

# Design and Function of Native Watercraft

by Sean Estill (adapted from the lesson "What Makes a Boat Float" by David Clarke)

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**Grade level 5 – 7**

**Time required**

Two 50 minute class periods,  
plus a field trip

**Materials/Technology**

Clay bars – one per group  
Tub for water  
Pennies – at least three rolls  
Towel  
Pictures of different types of  
native watercraft (See  
Resources section)

**Summary**

The students will be given two targets to meet. The students will then design a vessel to meet each of these targets. After the students have designed their vessels to meet these targets they will compare their design to the designs of native Inuit crafts that served similar purposes.

**Objectives**

The students will

- 1) gain experience in model design
- 2) develop skills in recording and communicating their laboratory findings.
- 3) learn to relate structure to function in designing an effective water craft
- 4) gain an appreciation for the importance and ingenuity of native watercraft

**Montana Science Standards Addressed**

- 1) Students design, conduct, evaluate, and communicate scientific investigations.
- 2) Students demonstrate knowledge of properties, forms, changes, and interactions of physical and chemical systems.

**Assessment**

Evaluate students using:

- 1) Lab procedure and lab safety scoring record
- 2) Student records of laboratory work
- 3) Ability of students to design a vessel to meet the targets

**Background Information**

*Umiak*

The umiak is a wide boat with a deep open hull. With a largely flat bottom and propelled by oars, the main purpose of the craft was to transport goods and people over large distances. A typical load for this type of craft was several tons of weapons, provisions, children, dogs, tents, and clothing.

*Kayak*

The kayak is a long, narrow, shallow craft. This was taken out into the open sea, where the craft's speed and maneuverability were suited to hunting. Typically this type of craft carried one person and had places for attaching the tools of the hunters, harpoons and lances.

### *Testing the models*

A large Rubbermaid tub works well for these tests. Allow the students to test their designs as needed. Before students can accept the design as their final design, its capabilities must be demonstrated to the teacher. Testing for the speed and maneuverability can be a very subjective undertaking without a great deal of effort. Ensure that the students are making design changes that are improving the function of their boat. When you are satisfied with the students' progress you can approve their final design. Testing for the load bearing capacity of the umiak design is a very straightforward undertaking. Require the students to construct a craft that will hold three rolls of pennies. This portion of the activity can be turned into a class competition to see how many pennies a craft may support. An easy way to track the designs that you approve for a group is to initial the group's final design.

### **Procedure**

- 1) Break the class into groups of two or three students. Provide each group with a copy of the design targets. Give the students ten minutes to brainstorm ideas for the vessels.
- 2) Provide each group with a bar of clay. This will be the material that they use to construct their boats.
- 3) Inform students that for each vessel that they test, they need to record a sketch of their boat, changes or reasons for the design, and the results on the laboratory sheet.
- 4) Allow the students to test their designs in the tub of water.
- 5) As a wrap up activity, have the students, as a group, identify similarities in their designs. Show the students pictures of Inuit kayaks and umiaks. The students should be able to identify similarities between their design and the native Inuit vessels. Based on this, the students should be able to predict the function of the two vessels.
- 6) Present the uses of the Inuit kayaks and umiaks.
- 7) Both the Kootenais and Pend O'Reille people historically used canoes extensively for fishing and transportation. The designs of watercraft were unique to each culture; an example would be the Kootenai sturgeon-nosed canoe. There are many local resources available on the subject of native watercraft. Both the People's Center and the Kootenai Culture Committee have models of authentic native canoes. The People's Center also has historic pictures and videos of canoes and the construction process, and personnel knowledgeable about the watercraft of local tribal people. The Darcy McNickle Library at Salish Kootenai College has articles and books about the subject.

### **Resources**

As noted in the Procedure section of this lesson, there are many local resources available about the watercraft of local tribal people. See step #7

More information on native watercraft can be found at the following web sites.

*Canadian Museum of Civilization* – an excellent site for background information and pictures of native watercraft

[www.civilization.ca/aborig/watercraft](http://www.civilization.ca/aborig/watercraft)

*Native Roots*

[www.sentier.ca/nativeroots\\_canoe.htm](http://www.sentier.ca/nativeroots_canoe.htm)

*All about Canoes*

[wysiwyg://8/http://www.canoe.ca/AllAboutCanoes/canoe\\_history.html](http://www.canoe.ca/AllAboutCanoes/canoe_history.html)

*The Haida Canoe*

[www.chin.gc.ca/haida/nojava/english/canoe/index.html](http://www.chin.gc.ca/haida/nojava/english/canoe/index.html)

# What makes a Boat Float?

## Design Targets

### **Important**

For each design that you test, fill out one design section on the laboratory worksheet.

### **Design Target #1**

You are a member of a tribe of Inuits who is living on the western coast of Canada. As summer approaches, you are given the task of designing a craft that will carry people and supplies to your summertime settlement. You will be traveling along the coast in reasonably calm waters. Your craft must be able to carry several people, their possessions, and supplies for the summer. To simulate this load, you will use rolls of pennies. You must design a craft that will carry three rolls of pennies.

### **Design Target #2**

You and your Inuit tribe have reached their summer settlement. Since you successfully designed the crafts that brought your tribe safely here, you have been given the job of building a boat to take the hunters out into the ocean to hunt for food. This boat must be lightweight, maneuverable, and most importantly fast in the water while carrying only one person. Use the tub of water to demonstrate your craft's speed and maneuverability.

# What Makes a Boat Float?

## Laboratory Worksheet

Target # \_\_\_\_\_

Sketch	Changes	Results

Target # \_\_\_\_\_

Sketch	Changes	Results

Target # \_\_\_\_\_

Sketch	Changes	Results