UNIT: Math 10 - Linear Equations and Inequalities; Science 10 -
Physical Science: Motion in Our World; Life Science: Sustainability of Ecosystems;
Native Studies 10-Economies: Aboriginal Perspectives

THEME: Human Face of Mathematics - Mathematics in Aboriginal Culture

EQUIPMENT
- Internet
- atlatl and dart of various lengths (For example 0.5m, 1 m, 1.5 m, 2 m)
- measuring tape
- coloured tape
- stop watch
- distance chart
- calculator
- computers with a spreadsheet program

PREREQUISITE KNOWLEDGE:
Math 10
Linear Equations and Inequalities
2. To solve a formula for an indicated variable.
-calculate velocity

Science 10
Physical Science: Motion in Our World
2. Categorize the motion of everyday objects as uniform and non-uniform.
3. Operationally define uniform and non-uniform motion.
4. Discuss the role of "frame of reference" in determining whether an object is in motion.

LEARNING OUTCOMES:

Science 10
Physical Science: Motion in Our World
1. Observe and describe the motion of everyday objects qualitatively using personal words and phrases.

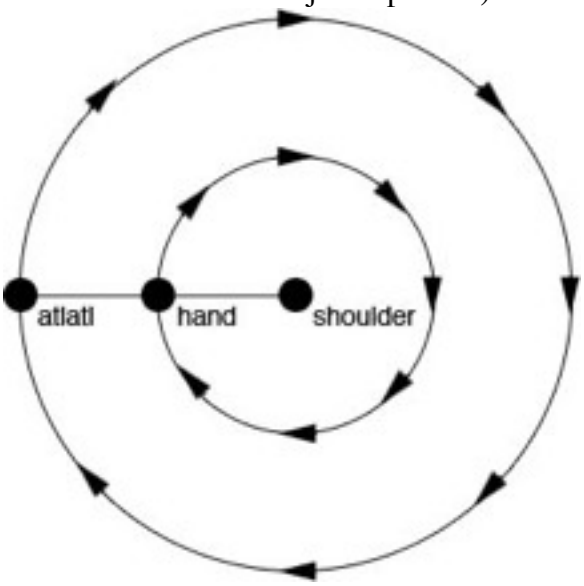
Life Science: Sustainability of Ecosystems
1. Explore cultural perspectives on sustainability
2. Investigate human impact on ecosystems

Native Studies 10-Economies: Aboriginal Perspectives
Analyze how Aboriginal economies were environmentally responsible.

Introductory Activity modified from Poverty Point Expeditions, by Debbie Buco, Lousiana Division of Archaeology, Activity Booklets, http://www.crt.state.la.us/archaeology/expeditions/atlatlantics.htm)

Choose 3 students to simulate the rotation of the hand and the atlatl around the shoulder joint. One person will pretend to be the hand and observe how fast the spear would travel if the hand threw it. Another group member will pretend to be the atlatl and observe how fast the spear would travel if the atlatl threw it.

Measure and cut a piece of string or rope which is four feet long. Place a mark in the middle of the string, two feet from both ends. The "shoulder joint" member will kneel down while holding the tip of the string stationary on top of their head. The "hand" person will hold the string securely at the two foot measurement, and the "atlatl" person will hold the end of the string (four feet from the "shoulder joint" person.)



The "atlatl" person must keep the string taut at all times while walking in a circle around the "shoulder joint" person. The "hand" person must keep pace with the "atlatl" person. Have the class determine who is running faster.

This demonstrates how throwing with an atlatl increases the speed of the dart as it is thrown. A dart which is thrown from an atlatl the length of your arm would travel approximately twice as fast as a dart thrown by the hand. For an even more vivid simulation, increase the length of the radius for the atlatl to about six feet. The larger the radius, the faster the "atlatl" will travel.

Teacher Set Up

1. Using the coloured tape, mark off a throw line.
2. Divide the class into groups of no less than 4. For each group you will need one student to throw the dart, one student to measure the distance thrown, one student to time the flight of the dart and another to record the data. One student from each group will throw the dart for the sake of consistency.
3. Give each student a distance and time chart.

Culminating Activity

Background Information

1. Research the weapons of the Aboriginal people pre and post contact.

2. Describe the effect on the animal population and Aboriginal way of life when each weapon was introduced.

Speed of the Dart

1. After your teacher demonstrates how to use the atlatl, create a hypotheses on which length of dart they think will travel the fastest.
2. Record the distance and time traveled for each length.
3. Time the dart from the time it leaves the atlatl until it lands on the ground.
4. Throw the shortest dart about 5 times each as far as possible, not crossing the line.
5. Measure each throw from the line to see how far the dart traveled.
6. Repeat for each length of dart.

Motion of the Atlatl and Dart

1. While the dart is being thrown, observe the thrower from the side.
2. Through the course of all of the trials, describe and sketch the motion of the thrower and the path of dart for the furthest and most accurate throws.
3. Investigate why this motion is the optimal.

Data Analysis

1. Calculate the speed for each throw
2. Determine which length of dart traveled the fastest.
3. Compare your results to your hypotheses.
4. Represent data graphically from a spreadsheet by choosing the appropriate graph type. Justify the type of graph you used.
5. Determine which dart length had traveled the fastest.
6. As a group answer the following questions:
   a) How does the physical attributes of the person throwing the atlatl effect the experiment?
   b) What other factors would effect the experiment?
   c) How could the results differ for different people throwing the dart?
   d) Discuss why the person who is throwing the dart should also be the same.

Closure

1. Each group presents their findings from the experiment.
2. As a class, form conjectures as why different groups may have had different results and how the experiment could be changed to have more accurate results.
3. Discuss the following quote:

   "The atlatl and dart is truly the natural weapon system of the human race. When humans used the atlatl, we were in balance with nature. We didn't take more from the environment than what the environment could replace itself." - Dr William Robert Perkins, Atlatl researcher