

Tlúu

Canoes

Grade Level 2-3

Haida Cultural Significance

Southeast Alaska is made up of many miles of coastline and hundreds of islands, with a wide variety of resources and villages scattered throughout. Canoes were the primary mode of transportation used by the people of Southeast Alaska for hundreds of years. Haida people use canoes and other watercraft to support their coastal lifestyle, to gather resources, and for basic transportation. Canoes were used for hunting, fishing, gathering and traveling between villages to trade or take part in a traditional party. Canoes vary greatly depending on their function.

The process of canoe building requires much skill, and often the canoes themselves would be used as trade items between tribal nations. A carver with great skills could bring wealth and prestige to a clan and village. Today traditional canoes are still used in a variety of traditional and recreational ways. Canoes represent unity and teamwork, strength training and health, as well as being a sophisticated art form and symbol of cultural identity.

Elder/Culture Bearer Role

Elders enrich this unit with their cultural knowledge in the areas of:

- Storytelling, as the Elder shares the legend of Naatsilanéi
- Haida language—names of trees in Haida, types of canoes in Haida
- Cultural values, as the Elder shares knowledge of canoes.

Overview

In this unit students learn what makes objects move and understand how they move. Central understandings include the concepts of friction, gravity, force, and the movement of sound waves.

In Lesson #1 students listen to and respond to the traditional Haida story, Naatsilanéi while learning the wisdom of Haida ancestors as they worked with various types of wood. After using various woods of different densities, and learning that some woods float higher than others, students better understand how scientists experiment.

In Lesson #2 students learn to identify the parts of a canoe, examine the process of constructing a Haida canoe, and learn to identify different types of canoes and their uses.

In Lesson #3 students learn about friction by pushing a large box that simulates a canoe.

A series of elementary level thematic units featuring Haida language, culture and history were developed in Ketchikan and Hydaburg, Alaska in 2004-6. The project was funded by the U.S. Department of Education, Haida Language Immersion Program - Boosting Academic Achievement grant #S356A030046, awarded to the Sealaska Heritage Institute.

Lessons and units were written by a team including Jordan Lachler, project director and linguist specializing in documenting and revitalizing Native American languages. Lachler heads up the local field office of the Sealaska Heritage Institute in Ketchikan. Cherylyn Holter (T'áaw Kúns) grew up in Hydaburg, raised by her grandparents, Willis and Hazel Bell and has worked with the remaining fluent Haida Elders for years. She taught the Haida language to students since returning to Hydaburg in 1990. Linda Schrack (Skíl Jáadei) grew up in Ketchikan, spending a great deal of time with her grandparents, Robert and Nora Cogo. She worked for many years in the field of early childhood education, and is an accomplished Native artist and traditional Haida dance group leader. Julie Folta, a cultural curriculum specialist with years of experience developing and teaching thematic, child-centered curriculum in rural Alaska also contributed to lessons and Annie Calkins edited final drafts of the units.

All units are available online at sealaskaheritage.org.





The tests are done on different surfaces such as a rug, gravel and concrete. The streamlined shape of a canoe is designed to reduce the friction of the water against the canoe and reduce the amount of force required to move it.

In Lesson #4 students learn about force as a push. They explore paddles and how paddles are designed as a lever to create the most force with the least amount of effort. Students learn about the forces of nature such as the wind. Sails attached to canoes utilize this natural force as a push in traveling long distances.

In Lesson #5 students learn about the concept of work and force as a pull related to the use of fishing nets. More force is required to move heavier loads (full nets) than lighter loads. The concept of friction is reinforced.

In Lesson #6 students learn that sound is produced by things that vibrate. Things that vibrate faster produce higher pitched sounds and things that vibrate slower produce sounds that are lower in pitch. Students also learn a canoeing song, and are introduced to a traditional greeting ceremony.

In Lesson #7 students participate in a canoeing, drumming field trip in which they learn to apply the concepts learned in previous lessons.

Alaska State Standards

English/Language Arts

D2) Evaluate the validity, objectivity, reliability, and quality of information read, heard, and seen

Science

- A5) Understand strength and effects of forces of nature
- A6) Understand that forces of nature cause different types of motion and describe the relationship between these forces and motion
- A8) Understand scientific facts, concepts, principles, and theories
 - b. state that whenever energy is reduced in one place, it is increased somewhere else by the same amount
- B1) Use the process of science, including observing, classifying, measuring, interpreting data, inferring, controlling variables, developing models and theories, hypothesizing, predicting, and experimenting
- B2) Design and conduct scientific investigations using appropriate instruments
- C3) Understand that society, culture, history and environment affect the development of scientific knowledge
- D1) Apply scientific knowledge and skills to understand issues and everyday events

Math

- A1) Understand and use numeration, including
 - a. numbers, number systems, counting numbers, whole numbers, integers, fractions, decimals, and percents
- A2) Select and use appropriate systems, units, and tools of measurement, including estimation
- A3) Perform basic arithmetic functions, make reasoned estimates, and select and use appropriate methods or tools for computation or estimation including mental arithmetic, paper and pencil
- A4) Represent, analyze, and use mathematical patterns, relations, and functions using methods such as tables, equations, and graphs
- A6) Collect, organize, analyze and use mathematical patterns, relations, and



functions using methods such as tables, equations, and graphs

Cultural Standards

- A3) Acquire and pass on the traditions of community through oral and written history
- D1) Acquire in-depth cultural knowledge through active participation and meaningful interaction with Elders

Lesson #1 Naatsilanéi: A Scientist

Objectives

Students:

- Understand that Haida stories teach important lessons
- Identify scientific behavior and understand the process of experimentation
- Understand the properties of buoyancy of different types of wood
- Learn what type of wood is used to make Haida canoes.

Time

3-4 hours

Materials

- Written, Audio or Video Story of Naatsilanéi
- Pictures / drawings of trees labeled in Haida and English
- Pocket chart cards of target vocabulary and phrase patterns
- Tub of water
- Pieces of wood - same size and shape - of tree types mentioned in the story; alder, red cedar, yellow cedar, spruce and other woods - (Ask your lumber supply company or shop teacher)
- Objects for sinking/floating experiments, colored math tiles
- Wall chart paper for creating posters

Haida Vocabulary

kíid, kíidaay	(the) spruce
k'áang, k'áangaay	(the) hemlock
sgahláan, sgahlanáay	(the) yellow cedar
ts'úu, ts'uwáay	(the) red cedar
kál, kaláay	(the) red alder
sk'áangw, sk'áangwaay	(the) stick of wood



Haida Phrases

Dáa gw k̄iid k̄ing us?	Do you see the spruce tree?
K'áangaay hl díi k̄indaa.	Show me the hemlock.
Tl'áan uu sgahlanáay íijang?	Where is the yellow cedar?
Ts'uwáay hl tlatl'áa.	Touch the red cedar.
Kál gw is us?	Is this a red alder?
Giisd uu sk'áangw da'áang?	Who has the stick?

Teacher Background Information

Types of trees

Spruce: These trees can stand about 70 m tall and 2 m in diameter. The bark is scaly with brown and grayish colors. The leaves are yellowish-green or bluish-green in color with sharp pine needles that are stiff and droop. Brownish-red round pine cones 5-8 cm long hang from the ends of leaves. The pine needles have seeds and have a scaly texture. You will know it's a spruce tree when you grab the leaves and it hurts. Spruce trees traditionally provide pitch-medicine when mixed with devils club. It is also used as a fire starter; roots are used for weaving baskets and hats; new-growth of the budding spruce tips can be used for tea or jelly.

Red Cedar: Red Cedar trees average about 60 m tall or more. These trees can get fairly large with vertical strands of bark that are grey to reddish brown in color. Strips of bark can tear off with a fibrous look. The flat showering branches have a slightly droopy look that turns upward. The leaves have a glossy overlapping scale texture that is yellowish green and turns brown. Small reddish oval cones with very few scales and about 1 cm. long sprout on the leaves. At the beginning of the sprouting, the cones are green and turn brown with a wood texture and sprout upwards like a flower. Red cedar is traditionally used to weave, carve and make canoes.

Yellow Cedar: These trees stand about 50 m tall with a dirty white to grayish brown bark having a twisted trunk. The bark has a shredded, peeling look to it. The leaves droop and have a slightly smooth scaly look that are bluish-green and are about 3-6 mm long. The tips are sharp pointed and spread out. The cones are about 4 mm long and start out with a berry look that is bumpy and grow to a brownish cone with scales shaped like a mushroom. It is traditionally used for carving, making canoes, and weaving.

Hemlock: This tree averages about 60 m tall and has a narrow look to it. The reddish-brown bark has a scaly rough look. The leaves look like spruce tree leaves but are flatter without the sharpness at the tips. The yellow-greenish leaves have needles with a rounded tip that average about 5-20 mm long. The oblong cones are about 2 cm long, are first purplish-green and as they mature, then turn light brown. Traditional use is mainly to collect herring roe.

Alder: Alder wood trees are about 25m tall and have thin, smooth grey bark with patches of white lichen. Green moss will grow on the bark as well. The leaves are about 5-15 cm. long, broad and elliptic with a sharp tip. The leaves are also green and have a rustic, hairy look underneath the leaf. Brown, long clusters of cones about 2 cm. long will grow on the leaves (even through the winter).



Activities

Activity #1

Read, tell or watch Na a tsila né i legend

1. Before reading/telling/watching the story, ask students if they know the legend of Naatsilanéi. Ask them to tell you what they know. Let students know that at one point in the legend Naatsilanéi needed to act like a scientist, he experimented with three types of wood to determine which had the most desirable characteristics. Ask students to tell you what scientists do; record this on a chart. Tell students they are to listen to the story and see if they can find the point at which Naatsilanéi acted as a scientist.
2. Read, tell or watch a video of the legend. Elder role: Tell the story. Ask students to tell you what Naatsilanéi did that showed he was a scientist. Circle the words on the chart previously made...(something like...scientists experiment; scientists try something and if it doesn't work, they try something else; scientists discover new things).

Activity #2

Haida Lesson

1. Show tree wall cards with the Haida names and practice saying both the English and Haida names.
2. Tree Sentence Pattern Wall Cards: Using a pocket chart with the stem phrase,

_____ **uu HI k'ínggang.**
I see a _____.

students create and read/recite sentences using the Haida vocabulary words for this lesson.

3. Create a book entitled:

K'iidaay HI K'ínggang
I see the trees

showing different types of trees labeled correctly with Haida phrases.



Activity #3 Looking at tree types from the story

1. Discuss how different trees have different types of needles/leaves, bark, cones, and overall shape.
2. Take a walking field trip to look at types of trees: Go and look at real red cedar, hemlock, spruce and alder trees.
3. Take samples of fallen branches to bring back to the classroom. Remind students that it would not be respectful to cut off branches for this use but that there are times when branches are taken from living trees with respect.



4. Discuss observations of trees and make body movements to help remember the characteristics of each tree. Use TPR instructions to demonstrate to students how to act like different trees.



TPR Responses for:

kál
alder



kíid
spruce



k'áang
hemlock



ts'úu
red cedar



5. Using the branches of red cedar, spruce, hemlock and alder trees students do sketches, paying close attention to the details of the different branches.



6. With students, create a chart, similar to the one below, noting their observations.
Elder role: comment on how parts of the different trees were used traditionally.

	Ts'úu	Kál	Kíid	K'áang
	Red Cedar	Alder	Spruce	Hemlock
Bark	paper-like	smooth	rough	rough
Needles	flat, soft, flexible	leaves are sticky on the back	hard, sharp, stiff	little sharp, little stiff
Uses	bark-weaving, wood-carving	firewood in smokehouse	roots-weaving	gathering herring eggs

Activity #4 Haida Lesson

Use Wall Chart cards and pocket chart cards to teach the Haida words and phrases related to floating and sinking. Use reduced size wall chart cards to play a matching game.

Activity #5 Naatsilanéi's experiments with wood

1. Students classify objects on a T-chart labeled in English and Haida similar to the following example:

Gagínggang.	Chahgáng.
It floats.	It sinks.
...	...
...	...
...	...

2. Part 2: Using red cedar, yellow cedar, spruce and alder as well as other woods, students conduct sinking and floating experiments. Since most woods will float, students will be looking at the buoyancy of the woods- how high or low they float in the water. (Some exotic, very dense woods will float lower in the water, so obtaining some of this type of wood might be useful.)



3. Discuss the concept of “rating” floating, better floaters will earn a higher rating: 4, poor floaters will earn a lower rating: 1.
4. Have students record their information on “Wood Floatation Experiment” form. Each group tests 4 types of wood. First predict which woods will be better floaters and then observe the wood floating. Students then rate all four pieces with 4, 3, 2, and 1 ratings.
5. In a group using the information collected, make a class chart and rate the “best floater to the worst floater”.



6. Part 3: Since canoes not only float, but also carry weight, predict which types of wood will hold the most weight. Students can decide what to use to test for carrying a load. Math pattern tiles work well. Have an exploration period where students can see what the best ways are to load the tiles on the wood samples. Discussions on balance should take place during exploration.



Conduct “load” part of experiment. Check to see how many tiles each type of wood can hold before it sinks.

7. After the experiments discuss which types of wood make the best to make a canoe.



What qualities of the wood are good for different purposes?

Assessment

Students tell how Naatsilanéi thought like a scientist. They also rate pictures of floating wood according to how they rest in the water.

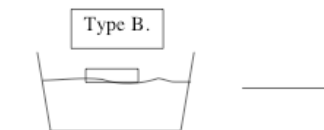
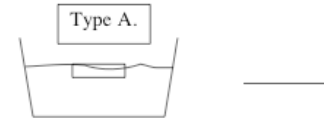
Have students fill in the blank version of “I see the trees”, correctly identifying and labeling the pictures of trees.

Name _____ Date _____

What did Naasaklene learn? _____

What did Naasaklene do to think like a scientist?

Rate each type of wood: 4 - best floater 1 - worst floater



Resources included with this lesson

- Story of Naatsilanéi
- Audio of Naatsilanéi
- Pictures/drawings of various tree types
- Book “I see the trees” for students to read which includes various tree types with Haida phrases describing the trees. This could also be used without text, so students could write their own sentences
- Experiment form: “Wood Floatation Experiment”
- Word wall and student size/phrase cards for Haida vocabulary/phrases
- Pocket chart words and phrases in Haida
- Audio CD of Haida words and phrases
- Interactive CD of Haida Language Activities
- Felt board pieces for retelling Naatsilanéi
- Calendar and date pieces of killer whale and man for patterning throughout the unit.



Optional Extension Activities:

- Invite a carver to the classroom. Ask him or her to talk about and show different types of wood, why they use specific types for specific purposes and the difference between green and cured woods.
- Write a thank you letter to the carver, Elder or other classroom visitors.
- Write and illustrate your favorite part of Naatsilanéi legend.
- Students read Naatsilanéi independently.
- Students retell Naatsilanéi in their own words to a partner or to a tape recorder.
- Write a script and create a puppet play for Naatsilanéi.
- Use felt board pieces included in Resources to retell the story to a partner.
- Watch the film “The Whale Rider” from New Zealand. Compare and contrast it with the story of Naatsilanéi.
- Play concentration (memory) with various pictures of different types of trees. Using Total Physical Response (TPR) instructions, ask students in Haida to touch or point to the pictures to identify types of trees.

Lesson #2 Canoe Design

Objectives

Students:

- Learn to identify the parts of a canoe
- Learn to identify five types of canoes and their uses
- Become familiar with the process of constructing a canoe
- Understand that Haida people are methodical in their canoe design

Time

4-5 hours

Materials

- Historical pictures of Haida canoes
- Pictures of other water craft
- Drawings of different styles of Haida canoes
- Pocket chart cards of target vocabulary and phrase patterns
- Pictures of Hoonah Canoe Carving Project
- Diagram of canoe parts



Haida Vocabulary

tlúu, tluwáay	(the) canoe
ku tlúu, ku tluwáay	(the) sea otter canoe
kíidaaw tluwáay	a/ the war canoe
tlúu in, tlúu in-gáay	(the) dugout canoe
tlúu k'únk'unaa, tlúu k'únk'unaaas	(the) canoe with a scarfed-on bow and stern
t'áang	a/ the stern
sk'íw	a/ the bow

Haida Phrases

Dáa gw tluwáay k'ing us?	Do you see the canoe?
Áa uu ku tlúu íijang.	Here is a sea otter canoe.
Kíidaaw tluwáay hl díi kíndaa.	Show me the war canoe.
Tl'áan uu tlúu in-gáay íijang?	Where is the dugout canoe?
Tlúu k'únk'unaa gw is us?	Is this a canoe with a scarfed-on bow and stern?
Áa uu t'áang íijang.	Here is the stern.
Húu uu sk'íw íijang.	Over there is the bow.

Teacher Background Information

Haida canoes require great skill to create. The tree is selected for special qualities and honored with a ceremony of respect before being cut. The canoe may often be roughed out near where the tree had grown before being moved to a more convenient location to be finished. The creation of a canoe takes a lot of time, patience, special tools, and skills. A master canoe carver holds a unique position in Haida society. Often a well made canoe could support a whole clan or village. Canoes vary greatly depending on the region, available materials and the desired function.

ku tlúu

sea otter canoe

This small, heavy canoe is used for hunting and fishing. It has a symmetrical shape at the bow and stern and is made of spruce or cedar.

kíidaaw tluwáay

war canoe

Carved of cedar, these canoes can be quite large, some carrying up to 60 people. They are used for long voyages, trade, hunting and transporting freight. They often had a carved prow representing a clan crest. Many of the finest of these were traded with other Native groups up and down the Northwest coast.



tluu in
dugout canoe

Usually made from just half a log, these are the smallest and fastest canoes.

tluu k'unk'unaa
canoe with a scarfed-on bow and stern

This type of canoe had a bow and a stern that were made from separate pieces wood which were scarfed onto the main body of the canoe. Usually this is done only with larger canoes.

Activity #1 Labeling pictures of canoe parts

Give students canoe parts diagram and have them fill in the blanks of each part of a canoe. Put up poster sized diagram for students to reference as they work.

Activity #2 Comparing canoe types

1. Refer back to tree uses. Reinforce that cedar trees are used to make canoes.
2. Watch video "Qayaqs and Canoes". Watch either the entire video or just the segment of "Making a Canoe" with Wayne Price.
3. Look at and post photos of canoe carving project in Hoonah. Compare and contrast to the video.
4. Discuss characteristics a tree would have in order to be good for a canoe: tall, straight, not too many branches, floating wood like the orca from Naatsilanéi story.
5. Look at historical photos of canoes from the Northwest coast.



Jack Adams' racing canoe, Portage Bay, Seattle, 1909

In 1909, Jack Adams, a member of the Squamish Tribe, built a canoe, built of cedar, Haida style. The hull is made from a single 40-foot log. On September 6, the canoe raced in Portage Bay. In the picture, Adams and ten other men pulled the canoe in Portage Bay.



Dugout canoe with two sails, ca. 1900



Canoes near village, Vancouver Island, British Columbia, ca. 1901.



6. Each student sorts their own photos of canoes into different groups based on characteristics the students choose.



7. Students label their sorts with sticky notes; with sails, without sails, large, small, fishing, with designs, without designs, ect.
8. Use student sticky notes to make a large class chart. Each student takes a turn to put their notes on the chart, choosing which notes form a group. After all the notes are posted, label the groups and select a characteristic of each group: size, use, place (in water, on the beach), looks (design, no design), shape (high prow, flat prow, carved prow), sails.



9. Students make their pictures into a book by stapling all pages and the cover together in the order decided.
 1. Show different pictures of canoes one at a time. Students use a pocket chart to create the phrase: "I see (___)" filling in with different canoe vocabulary.
 2. Post Haida canoe vocabulary cards in the room and practice daily, possibly during a morning meeting.



Activity #3

Paper canoe with designs

As a class, look at pictures of canoes with designs. Discuss the possible meaning of the designs.

Give each student a copy of the paper canoe page and show an example of a completed paper canoe.

Show students where to draw a design on the canoe pattern. After a period of time they can create their own designs. Ask students to share their design with a partner and comment about what is unique about each design.

Have students cut out the canoe patterns and use small pieces of clear tape to connect the prow and stern to form the canoe.

Assessment

Using the wall cards, students point out the parts of a canoe and discuss one feature that describes the canoe; it has a sail, it is big, it has a raven design, etc.

Resources included with this lesson

- Diagram of canoe parts
- Diagram of canoe parts worksheet
- Historical pictures of Haida canoes
- Pictures of other water going craft
- Paper model canoes
- Canoes Book
- Word/ phrase cards for Haida vocabulary/phrases
- Pocket chart words and phrases in Haida
- Audio CD of Haida words and phrases

Additional Optional Activities

- Invite a local canoe carver to describe the process of canoe construction.
- Look at specialized tools for canoe construction; discuss the concept of a lever to increase the force applied by a tool.
- Have students identify areas on a map where specific canoe types originated.

Lesson #3

Friction at Work in Haida Canoes

Objectives

Students:

- Understand that push is one type of force on an object
- Understand that different surfaces create different amounts of friction
- Understand the concept of friction as it relates to the shape of a canoe



Time

3-5 hours

Materials

- Drawing, diorama or poster showing canoes on beach, including trees, rocks, bushes etc.
- Friction Experiment Worksheet
- Large box or other object to simulate canoe
- Measuring tape
- Timers
- Graph (Poster, wall size)
- Cooking oil
- Log rollers for simulated canoes
- Tub/pool of water
- “Sculpy” clay (or similar that can be oven baked)

Haida Vocabulary

kwaa, kwa'áay	(the) rock
kiid, kiidaay	(the) tree
kiidaay káahlíi	a/ the forest
chaaw salii	a/ the beach

Haida Phrases

Kwa'áay hl diig isdáa.	Give me the rock.
Kiidaay hl tlat'áa.	Touch the tree.
Áa uu kiidaay káahlíi ijang.	Here is the forest.
Húu uu chaaw salii ijang.	Over there is the beach.

Activity #1

Friction is a force created when two objects rub against each other

1. Introduce the concept of friction by rubbing hands together to feel the heat.
2. Add oil and compare which creates more heat (friction) - hands with or without oil.
3. Rub hands on different substances (own clothing, carpet, linoleum in the halls, wall surfaces, grass).
4. Discuss the heat that is felt and which surfaces cause the most heat.
5. Discuss which surfaces are harder or easier to rub hands quickly on.



Activity #2 Haida Lesson

1. Students point to various items on a picture of a canoe launch environment.
2. Students label picture of a canoe launch site with appropriate words and practice saying the phrase as they point to the picture.



Activity #3 Ease of motion (launching a canoe) is affected by friction

1. Discuss with the class the problems that might be encountered while trying to push (launch) a canoe down a beach to the water. Why would this be hard? What would make it harder or easier to push? Lead students to think about different beach surfaces: rocks, pebbles, sand.
2. Think back to Activity #1 and what caused more and less friction. Discuss which beach surfaces would cause more and less friction.
3. Discuss a plan about how we could simulate a canoe and what surfaces we could test for friction.
4. Using a large wooden box as a canoe, draw and cut out canoe sides from cardboard and attach to the sides of box. Use this box to simulate a canoe that students push on different surfaces as they conduct an experiment to compare ease of pushing.
5. Determine how to make the experiment fair and which variables will not change throughout the tests: number of students pushing and distance pushed.
6. Determine how to measure the ease of pushing: timing how long it takes to push a certain distance.
7. Determine which surfaces to test and the variables that will change: carpeted room floor, gym floor, outside concrete, playground gravel.
8. Make predictions about which surfaces will cause the least friction, and be easiest to push the canoe and why.
9. Conduct experiments.
10. Make a class data table, find the median time for each surface.
11. Make a graph using the median times.
12. Write a statement describing the results of the experiments.



Activity #4

Design an object (canoe) to meet specified characteristics

1. Discuss canoe shapes and why certain shapes are better for canoes and why others would not work as well, for example a flat front like the box.
2. Discuss:
 - a. Bigger surface area = more friction = harder to push
 - b. Smaller surface area = less friction = easier to push
3. In a tub of water try pushing a flat piece of cardboard through the water and then try pushing a bent piece with a forward facing V through the water.
4. Discuss which one “cuts” the water easier.
5. Use Pocket chart cards to learn Haida vocabulary for “it is fast/not fast”.
6. Design and construct canoes from clay.
7. Float and push toy canoes in water (pool, ocean, lake, tub).

Assessment

Observe individual students during this lesson, and using a simple rubric, record how they participate in discussions. Ask students to choose a beach surface that would cause the least amount of friction when pushing a canoe and use Lesson #3 assessment page to evaluate their comprehension and understanding.

Resources included with this lesson

- Drawing showing canoe launch on beach, including trees, rocks, bushes etc.
- Friction Experiment Worksheet
- Word/ phrase cards for Haida vocabulary/phrases
- Pocket chart words and phrases in Haida
- Audio CD of Haida words and phrases
- Interactive CD of Haida Language Activities

Additional Optional Activities

1. Write a story about an adventure on a canoe or other watercraft.
2. Write “pass around stories” on canoe shaped paper where one student starts the story, passes it on to another student who continues the story. (A template is provided with resources)
3. Make a diorama of a beach environment showing a canoe launch, forest, mountain, canoe, etc.



Lesson #4

Force as a Push: Paddles and Sails

Objectives

Students:

- Explore different shapes of paddles
- Understand the concept of force as a push or a pull
- Understand the use of a lever to increase force
- Explore the concept of teamwork and cooperation to increase force
- Identify the wind as a source of natural force
- Learn how Haida people utilized the wind to aid them in transportation
- Conduct experiment to capture the force of the wind

Time

3-4 hours

Materials

- Copy of raven and eagle paddle designs
- Sail pattern
- Prepared cedar bark – wide strips
- Tub of water
- Electric and/or hand fans





Haida Vocabulary

yáahl, yáalaay	(the) raven
ts'áak', ts'áak'aay	(the) eagle
áal, áalaay	(the) paddle
gya'áangw, gya'áangwaay	(the) sail
gya'áangw sk'áangwaay	a/the mast
sgíndaaw, sgíndaawaay	(the) rudder

Haida Phrases

Yáalaay hlǵálgang.	The raven is black.
Ts'áak'aay i'waan-gang.	The eagle is big.
Áalaay uu Hl da'áang.	I have the paddle.
Gya'áangwaay gw is us?	Is this the sail?
Gya'áangw sk'áangwaay hl kínhlaa.	Look up at the mast.
Tl'áan uu sgíndaawaay ijjang?	Where is the rudder?

Teacher Background Information

Paddling provides the push to move a canoe. Paddles can be many shapes and sizes. The rudder paddle is long and thick, and one person standing in the stern uses it to steer. Paddles for open ocean travel are longer than everyday paddles. Some paddles are designed with a sharp point that doubles as a weapon; others are designed with a strong straight end used to push. Wide paddles create more friction and thus are harder to pull.

Activity #1 Shapes of paddles

1. Use a variety of wide and narrow boards or pieces of cardboard and a tub of water to experiment with pushing through the water. Which shapes are easier to move through the water? Why do you think that is so? How wide would you make a paddle?
2. Repeat the experiment, using a variety of long and short boards or cardboard. Which ones give the most push? Why? How long would you make a paddle? Discuss the concept of a lever and that levers make work easier. How is a paddle like a lever?



3. Repeat the experiment again using a variety of paddles. How does shaping the blade affect how the paddle moves through the water? Why is it easier to move a paddle through the water than a board? How does paddling push a canoe?
4. As a class make a list of the properties of a paddle that can best propel a canoe.

Activity #2 Making paddles

1. Using a template of either a raven or eagle design students color the design and cut out the shape.
2. Using poster board, model how to make two paddle shapes, and then cut them out,
3. Staple the edges of paddle shapes together. Insert a wooden dowel through the middle between paddle shapes to provide support.
4. Glue the raven or eagle designs on one side of the paddle.



Activity #3 How to paddle

1. Use rows of chairs or a large refrigerator box to simulate a canoe. Have students line up as if they were sitting in a canoe and practice paddling together.
2. Sing the song "Row, Row, Row your Boat" in English and then in Haida, using the paddles.

Activity #4: Design a canoe with a sail

1. Using the canoe constructed from clay in the previous lesson, create a mast and sail for the canoe.
2. Race canoes in water, using fans to simulate wind. (use a pool, ocean, lake, tub or mud puddle).

How does a sail push the canoe?



How does the force of the wind affect the speed of the canoe?

How does the shape of the sail affect the speed of the canoe?

Resources included with this lesson

- Word/ phrase cards for Haida vocabulary/phrases
- Audio CD of Haida words and phrases
- Sail pattern

Additional Optional Activities

1. Make mini wooden paddle necklaces using small wooden craft spoons. Draw a design on the spoon part, drill a hole in the end, string onto a necklace and add beads.
2. With the advice and modeling of an Elder or tradition bearer, make a sail out of plaited cedar bark.

Lesson 5

Force at Work with Fishing Nets

Objectives

Students:

- Understand that pull is one type of force on an object.
- Understand that greater force (pull on the net) is required to move greater loads (nets empty and full of salmon).

Time

3-5 hours

Materials

- Fisherman or fisherwoman
- Fish net line
- Simulated salmon – Salmon construction described in Activity #4, Optional Extension Activities (these will have to be made ahead of time.)



Haida Vocabulary

aad, aadáay	(the) net
kináang	it is heavy
kiyáang	it is light
st'aagáagang	it has been filled, it is full
aad k'áal	a/ the empty net
k'áalaagang	it is partly-full, partly-empty

Haida Phrases

Aadáay kináang.	The net is heavy.
Aadáay kiyáang.	The net is light.
Chiin eehl aadáay st'aagáagang.	The net is full of salmon.
Aad k'áal uu iijang.	It's an empty net; The net is empty.
Aadáay k'áalaagang.	The net is partly-full, partly-empty.

Activity #1 Comparing nets

1. Using various sizes of nets, including nets with varying mesh sizes, students explore the net, orally comparing and contrasting the nets.
2. Students select one net sample, place it under drawing paper and, using the side of a crayon, make a rubbing of the net.
3. Students orally dictate, and then write a sentence about the size of the net or the mesh and/or hypothesized use of the net.





Activity #2 “Nets” Book

Make the “Nets” book and practice Haida words for nets—It’s big, it’s small, it’s heavy, and it’s light, etc.

Activity #3 Differing amounts of force are required to pull empty and full nets

1. Using a large seine net loaded with different amounts of simulated salmon (see optional activities if you need to make simulated salmon) set up an experiment to test for amount of force needed to pull in the net.
2. Determine how to make the experiment fair, which variables will not change throughout the tests: Distance pulled (15 ft.) and time to beat (under 5 seconds)
3. Determine the 4 load amounts: empty, 15 fish, 30 fish, and 60 fish.



4. Determine how to measure force needed to pull different amounts of weight:
 - a. Decide on a distance to pull a net loaded with different amounts of fish, (15 ft)
 - b. Time how long it takes 1 student to pull an empty net or zero fish (about but not over 5 seconds),
 - c. Load the net with the next smallest amount of fish (15),
 - d. Time how long it takes one child to pull the net the same distance (it should take more than the amount of time it took to pull the empty net) ,
 - e. Add one child (force) at a time until they can pull the loaded net the same distance in the same amount of time (or less) as the one student with an empty net,
 - f. Continue adding fish to create different weights, and adding students to pull the net in under the allotted time (5 sec.).
5. Make predictions about how many kids it will take to pull the different loads in the same time.
6. Conduct experiments, using Haida phrases to describe the nets (heavy, light, full, empty, etc.)



7. Make a class data table.
8. Make a graph.
9. Write a statement describing the results of the experiments.

Assessment

Assessment sheet included in Resources: When given 3 pictures of loaded nets and three pictures of students pulling nets, students match the loaded net with the number of children needed to pull that net. They write about why they made the choices they did. Students should use the vocabulary words “force” and “weight” in their writing.

Resources included with this lesson

- Pictures / drawings of nets being pulled on smooth and rough surfaces
- Pictures / drawings of nets with many, few or no fish
- Word/ phrase cards for Haida vocabulary/phrases
- Pocket chart words and phrases in Haida
- Audio CD of Haida words and phrases
- Interactive CD of Haida Language Activities

Optional Extension Activities

Making simulated salmon

Decide on what type of salmon to make and find out the average weight of that salmon. Measure and fill ziplock bags with rice or sand to the correct weight. Make paper cutouts of a salmon and staple them together to form a whole fish and put filled ziplock bags inside. A more permanent salmon may be made from cloth. Use the salmon in the nets. If nets are not available, sheets with lines drawn on them to represent a net could be used.

Making contemporary nets; net repair (time varies)

Invite a fisherman to the class with the focus of net repair. Students learn basic knots and techniques used in net repair and use them on classroom nets.



Making line (for fishing, nets, ropes, anchors and harpoons) from bull kelp (time varies)

Using information found at http://primitiveways.com/bull_whip_kelp.html read about and, if possible, make line for fishing from bull kelp. Students learn this kelp was used by ancestors to make line and for other purposes as well, including for storage containers, to steam thin strips of wood for bentwood halibut hooks, as moulds for hot oil and as food.

Lesson #6 **Sound Vibrates in Drums and Rattles**

Objectives

Students:

- Understand that sound is caused by vibration
- Understand that sound vibrations are long or short and that sound (pitch) varies according to wave length
- Learn how traditional instruments (drums) produce different pitches

Time

3-4 hours

Materials

- Rubber bands
- Paper cups
- Chart paper
- Blank paper
- Haida drums or pictures of drums
- Heat lamp or hair dryer
- Cd of Canoe song
- Poster board
- Crayons or markers
- Glue
- Stapler and staples



Haida Vocabulary

gáwjaaw, gáwjuwaay	(the) drum
sgi dámdga	to drum loudly
gúustl'aasan	quietly, softly
sgidáng	to drum

Haida Phrases

Gáwjuwaay hal sgidánggang.	He is drumming.
Hal sgi dámdgaang.	He is drumming loudly.
Gúustl'aasan gáwjuwaay hal sgidánggang.	He is drumming softly.

Activity #1 Sound is produced when objects vibrate

Conduct a series of experiments/demonstrations as follows.

1. Using 2 rubber bands, tie one so that it is smaller than the other, and stretch them around a cup to create a plucking instrument.





2. Observe each rubber band and make notes on chart paper about how they look; one is thinner/thicker than the other, one is tighter/looser than the other.
3. Carefully pluck one at a time and listen to how they sound.
4. Note on the chart paper what students observe; one is higher/lower in pitch than the other.
5. Pluck each rubber band again, this time observing the vibrations and movement of each.
6. Using a blank sheet of paper, students draw how they saw the rubber bands moving.
7. On chart paper draw two wavy lines, one with small close together waves and one with larger, wider waves, to represent the two rubber bands. Ask the students which one would make a higher pitched sound and which would make a lower pitched sound.

Activity #2 Haida drums

1. Show pictures of different drums or use real ones if available.



2. Ask the students which drums they think would make higher or lower pitched sounds and why.
3. If real drums are used, beat them while listening for the differences in pitch. Discuss that when a drum is warm, the skin on it tightens and this causes a tighter vibration like that of the tighter rubber band, and vice versa with a cold, loose drum. Use a heater, lamp, or hairdryer to heat up a drum and listen to the pitch get higher.
4. Use appropriate Haida vocabulary and language structures to say, "This drum is loud, quiet, big, small" Using pictures of drums (see Resources), use appropriate Haida vocabulary and language structures to describe a drum in Haida. "This drum has a (raven, eagle, orca, salmon) on it".



Assessment

Students use the assessment sheet (see Resources) to match a loose drum wave pattern to larger waves and a tight drum to smaller waves pattern. Students describe the sound that each one would make.



Resources included with this lesson

- Assessment sheet
- Pictures of drums
- Paddle designs
- Paddle template
- Language materials
- Word/ phrase cards for Haida vocabulary/phrases
- Audio CD of Haida words and phrases

Optional Extension Activities

- Make a bull kelp rattle - Make traditional rattles using the directions found at http://primitiveways.com/bull_whip_kelp.html
- Vary the items used to fill the rattles, and notice the different sounds made by these items.
- Compare and contrast different types of native drums.



- Learn to identify and draw different NW Coast designs and how to put them into a circular format.
- Make embroidery hoop mini drums using rawhide for the drum head. Paint NW Coast designs on the skin.
- Compare the different sound drums make when struck in the center, or along the edge. Hypothesize why this might be occurring.
- Discuss with a music teacher ways that she/he might integrate drums and drumming into music classes.

Lesson #7

Canoe Paddling: A Field Trip

Objectives

Students:

- Experience how the position and motion of a canoe can be changed by pushing (paddling) and pulling
- Understand how balance affects motion
- Experience how paddling together increases the amount of force, resulting in more motion

Time

3-4 hours

Materials

- Canoes
- Paddles
- Life jackets
- Rain Ponchos

Activity #1

Canoe paddling commands

1. Teacher orally introduces students to paddling commands in English and Haida (using TPR) while demonstrating the correct action. Students join in as soon as possible. For Haida canoe commands, consult the online version of the curriculum.
2. Students take part in dry land practice following canoe paddling commands. In relay teams of 5, students listen to Haida paddling commands as they paddle a canoe through a simulated (chalk or paper) river. Students who fail to follow the command correctly capsize (the teacher points to them) and they are required to go back to the start line and begin again.



Activity #2 Canoe field trip

1. As a culminating experience, students take a field trip with classmates, teachers and parents to a local lake or the ocean. Using traditional and contemporary canoes of varying structures and sizes, students paddle the canoe, following directions given in Haida by Elders, knowledge bearer, teachers or parents.
2. Use appropriate Haida vocabulary and language structures to direct students via paddling commands which the students follow throughout the field trip.
3. As students paddle the canoe try different ways of paddling,
 - a. Only paddling on one side causes a change of direction
 - b. Paddling backwards
 - c. Paddle forwards on one side, backwards on the other
 - d. Only one paddle
 - e. Paddle all randomly
 - f. Paddle together in rhythm
 - g. Paddle really fast
 - h. Paddle really slow
 - i. Paddle against wind/into wind
 - j. Paddle against current/into current
4. Teachers take pictures of students following commands correctly.

Activity #3 Log of Canoe Trip

When students return from the canoe trip, direct them to:

1. Label the pictures of themselves following the paddling commands (from Activity 2) with correct pre-written Haida command labels,
2. Write a 3 – 5 paragraph journal entry telling about the canoe trip,
3. Draw pictures to accompany their journal entries.

Assessment

Collect student logs of the canoe trip and evaluate the writing using one or more traits of the analytical writing rubric. Determine their understanding of canoe commands and paddling techniques using their writing, illustrations and via individual questioning of students. In addition, assess student mastery of canoe commands in Haida.

Resources

- Canoes, paddles, life jackets sufficient for all students
- Labels of canoe commands for students to adhere to own pictures