



Grade Level: 8  
Subject: Math

# Bentwood Boxes

## ESSENTIAL UNDERSTANDINGS

- Lifeways
- History

## LEARNING OUTCOMES

- Students will be able to identify the proper formula to use for volume of a rectangular prism and volume of a cylinder.
- Students will be able to use the surface area of a rectangular prism to solve a mathematical problem. Students will be able to construct the appropriate size bentwood box in order to hold the drum with a given radius and height.
- Students will be able to describe the steps for making a bentwood box from cedar.
- Students will be able to explain to a partner what Native peoples used bentwood boxes for.

## CULTURALLY RESPONSIVE PRACTICES

- Connecting to the lives of students
- Preserving and honoring cultural history
- Student talk, working together and individually
- Music

## ASSESSMENT

Students will be assessed on their proficient completion of the Bentwood Box Gift worksheet

## Overview

Using both a primary and secondary source, students will be introduced to the art of making bentwood boxes from cedar, which was a practice used by Native Peoples from the Pacific Northwest Coast, specially the Chinook people. Students will also perform the necessary math functions to solve real-world mathematical problems involving volume of cylinders and prisms.

## MATERIALS

- [Bentwood Box Gift Worksheet](#)
- [Bentwood Box Read Aloud](#)
- [Exit Ticket](#)
- Calculators (optional)
- [Formula Sheet](#) (optional)
- [Vocabulary](#) (optional)

## LOGISTICS

- Where does this activity take place?  
**Classroom**
- How are the students organized?

**Whole Class**      Teams: 3-5

Pairs                      **Individually**

## TIME REQUIRED

**50 minutes**

## STANDARDS

### Oregon Common Core State Standards: Math

**8.G.C.9** Know the formulas for the volumes of cones, cylinders, and spheres and use them to solve real-world and mathematical problems.

### Oregon Social Sciences Academic Content Standards

**Historical Knowledge 8.27** Determine and explain the importance and contributions (products, events, actions, and ideas) of key people, cultures, and ethnic groups, religious groups, and other historically underrepresented groups in Oregon, the United States, and the world.

**Historical Thinking 8.31** Synthesize information and data to construct an account of historical events that includes multiple sources and varied perspectives.

### English Language Proficiency Standards

**6-8.4** An ELL can construct grade appropriate oral and written claims and support them with reasoning and evidence.

## Background for Teachers

Teachers should read through both provided read alouds, as well as the vocabulary, prior to teaching this lesson.

### Websites:

<https://www.donsmaps.com/bentwoodchests.html>

<https://www.ictinc.ca/blog/a-brief-history-of-the-haida-bentwood-box>

<https://lrinspire.com/2018/06/27/teachings-of-the-cedar-tree/>

### Books:

Cedar: Tree of Life to the Northwest Coast Indians by Hilary Stewart

## VOCABULARY

- **Chinook** - the Chinook people lived in the Northwest along the banks of the Columbia River and the coast of the Pacific Ocean
- **Plank** - a long flat piece of timber, thicker than a board (in this case, the planks were made from cedar)
- **Kerf** - a cut or incision
- **Cedar Bark** - the outer layer of the cedar tree that is harvested in long sections, pounded, and softened to be used for making Grand Ronde baskets. Cedar bark was also harvested whole and used to waterproof the roofs of plank houses. Chinookan people made waterproof clothing from cedar bark and cedar hats. Cedar bark was also used to make cordage (also known as rope). Cedar bark was a valuable resource for the Grand Ronde Tribe.

## Opening

Begin by asking students to put themselves back in time before European contact or since time immemorial; a time when just Native Americans occupied the land. Describe what the land may have looked like (no buildings except plankhouse, more plants (cedar trees, wapato, juncus) and wildlife (deer, fish, bear). Remind them that there were no stores and Native Americans could only use the resources around them to create tools and other materials.

Ask students:

- *If you had to make a box using only the resources around you, what would you use?*
- *If this box was going to be protecting a drum shaped in a cylinder would it change the materials you use?*

## Activity

1. Present to students the Bentwood Box reading that accompanies this lesson. Review vocabulary words with students prior to reading.
2. The teacher can read the information aloud, split the students into groups/pairs, or have the students read individually.
3. While reading the read aloud page, as students:  
*How does making one of these boxes relate to math? What words in the reading help make that connection?*
4. After reading through the steps required to construct a bentwood box, direct the students' attention to the picture and diagram that show how to make a bentwood box. Point out to students that the sides are all one piece but that the top and bottom are two separate pieces.
5. After both readings are finished, ask students to turn to a partner and answer:  
*What kinds of things are bentwood boxes used for?*
6. Have students think-pair-share the steps they would take in order to make a bentwood box.
7. Pass out the Bentwood Box worksheet
8. Allow students time to work on the worksheet. The teacher may walk around the room and ask students questions such as:  
*How do you know you have designed the smallest bentwood box possible to fit the drum?*  
*Would there be other size boxes that are possible to design that would hold the drum?*

## Closure

To close the lesson, have students fill out the exit ticket answering the question:

*How does the art of making bentwood boxes relate to math?*

## Differentiation

- Students can receive individual copies of the read aloud and vocabulary.
- Teachers can post volume formulas for students on the whiteboard or give out copies of a formula sheet
- Students can work in pairs on the worksheet

## Extension

- Students who finish early can create a design that they would put on their own bentwood box if they were to make one.

## Notes/Other

Provided with this lesson are the different volume formulas needed in order to solve the math problem. Teachers can use this sheet at their own discretion.

Jan Michael Looking Wolf's or Grand Ronde Canoe Family audio tracks can be played as background music while students are working. These audio tracks can be found on Spotify or Apple Music.

Jan Michael Looking Wolf: [Spotify](#) and [Apple Music](#)

Grand Ronde Canoe Family: [Spotify](#) and [Apple Music](#)

## Appendix

Bentwood Box Gift Worksheet:

[https://drive.google.com/file/d/10UkBOKTBBvjGuq\\_VQv6DqyfDWhHI8SnR/view?usp=sharing](https://drive.google.com/file/d/10UkBOKTBBvjGuq_VQv6DqyfDWhHI8SnR/view?usp=sharing)

Bentwood Box Gift Worksheet Answer Key:

<https://drive.google.com/file/d/1X-jogHxiS4u8vGb9gOjI7ueX3rTxnOeh/view?usp=sharing>

Bentwood Box Read Aloud:

<https://drive.google.com/file/d/1IZq8w0tSPMWmt1zMEKlEaSQ7TxMztoxt/view?usp=sharing>

Formula Sheet:

<https://drive.google.com/file/d/1v6FQONErD7F-nnT2TfO9nPcD95v40cje/view?usp=sharing>

Exit Ticket:

<https://drive.google.com/file/d/11bzy00g2leXenPXLag31sVidLKPfcc-m/view?usp=sharing>