Inquiry Question

How did the Gitxsan peoples employ the Pythagorean Theory in the development of their canoes?

Name: ______________________________ Date: _____________

British Columbia is laced with rivers, and BC's First Peoples used canoes on rivers and lakes for travel, hunting, and fishing. The word for February in the Gitxsan language (Lasa hu'mal) means "when the cottonwood trees snap because of the bitter cold" and "when the false thaw comes and ice melts and canoes can be used on the rivers." Today, First Peoples still use canoes, but also use rafts and jet boats for fishing and travel on the rivers and still have to account for the current and wind when crossing a waterway.

Crossing a river is tricky business and canoeing the waterways of BC requires skill and experience. If you want to get to the opposite side directly across from where you start, you can't just head straight across. The river's current will be pushing you downstream while you are paddling to the opposite side. This activity looks at how a canoe crossing a river is influenced by the current and uses the Pythagorean theorem to calculate the diagonal distance traveled by the canoe.

Beaver Story (to set the context)

In earlier times two Gitxsan clans lived on either side of the Skeena River. A giant beaver lived on the river and kept digging at both riverbanks, causing slides that were potentially dangerous to both clans. This was unacceptable. So together the warriors of each clan went out in their canoes to try and destroy the beaver.

So a wise chief among them took the giant beaver and split it down the middle and gave half to each clan. All the Gitxsan clans were happy and a war among clans was prevented. Today the split beaver design is a popular motif in Gitxsan art.

General Instructions

Build the canoes from poster board and tape. Trace the paper copy of the canoe with a dull pencil or medium ball point pen and press down hard, you will see the indented outline of the canoe on the poster board. Investigate these designs and create one on the prow of the boat.

1. Set up the large plastic containers and fill them with water.
2. Measure the length and width of the container and record these values on a data collection sheet.
3. Set up the fan at one end (the narrow end/width) of the container and set the speed and distance from the container so that the canoe moves steadily along the length of the container when it is pushed across (but doesn't capsize, or go straight to the end). You may have to change the setting on the fan, or move the fan closer or further from the end of the container. Experiment with this.
4. Without the fan running, determine how much of a push will make the canoe drift to the other side.
5. Run the fan and give the canoe a steady push across the "river" (container).
6. Mark (with erasable marker) where the canoe gets to the other shore, and measure the distance along the container from the starting end to where the canoe touched the other shore. (Side A).
7. Measure the distance across the river, the width of the container (Side B).
8. Use the Pythagorean theorem to calculate the distance that the canoe travelled.
9. Use a metre stick to measure the diagonal distance travelled and compare this value to the calculated value for the hypotenuse.

Repeat steps 6 to 10 three times using a different fan speed (or move the fam farther away

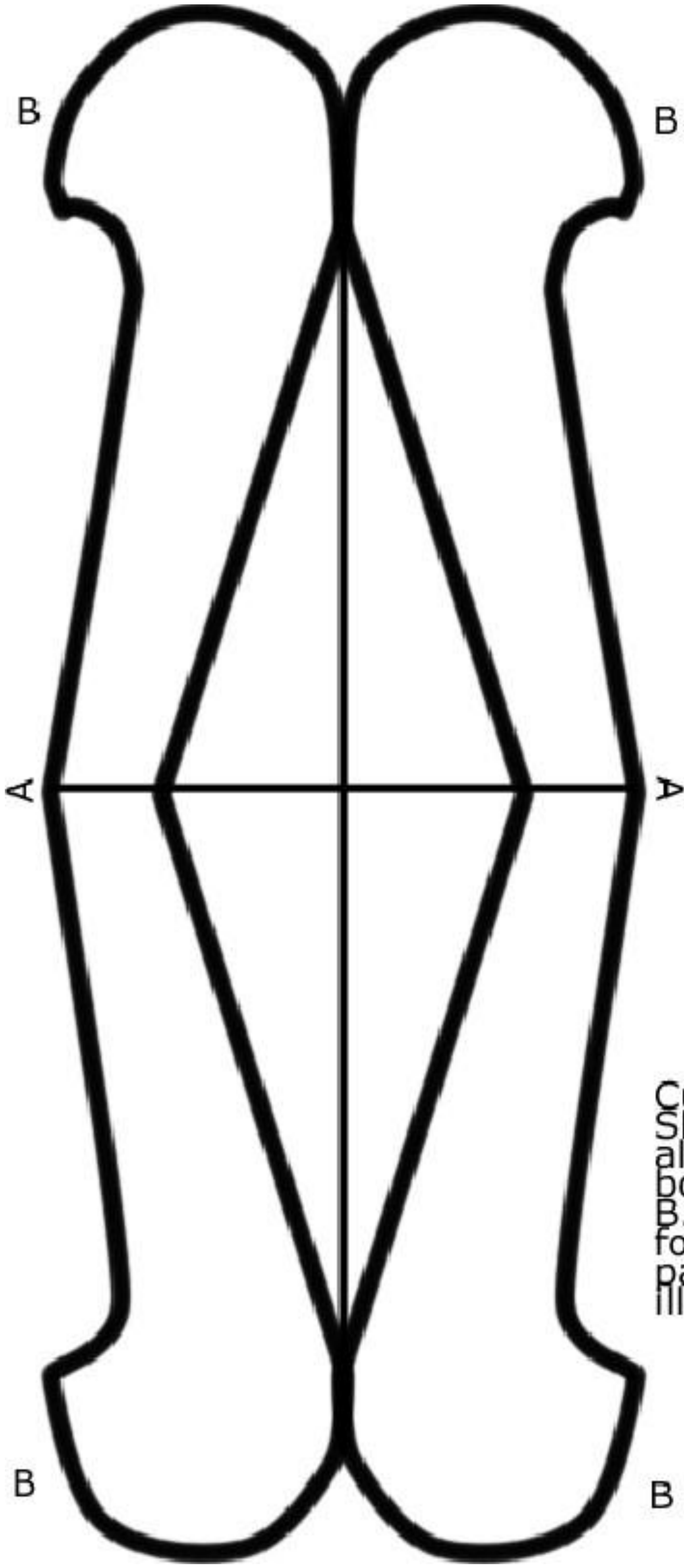
Materials you'll need:

- large plastic container (4 L storage bin, bathtub, fish tank, wave tank from physics dept., etc.) to replicate a lake or river
- printed canoe pattern
- poster board or old file folders
- dull pencils or a medium ball point pen and scissors
- pencil crayons
- fan (household fan or small handheld fan)

Project submission:

- A picture of the finished canoe (take this before putting it in the water.
- A picture of your 'river set up"
- A copy of your data sheet with calculations.

Adapted from Teaching Mathematics in a First Peoples Context



Cut out the canoe. Then Slit at 'A'. Fold in half along center line. and paste both halves together at B. Where you slit at 'A', fold towards eachother and paste together...like illustration above.

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