



## MATHEMATICS

# The Mathematics of Basket Weaving

## ESSENTIAL UNDERSTANDINGS

- **Lifeways**
- **Federal Policy**
- **Genocide**
- **Laws**

## LEARNING OUTCOMES

Student will understand

- that basket weaving uses geometric patterns,
- how to apply multiplication to determine the area of repeating patterns, and
- Oregon's Native American crafts reflect lifeways and cultural traditions.

## ESSENTIAL QUESTIONS

- How do Native Americans in Oregon use geometry in basket weaving?
- Why is it important to continue traditional Native handicraft practices in Oregon?

## REQUIRED TIME

- 30 minutes

## Overview

In this lesson, students analyze basket weaving patterns from Oregon Tribes, focused on identifying shapes, arrays and areas. Students also participate in discussions of the impact of federal policies on traditional lifeways crafts, highlighting the resilience and preservation of Native traditions in Oregon. Students learn that these basket weaving practices are common across all Oregon Tribes, while also having the opportunity to look at examples from the Confederated Tribes of Grand Ronde and the Siletz Indians.

## Background for Teachers

This lesson addresses the Essential Understandings, *Lifeways*, *Genocide*, *Federal Policy and Laws*, which focuses on the policies, laws and legal actions that resulted in the genocide of Native peoples in Oregon by the United States government.

Despite these systemic policies of erasure and assimilation, Native American communities in Oregon have preserved many of their cultural traditions, including the artistic and mathematical knowledge reflected in basket weaving.



The Essential Understanding, *Lifeways*, focuses on the idea that Native cultures and traditions are shaped by their environment. Lifeways include the strong traditional systems and legacies that Native peoples have developed, sustained and continued to practice across Oregon.

In this lesson, students learn that Native American basket weaving incorporates complex mathematical concepts, including geometry, patterns, symmetry and measurement. Oregon Tribes have maintained basketweaving traditions that demonstrate these mathematical principles while preserving cultural knowledge. Despite historical attempts to suppress Native American cultural practices, these traditions are living practices that continue today.

The basket weavers featured in this lesson—Bud Lane (Siletz), Kelli Palmer (Warm Springs), and Sonya Moody-Jurado (Confederated Tribes of the Siletz Indians)—are contemporary artists who maintain these traditions. Their work shows how mathematical understanding is embedded in cultural practices and has been passed down through generations.

## Considerations for Teachers

### Practices

The following principles can help guide your decision-making and engagement with students while teaching this lesson.

## STANDARDS

### Oregon Mathematics Standards

- **3.OA.D.9:** Identify and explain arithmetic patterns using properties of operations, including patterns in the addition table or multiplication table.
- **3.GM.A.1:** Understand that shapes in different categories may share attributes and that shared attributes can define a larger category.
- **3.MD.5:** Recognize area as an attribute of plane figures and understand concepts of area measurement presented in authentic contexts by tiling and counting unit squares.
- **3.MD.6:** Measure areas by counting standard and non-standard unit squares.
- **3.MD.7:** Relate area to multiplication and addition. Use relevant representations to solve problems in authentic contexts.

- Focus on teaching the Essential Understandings through an exploration of geometric basket weaving designs.
- When sharing content with students, address the "why," not just the "what."
- Highlight the strengths and struggles of Oregon's Indigenous peoples today, while also acknowledging their history and traditions.
- Ensure that your teaching practices are accessible and appropriate for Native and non-Native students alike.

## Assessment

During this lesson, observe and listen to students during discussions, as well as when they are working independently or collaboratively, to determine how their learning is progressing. Take notes on what students say and do in relation to the success criteria. Use this formative information to provide students with feedback and plan next steps.

At the end of the lesson, give students an opportunity to reflect on their learning through self-assessment. They can indicate their level of learning in relation to the success criteria. They can also write an explanation of why they feel they are at that learning stage.

## Success Criteria

- I can explain why basket weaving is an important tradition for Oregon Tribes.
- I can name one way mathematics is used in Oregon's Native basket weaving.

## KEY WORDS and IDEAS

- **Lifeway:** All the activities, ceremonies, crafts and governance of tribal peoples in Oregon.
- **Resilience:** The ability to stay strong or bounce back when things get tough.
- **Pattern:** A repeating design or sequence.
- **Symmetry:** Balance in a design where one half mirrors the other.
- **Array:** An arrangement of objects in rows and columns.
- **Area:** The amount of space inside a two-dimensional shape.
- **Weaving:** Interlacing materials to create a pattern or object.
- **Geometric:** Relating to shapes, sizes, and properties of figures.



- I can apply multiplication to determine the area of repeating patterns in basket weaving designs.

**For the following activities, use the slide deck to support your implementation.**

## Introduction

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**Time: 10 minutes**

### Step 1:

Explain to students that today they will learn about basket weaving, an important part of the lifeways of many Native peoples in Oregon and how basket weavers use mathematics to weave their baskets.

Explain that "lifeways" is a big idea encompassing many activities that are important to Native peoples in Oregon. Basket weaving is one of them. For many years, Native people in Oregon had to hide their lifeways. However, they were resilient and kept weaving baskets and practicing their lifeways, even when it was very hard.

Ask students to turn and talk, and then have them explain "lifeways" in their own words.

### Step 2:

Review the essential questions with students. Give students the opportunity to question, answer and wonder.

### Step 3.

Introduce basket weaving. Provide the simple definition: Interlacing materials to create a pattern or object. Then ask students to describe the images and how they show "interlacing materials." List their ideas on the board.

### Step 4.

Describe the many purposes of baskets, both now and in the past. These purposes include

- ornamental and ceremonial purposes
- carrying everyday items
- supporting fishing, harvesting, and other activities

### Step 5.

Share images of baskets made by various basket weavers, such as Bud Lane and Sonya Moody Jurado, as well as a video of Kelli Palmer.

Video: Basket Weaver Draws from Native Culture:

<https://youtu.be/lqJBXHA630A?feature=shared>

Ask students to reflect on how these practices represent their lifeways.

### Step 6.

Share the learning outcomes, success criteria and key words and ideas with students.

## Main Activity

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**Time: 20 minutes**

### Step 1.

Explore the geometry in a basket pattern. Ask students to look for repeating geometric shapes and patterns in the baskets.

Have students turn and talk about the patterns they see, then have them count the shapes in their pattern.

Ask students to share their observations with the whole group. Write down a list of their observations.

[Pause here if completing this lesson over two days.]

Explain to students that next they will be looking at some pictures to observe the plants and animals that interact in the environment on the Burns Paiute and Warm Springs Tribal lands.

## The Mathematics of Basket Weaving

**Step 2.**

Students work with patterns. Give students grid paper and colored pencils. Model how to create a simple basket pattern on grid paper based on what the students have noticed. Demonstrate how to identify the area of the repeating pattern unit using multiplication.

Have students create their own basket-inspired pattern on grid paper. Ask students to

- Create a repeating pattern
- Identify shapes in their pattern
- Calculate the area of their repeating pattern unit

**Wrap-Up**

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**Time: 5 minutes**

**Step 1.**

Students pair and share: Ask students to explain their designs and calculations to a partner.

**Step 2.**

Facilitate a whole-class discussion. Ask students questions such as

- Why is basket weaving an important tradition for Oregon Tribes?
- How is mathematics used in Oregon's Native basket weaving?
- Without mathematics, what might your pattern look like? Would you be able to weave a basket without a geometric pattern?



**Additional Resources**

- 2nd Grade Lesson: [Confederated Tribes of the Siletz Indians, Baskets](#)
- Video: [Basket Weaver Draws From Native Culture](#)

## Student Self-Assessment

**Name:**

**Directions:** Read the lesson success criteria in the first column. Then decide, did I meet these criteria? Choose Not Yet or Yes. Then describe one thing you did well and one next step you can take in the box below.

<b>Success Criteria</b>  "Can I..."	<b>Not Yet</b>  	<b>Yes</b>  
explain why basket weaving is an important tradition for Oregon Tribes?		
name one way mathematics is used in Oregon's Native basket weaving?		
apply multiplication to determine the area of repeating patterns in basket weaving designs?		

**What did I do well and what is a next step I can take?**

