



Theme

Atlatls allowed Wabanaki hunters the ability to hunt large dangerous animals from a safe distance which could not be possible using a hand thrown spear.

Grade Level

4-5 grade

Time/Location

1 or 2 class periods depending on how many students.

Inside the classroom and in a large open field.

Goals

- Understand that simple tools can greatly assist hunters.
- Graphically represent and interpret data.
- Use simple equations to compute rate of speed.

Objectives

Students will:

- Mathematically compute the rate of travel for a spear thrown by hand and a spear thrown using an atlatl.
- Be able to explain how an atlatl works.
- Correctly graph the collected data.

Atlatl

Background:

Before the innovation of bows and arrows (about 2000 years ago in Maine), Wabanaki people used atlatls to hunt large game animals, such as mastodons and later moose, in the region. An atlatl is a small wooden platform which is held in the hand. At one end it has a small wooden point which fits into the fletched end of a spear. The function of the atlatl is to act as a lever or an extension to the thrower's arm, increasing both the distance and speed at which a spear can be thrown. Atlatls would have been used by Indians beginning about 12,000 years ago.



Spear (top) and atlatl (bottom)

Engage:

How do you kill something which is stronger and faster than you (solicit suggestions)? How would you kill something stronger and faster than you 10,000 years ago (solicit suggestions, remind students that there were no guns at that time)? Atlatls have been used in many different cultures, including the Wabanaki, to hunt animals as large as a mastodon.

SIZE COMPARISON



From the New York State Education Department. The Cohoes Mastodon. Internet. Available from <http://www.nysm.nysed.gov/exhibits/longterm/mastodon/>; accessed 20, July, 2015.

Have the students develop a hypothesis as to which will go farther/faster—a spear thrown by hand or a spear thrown using an atlatl.

Give the students a few minutes to think/pair/share with the person sitting next to them about what pieces of data they think we will need to collect to determine which went farther/faster. After a few minutes write their suggestions on the board before explaining to them we don't need a radar gun to figure out the speed—we can do it using a simple math equation:



Essential Questions

- Does using a lever increase the distance a spear can be thrown?
- Would an atlatl be an effective weapon to use when hunting fast moving dangerous prey?

Academic Vocabulary

Atlatl
Lever
X-axis
Y-axis
Bar graph

Materials

3 different colors of flagging tape
Atlatl set
Calculators
Data Sheets
Stopwatch
100 foot surveyors tape

State Standards

Data Analysis
4th Grade

- Students collect and represent data in tables, line plots, and bar graphs, and read and interpret these types of data displays.

Equations and Inequalities
4th & 5th grade

- Students find the unknown in simple equations in the context of numbers and operations as described in Standard 2.1

$$\text{Rate} = \text{Distance} / \text{Time}.$$

When we conduct our experiment we are going to need someone who will be using a stopwatch. They will start the stopwatch when the spear leaves the throwers hand and stop the stopwatch when the spear hits the ground. We are also going to need two people measuring the distance the spear traveled. (You can either assign these tasks to just three students or rotate the task through your class.)

As with any experiment, there will be some safety procedures we will follow throughout the data collection process. Using different colored flagging tape, you will mark off three areas: waiting area (orange), throwing line (green), and time keeper spot (blue). The time keeper needs to be located off to the right or left side, far enough away to avoid getting hit by a spear which may go wide, but still close enough so that they can see to determine when to start and stop the stopwatch.

Those not throwing the spear will stand behind the orange tape in the waiting area, the thrower will stand behind the green line, and the time keeper will be standing behind the blue line.

Explore:

When choosing a place to conduct your experiments make sure that you have a lot of room, especially if the students have a good amount of arm strength. There is the possibility that the spear could travel as far as a football field. Students must also clearly understand the rules before starting.

Procedure:

1. Hand out a data collection sheet to each student and remind them they will be collecting data to create a graph so they can compare their data later.
2. Have the students stand in the designated waiting area.
3. One at a time, the students come up to the throwing line and take their turn throwing the spear by hand.
4. Count backwards from three to one, and on zero the student will throw the spear.
5. Once the spear leaves the student's hand the stopwatch will start and when the spear lands the stopwatch will stop.
6. After the spear lands, have one student stand next to the thrower while another student pulls out the other end of the measuring tape and walks out to where the spear landed.
7. Once the distance has been measured, have all the students record the distance and the time on their data sheets.
8. Once all the students have taken a turn, repeat the process with the atlatl.



Functions and Relations

4th Grade

- Students use tables, rules, diagrams, and patterns to represent the relationship between quantities and to extend sequences.

5th Grade

- Students use tables, rules, diagrams, and graphs to represent and analyze the relationship between quantities.

B1 Skills and Traits of Scientific Inquiry

- Students plan, conduct, analyze data from and communicate results of investigations, including fair tests

9. Once all data has been collected, return to the classroom and compute the rate either with or without a calculator.

Explain:

In order to compare our data, we are going to create a bar graph. On the x-axis will be the speed of the spear and on the y-axis we will graph distance traveled. We will use one color for the hand-thrown spear and a different color for the atlatl-thrown spear.

Give the students a few minutes to graph their data and then review their findings. The students should be able to see that the atlatl spear was traveling faster and farther than the hand thrown spear.

Elaborate:

The reason the atlatl thrown spear went faster is because the atlatl works as a lever, which acts to help you extend your arm and create more push behind spear. This faster moving spear would allow you to stand further from the animals you were hunting. The faster moving spear would have also been beneficial if the hunted animal began running. A person who is really good at using an atlatl can throw it 100 meters or 328 feet and would have been very successful in hunting a wide variety of animals.

Evaluate:

Students can accurately interpret the data they collected and draw logical conclusions.



Graphing Rubric

Category	4	3	2
Units	Units used are appropriate for the data set	Most units used are appropriate for the data set	Units used are not appropriate for the data set
Labeling of X axis	Clear neat label that describes the independent variable	The axis has a clear label which describes the independent variable	The X axis has a label
Labeling of Y axis	Clear neat label that describes the independent variable	The axis has a clear label which describes the independent variable	The Y axis has a label
Accuracy of Plot	All point are plotted and easy to read, ruler is used to make bars	All points are plotted correctly and are easy to read	All points are plotted correctly.

Recommended References:

Raymond, Anan. "Experiments in the Function and Performance of the Weighted Atlatl." October 1, 1986. Accessed June 14, 2015. <https://experimentalarchaeology.files.wordpress.com/2011/06/weighted-atlatl-experiments.pdf>.

Whittaker, John. "Weapon Trials: The Atlatl and Experiments in Hunting Technology." July 1, 2005. Accessed June 14, 2015. [http://web.grinnell.edu/anthropology/Atlatl Stuff for John/Atlatl Experiments.pdf](http://web.grinnell.edu/anthropology/Atlatl%20Stuff%20for%20John/Atlatl%20Experiments.pdf).

Berg, Bob. "What Is an Atlatl?" YouTube. December 28, 2013. Accessed June 14, 2015. <https://www.youtube.com/watch?v=ITM4sk1VH-E>.

Atlatl Can Be Purchased From Thunderbird Atlatl's website www.thunderbirdatlatl.com/shop/