

5.7 Is Cold More Dangerous Than Heat?

Story Extension for This Lesson:

One of the greatest dangers facing Sam, Alex, and their class in the cold North is the risk of frostbite, hypothermia, and eventually death from the cold. Staying warm is essential. As the class prepares for their trek to the North, they must be aware of the effects of the cold, and ways to prevent frostbite and hypothermia.

FACT: In the United States, "about 9,000 people die from heat each year but 144,000 die from cold."

- <http://www.climatedepot.com/2016/04/07/study-heat-kills-9000-in-usa-and-cold-kills-144000-in-usa/#ixzz4Gad7dp2O>

Grade: 5

Strand: Human Organ Systems

Experts (suggested):

- Dr. Stephen Cheung, Email: scheung@brocku.ca

Big Ideas:

- Systems in the human body work together to meet our basic needs. (Overall expectations 2 and 3)
- Choices we make affect our organ systems and, in turn, our overall health. (Overall expectations 1 and 3)

Overall Expectations:

1. analyze the impact of human activities and technological innovations on human health
3. demonstrate an understanding of the structure and function of human body systems and interactions within and between systems

Specific Expectations:

- 1.1 assess the effects of social and environmental factors on human health, and propose ways in which individuals can reduce the harmful effects of these factors and take advantage of those that are beneficial
- 1.2 evaluate the effects, both beneficial and harmful, of various technologies on human body systems, taking different perspectives into account
- 2.2 use scientific inquiry/experimentation skills (see page 12) to investigate changes in body systems (e.g., heart rate, breathing, body temperature) as a result of physical activity
- 3.1 identify major systems in the human body (e.g., musculoskeletal system, digestive system, nervous system, circulatory system) and describe their roles and interrelationships

Inquiry Skills:

Predicting, Designing, Graphing, Reporting

Instructions:

Part 1:

Share the YouTube video How To Demonstrate Insulation Principles, which shows how polar bears and other arctic animals can live in freezing air and cold water without freezing to death.

- YouTube video: <https://www.YouTube.com/watch?v=8I96BzSNNqE>

Unfortunately for humans, we can't easily add a layer of blubber around our entire body, so we need other ways to keep ourselves warm (and dry).

Part 2:

This activity is a perfect companion to the Grade 5 Properties of and Changes In Matter unit. Have students survey the materials, and predict what they think might be a good insulating material. Have pairs or small groups of students select two materials, and test them for their insulating properties.

As a class or in small groups, have students develop a fair test or experimental procedure to test the materials. You may need to introduce the concept of a control, against which the various experimental treatments can be compared (e.g. how quickly does a thermometer in a ziplock bag cool when immersed in ice water as a control versus a thermometer wrapped in cotton balls inside a ziplock bag). In order for the class to compare results, you may want groups of students to develop a methodology, share with the class, and then come up with a common testing protocol that all groups will use. See smarterscience.ca for PDF posters that can assist in the experimental design process.

Part 3:

Have the class consolidate their data, and then analyze the data to see which materials were the best insulators and which were the worst.

Part 4:

Have students research shivering and other bodily responses to getting cold

Materials List:

- thermometers
- beakers or other containers
- water
- ice cubes
- Ziplock bags

Various materials that can serve as insulating materials:

- tissue paper
- cotton balls
- newspaper
- different fabrics
- styrofoam
- various other materials that may be available (can ask students to bring materials in)

Connections:

Mathematics: Data Management

Assessment Strategy:

Individually, have students look at the results of the class experiment, and answer the following questions in their science journal:

- What were the best insulating materials? Did they have anything in common that made them good insulators?
- What were the worst insulators? Why do you think that is?

Read about ways to dress in cold weather (<http://www.wikihow.com/Dress-for-the-Cold>):

- Why do you think dressing in layers is an effective way to stay warm?
- The article says wool socks are the best. Where does wool come from? Why do you think natural materials, like wool, make good insulators?

Subject Area:

Useful links to Grade 5 Science: Properties Of and Changes In Matter

Connects to:

Grade 5