

Write your notes
about what you are
reading in this space.

Science Shorts -6

Thermal Energy

Rub your hands together very quickly. Are they beginning to feel hot? You just created heat or thermal energy! The more you rubbed your hands against each other, the more thermal energy you created. When you think of energy, you probably think of whether or not you are tired or full of energy. Energy is what makes things happen. It makes grass grow, cars move, computers work and stars explode.

All materials are made of tiny particles called molecules. These molecules are always moving. The movement of these molecules creates heat. The amount of heat created depends on how fast the molecules move. The faster they move, the hotter it will get. Usually, as molecules move faster, they take up more space and make objects expand.

Heat can be transferred from one object to another. It can be transferred in three different ways: conduction, convection or radiation. The type of material something is made of makes a difference in how heat is transferred. You see this when a cup of hot chocolate cools off. Your cup gets warmer and your hot chocolate gets cooler. This is called conduction. Solids transfer thermal energy through conduction. The molecules in the solid bump into each other, which makes them move faster. An object gets hotter from the movement of the molecules. All solid objects conduct heat, although some are better conductors than others. Good conductors are made out of metal. Most pots and pans have handles made out of poor conductors like wood or plastic. They keep the heat from traveling through the handle and to your hand.

Liquids and gases transfer thermal energy better through convection. Convection is when the molecules of an object spread out. Convection occurs when hot air rises above cooler air. The movement of the air molecules creates air currents. Warm air rises and cooler air sinks. These convection currents also occur in water.

Radiation is a means of heat travel that is very different from conduction and convection. Radiation is the release of invisible heat rays from a fire or from the sun. It does not rely on moving molecules to transfer heat. Heat waves can travel, or radiate, through outer space where there are not air molecules. For example, when the radiant energy of the sun hits a solid object like the earth, the earth soaks up the energy and changes it into heat. This is how the sun heats the earth even though the sun is 93 million miles away.

Thermal energy is a form of energy that usually involves molecules in motion. It can be transferred through conduction, convection or radiation.

1. Solids transfer heat best through _____ while liquids and gases transfer heat best through _____.

2. Look at the following words: heat – ruler – temperature – thermometer.
Which word does not belong with the others?

- a. heat b. ruler c. temperature d. thermometer

3. Fill in the chart below with the following words:

Solids liquids gases bumping molecules outer space
water Sun metal invisible heat rays
glass carbon dioxide fire

Conduction	Convection	Radiation

4. Which type of heat transfer is used in cooking in a metal pan? _____

5. Which type of heat transfer is used in a hot air balloon? _____

6. Which type of heat transfer is used by the solar panels on the International Space Station? _____

7. Which type of heat transfer is happening when you walk on hot sidewalks with your bare feet? _____

8. Which type of heat transfer is happening when the warm air rises from the land and the cool air from the ocean blows in? _____