

# Light Energy

Most of us experience light every day of our lives. Some types of light, like the glow of a nightlight at bedtime, a sunny spring day, or the burning of a campfire, can be comforting. Other light, like the sharp crackle of lightning, can be scary or unpleasant. From the time we first perceive our surroundings, we use our sense of sight to observe and learn about the world around us. What are some ways you experience light?

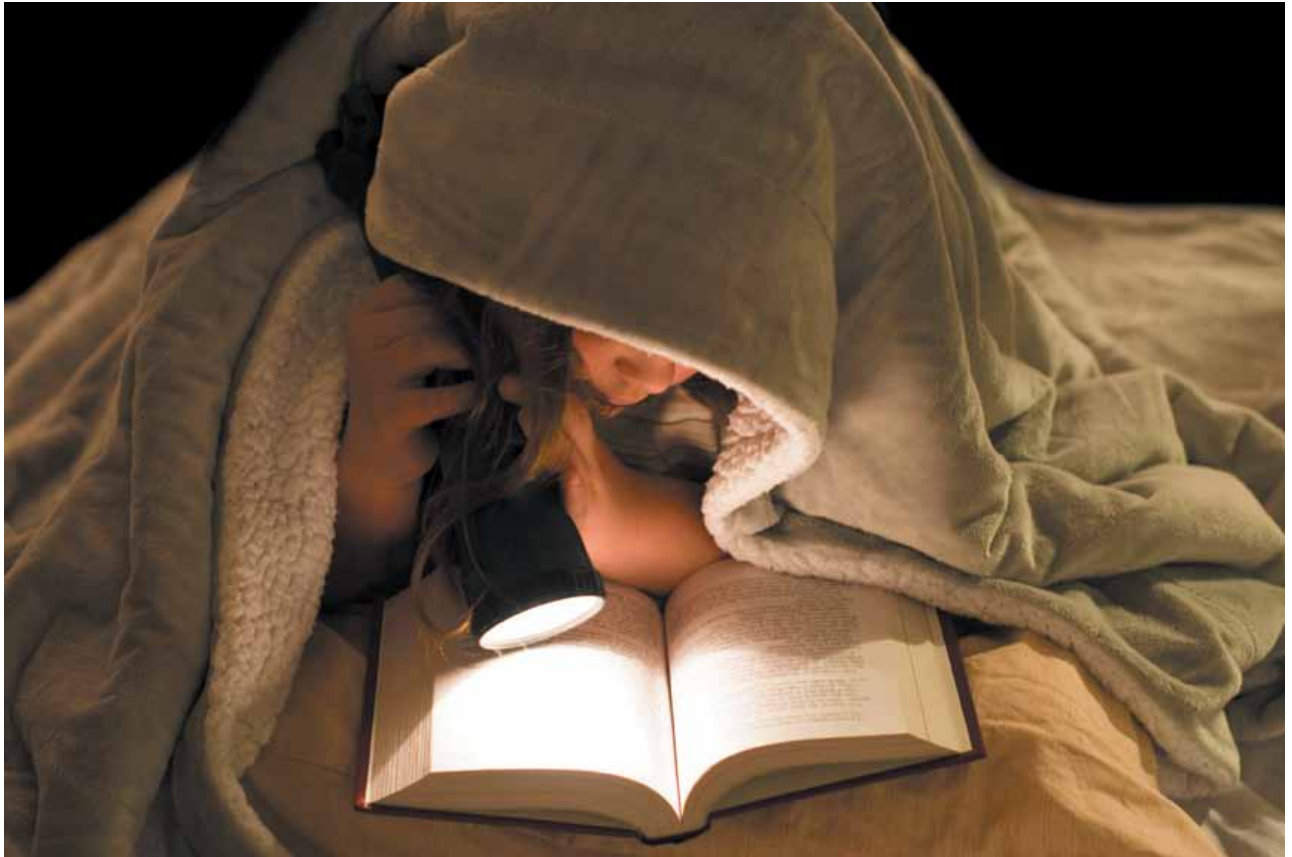


This burning campfire provides a comforting light.



Lightning can be scary when it lights up the sky.

Light is a form of energy. When we see light, we know energy is present. Light is known as **radiant energy**, or **electromagnetic radiation**. When we talk about light, we usually mean the radiant energy that we are able to see. This is called **visible light**. There are also many forms of radiant energy that we are not able to see such as **radio waves** and **microwaves**. Radio waves are used to broadcast television and radio signals. Microwaves are used to cook food in microwave ovens.



When we see light from this flashlight, we know energy is present.

Light can travel from one place to another. It travels at immense speeds. It travels so fast that its effects appear to be instantaneous. When you turn on a light switch, the room brightens immediately. Light travels at a speed of about 300,000 kilometers (186,000 miles) per second through a **vacuum**, such as space. At this speed, it takes around eight minutes for sunlight to travel from the sun to Earth.

### Word Connection

**vacuum**—A place without matter.



It takes around eight minutes for sunlight to reach Earth.

Light can not only travel from place to place, but it can also transfer to a different form of energy. For example, light from the sun is transferred to heat at Earth's surface. This can cause us to sweat. It can also cause our ice cream cones to melt on a hot summer day!



Sunlight transfers to heat and causes this ice cream cone to melt.

## Light Energy

The light energy from the sun is transferred to chemical energy by plants through the process of **photosynthesis**. Special pigments, substances that color a plant's leaves, absorb the sun's energy and use it to create the sugars the plants need to grow and function. Plants, in turn, provide food—chemical energy—for humans and other organisms.



Light energy is transferred to chemical energy, enabling plants to grow.

Light is transferred to produce electrical energy in solar panels. Solar panels are like batteries, containing the substances necessary to create an electric current. Solar panels are made of **solar cells** (referred to as **photovoltaics**, meaning “light-electricity”) that generate an electrical current when struck by light. Solar panels provide electricity to solar devices including calculators, parking meters, refrigerators, home heating and cooling systems, and satellites in space.



Light energy is transferred to electrical energy by the solar panel on this house.

## Light Energy



The solar panel on top powers this parking meter.



A small solar collector powers this calculator.



Many transfers of energy involve the transfer of one form of energy to several forms. For example, in the solar pulley, light energy is first transferred to electrical energy by the solar panel. Then the electrical energy is converted to motion energy by the motor. This causes the solar pulley to move the spool of thread upward. When the spool of thread moves upward, motion energy is transferred to sound energy.



With the solar pulley, light energy is transferred to several forms of energy.

In machines and inventions, some energy transfers happen that aren't useful. For example, light energy transfers to heat when it shines on a solar panel, but the heat energy doesn't help the panel make electricity. Likewise when you turn on a light bulb some electrical energy is transferred to heat energy. The transfer of electrical energy to heat energy is not useful; it is wasteful. Engineers call this wasteful type of energy transfer "inefficient."

### Word Connection

**Inefficient**—When tasks or processes waste energy or time.



Whenever light is present we know energy is also present. Light can travel from place to place. Light can also transfer from one form of energy to another. Next time you see light think about how the light got to you and whether or not there were energy transfers involved.

# Glossary

**electromagnetic radiation**

Radiation that travels through the vacuum of space at the speed of light.

**microwave**

An electromagnetic wave used to cook food in microwave ovens.

**photosynthesis**

The process by which plant leaves absorb the sun's energy and use it to create the sugars the plants need to grow and function.

**photovoltaics**

Devices designed to convert sunlight into electricity.

**radiant energy**

The energy of any type of electromagnetic radiation.

**radio wave**

An electromagnetic wave that can be used to broadcast television and radio signals.

**solar cells**

A photovoltaic cell that converts sunlight directly into electricity.

## Light Energy

### **vacuum**

A place without matter.

### **visible light**

An electromagnetic wave that humans are able to see.

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