Review radiation

Open your notebook to the model you made to explain radiation from the Sun. Discuss these two questions with a partner.

1. What is radiant energy?
2. How does radiation affect the surface of Earth?
Focus question

• How does energy move through materials?
Energy-transfer challenge

Talk in your groups to figure out how to get 30°C water using these materials.

• Cold water
• Hot red water
• Plastic-foam cups (good for transporting hot and cold water)
Energy-transfer challenge

- Plastic cups (good for conducting the investigation)
- Vials
- Thermometers
Introduce engineering activity

Teacher masters V and W, *Hot-Water Inquiry* and *Hot-Water Setup*
Discuss results

1. Were you able to raise the temperature of a sample of water to 30°C?
2. How were you able to do that?
3. How did energy transfer from the hot water to the cold water?
Explain conduction

Temperature is a measurement of the motion of particles, or kinetic energy. The greater the kinetic energy, the higher the temperature of a solid, liquid, or gas.
“Energy Transfer by Collision”

Energy Transfer by Collision

In gas, particles fly through space.

Some fly fast.

Others have less kinetic energy and move more slowly.

Frequently, particles collide. When they do, energy transfers from fast-moving particles to slow-moving particles.
“Energy Transfer: Conduction, Radiation, Convection”

Conduction is energy transfer between molecules as a result of contact. Close-up of energy transfer between metal particles and water particles.

Radiation

Where is conduction in the environment?

Conduction occurs when two particles at different energy levels (different amounts of movement) make contact. The particle with more energy (movement) transfers energy (motion) to the particles with less energy. Energy is conducted (transferred) from particle to particle in a material, or between different objects and materials, when particles collide.
Analyze warm-water experiment

Talk in your groups to explain the series of energy transfers that take place as water is heated to 30°C.

Think in terms of the particle interactions.

Come up with a group model.
View online activity

“Particles in Solids, Liquids, and Gases”

Weather and Water Course, 5.1: Fluid Conduction
Step 14
Discuss ideas about conduction

Title a new page in your notebook: Thinking about Conduction. Discuss the questions with a partner and record your ideas.

1. What is heat?
2. How is conduction different from radiation?
Discuss ideas about conduction

3. Why does a soda can feel cold in your hand when you take it out of the refrigerator?
Pose a question

1. How did the spoon handle get so hot?
2. How can energy transfer through an object like a metal spoon?
3. How could we find out if conduction is a possibility?
View video

Conduction through Metals

Weather and Water Course, 5.1: Fluid Conduction
Step 17
View video

Make a model in your notebook to explain the energy transfers in this system.
Thermometer

A glass thermometer filled with red alcohol is in a pot of water. Look at the close-up view (not to scale) of the thermometer.

Vibrating glass particles hit alcohol particles inside the thermometer bulb. Energy transfers to the alcohol particles. The alcohol particles move faster and hit each other harder. The alcohol expands and moves up the thermometer stem.

Weather and Water Course, 5.1: Fluid Conduction
Step 18
Review vocabulary

Spend a few minutes reviewing the vocabulary for this part. Update the vocabulary index and table of contents in your notebook.

• conduction
Answer the focus question

• How does energy move through materials?
Wrap-Up/Warm-Up

Share your notebook responses and then make any final updates to your notebook entry. Use cause-and-effect relationships in your explanations.