

Teacher notes:

In the classroom:

1. Begin by introducing the STEM project: building and testing a canoe that you construct. You will be testing your canoe by adding rice to see how much it can hold without sinking.
2. Introduce two types of indigenous canoes: birch bark and dugout. Show the two videos to learn about how they are made and the peoples who make them. Fill out the Types of indigenous canoes page.
 - a. <https://youtu.be/HkYndMUO9Pk>
 - b. <https://vimeo.com/83392411>
3. Go over Canoe Challenge Overview page.
4. Read the history of ricing and show the video:
<https://youtu.be/iYc73eQbq6o>
5. Review the Engineering mission making sure students understand the criteria and constraints for building their canoe.

In the STEM lab:

1. Have students brainstorm a design. They should list the materials they are using, draw a picture of their plan, and decide what style of canoe they are building.
2. Have students build their canoe.
3. Students will test their canoe three times. Students should fill out the log after each test.

In STEM lab or in classroom:

1. Have students fill out the reflection this can be done individually or as a group.
2. For additional social studies connections:
 - a. <https://www.mpm.edu/content/wirp/ICW-153> this is a good resource for history of Menominee Tribe

Ricing Canoe Stem JOURNAL

NAME: _____

Types of Indigenous Canoes

Figure 7.2



[Dug out video](#)

Figure 7.3



Figure 7.4



[Birch bark video](#)

Figure 7.5

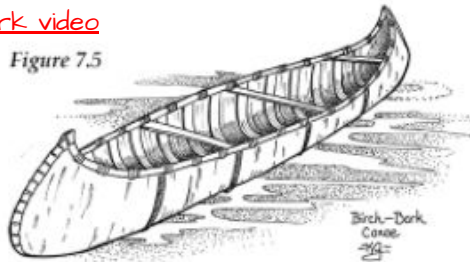
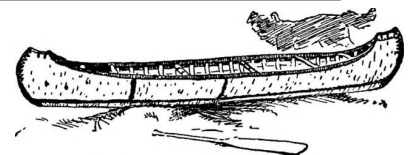


Figure 7.6



- Figure 7.2 ▲ Nuu-chah-nulth whaling canoe. A notch in the top of the prow was designed as a harpoon rest, and was said to take the shape of a wolf's head. Illustration by Karen Gillmore.
- Figure 7.3 ▲ Coast Salish canoe for general travel and transport of goods. Illustration by Karen Gillmore.
- Figure 7.4 ▲ River canoes enabled trade between the interior and the coast well into the 20th century. Illustration by Karen Gillmore
- Figure 7.5 ▲ Birch bark canoe. Illustration by Karen Gillmore.
- Figure 7.6 ▲ Sturgeon-nosed canoe. Illustration by Karen Gillmore.

What type of canoes do you find most interesting and why?



Canoe Challenge Overview

During the fall months, the Ojibwe and Menominee people go out in their canoes to collect wild rice. You will be constructing a canoe to hold rice. You will need to design your canoe to be able to hold as much rice as possible without sinking.



Traditional canoes of the Ojibwe and Menominee people were constructed out of birch bark. For this challenge you will only be using a 12" x 12" square of aluminum foil to build your canoe.

History of Ricing

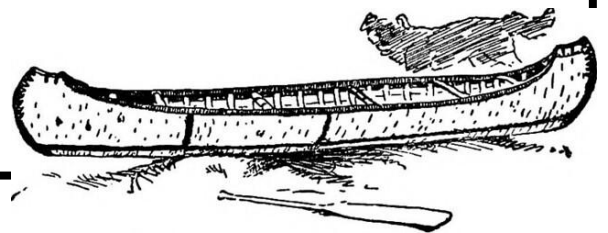
One of the food staples particularly enjoyed by the Ojibwe and Menominee was wild rice. Wild rice is not a true rice, but rather a cereal grass -- *Zizania aquatica* -- which grows in shallow lakes and streams. It ripens in late summer, usually from the middle of August to early September.

Native people in the Great Lakes boiled rice and ate it with corn, beans, or squash. Meat, a small amount of grease, or maple sugar was often added for seasoning. As a treat, it was occasionally parched like popcorn. For storage, rice was placed in birchbark containers.

If a family wished to leave some rice in an area they would return to later in the year, they buried a dugout canoe full of rice on the sunny slope of a hill, so rainwater would drain off and not spoil the grain. It was said that rice cached this way would keep as long as two years.

Wild rice was so important to the Menominee that they became known as the Wild Rice people. In their oral traditions, wild rice was the gift of one of the underneath beings and sacrifices were necessary to insure a good harvest. When the rice was ready for harvesting, tobacco was offered to this spirit (it was put in a tiny hole dug for the purpose) and the chief asked for four days of good weather during which his people could gather the rice. After that, the underneath spirits and the Thunderbirds could claim their share. The chief threw tobacco into the fire as an offering to the Thunderbirds so they would not interfere with the weather. Following the speech all the old people had a chance to smoke the tobacco as the pipe was passed from one to the other. Then a feast was held. Calm weather was thus assured, unless someone did not act with due respect or made excessive noise.

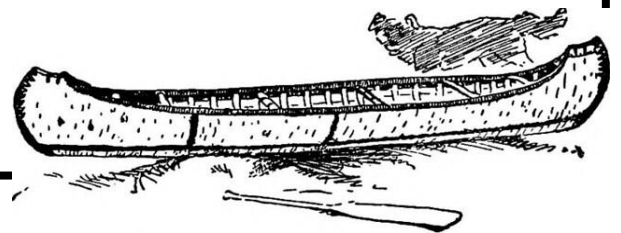
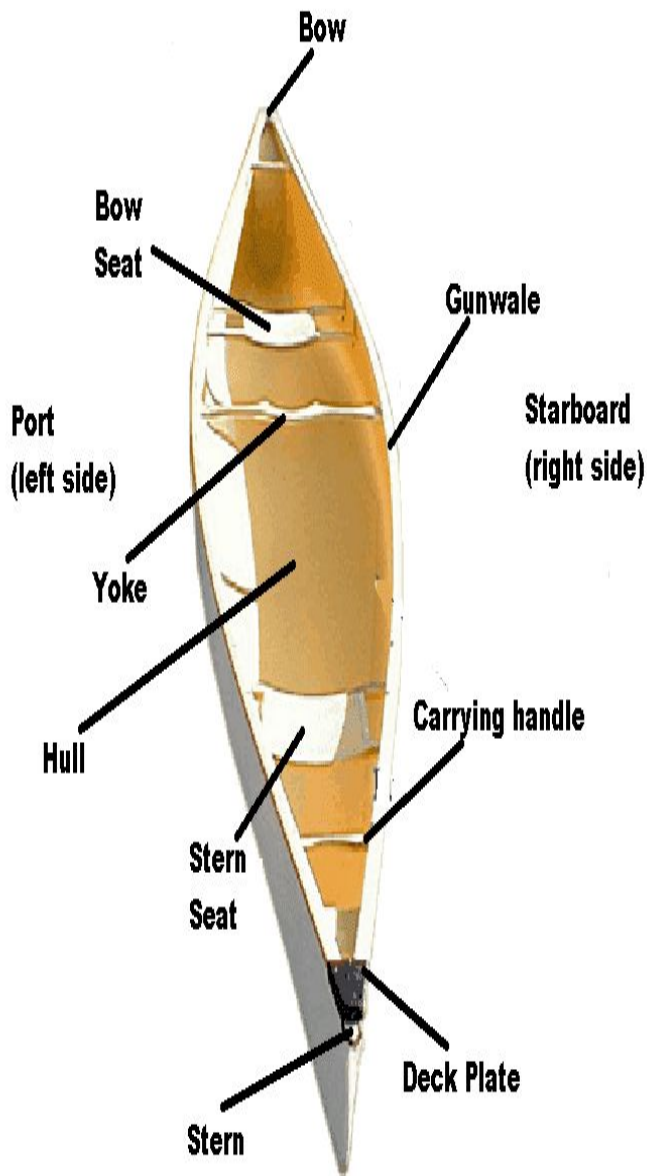
[Click the canoe to watch a video on Harvesting Wild Rice](#)



History of Ricing

HARVESTING THE RICE

In the morning, the men set out in their canoes with a woman to knock the rice. The woman sat in the prow of the canoe, facing the rear, while the man usually stood in the stern. Because it was impractical to paddle through the dense rice stalks, the man propelled the canoe with a crotched sapling ten to sixteen feet long, using it to grip the roots of the rice. With a twist of the pole he forced his boat through the tall stalks. The woman, using a cedar stick about three feet long, pulled bunches of rice over the gunwales and, with a shorter stick, knocked the ripened grain into the bottom of the canoe. It was hot and tiresome work, but the people all moved with a rhythm they had learned as children. In more recent times, double-ended row boats were used instead of canoes. Instead of the traditional pair of man and woman working together, pairs of men or women also now harvest rice as a team.



RICING ENGINEERING MISSION

Objective: Design and build a canoe that can hold the most rice as possible without sinking.

For the purpose of this challenge, we will be using dried beans in place of rice.

Challenge Rules:

1. Using only a 12" x 12" square of aluminum foil, build a canoe.
2. The canoe cannot be longer or wider than 4 inches.
3. The canoe must be able to float before adding any dried beans.
4. No more than 2 dried beans can be added at one time.
5. The canoe must hold the dried beans for 10 seconds before more dried beans can be added.
6. Each time you add a dried beans to the canoe, it must stay floating for 10 seconds before any additional dried beans can be added.

BRAINSTORM A DESIGN

BRAINSTORM IDEAS FOR YOUR DESIGN.

List the materials you plan to use,
then draw a picture of your design.

What type of canoe did you model your design after?

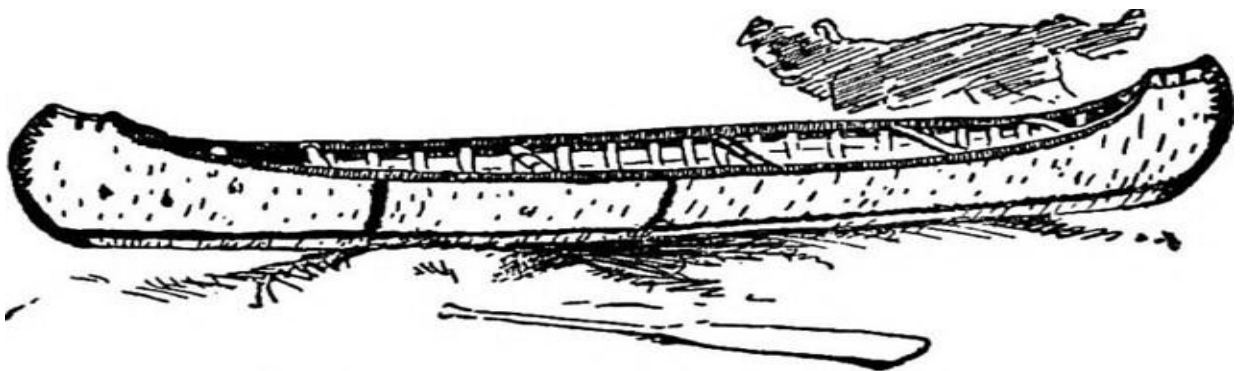
How many beans do you believe your boat will hold before sinking?

- cups:
- grams:
- beans:



BUILD & TEST

1. Gently drop the beans (rice) into the canoe, no more than 2 beans at a time.
2. The canoe must float for 10 seconds each time after new beans (rice) are added.
3. If the canoe floats, you may add 2 more beans. You can make the choice to add 1 bean or 2 beans, but no more than 2 beans can be added at one time.
4. If the canoe sinks, the test is over and you should measure how many beans the canoe was able to hold without sinking. Note: you will not use the amount of beans placed into the canoe on the current test, as that amount is what caused the canoe to sink.
5. Record the results on your chart.



TEST LOG

You will be constructing a canoe to hold rice (dried beans). You will need to design your canoe to be able to hold as much rice (dried beans) as possible without sinking.

Test Number	How much rice (dried beans) did your canoe hold?
Test 1	<ul style="list-style-type: none">● Grams:● Cups:● # of Beans:

Draw a picture of your canoe in this space.

Be sure to show where the beans were placed in the canoe and circle what area of the canoe began to sink first.

RICING STEM REFLECTION

What did you learn about ricing ?

What do you think made your canoe sink, and if you could modify the design what changes would you make?

What features of your canoe helped it float?

Do you think the placement of the beans (rice) had anything to do with the buoyancy of the canoe?
