

Project FOCUS
Michael Cheng
Best Lesson
Third Grade

Lesson Title: **Insulator Detectives!**

Unit Title: **Physical Science: Heat Energy**

Performance Standards Covered:

S3P1. Students will investigate how heat is produced and the effects of heating and cooling, and will understand a change in temperature indicates a change in heat

b. Investigate how insulation affects heating and cooling

S3CS1. Students will be aware of the importance of curiosity, honesty, openness, and skepticism in science and will exhibit these traits in their own efforts to understand how the world works

a. Keep records of investigations and observations and do not alter the records later

b. Offer reasons for findings and consider reasons suggested by others.

S3CS7. Students will be familiar with the character of scientific knowledge and how it is achieved.

a. Students will recognize that similar scientific investigations seldom produce exactly the same results, which may differ due to unexpected differences in whatever is being investigated, unrecognized differences in the methods or circumstances of the investigation, or observational uncertainties.

Essential Question:

What are insulators and what types of materials make good insulators?

Objective:

To teach students about insulators and to allow them to investigate and discover different materials that makes for good or poor insulators.

Key Words and Terms:

Heat

Heat Energy

Insulation

Thermal Energy

Lesson Plan Abstract:

Students will investigate what insulators are by testing the effectiveness of different materials as insulators.

Materials:

- **1 Container large enough for several hands to fit in at a time as well as several inches of water and ice**

- 10-12 Cups of cold water (enough to fill the container up to a few inches)
- 10-15 Ice cubes
- 4 plastic sandwich bags
- 1 Roll of paper towels
- 1 Sheet of aluminum foil
- 1 Newspaper
- 1 Mitten
- Enough copies of the handout ([Project FOCUS Insulator Detectives! Handout.docx](#)) for all the students

Safety Concerns:

Make sure kids don't try to eat the ice or put anything in their mouths as this could potentially spread germs. Also remind the kids that they don't have to keep their hand submerged for the entire time limit. If their hands become too cold, tell them to stop and warm their hands by rubbing them or holding them in your hands.

Procedure:

- **Prior to arriving you should have created the insulators (lining the inside of a plastic bag with 2-3 layers of aluminum foil; lining the inside of a plastic bag with 2-3 layers of paper; taping the plastic bag over the mitten to waterproof it).**
- **Pass out the Insulator Detectives! handout**
- **Explain the experiment to the class and review the concepts of heat/thermal energy and insulators.**
- **Have the students fill out the second page of the handout (have them predict and write down their hypothesis on which material will be the best insulator and which will be the worst).**
- **Add water to the container until there are several inches of water at the bottom. Then add the ice (the goal is to make the water noticeably cold).**
- **Have the students come up in groups of 5. Give each student in the group an insulator (or their bare hand) and have them submerge their hand into the water for 10-15 seconds. Allow their hands to warm up for around 30 seconds. Repeat this procedure, allowing each student to try every insulator.**
- **Once one group has cycled through all the insulators have them return to their seats and record their observations on their handouts.**
- **Bring another group of 5 students up and repeat the procedure.**
- **After every student has gone, bring the class back together and discuss the results of the experiment and end the lesson with a review of the concepts covered in the experiment.**

Notes and Tips:

An alternative way to construct the insulators is to tear the aluminum foil and paper into small pieces and just put them into the plastic bag. I found that lining the bag with layers of the material gave the best results however.

Feel free to experiment with other materials to construct your insulators.

You can also add salt to the water to make it even colder if that is desired.

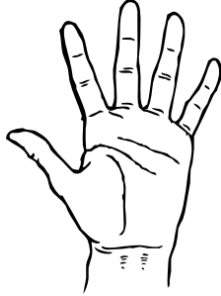
Also, make sure to remind the students to not splash the water when their hands are submerged and to simply keep their hands still.

References:

**- This lesson was adapted from a best lesson:
<http://www.focus.uga.edu/thirdgrade/documents/3-PS-Insulationinvestigation.pdf>**

Insulator Detectives!

Suspects:



- Bare Hand



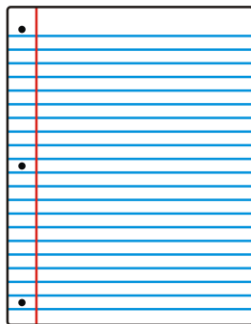
- Plastic Bag



- Mitten



- Aluminum Foil



- Paper

Hypothesis:

I think _____ will be the best insulator.

Why?

I think _____ will be the worst insulator.

Why?

Rank the "suspects"!

1 best insulator

5 worst insulator

Bare Hand:

Plastic Bag:

Mitten:

Aluminum Foil:

Paper:

Was your hypothesis true?

What did you learn from this experiment?