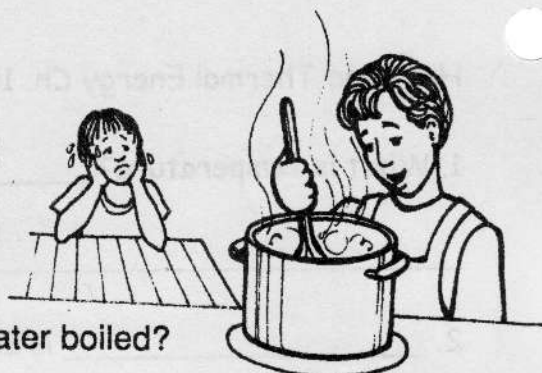


Name _____

Energy

Juan was boiling spaghetti on the stove. His friend Marcus was too hot to help on this sizzling summer day. The spaghetti was delicious, even though Juan burned his hand on the hot pan while serving it.



1. Which type of heat transfer occurred when the water boiled?

2. Which type of heat transfer occurred when Juan burned his hand?

3. Which type of heat transfer made Marcus feel hot?

State whether each of the following examples demonstrates potential (P) or kinetic (K) energy. Write *P* or *K* in the blanks.

- | | |
|----------------------------|--|
| 4. _____ a lump of coal | 5. _____ a falling ball |
| 6. _____ a running man | 7. _____ a firecracker that has not been lit |
| 8. _____ an unused battery | 9. _____ a moving car |
| 10. _____ a burning candle | 11. _____ a piece of candy |

Write what kind of energies (sound, mechanical, light, nuclear, heat, chemical, electrical, or radiant) are being demonstrated in the situations described below. The energy wheel on the poster will help you.

12. _____ a clap of thunder
13. _____ a burning piece of wood
14. _____ uranium in use in a fusion power plant
15. _____ sunlight traveling to a planet
16. _____ a camera flash in use
17. _____ a running dog
18. _____ friction
19. _____ a battery-powered watch
20. When a match is struck, _____ energy changes to heat and light energy.
21. When a hammer hits a nail, _____ energy is changed to _____ energy and heat energy.
22. A light bulb changes _____ energy to _____ energy and heat energy.

Heat on the Move

Heat energy comes from the movement of atoms and molecules that make up matter. When they vibrate and bump one another, they generate friction. **Friction** is a force that tries to keep objects from sliding across each other. The friction between the moving atoms and molecules generates heat. (You experience friction and the heat it creates when you rub your hands together on a cold day.)

Heat travels in three ways: conduction, convection, and radiation. During **conduction**, heat energy travels by direct contact. A heat source sends heat from molecule to molecule within a solid. **Conductors** are materials, such as iron and copper, that allow heat to flow through them easily. Materials such as wood and rubber, which do not allow an easy flow of heat, are called **insulators**.

Convection is another way in which heat energy is transferred. A heat source sends heat currents in a fluid motion throughout a liquid or gas. The heated liquid or gas is lighter because its molecules are farther apart, and it moves upward, away from the heat source. As the air or liquid cools, it moves back down and is heated again. The cycle continues. These movements are called **convection currents**.

Radiation is heat energy that travels in waves. These waves are called infrared rays. Radiation does not depend on the movement of atoms or molecules, so it can travel through a vacuum, a space that has no matter in it.

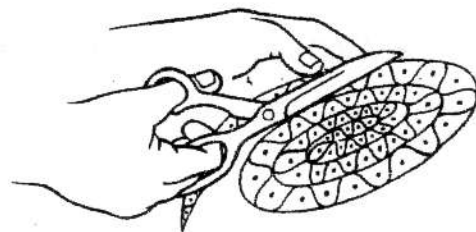
Write letters in the blanks to match each description with the correct word. (Some letters will be used more than once.)

1. ____ This type of object does not transfer heat easily.
2. ____ The sun warms you.
3. ____ the transfer of heat energy by direct contact
4. ____ This type of object transfers heat easily.
5. ____ the transfer of heat by rays
6. ____ You burn your finger on a hot stove.
7. ____ This causes air near the ceiling to be cooler than air near the floor.
8. ____ The end of a spoon left in hot water becomes hot.
9. ____ A space heater heats air then blows it across the room.
10. ____ Sunlight warms the earth.

- | |
|---------------|
| A. conduction |
| B. convection |
| C. radiation |
| D. conductor |
| E. insulator |

Follow the directions below to prove the existence of convection currents.

- A. Cut a large circle from thin cardboard. Draw a spiral that eventually reaches the circle's center. The lines should be approximately $\frac{1}{2}$ " apart. Use bright colors to decorate the spiral.
- B. Cut along the spiral, then carefully make a tiny hole in the center of the circle. Push a piece of string through the hole, and tie a knot underneath.
- C. Hang the spiral over a heater or a warm lamp to watch the convection process. The rising air (convection currents) makes the spiral turn.



Examining Energy

The law of conservation of energy states that the amount of energy that exists in the universe always remains the same. Energy can, however, change from one form to another. Think about what happens to the electrical energy used to turn on a lamp. It changes to light energy and heat energy as the lightbulb gives off light and becomes hot. There are many forms of energy:

- **Mechanical energy** makes things move.
- **Heat energy** causes an increase in temperature.
- **Light energy** makes things visible.
- **Electrical energy** usually results from the flow of tiny particles called electrons. Electrical energy flows through materials such as iron, steel, and copper wire.
- **Chemical energy** is stored in a substance and released during a chemical reaction. During a chemical reaction, a new substance is produced.
- **Nuclear energy** is released when we change the nucleus of very small particles of matter called atoms. Nuclear energy is also called atomic energy. Nuclear energy is a powerful but potentially dangerous form of energy.
- **Radiant energy** is made up of heat energy and light energy. Solar energy, the energy from the sun, is a form of radiant energy. It is produced by nuclear energy.

Fill each blank with the appropriate type of energy described above.



During their spring campout, a group of campers called the Falcons used many different forms of energy. They started out by pitching their tents. This required a lot of (1.) _____ energy. After the tents were up, it was time for lunch. Since there were no outlets to provide (2.) _____ energy, the boys decided to use aluminum foil to create an oven which captured (3.) _____ energy from the sun. They used the (4.) _____ energy from the sunlight to warm their food. After they ate, their bodies used (5.) _____ energy to digest the food. Then the campers used (6.) _____ energy to take a long hike. It began to grow dark before the campers reached their tents, so they turned on their flashlights. The (7.) _____ energy in the batteries changed into the (8.) _____ energy which the campers used to see the trail in the dark.

9. Find out more about nuclear energy. What is its most common use?
