

**Exploring Motion-Related Technology
Through a First Nations' Game:
A Lesson to Support
Science 10**

**by
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**Teaching Materials
from the
Stewart Resources
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These units were developed by the following team of teachers, Elders, and cultural advisors: Yvonne Chamakese, David Hlady, Anna-Leah King, Duane Johnson, Marcia Klein, Lana Lorensen, Sally Milne, Joseph Naytowhow, Lamarr Oksasikewiyin, Stuart Prosper, Ron Ray, Ted View, John Wright, and Laura Wasacase.

All resources used in these lessons are available through the Stewart Resources Centre:
http://www.stf.sk.ca/services/stewart_resources_centre/online_catalogue_unit_plans/index.html

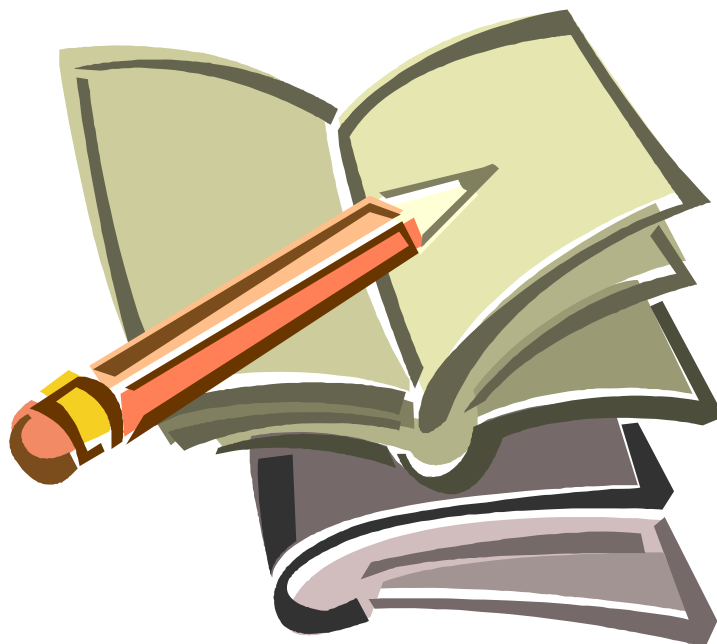
Information regarding the protocol when inviting Elders into the classroom can be found in the document: *Elders in the Classroom* by Anna-Leah King (see Appendix A). Further information can be found in the Saskatchewan Learning document: *Aboriginal Elders and Community Workers in Schools*.

Illustration on the front cover contained in:

Macauley, D. (2001). The story of snowsnake. Retrieved December 11, 2007, from http://members.shaw.ca/dmacauley/story_of_snowsnake.htm

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Overview

This lesson is from the unit in the *Science 10 Curriculum Guide* entitled Physical Science: Motion in Our World (MW), and can be used as an introduction to the concept of motion. The lesson uses a First Nations' game, snow snakes, to illustrate motion. Because snow is necessary for this game, the unit will need to be used during the winter.

Foundational Objectives

MW1 Explore motion-related technologies.

MW2 Observe and describe the motion of everyday objects.

*Source: These and other objectives are found in the following document:
Saskatchewan Learning. (2005). Science 10 curriculum guide.
Regina: Saskatchewan Learning.*

Timeframe

The lesson should take approximately 3 hours.

Resources

Nelson Science 10 and *Sciencepower 10* can be used for background information on the topic of motion. Resource material for this activity is included in the lesson. Further information on the game of snow snake can be found in:

Dene Games: A Culture and Resource Manual, 1999. The Sport North Federation (NWT).

Another useful resource is:

Gregory Cajete (2007). *Spirit of the Game: An Indigenous Wellspring*.

All of these titles are available for borrowing from the Stewart Resources Centre of the Saskatchewan Teachers' Federation.



Exploring Motion-Related Technology Through a First Nations' Game

Foundational Objectives

MW1 Explore motion-related technologies.

MW2 Observe and describe the motion of everyday objects.

Key Understandings

- Motion is affected by a variety of variables.
- Motion can be illustrated in a variety of ways.

Essential Questions

1. How can you tell if an object is in motion?
2. How can you tell if an object is speeding up or slowing down?
3. How can you tell if an object is undergoing uniform motion?
4. How does the choice of frame of reference influence the observation of motion and the motion itself?
5. How can you use your own movements to represent uniform and non-uniform motion?



Learning Objectives (LO)

Students will be able to:

- MW1** LO1 Acquire, with interest and confidence, additional science knowledge and skills using a variety of resources and methods, and adopt behaviours and attitudes that project a positive self-image.
- MW1** LO2 Distinguish between scientific questions and technological problems when exploring motion-related topics.
- MW1** LO3 Recognize the contribution of science and technology to the progress of civilizations.
- MW1** LO4 Relate personal activities and interests related to motion, and various scientific and technological endeavours to specific science disciplines and interdisciplinary studies such as kinematics, aerodynamics, mathematics, ergonomics, and environmental science.
- MW1** LO5 Evaluate the design and function of a motion-related technology using identified criteria such as safety, cost, availability, and impact on everyday life and the environment.
- MW2** LO1 Observe and describe the motion of everyday objects qualitatively using personal words and phrases.
- MW2** LO2 Categorize the motion of everyday objects as uniform and non-uniform.
- MW2** LO3 Operationally define uniform and non-uniform motion.
- MW2** LO4 Discuss the role of “frame of reference” in determining whether an object is in motion.



Assessment Evidence

MW1.1

Observe as the groups develop their tracks and modify variables. Students will record the changes they make during the activity. Students could be asked to write a short summary of the activity including what they learned about motion. These summaries should include: (a) a variety of ideas, and (b) modifications of their plans.

Students can be assessed on the way they throw the spear/rod. If a greater intensity and motion is used, the spear/rod tends to wobble at the point of entry. However, if less force used, the spear/rod will glide more evenly down the track. Students could also be given a mark based on the average distance their team tossed the snake.

MW1.2

Students will be given a short quiz where they will be asked to identify a set of situations as scientific problems or technology problems with an explanation.

Science vs. Technology Quiz

For each of the following examples, please indicate if the process is primarily science or primarily technology and state why:

1. Research into safety equipment in cars.
2. Research into the life cycle of spiders.
3. Research into how cattle grow more muscle.
4. Research into how to speed up the rate of a cool chemical reaction.
5. Research into the age of the universe.

Answers

1. Technology - This research is done specifically to help people.
2. Science - This research is done for scientific interest and advancement.
3. Technology - This research is done specifically to improve beef production.
4. Science - This research is done for interest.
5. Science - This research is done for interest.

It is important to note that the reasoning is more important than the statement of science or technology. If the student answers question #4 as technology, it would be correct if they assumed and stated that the reaction in the question was needed for industry.

MW1.3

The students can be asked to participate in a discussion that relates snow crossing technologies of the past to present generations of people. Marks can be given for showing understanding of the importance of the technologies and for suggesting alternate technologies.

MW2 - All

Students will be quizzed on the list of Key Understandings from the curriculum document for MW2:

- Motion at a constant speed in a straight line is called *uniform motion*.
- All motion is measured relative to some *frame of reference* chosen by the observer.
- Scientific knowledge is based on observation.
- An operational definition in the physical sciences explains how to measure the quantity being defined.



Resource Materials

Information for the Teacher

The explanation here is taken from the website address below, which also includes a picture of a snow snake:

“Snow snakes originate from various First Nation communities around the world. Wherever there was snow, a snow snake game could be played. The snow snakes range from four inches to four and a half feet in length. The snake in the picture was used by the Ojibway and Cree Nations. The Iroquois national game was snow snakes. Inuit and Dene peoples had a different version of snow snakes - theirs were made of bone. The bone snow snake resembles the handle of a curling rock. The snakes used in the Canadian Shield and Plains were tossed as far as one mile across frozen lakes and were recorded as traveling as fast as 140 miles per hour. The original snow snake was usually a hard wood and, depending on the First Nations community, the game and the shape of the snake would change.”*

**According to the website. You may want to ask students to comment on whether they believe this figure is correct, in light of other speeds recorded in sport (fastest baseball pitch - 100.9 mph; fastest luge speed - 86.6 mph)*

Source: Robillard, B. (1980-2002). Aboriginal games and activities. Retrieved December 11, 2007, from www.mts.net/~c54s55/SNOWSNAKES.html

Dene and northern First Nations and Métis people played the game of snow snakes as a way of team-building and refining their physical dexterity. Snow snakes was a game that allowed people to show their skill and talent in being able to hit their target with accuracy and have their spear travel the length of the course. The community worked together to build an elaborate groove for the spear to travel and they formed the shape of a “u” with a slightly rounded square edge. Water was poured on the length of the course to freeze an even surface. The track was about the width of a person’s foot and the length could vary. The ice helped the spear travel the length of the course, and the thrower whose spears made the length of the course the most number of times was considered the most skillful of the group.

Snow snake was played in a variety of ways by different First Nation groups. Traditionally, the game was only played by males, and was not played by teams, as in this activity, but by individuals. The name “snow snake” was first used by Stewart Culin in the book *Games of the North American Indians*. Snow snake is a winter version of the spear throw. In the original game, arrows, spears, or javelins were thrown. The playing area used could be a wide open space such as packed snow or smooth ice, but a frozen riverbed was the preferred area. A throwing line was marked, and competitors were allowed to run up to this point, or to throw from a stationary position. A variety of grips were used, such as a two-handed grip, a centre grip, or an end grip.

Source: Heine, M. (1999). Dene games: A culture and resource manual. Yellowknife: Sport North Federation, pp. 3-43-3-48.

In other variations of the game, the snow snake was hit with an object, which increases the speed, but also the likelihood of injury to a by-stander. The Chipewyan people used this game as a test of accuracy. In this version, a snake was used as a target that had to be hit by those throwing.

Lesson Plan

This lesson uses a snow snake activity to introduce learning objectives in the Science 10 curriculum unit on motion.

Materials Needed (per group using 5 to 6 in a group)

- a stick about 1.5 m long and a variety of dimensions (could be scrap cuts from a shop)
- pails are useful but not necessary (small garbage cans)
- other items as required (brought by students)

Method

1. Introduce the lesson by discussing the Key Understandings and Essential Questions, and by providing an overview of the lesson and assessment.
2. Introduce the students to the concept of uniform and non-uniform motion.
3. Introduce the activity as a Cree or Dene game. The challenge for students will be to see who can slide the snake the furthest.
4. Divide students into 4 or 5 groups. Give each group an area of a field, lawn, or ditch to build their track (10 cm - the width of a boot) in which the snake can slide. Students may build the track as long as they need. Most groups start with a track that is 3-5 metres in length.
5. Give each group the snake (a stick). The challenge for each group is to get their snake to go the furthest when thrown down the track. Their initial experience may be that the task is difficult, and their challenge will be how to improve. Let the students know that they may bring whatever they feel they will need in order to improve the track, their snakes, and their throwing technique.
6. Tell students to record all the changes that they try in a diary or a journal.
7. Encourage student to implement their improvement ideas and to observe the improvements of others.
8. Inform students that they will compete against each other in the next class.

9. Hold competitions:

- a. **Group average on own track** - Each student throws the snow snake and each student's best throw length is measured. The group average is determined and the group with the highest group average wins.
- b. **Champion average on best track** - Each group selects a champion and the different champions compete on the best track. The champion who throws the furthest or the fastest (if more than one snake travels to the end of the track) wins.

10. Conduct in-class debriefing and discussion.

Class discussion is based directly on the learning objectives and is related directly to the activity.

1. *Acquire, with interest and confidence, additional science knowledge and skills using a variety of resources and methods, and adopt behaviours and attitudes that project a positive self-image.*
 - a. Let students know that physical fitness and precision were important in First Nations and Métis cultures. This game allowed for deeper appreciation of personal dexterity and physical activity within the local environment and landscape.
 - b. Students are asked to discuss their understanding of sliding on snow and share the adaptations they made to the surface, the walls, the length of their track, and the space around their track. Students are also asked to discuss their snakes and their throwing techniques. Each individual student's contribution is valued.
2. *Distinguish between scientific questions and technological problems when exploring motion-related topics.*
 - a. Students are encouraged to describe the difference between scientific questions and technological problems in relation to the activity they have just completed.
 - b. Science can lead to technology. Observation of how things move in nature can lead to technology for helping people move through nature. One example is snowshoes - a technological development that is based on the observation and pattern recognition of the ways in which lynx and rabbits move through the snow.

3. *Recognize the contribution of science and technology to the progress of civilizations.*
 - a. Discuss how snow crossing technology has been used and perfected over thousands of years in many different cultures. Snowshoes, skis, dog sleds, and snowmobiles can be discussed.
 - b. Invite students to bring personal stories of the importance of these tools and the importance of the tool to past and present society.
4. *Relate personal activities and interests related to motion, and various scientific and technological endeavours to specific science disciplines and interdisciplinary studies such as kinematics, aerodynamics, mathematics, ergonomics, and environmental science.*
 - a. Ask students about their own interest in snow and ice crossing technology. One option could be to ask students to research the structure and design of these tools.

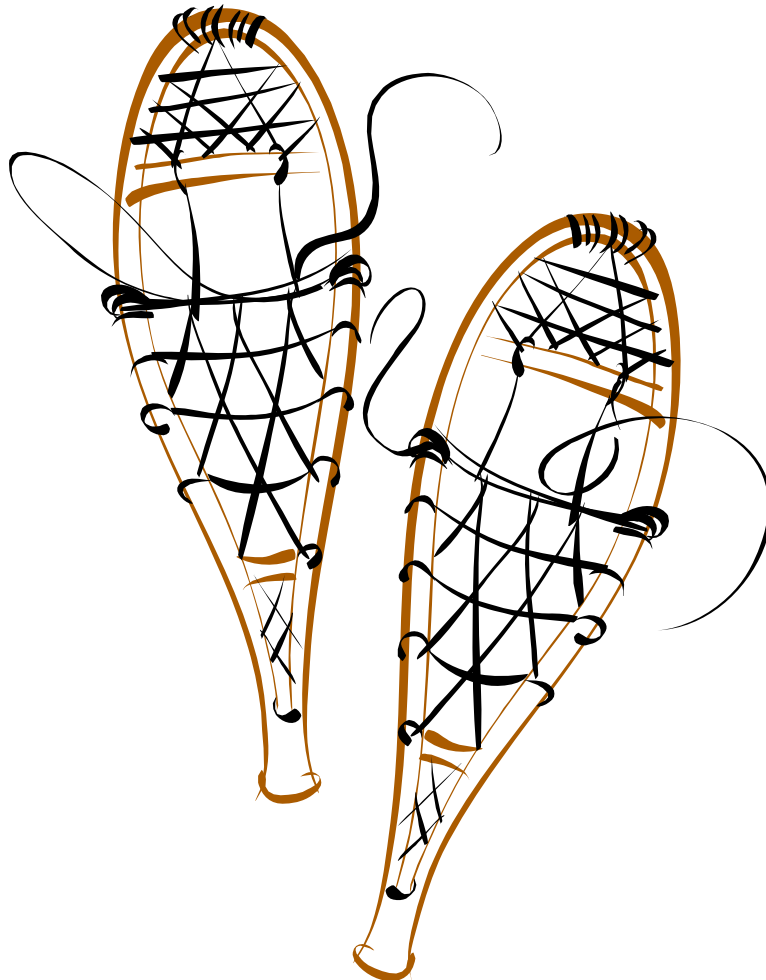


Possible Extension Activities

This enrichment activity is based on learning objective **MW1** LO5:

Evaluate the design and function of a motion-related technology using identified criteria such as safety, cost, availability, and impact on everyday life and the environment.

With background help from people in the community, snowshoe making could be included here.



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APPENDIX A

Elders in the Classroom

by
Anna-Leah King

It is the Elders' responsibility to guard sacred knowledge and to maintain the ceremonial oral tradition of knowledge transmission. In Saskatchewan, the territory is home to four First Nations, namely Cree, Saulteaux, Dene, and Ojibwa - Dakota/Nakoda/Lakota.

Source: Office of the Treaty Commissioner. (2002). *Teaching treaties in the classroom: Participants manual*. Saskatoon, SK: Office of the Treaty Commissioner.

All of these First Nations have a home here and it is entirely appropriate to represent any or all of these First Nations when approaching curriculum content. The Elders bring with them traditional knowledge and perspective passed down from generation to generation through the oral tradition. The reference to Elders' wisdom has lately been termed "Indigenous knowledge" or "traditional knowledge." Their traditional knowledge and wisdom will give insight to teachers willing to reshape curriculum and validating First Nations content and perspective.

Inviting the Elders

Protocol

The Elders would expect to be approached in the traditional way, respecting traditional protocol. They are given a small offering of tobacco in exchange for their commitment to invest their time and energy into the work at hand. They can be asked to lead the gatherings with prayer and ceremony. First Nations gatherings always begin with prayer and ceremony. It is entirely appropriate to ask this of them. It may not be what you are familiar with, but you will soon realize the benefits of respecting First Nations protocol and ceremonial practice. The Elders may want to begin with a smudge on the first gathering and offer prayer for the task at hand and the team that has been brought together. The Elders are well aware that any given group put together is there to learn from one another and so blessings towards this endeavour are prayed for. Sometimes, depending on the size of the project, a pipe ceremony may be requested. Each Elder may have a slightly different approach to opening and closing ceremony. Some may speak for a while. Others will ask you to share so they can become more familiar with everyone. Simply inviting them with an offering of tobacco and asking that they open and close the gatherings is enough. The Elder will take it from there.

Elder Expectation

When you invite Elders, it is important that you are clear on what you expect from them. If you are asking them to contribute with their knowledge, wisdom, and guidance, then say so. They may not all be familiar with education and what teachers and curriculum writers are trying to do, so explaining what curricula is and what is needed of them is essential to a good working relationship. You want them to contribute First Nations and Métis content and perspective. The Elders need to feel confident that they will be of assistance. Let them know that you see their role as wisdom keepers and they need to draw upon their personal experience, cultural knowledge, and teachings to contribute to the process. The Elders will share what is acceptable and give caution for what they view as sacred knowledge that is only to be shared in the context of ceremony.

Elders need time to think before they answer. Do not be impatient and feel they are not answering soon enough, as they will answer your questions in time. Some Elders are reflective, philosophical thinkers. They will review holistically what you have asked of them. A concept that you think is simple and straightforward has many different dimensions to a First Nations speaker, and they must put the concept into the context of the whole and analyze the dimension of its interrelatedness. Sometimes they translate what you are saying to themselves in their language. They think things out in their mother tongue first and then find the words of closest approximation in English. Not all words and concepts are readily translatable. That is why letting the Elder know what is expected of them beforehand is important because it gives them time to think it over and to find some area of common ground.

Elder Care

Elders do not expect anything but it would be nice to assign one person to see to their needs. Offer them a comfortable seat and debrief them on the expectations for the gathering. Introduce them to everyone and generally make them feel welcome. See to it that they have water, juice, coffee, or tea. It is good to have a snack for them at coffee break. Invite them to pray over the food before you eat. Allow them to be first in line for lunch or let them know you will serve them. This is an example of First Nations protocol. These are small things, but kind gestures go a long way with Elders. They appreciate when younger people make efforts to lighten their load. These gestures make the Elder feel welcome and cared for in a respectful way.

Gifts

It is appropriate to have a small gift for the Elders. If they are paid for their time, this would be considered the gift. Some give a small gift in addition to the honorarium, such as a basket of teas or jams.

Further information can be found in the document: *Aboriginal Elders and Community Workers in the Classroom*, available from the First Nations and Métis Branch of the Ministry of Education.