Cultural Standards

- 4.1.1: D-6 - Compare traditional lifestyles (e.g., food, clothing, shelter, community roles) of Native cultures in Minnesota
- 4.1.2: E-6 - Explain the importance of values and teachings (e.g., respect, humility, resilience, patience) in Native teachings
- 4.1.2: F-6 - Identify ways in which local Native American communities maintain a connection to traditional values
- 4.1.3: D-6 - Describe an innovation, traditionally used by Native Americans from one of the following categories: transportation, shelter, hunting, gathering and preparing food, and making garments

MN State Standards

- 5.1.1.3: Estimate solutions to arithmetic problems in order to assess the reasonableness of results
- 5.1.1.4: Solve real-world and mathematical problems requiring addition, subtraction, multiplication and division of multi-digit whole numbers
- 6.1.3.5: Estimate solutions to problems with whole numbers, fractions, and decimals and use the estimates to assess the reasonableness of results in the context of the problem
- 7.2.2.2: Solve multi-step problems involving proportional relationships in numerous contexts

Snowshoes!

Winter #3 **Integration: Science**

Background Information

The Inuit and Native Americans (most notably the Athabascans, Algonquin, Attikamek, Montagnais, Cree, Naskapi, Labrador and Iroquois) mastered the development of snowshoe making. Although snowshoes were also used in Europe, mainly in the Alps and Scandinavia, their development was not as sophisticated as of those across the Atlantic. In Europe there was a stronger focus on the development of skis to facilitate walking and traveling through deep snow. The snowshoe, in its advanced form, was introduced in Europe only when the first settlers brought them back from North America around 1600.

For Native Americans that were living in the northern part of the continent, snowshoes were essential for hunting and gathering materials in wintertime. They were manufactured with great care, and with materials that were best suited for the job — the hard wood of the white ash and the durable hide of the caribou or moose. Occasionally moose intestines or tendons were used as well. If none of these were available, sealskins for the top section and larch for the frame were substituted. The introduction of the cow by the Europeans lead to a greater use of cowhide, a practice that continues to this day. Native Americans fastened their moccasins with leather thongs to the snowshoe.

Lesson

Take students outside to walk in the snow. If you are able, give snowshoes to a few students so that the group can learn the benefit of spreading out their body weight. Be sure to walk through deep snow.

Head back inside. Ask students to discuss what they observed. What are their theories for their observations?

Hand out graph paper. Have each student trace their boot onto the paper. Students should estimate the number of squares their boot covers. Partial squares of more than one half should also be included. After estimating, students should do an accurate count. How many squares does their boot cover?

Next students should trace a snowshoe onto graph paper. They should once again estimate, then accurately count, the number of squares "under" the snowshoe.

In order to determine pounds per square inch (psi), students need to know how much they weigh. Students who are willing to stand on the scale should write down their weight.

Using scratch paper and a pencil, students can figure out the pounds per square inch for both their boot and the snowshoe. By dividing their weight in pounds by the number of squares their boot covered, students will learn how much of their weight is distributed on each square inch when they step down. Once complete, divide students should divide their body weight by the number of squares "under" the snowshoe. What do these numbers tell us?

Materials:

- Writing utensils
- Graph paper (1 inch)
- Scratch paper
- Snowshoes (at least one pair)
- Bathroom scale

Vocabulary:

Alaskan style

Babiche

Bearpaw style

Beavertail style

Cree style

psi

Tendon

Thong

White ash

Discussion Questions

1. Explain why you think it is easier to walk in deep snow with snowshoes on.
2. What other modes of transportation rely on spreading out the user's body weight? (snowmobile, dog sled, and skis)
3. What does psi stand for?
4. How big could we make snowshoes? (General rule of thumb is 1 psi for snowshoes). What would be the disadvantages of making a snowshoe with less than 1 psi? (Unnecessarily heavy, too large for the user, etc.)

Evaluation

Students should be able to explain what psi means.

Students should be able to explain the purpose and benefit of wearing snowshoes.

Students should be able to make predictions about the relationship between weight and surface area and force, and how psi changes as you increase or decrease the surface area.

Enrichment Activities

1. Research snowshoe shapes. (See attached chart for descriptions and sizes). Made models out of cardboard to see the variety of shapes created. What might some of the pros and cons be to using these styles?
2. Make a mini snowshoe (see attached page)
3. Learn how to elders traditionally made snowshoe frames: http://www.youtube.com/watch?v=2QntyCORt10 (Listen to the snow crunch! It's cold there!)
4. Make a wooden frame and weave it in the traditional snowshoe weave. Predict how much twine you will need to complete the project.
5. Determine how you could make "survival snowshoes" out of found items in the wilderness.
6. Hold a snowshoe race.

<u>Friday Field Trip Ideas:</u>

1. Go snowshoeing at a Three Rivers Park District facility.
2. Invite a craftsman in to talk about how to make a snowshoe. (There is an authentic video here: http://www.youtube.com/watch?v=erUZWu98jok)
3. Make survival snowshoes and determine whose pair is most effective. What makes a good snowshoe?

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