

**Project FOCUS
Best Lessons
THIRD GRADE**

Title of Lesson: Insulation Investigation

Theme: Physical Science

Unit Number: Unit Title: Heat Energy

Performance Standard(s) Covered (enter codes):

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

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

-Scientific Method: Hypothesis

-Insulation

-"Dead Air" Pockets

Learning Activity (Description in Steps)

Abstract (limit 100 characters): Students learn what an insulator is while experimenting with different materials.

Details:

***Note:** This lesson was designed for small groups of five but can easily be adapted for a larger class.

To set up the experiment, first fill the bucket with a few inches of water and some ice. The goal is to get the water noticeably cold. Set out the "suspects" or the different insulators. For some of the materials, it would be best to put them in a plastic baggie so they do not get wet, for example the mitten and newspaper (crumple this up and stuff in the bag).

Begin by first reviewing the scientific method with the students, especially focusing the attention on the idea of a hypothesis. Have the students explain the concept to you, and make sure they understand that it is an "educated guess." Also emphasize that it is okay for a hypothesis to be "wrong" or different than your final results, that is how we learn!

Next, explain that in this experiment they will be investigating different insulators. Ask or review what an insulator is and discuss that it is something that slows the transfer of heat energy between objects. In this case, it will keep their body heat near their hand and prevent it from traveling towards the ice (perfect time to review that heat moves from hot to cold)! Have them then make hypotheses about which one of the "suspects" will accomplish this goal and do it the best or the most efficiently (and vice versa). Record on worksheet. Encourage that its okay to have answers different than the other members in their group. Also ask them to support their answer or why they think their answer is correct.

For the actual experiment, start by having all students put one bare hand in the bucket of ice water. (You might have to remind them not to splash or mess around with the water!) Have them keep it there for a couple of seconds and ask them what it feels like. Hopefully the answers are cold! Then have everyone choose their first "suspect" and emerge their covered hand in water. Keep it in the cold water for a few seconds (also make sure that their hand is positioned so water doesn't get into the baggie, glove, etc.). Keep rotating until everyone has experimented with all the objects.

Now the students should rank the "suspects." One is equivalent to the best insulator, or the object that keeps their hand warmest (prevented the flow of heat towards the ice) while six is the worst insulator or the object that did not keep their hand warm at all. Have the students share their answers. Have them consider why the results turned out the way they did. Explain that the best insulators form "dead air" pockets around the object, in this case their hand, and prevents the cold air from touching it, thus insulating.

End by sharing what everyone learned from the experiment and if time allows, see if they can bridge knowledge between other topics. An example: Discuss the different temperatures found in regions of Georgia. What do animals that live in very cold or very hot places do to survive the cold/heat? What kind of insulators do they have? What types of materials make good insulators?

Materials Needed (Type and Quantity):

-Bucket (Large enough that multiple hands could fit in it)

-Water

-Ice

-Plastic Sandwich Baggies

-Newspaper

-Rubber Glove

-Aluminum Foil

-Mitten

-Paper Towels

(Quantities will depend on how many students are in in classroom/group and different materials can also be experiment with)

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

-Note that the experiment involves water. Be sure to establish at the beginning of the experiment it should stay in the bucket!

-Other materials can also be used as potential insulators! Examples could be Crisco (could link this to how animals stay warm), styrofoam, metal (this could be used to introduce the idea of conductor), etc.

-Make sure when the students are positioning their hands in the water, that they are doing it in such a way that water does not get into the baggie, glove, etc.

Sources/References:

1)

<https://www.georgiastandards.org/Standards/Georgia%20Performance%20Standards/ThirdGradeApproved7-12-2004.pdf>

2)

3)