Learning Target: I can describe and explain thermal energy changes in terms of conduction, convection, and radiation.

Thermal Energy Changes Reading for Meaning

Part A: Read the following information about thermal energy transfer and answer the questions that follow. (MAKE SURE TO HIGHLIGHT AND UNDERLINE IMPORTANT INFORMATION!!!)

Heat energy comes from the movement of atoms and molecules that make up matter. When atoms and molecules 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.)

1. Where does heat energy come from? _____
   _____
2. How is friction generated? _____
   _____
3. What is friction? _____
   _____
4. How does friction generate heat? _____
   _____

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.**

5. What are the three ways heat travels? _____
6. How does heat energy travel by conduction? _____
   Explain how this process occurs. _____
   _____
7. Conductors are materials that _____
   What are some examples? _____

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.**

8. Describe a heated liquid or gas. _____
   _____
9. Describe a cooled liquid or gas. _____
   _____
10. Why do we call convection currents a cycle? _____
    _____

Lab Sheet Created By: Chivas & Jordan Spivey

Learning Target: I can describe and explain thermal energy changes in terms of conduction, convection, and radiation.

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.

11. What is radiation? _____
    What do we call these waves? _____
12. How is radiation different from heat transfer through conduction and convection? _____
    _____

Part B: Write letters in the blank to match each description with the correct word. (You can use letters more than once.)

A. Conduction
B. Convection
C. Radiation
D. Conductor
E. Insulator

1. _____ This type of object transfers heat easily. (most metals)
2. _____ Getting a tan from the sun.
3. _____ You burn your leg on an iron.
4. _____ Heat energy transferred by direct contact.
5. _____ A heater takes in cold air, heats it, and the warm air rises while the cool air sinks.
6. _____ The transfer of heat by rays.
7. _____ This type of object does not transfer heat easily. (wood, rubber, plastic)
8. _____ Hot sand on the beach warms your feet
9. _____ Sunlight warms the earth.
10. ____ Boiling water. Hot water rises to the top, cold water comes to the bottom.
11. ____ Why it's warmer at the top of a house, and cooler at the bottom of a house.
12. ____ Steak cooking in a pan.

Part C: Use your knowledge of thermal energy transfer to answer the following questions.

Provie three examples of how we use thermal energy transfer to cook food. Use the words conduction, convection, and radiation in your descriptions.

1. _____
2. _____
3. _____

Lab Sheet Created By: Chivas & Jordan Spivey