

TRB 3:5 - Investigation 4 - Heat Misconceptions

Summary

Classroom activities help students understand that gloves do not provide heat, but rather, they will insulate or hold in any heat that is in their hand.

Group Size

Small Groups

Materials

- ice cubes in sealable bags
- 8 thermometers (be sure all thermometers have the same temperature)
- assorted gloves, mittens, coat, etc. So each group of students has something to experiment with
- [Science Experiment Worksheet](#) (pdf)

Additional Resources

Books:

- *Make it Change*
by David Evans (Dorling Kindersley)
- *Experiment with Heat*
by Salvatore Tocci (True Books)
- *Its Much Too Hot! An Early Learner Book About Heat*
by Bob Graham

Background for Teachers

Heat is the name given to the flow of energy from hotter to cooler objects. Temperature is used to measure the amount of heat energy. A temperature reading is the average amount of energy movement in a substance. The molecules in cold things move very slowly and the temperature smaller. The molecules in hot things mover very quickly, and the temperature rises. Hot substances usually expand when heated.

When a hot substance comes in contact with a cold substance, the heat energy will flow from hotter to colder until the objects become the same temperature.

Insulators are materials that block the flow of heat, while conductors are materials that allow heat to flow easily. Sometimes students believe that insulators are really heat sources, because they seem to make things warm, or heat things up. Insulators will stop the heat from flowing, so things that are warm tend to say warm. but they are not a heat source. Good insulators include plastics, air, fabrics that hold air, feathers, or other similar materials.

Intended Learning Outcomes

1. Use a Science Process and Thinking Skills
3. Understand Science Concepts and Principles

Instructional Procedures

Pre-Assessment/Invitation to Learn

Invite a student to come to the front of the room, and hand the student an ice cube to hold (can be put in a sealable bag). Ask the student what is happening. Clarify that the ice is not bringing cold to the hand, but that the heat is moving from the warm hand to the ice cube, until eventually they become the same temperature. When their hand is cold, sometimes people also believe that it is their gloves

that keep them warm.

Instructional Procedures

Use several different types of gloves, and ask student to predict if these gloves would warm up their hands. Does one glove work better than the other?

Divide students into four groups and hand out a worksheet for each student.

Each group will set the glove or coat on a counter out of direct sunlight and place a thermometer in each glove, and one thermometer on the counter.

After 5 minutes, check the thermometers. The temperatures should both be the same.

Discuss what has happened so far. Do gloves make your hands warm? They seem to. Have one student in the group put the glove or coat on, with a thermometer touching them.

After 5 minutes, record the temperature on each thermometer.

Now put the thermometer back in the glove only, and let them sit again for five minutes. What is the temperature now?

Draw a conclusion: Gloves do not give heat, but will insulate or hold in any heat that is in your hand. As long as a warm hand is in the glove, the glove will be warm. If the hand is removed, then the glove returns to room temperature.

Have students complete the worksheet, fill in their observations, and record a new science question.

Grading student worksheet:

10 points	correct, complete, detailed
8 points	partially correct, complete, detailed
6 points	partially correct, partially complete, lacks some detail
5-1 points	incorrect or incomplete, missing data, needs help

Extensions

Math-

Read and record the temperatures to the nearest ten degrees using a Fahrenheit thermometer.
(*Standard IV, Objective 2*)

Science-

Some students may also try different experiments, such as how to keep an ice cube the coldest, or how to melt an ice cube the soonest. The experiment worksheet will work for any student experiments. (*ILOs 1, 2, 4*)

Language Arts-

Discuss the different temperatures found in ecosystems around the world. What do animals that live in very cold places do to survive the cold? What kind of insulators do they have? What types of materials make good insulators?

(*Standard VII, Objective 3*)

Homework & Family Connections

Insulator Activity in " *My Book About Heat and Light.*"

Assessment Plan

If you have gone over both how heat flows and if gloves keep hands warm, then you may have students complete the true/false [What I Know About Heat worksheet](#) (pdf).

Another assessment is to use the [Heat Story worksheet](#) (pdf) and have students write what they know about heat.

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