

PIS Snow Insulation Lab

Target Concepts:

- Some materials have properties that make them better insulators than other materials.
(Alaska Science Standard A2 -Changes in the properties of matter)
- The better the insulation the slower the temperature change.

Target Skills (Science Stand B1 and B2 - Processes of science and scientific investigations):

- Observation
- Inference
- Prediction
- Data collection
- Graphing
- Controlling variables
- Experimenting
- Entering data on spreadsheet

Materials:

- snow
- small vials with lids for the snow
- medium-sized containers for the insulation
- insulating materials:

popped corn	polyester batting	dead air
straw	sawdust	sand
gravel	cotton	wool
beans	styrofoam	moss
etc.		
- stopwatch, timer, or clock with second hand
- thermometers

Vocabulary

- Insulation
- Conduction
- Variables (manipulated and responding)
- Control

Gear Up

- Ask how students keep warm in the winter. Discuss.
- Ask how animals keep warm in winter. Discuss.
- Ask students to share their ideas about how and why the insulators listed might work.
(How do the insulators keep them warm?)
- Ask students if they think these same insulators would help to keep cold things cold.

Discuss.

- Display insulating materials available and ask for predictions of which one(s) would be the best and the worst insulator. Have each student write their predictions on the board.

Explore

- Divide class in to small groups.
- Have each group select an insulating material. (Draw straws if necessary).
- Have each team go outside and fill their vial with now right up to the top. Ask them why it was important for everyone to get the same amount of snow. (Don't want it to be a variable).
- Take the starting temperature of the snow. Record the temperature on the data sheet.
- Have each team nest the small vial in the larger container, so they are completely surrounded by the insulating material. Be sure to check that there is insulation on the bottom, too.
- Set up on vial with no insulation as a control. Ask students why you would do this. (Establish a base for comparison).
- Place all containers in the same warm location. Ask why they should be in the same place. (To establish a base for comparison, so that you can be sure that the only thing affecting the investigation is the manipulated variable [insulation]).
- Set the timer for 5 minutes.
- While students are waiting ask students why we set the timer. Ask them to identify all the variables besides amount of snow, location, time that they can think of. List.
- Next go back over the list and have students say which variables can be controlled and which cannot.
- Record the temperatures every 5 minutes. Continue for half and hour or until the last snow melts the the temperatures plateau.
- Enter the temperatures in Claris Spreadsheet. Column 1 should be the time 0 min, 5, 10, 15, etc. and column 2 should be the temperatures.
- Try different graphs of the data to see which one makes the most understandable display.

Generalize

- Ask each group to share their results (temperature after 30 minutes). Record on chart. Have them compare results with their predictions. Discuss.
- Ask what could account for their observations.
- Brainstorm and list the properties that the students feel identify the better insulations and the poorer insulations.
- Observe the data from the dead air test and the ambient air test. Ask students if they have any ideas that could explain the difference.

Assess/Apply

- Ask students where else they have seen dead air used as an insulator (some double pane

windows, clothing).

- Ask what other insulation is use in their house. What properties would they infer it had.
- Ask students what they thing would be the best for clothing in winter. discuss why.
Ask what they think plants and animals do to survive the winter.