

**Project FOCUS
Best Lessons
SECOND GRADE**

Title of Lesson: Conducting Heat - By Anupam Saha

Theme: Physical Science

Unit Number: **Unit Title:** energy/ Pushes and Pulls

Performance Standard(s) Covered (enter codes):

S2P2a - Identify all sources of light energy, heat energy and energy of motion.

S2P2b - Describe how light, heat, and motion energy are used.

Enduring Standards (objectives of activity):

Habits of Mind

- Asks questions
- Uses numbers to quantify
- Works in a group
- Uses tools to measure and view
- Looks at how parts of things are needed
- Describes and compares using physical attributes
- Observes using senses
- Draws and describes observations

Content (key terms and topics covered):

Heat, Heat Energy, Friction, Transfer of Heat

Learning Activity (Description in Steps)

Abstract (limit 100 characters): Students will learn about uses of heat, where heat comes from, and how heat travels.

Details:

Introduction:

- Review what heat is used for. For ex. boiling water, heating homes, cooking, etc.
- Ask students to name devices that produce heat. Mention that body also makes heat. ex. Fever

Lecture:

- Ask student to read HSP Science page 270 about friction
- Ask students to rub their hands together to make heat
- Explain motion energy to heat energy conversion

- Very briefly mention where electricity comes from and ask how it is used to make heat.

- Ask Student to read page 274 on movement of heat
- Explain transfer of Heat: always from Hot to cold area.

- No such thing as cold energy

Experiment:

- Students will get in a small groups of 3-4.
- Place boiling water in one styrofoam cup and place crushed ice in another.
- Take a metal spoon and dip it in the boiling water. Remove and lightly feel the temperature of the spoon.
- Take the hot spoon and place it in the ice. Remove and feel the temperature of the spoon.
- Repeat dipping in hot water and then in ice several times. Feeling the temperature is not necessary after the first round.
- Once a decent amount of ice has melted, stop the experiment.

Discussion:

- Explain how heat was transferred from the hot water to spoon, and then from the spoon to the ice, making the ice melt.
- Ask for 3 student volunteers. One will play the role of hot water, the others the spoon and ice.
- Give 10 books/paper/pencils/objects to student playing the role of hot water. Give 5 to student playing the role of spoon. Give none to student playing role of ice. Each object represents a unit of heat.
- Allow student playing spoon to touch student playing hot water. Hot water will give 1 object to spoon. This demonstrates that a bit of heat was transferred from the hot water to the spoon at contact, from hot to cold (student with 10 objects to student with 5 objects). Explain how the hot water is a bit cooler because it now has 9 objects, and spoon is hotter because it now has 6 objects.
- Restart the process (spoon starts with 5 objects again). Allow student playing spoon to touch student playing ice. Spoon will give 1 object to ice. This demonstrates that a bit of heat was transferred from the spoon to the ice at contact, from hot to cold (student with 5 objects to student with no objects). Explain how the spoon is a bit cooler because it now has 4 objects, and the ice is a bit warmer because it now has 1 object.
- Restart the process. Let spoon touch hot water, transfer 1 object. Then let spoon (now has 6) touch ice, transfer 1 object. (hot water now has 9, spoon has 5, ice has 1). Repeat this process until each has 5 books. Explain how hot water got cooler, and ice got warmer and melted.
- Explain how heat will no longer move when all 3 students are the same temperature due to no temperature gradient.

Materials Needed (Type and Quantity):

- Styrofoam Cups
 - Hot water
 - Ice (preferably crushed)
 - Metal Spoons
 - Paper Towels
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- Identical objects such as books, pencils or papers

Notes and Tips (suggested changes, alternative methods, cautions):

- Caution students to be very careful with hot water. **ABSOLUTELY NO HORSEPLAY.**

- If enough materials are available, each student should work independently. Sharing tends to be a problem among kids.
- Instructor should be alert in case of spills.
- Discussion may be pushed to the beginning of the next class due to time constraints

Comments: it is a good idea to have a cup of ice at the front of the classroom untouched through the entire experiment (control). This will show that the ice in the experiment melts faster than the control due to heat transfer.

Sources/References:

- 1) HSP Georgia Science Chapter 6
- 2)
- 3)