

NATIONAL SCIENCE EDUCATION STANDARDS

A. Science as Inquiry

Abilities necessary to do scientific inquiry
Understanding about scientific inquiry

B. Physical Science

K–4

Position and motion of objects

- o Sound is produced by vibrating objects. The pitch of the sound can be varied by changing the rate of vibration.

Light, heat, electricity, and magnetism

- o Light travels in a straight line until it strikes an object. Light can be reflected by a mirror, refracted by a lens, or absorbed by an object.

5–8

Transfer of energy

- o Energy is a property of many substances and is associated with heat, light, electricity, mechanical motion, sound, nuclei, and the nature of a chemical. Energy is transferred in many ways.
- o Light interacts with the matter by transmission (including refraction), absorption, or scattering (including reflection).

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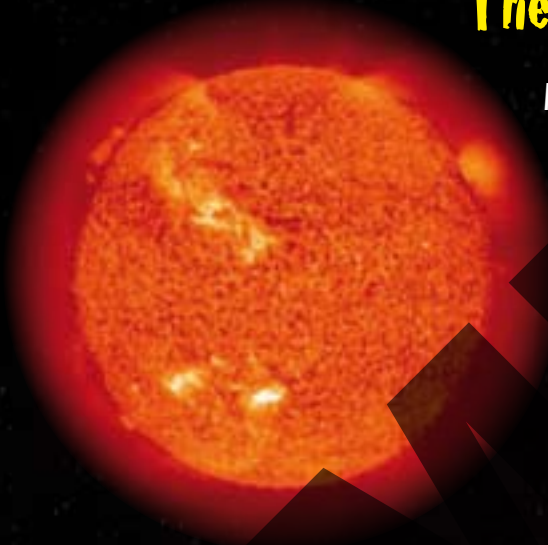
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WHERE DOES ENERGY COME FROM?

The Sun



Most of the earth's energy comes from the sun. Without the energy from the sun, living things on earth couldn't survive. Energy from the sun is called solar energy.

Energy can travel from one place to another. The sun **radiates** solar energy across millions of miles of space.



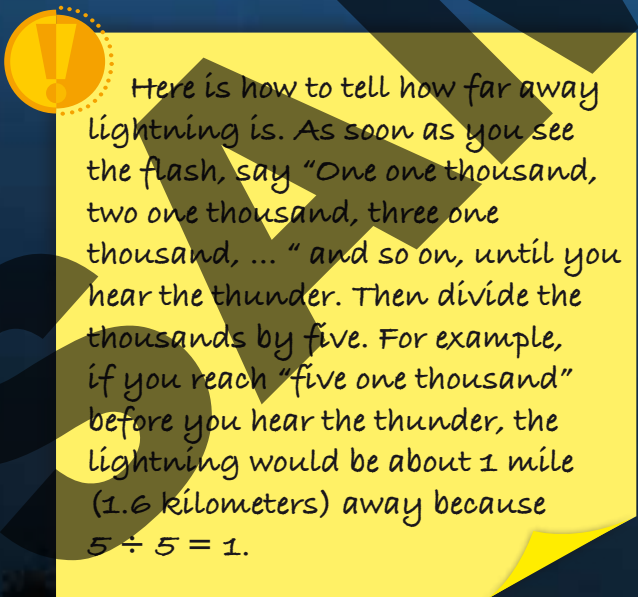
Do you know why sunlight feels hot? When heat (a form of energy) comes in contact with your body, it causes the molecules in your skin to move faster. This movement raises the temperature of your skin. This is why sunlight feels hot.

LIGHT

Light is also a form of energy. Like sound, it can travel as a wave. Unlike sound, it does not need a medium to travel through. How do we know this?

We know that light can travel through the vacuum of space because we can see light from the sun and from other stars. Starlight travels through empty space to get here—and it travels very, very fast. The speed of light is 186,000 miles (299,337 kilometers) per second!

Sound travels much more slowly, at only 761 miles (1,225 kilometers) per hour. This explains why you see a lightning flash before you hear the thunder that it makes.



Here is how to tell how far away lightning is. As soon as you see the flash, say “One one thousand, two one thousand, three one thousand, ...” and so on, until you hear the thunder. Then divide the thousands by five. For example, if you reach “five one thousand” before you hear the thunder, the lightning would be about 1 mile (1.6 kilometers) away because $5 \div 5 = 1$.

Seeing Color

You will need:

- scissors
- three pieces of card stock the size of a shoe box lid (you can use the lid as one of them)
- clear tape
- red, blue, and green **cellophane**
- a plain 4 × 6 inch (10 × 15 centimeter) note card
- red, blue, and green marker pens
- a shoe box
- a flashlight

What to do:

1. Cut a rectangular hole in the center of each of the three pieces of card stock.
2. Tape a rectangle of red cellophane over the hole in one of the pieces of card stock.
3. Use the green and blue cellophane on the other two pieces of card stock.
4. On the note card, color three equal-sized stripes of red, green, and blue with the marker pens.
5. Tape the note card inside the bottom of the shoe box at the center.

6. Place one of the pieces of card stock over the box and shine the light through the cellophane onto the colored stripes below.
7. Repeat this with each color.

Surprise a friend:

Show a friend what happens to the color stripes and the white around them each time you change the cellophane color. You'll need to explain that most cellophane lets small amounts of all colors through.



Everything we do uses energy. Without energy, the earth wouldn't have plants, animals, or people. The next time you have a snack, think about all the energy that's part of the food you are eating. It is about to become part of you!

