Light

Light is a specific form of energy called **radiation**. Three types of radiation are light, radio waves, and X-rays. Light moves in waves and is very fast. Nothing is faster than light; it is the fastest thing in the universe. In empty space, light can travel 670 million miles per hour. A beam of light can race around the earth seven times in one second.

Light travels at 200,000 miles per second (300,000 kilometers per second). The speed of light can change, however. To slow light down, just put something in its way (like air, water, or gas). Changing the speed causes the light to bend. For example, a stick under water looks broken or bent. This is called **refraction**. Refraction (broken light) is used to make telescopes, cameras, magnifying glasses, and eyeglasses.

The sun naturally gives out light. Most objects do not give off light and can be seen only because light bounces off them. Objects cannot be seen in the dark because no light is bouncing off them, and a dark surface reflects less light than a white surface. The **law of reflection** states that light hits a surface at a particular angle and is **reflected** (bent) at the same angle in the opposite direction (called the angle of reflection). This is why if you can see someone in a mirror, you know that person can see you.

In 1913, a scientist named Niels Bohr discovered that when electrons (charged particles in atoms) change energy levels, they either give off or absorb packets of radiation as **light**. He called the packets of light photons. He found that the shorter the light's wavelength, the higher the photon's energy.

Light is carried in **electromagnetic waves**. Electromagnetic waves can be long (millions of miles) or short (shorter than an atom). Some are invisible to humans because human eyes can see only certain wavelengths. For example, butterflies can see ultraviolet rays, but humans cannot. Electromagnetic rays form this spectrum, from shortest rays to longest rays:

Gamma: Dangerous; kill living cells; occur in nuclear bomb explosions as radioactivity.

X-rays: Pass through skin and tissue but not bone, teeth, or metal.

Ultraviolet (UV) rays: Can pass through skin causing sunburn, cancer, and wrinkles.

Visible light: Only type of electromagnetic radiation human eyes can see; range of wavelengths we see as colors; bounce off objects.

Infrared: Carry heat; can see with night-vision goggles; emitted by fire.

Microwaves: Short waves that pass through plastic, glass, and so forth to heat water.

Shorter radio: Cell phones use short radio waves to send signals; travel best in straight lines.

Longer radio: TV and radio stations use longer radio waves to broadcast; can bend and travel around the world.

The light we receive on Earth comes from sunlight. The light is carried on tiny waves that vary in length from short to long. Color comes from these light waves, so the **colors** we see are really the light of different **wavelengths**. Short light waves create the color blue, while long light waves create the color red. White light is really all the colors, or wavelengths, blended together. Sunlight looks white because it contains all the colors.

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