

LESSON 2

Thermal Energy

► Play Video: Introduction



How does heat move?

New Vocabulary

conduction the passing of heat between two objects that are touching

conductor a material through which heat or electricity flows easily

convection the flow of heat in currents through a liquid or gas

insulator a material through which heat or electricity does not flow easily

radiation the transfer of energy through space

thermometer a tool used to measure temperature

Soon You'll Know

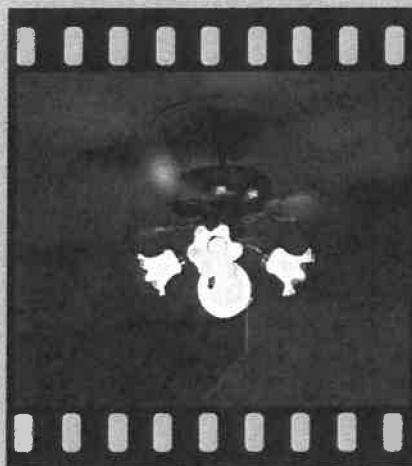
Main Ideas

1. What heat is and what causes it to form
2. How thermal energy can be transferred
3. What temperature is and how you can measure it

► Play Video A: Heat

Remember In the video you learned about thermal energy. Want more heat? Just get those molecules moving!

Think about it You already know that light and sound are forms of energy, but what about heat? Steaming hot chocolate has a lot of moving atoms and molecules in it! These moving particles make thermal energy. When thermal energy begins to flow, you get heat!



Light and sound are forms of energy.



Copper is a good conductor of thermal energy.



Foam is a good insulator.

The way heat flows has a lot to do with the material it's flowing through. If the hot chocolate is in a special foam cup, the heat does not flow as easily because foam material is a good **insulator**. However, if the hot chocolate is in a metal or glass cup, your hand will get hot in a hurry. That's because metal and glass are good **conductors**. They allow heat to pass through them easily.

Now You Know

Main Idea 1: Heat

Heat, or the flow of thermal energy, is caused by the movement of atoms in matter.

► Play Video B: Thermal Energy Transfer

Remember In the video you learned how thermal energy can transfer. All the cooking technology in the kitchen is based on this knowledge!

Think about it When you hold a cup with a cold drink in your hand, your hand gets colder. But it's not because the drink is transferring cold to your hand. It's because your hand is getting cooler as heat flows from your body to the cup. Heat always flows from warmer things to cooler things.



Heat flows from warmer objects to cooler objects.



Conduction is a common way to transfer thermal energy.



Convection occurs in boiling water.

The transfer of thermal energy occurs in three ways. When heat flows between two objects that are touching, such as your hand and a cup, **conduction** occurs. When heat flows because of movements in a liquid or a gas, such as when water boils, **convection** occurs. And finally, thermal energy can transfer through space in the form of **radiation**. This occurs when the sun's rays heat Earth.

Now You Know

Main Idea 2: Thermal Energy Transfer

Thermal energy can be transferred in three ways: through convection, conduction, and radiation.

► Play Video C: Temperature

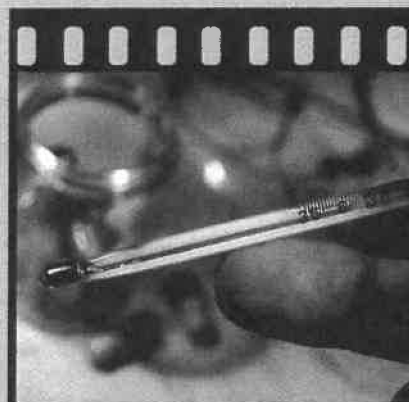
Remember In the video you learned about temperature. It's a hot topic these days!

Think about it You have two pots of boiling water. One is a big pot. The other is smaller. The larger pot has more thermal energy because it contains more particles. Therefore, more energy can flow out of it. But both pots have the same temperature. That's because temperature is a measure of how fast particles are moving. Temperature measures the average motion of particles, while heat describes the flow of energy.

Hot or Cold?

If you want to know how hot or cold something is, you need to use an instrument called a **thermometer** to find out.

Many thermometers have a liquid inside of them. When the liquid is heated, its particles move faster and faster and take up more space. This makes the liquid rise. When the liquid cools, the particles take up less space, and the liquid falls. Marks on the thermometer allow you to read the temperature at the top of the column of liquid.



Thermometers measure temperature.

Temperature is measured in degrees Fahrenheit or degrees Celsius.

Now You Know

Main Idea 3: Temperature

Temperature is the measure of how hot or cold something is. Thermometers are used to measure temperature.