelengths a spectrum.

Scatter

Scattering is when light bounces off an object. The light goes in different directions. Wavelength affects the amount of scattering. So does the size of the object.

Sunlight hitting the ground looks colorless. Still, we see the sky as blue. This is because of scattering. Sunlight enters Earth's atmosphere. Then, it hits gas molecules. These gas molecules scatter shorter wavelengths of light. It scatters across the skies.

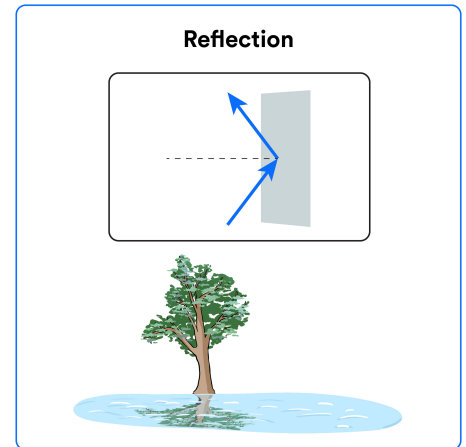


Image 1. With reflection, light bounces off an object. Graphic: Newsela staff

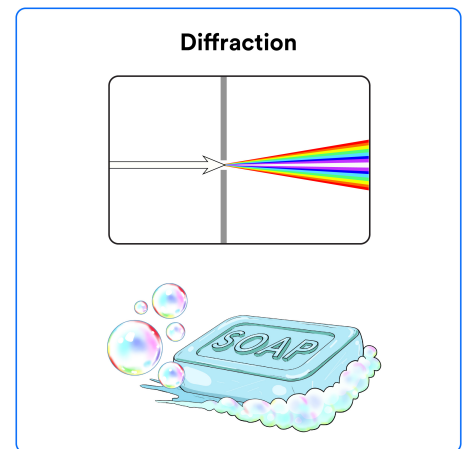


Image 2. Diffraction is the bending of light. Graphic: Newsela

Shorter wavelengths of light are blue and violet.

Refraction

Refraction happens when light waves change direction. This can happen when the medium changes. A medium is a substance that carries a wave. Light travels slower in air than in a vacuum. A vacuum has no gas molecules.

Light travels even slower in water. The change in speed bends the light. Different wavelengths of light slow down at different rates. They can bend at different angles. Put a straw in a glass of water. You can see that it looks bent at the surface of the water.

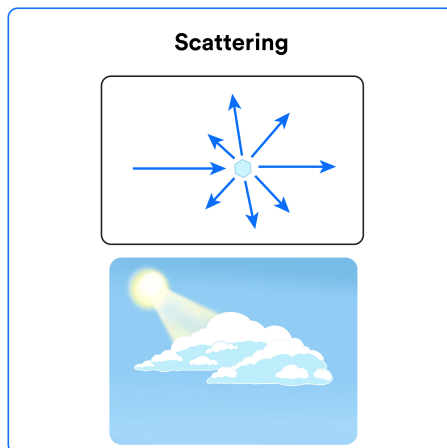


Image 3. The scattering of light. Graphic: Newsela staff

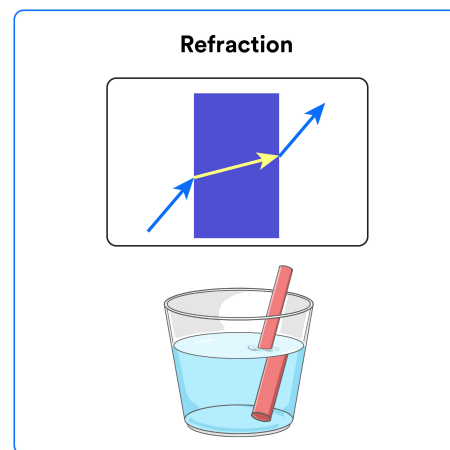


Image 4. With refraction, light waves change direction. Graphic: Newsela staff