



Reading — Solar Energy

Getting Ready

Have you ever gone into a room where the sun was shining brightly through the windows? If so, how did the temperature in this room compare to the temperature of other rooms?



In class, you learned that light can interact with objects in three ways. Light can be reflected (or scattered), transmitted, and absorbed. When light hits an object, one, or two, or all of these can happen at the same time. When light from the sun reaches a clear window, some of the light is reflected off of the smooth glass. Some of the light is absorbed by the glass, but most of the light is transmitted. Most of the light continues to travel until it reaches an object in the room, like the floor, walls, or furniture. These objects then scatter, transmit, and absorb the light that reaches them. The light absorbed by the objects causes them to heat up. These heated objects can then heat other stuff in the room, such as the air, the ceiling, and even you.

Today, you will read about many ways that people use sunlight, because they understand that light can make things happen.

How Do People Use Reflection?

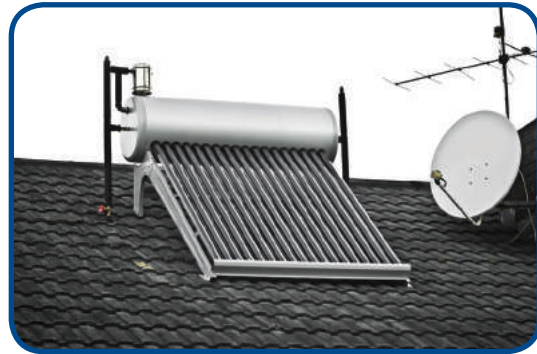
Have you ever seen a building that looks as if it were made out of mirrors? These buildings are made using reflective glass. How would replacing clear windows with reflective glass affect the temperature inside the building? Explain your ideas.



In class, you saw that light can cause many types of changes in objects besides heating them. Light makes plants grow, radiometers spin, and light-sensitive paper change color. You learned that in order for these changes to occur, light reaching the object must be absorbed. Light carries energy as it travels, so when light is absorbed by an object, energy is transferred from the light to the object that it hits. It is the transfer of energy that enables objects to heat up, spin, grow, or change color. The energy carried by the light from the sun is called *light energy* or *solar energy*. Solar energy can be used in many ways.

Solar Water Heaters

Solar energy is widely available in California because it is very sunny. People who live in California have been using solar energy from the sun for a long time. Some people use solar energy carried by light from the sun to heat their water. Solar water heaters are often placed on roofs to absorb sunlight directly. People in southern California have been using solar water heaters for over a hundred years. By using solar energy, people do not need to pay for the gas or electricity that power most water heaters.



Most solar water heaters have three parts: a hot water storage tank, a solar collector that absorbs light from the sun, and a backup gas or electric heater that can heat the water in case of a cloudy day. Look at the picture of the solar water heater. It is designed to absorb as much light as possible and reflect as little light as possible.

Think of the activity you did in class when you used a light bulb to heat a beaker of clear water and a beaker of colored water. Use what you learned from that activity to help you explain why it is best for solar collectors to be black.



Do you think using solar water heaters would be a good idea where you live? Why?



How Does Solar Energy Make Electronics Work?

Heating water is not the only way to use solar energy. Have you ever seen a sign that looks like the one in the photograph? To get people's attention, lights flash above and below the sign. These lights need electricity to operate, but they do not need to be plugged in. The dark panel on top of the sign is called a *solar cell*. It is similar to the solar collectors you just read about.



A solar cell produces electricity by using light energy from the sun. Solar cells are useful for things that need electricity but are not near an electrical outlet. States like New Mexico and Arizona use a lot of solar cells because they have a lot of sunlight, and many desert areas are far from electricity.

Solar cells are also useful to move things. For example, scientists can build cars that never need gasoline. These cars have solar cells, so they move using light energy from the sun.

Solar Panel Powers Calculator

Some calculators are designed to operate using a small solar cell. Like the solar collectors on solar water heaters, solar cells are designed to absorb a lot of light and to reflect very little. Explain why a good solar cell absorbs a lot of light and reflects a small amount of light.



Some miniature cars can run using small solar cells, but the solar cells needed to run a real car must be very large. Using what you know about solar energy, explain why a real car needs a bigger solar cell than a miniature car.



Solar energy can be used to heat water, generate electricity, move things, or even make living things grow. Since it is plentiful, and it does not create pollution, solar energy is an excellent energy resource. You may want to learn more about solar energy on the Internet.