

"To Make the Best Better"

4-H Youth Development



Discipline: All
Age Level: All
Time: 20-30 minutes

Next Generation Science Standard : Analyzing and Interpreting Data

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Acres of Adventure,
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Insulation Calculation

Objective/Success Indicators: Youth discover how properties of insulation affect them.

Assessment Question: What insulation materials will keep you warmest during cold weather shooting?

Supplies:

- 22 quart sized Ziploc bags (11 per team suggested)
- Marking pens for labeling
- Variety of insulation material to fill quart sized bags, with one type of insulation per bag. (wool, cotton, polar fleece, cotton balls, fabric, quilt batting, aluminum foil, etc.)
- Water and/or ice pack
- Timer

Lesson Outline:

1. Divide the group into teams of 2-6 youth. Have them student the different types of insulation available and as a group, choose four to test along with one bag of air.
2. One member of each team will volunteer to be the test subject.
3. Instruct teams to have test subject place his/her hand in the inner bag, zip it up as best you can.
4. The group predicts how long it will be before the subject's hand first feels cold while holding an ice pack. Write down the predictions, then hand the test subject an ice pack and start the timer.
5. The test subject will indicate when his/her hand first feels cold by raising free hand or by speaking verbally. Immediately stop the timer and write down the exact time.
6. Repeat the process with each material and with the bag of air.

Gather as a group to discuss the results. What materials worked best? Which ones didn't? What was similar about the materials that worked best? What are the properties of good insulation? From this information, brainstorm other materials that might make good insulation. If interest is keen, have youth gather some of those materials, to conduct another round during your next meeting.



...To Make the Best Better.

Now consider the actual experiment. If someone else were to be the test subject, do you think the results would be the same? Why or why not? If you were to do this experiment again, what would you do to get more data and make your conclusions applicable to anyone?

How can you apply this knowledge about insulation to shooting sports? On the range? Out hunting? Other situations?

Background Information:

Don't contaminate the insulation bags! To keep insulation from mixing, turn one-quart sized zipper-type plastic bag inside out and insert it inside a second bag which contains insulation. You have a bag within a bag arrangement. Make sure the insulation is around the second bag. For the bag insulated with air, blow air between the inner and outer layers. Label the bags by the type of insulation they contain.

Make your own cold packs! Fill two zipper-type plastic bags with water and freeze or fill the bags with ice and water.

If the group is small, and there is enough time, let everyone be a test subject.

During the final discussion, you may have to prompt the youth about shooting sports clothing, mats and/or food coolers. Having a few examples to show at this point can be helpful.