



## MATH

# Beaver Teeth Dice Game

### ESSENTIAL UNDERSTANDINGS

- Identity
- Lifeways

### LEARNING OUTCOMES

By the end of the lesson, students will be able to:

- Students will create statistical questions and identify variables in data related to the question.
- Students will develop data sets based on the traditional Beaver Teeth Dice Game.
- Students will describe how the specific features of a place and landscape were incorporated into traditional Cow Creek games and materials and how that reinforced Tribal culture and values.

### ESSENTIAL QUESTIONS

Why do we need to create and share data?

### LOGISTICS

- Where does the activity take place?  
*Classroom*
- How are the students organized?
  - Whole class
  - Teams: 2 – 4
  - Pairs
  - Individually

### TIME REQUIRED

Two to three hours of class time.

### Overview

In this lesson students will learn about statistical questions and displays while also learning about the Beaver Teeth Dice Game—a traditional game played by the Cow Creek Band of Umpqua Tribe of Indians. In the process, they will also deepen their understanding of the Tribe’s traditional and contemporary culture.

### Background for teachers

- To better understand the historical and contemporary story of the Cow Creek Band of Umpqua Tribe of Indians, it is essential to review their story, including pre-contact, contact, and current information at <https://www.cowcreek-nsn.gov/tribal-story/>
- The goal of Oregon math standard 6.SPA.1 is for students to recognize questions that anticipate variability in the answers—the hallmark of a statistical question. From there, students will determine ways to measure the data to answer a statistical question.
- Native American traditional games have been shared across Tribes, and the variation in how the games are played and the materials that are used reflect each Tribe’s cultural values and connection to a specific homeland. Beaver Teeth Dice Game reflects both of these aspects,



and there is wide variation from Tribe to Tribe in terms of materials, rules, players, and point systems. Beaver Teeth Dice Game is traditionally a betting game in which individuals or teams would wager both low- and high stakes resources. Often women were the main players of this game, but it was not limited to them. Beaver teeth were a choice material due to their abundance and durability.

- Supporting the development of questions helps to emphasize mathematics understanding within contexts. Examples of mathematical questions can be found at <https://www.101qs.com/>. A process to assist students in developing and answering mathematical questions is available at <https://blog.mrmeyer.com/>
- As they develop questions and explore ways to gather and display data, student groups will vary in their choices. Teachers should anticipate this variation and consider the possible responses. It also helps to select and sequence student group displays in order to maximize student learning. Additional information about using the 5 Practices for Orchestrating Productive Mathematics can be found at <https://www.nctm.org/Publications/Mathematics-Teacher/2018/Vol111/Issue5/mt2018-03-366a/> or in the book *5 Practices for Orchestrating Productive Math Discussions* by Margaret Smith and Mary Kay Stein.
- Teachers may also want review *Evaluating the Evolution of Historic Depictions of Beavers and Beaver Culture* by Margaret Raimann. This text provides background information on traditional beaver stories and their importance for many

## STANDARDS

### Oregon social studies standards

**6.14** – Identify and describe how the physical and human characteristics of places and regions connect to human identities and cultures in the Western Hemisphere.

### Oregon math standards

**6.SP.1** – Recognize a statistical question as one that anticipates variability in the data related to the question and accounts for it in the answers. *For example, “How old am I?” is not a statistical question, but “How old are the students in my school?” is a statistical question because one anticipates variability in students’ ages.*

**6.SP.5** – Summarize numerical data sets in relation to their context, such as by:

- a. Reporting the number of observations.
- b. Describing the nature of the attribute under investigation, including how it was measured and its units of measurement.



tribal nations in the Pacific Northwest and *“compares these historic depictions to modern perceptions of beaver ecology. This approach seeks to shed light on the complicated relationship of beaver and humans, as well as the value of the beaver throughout North American history, ending with a reflection on the beaver’s meaning in sense of place in the Pacific Northwest.”* Available at: <https://wetlandsconservancy.org/wp-content/uploads/2017/03/Margaret-Raimann-Historic-Depictions-of-Beaver-and-Beaver-Culture-FINAL.pdf>

## Considerations for teachers

### Assessment

Students will participate in small-group activities and share out the information.

Teachers may also choose to use the **Beaver Teeth Dice Game Assessment Sheet** to measure student understanding of the mathematical concepts and how they relate to the Cow Creek Band of Umpqua Indians.

### Practices

- *Check and Add* – Students will develop a list of examples or characteristics to answer a question. Students will then pair up to share their unique answers. Students will give a check if an answer or example is common. If there is a novel example, students are encouraged to add it to their list. Student pairs are rotated so that students may hear and share their examples and continue to add to their list.

## MATERIALS

### What will be needed for students to engage in this activity?

- For each pair or small group:
  - A set of four beaver teeth dice (designed as indicated in the lesson) for each student pair or small group. Actual beaver teeth may be difficult to procure. Feel free to use other materials for the dice, while also reinforcing the cultural importance of the beaver to the Cow Creek Tribe.
  - A small basket, bag, or bowl to hold the beaver teeth dice.
  - Twenty-four counting bones (traditionally players used bird leg bones) or small sticks.
  - A flat surface on which to play.
- Student data worksheet.
- Slide deck and a way to present the information.



- *Gallery Walk* – Students display examples of work or thinking. In this case, students will display data tables from their game play. While the work is posted in various places around the room, individual students are encouraged to review the examples closely. They do not need to interact with other team members but can use sticky notes to accelerate and encourage thinking of mathematical concepts and practices and to provide support and reinforce positive elements.

### Learning targets

- I can identify the key characteristics of a statistical question.
- I can develop a statistical question
- I can create a data set to answer a statistical question.
- I can understand the importance of a traditional game like Beaver Teeth Dice Game.
- I can play Beaver Teeth Dice Game.
- I can show others how to play Beaver Teeth Dice Game

### Options/extensions

The slide deck can be adapted to allow students to fill in the variability or calculations within the dot plot or frequency tables. For example, on the frequency table, students may add in the various ways in which the dice are displayed, and you may choose to do a mini-lesson on organizing possible outcomes. Some students may still need to understand how tally marks are bundled by fives and

### KEY VOCABULARY

**Statistical questions** – A question that can be answered with data and for which it is assumed there will be variability in the data.

**Dot plot** – A method for tracking data points on a simple scale, using dots to represent the number of times an item appears in the data.

**Frequency table** – A method of organizing data items. A frequency table typically includes three columns, showing a specific item and the number of times it occurs in the data.

**Seasonal rounds** – A cultural tradition of many Indigenous people, in which they move from one location to another, based on the season, in order to hunt and gather food and other resources.



how to use the frequency column to count the number of occurrences from the tally marks. You may also choose to give the frequency and ask students what the tally mark cluster may look like.

## Reflection/closure

For a reflection activity, have students post their data displays around the room and then participate in a Gallery Walk. Students can use sticky notes to ask questions about a display and to compliment their peers on their the math skills.

For a closing activity, have students share who they might tell about the Cow Creek Band of Umpqua Tribe of Indians and how to play the Beaver Teeth Dice Game.

## Appendix

Materials included in the electronic folder that support this lesson are:

- Slide deck
- Beaver Teeth recording sheet
- Beaver Teeth Dice Game assessment sheet

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## Activity 1

# What is a statistical question?

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In this activity, students are provided information about statistical questions and then asked to identify and create statistical questions.

Use the slide deck to help with whole-group and small-group facilitation of understanding and to make meaning of the concept.

### Slide 2

Show the definition of a statistical question and provide student-friendly examples and non-examples. Explain that in the first example there is variety: some dogs may be young, some classmates may have no dogs or multiple dogs. Students would also need to collect data to find the answer.

In the second question, there is no variability. The question is a single response for a single person. And there is no need to collect data to find an answer.

### Slide 3

Allow students to work in pairs or triads to review the examples and non-examples. You can either give students a single example and ask them to explain why it is a statistical questions, or you can give a variety of examples and non-examples and ask them to identify the correct examples and explain why they are statistical questions.

If students are interested in more information about Maple the Beaver, they may go to: <https://www.idahostatesman.com/news/nation-world/national/article250322126.html#:~:text=Maple%20the%20beaver%20went%20into,was%20collecting%20one%20for%20herself>

### Slide 4

In their pair or triad have student groups read <https://oregonwild.org/wild-life/beaver> or watch the video embedded in the article (direct link is <https://youtu.be/vrHRPbedhSE>). Based on that information, have the student groups generate a variety of questions as they relate to beavers. Encourage any type of question. The key is to generate many questions. Student groups will write

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## Activity 1 *(Continued)*

their questions on paper or can use sticky notes for each question they develop. After student groups have generated a variety of questions, have them share with the whole class. You may choose to display them projected on the screen or on a large piece of chart paper.

From the displayed set of questions, have students identify which questions may be answered by gathering data or using other mathematical skills. After student-developed questions are organized into mathematical and non-mathematical questions, continue to have student define which of the mathematical questions are statistical questions. Clarify the rationale for determining which questions are statistical.

Have student groups use the non-statistical examples to create at least two questions that are statistical. Encourage student groups to post the questions publicly to share additional examples of statistical questions for student review.

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## Activity 2

# Tribal background and importance of traditional games

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In this activity, students are introduced to information about the Cow Creek Band of Umpqua Tribe of Indians and to the traditional Beaver Teeth Dice Game. In addition to the slide deck, students can review the Cow Creek Tribe's history and current information at <https://www.cowcreek-nsn.gov/tribal-story/>

### Slide 5

Discuss the key points displayed on the slide. Be sure to emphasize that Tribes were often mobile, following a seasonal round of migration based on the natural resources available in specific places within their homeland. In addition to these seasonal rounds, Tribes also engaged in trade with other Tribes to procure additional resources not found in their own home territory. It is also important to remind students that members of the Cow Creek Band of Umpqua Tribe of Indians are still living and thriving today.

### Slide 6

Teachers may use this slide to share the information as presented in slide 5. Teachers may choose to print this slide for student groups and as information is shared on the geographic area, they may highlight or note the areas of discussion.

### Slide 7

#### Say:

*Now that we have some information about the Cow Creek Band of Umpqua Tribe of Indians, let's look at some of the natural resources that were available in their home territory and why many Tribes traveled throughout the year, following what are known as seasonal rounds.*



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## Activity 2 (Continued)

Share key points of the slide.

### Slide 8

**Say:**

*Following seasonal rounds requires tremendous work, knowledge, and care. Yet, there was also time to learn, socialize, and connect in fun ways, including traditional games. Many of these types of games are based on both luck and skill and include betting to see who wins. The resources of the land provided materials for those games. Many games had materials that were easy to carry and rules that could be easily communicated across different languages.*

Share key points of the slide.

### Slide 9

**Say:**

*This is an example of Beaver Teeth dice that could be used for a game. Beaver teeth grow very long and are very strong. Beavers were also in abundance and were prized resources because they could be used in a variety of ways to benefit the people. Since beavers provided so much for the Cow Creek Tribe, they were very special, and there were many stories to be shared about why beavers and the environment they create should be honored and cared for. These beaver teeth are designed with circles and cross hatches or x's or lines. Beaver teeth were also easy to carry across long distances.*

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## Activity 2 (Continued)

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Share the key points of the slide. If you are using actual beaver teeth for the student games, let them know where they can find beaver teeth. If you are using other resources, such as popsicle sticks, let students know the rationale for using those materials, while also explaining the importance of beaver to the Cow Creek Tribe.

Students will participate in a “check and add” activity. Have students write three reasons why playing games and using these resources might be important to Tribal members. After students have written their examples, have them pair with another student to share. If students have similar answers, have them put a check mark next to that choice. If students are sharing a new idea, have them add that example to their list. Have students connect with others in multiple rounds so that each student has at least five examples of why playing games and using resources may be important to Tribal members. After individual students have identified examples, have them share with the whole group, so that as a class there are at least eight examples.

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### Activity 3

## Play Beaver Teeth Dice Game to gather data

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Students will be given the rules on how to play Beaver Teeth Dice Game and will then have an opportunity to play. Students will need to have a copy of the **Beaver Teeth Dice Game recording sheet**.

#### Slide 11

Share key points of the slide. Model how to toss the teeth and note the designs that face up and how to use the counting bones. If you are using materials other than beaver teeth and bones, share the rationale for the differences.

#### Slide 12

Explain the design differences between the male and female dice. Students can be encouraged to design a set of dice on the back side of their recording sheet or scratch paper.

#### Slides 13 and 14

Share with students the point system and how to keep track of turns. Model as a teacher with the whole class how to toss the bones, noting the placement of male, female, and blanks and how to collect the counting bones or sticks for points. Model how individuals or teams take turns based on how the dice fall.

#### Slide 15

Reemphasize that, depending on resources and who was playing, the game may have varied slightly from Tribe to Tribe.

Divide students into pairs or small teams of four to play the game. Ensure each student has a copy of the **Beaver Teeth Dice Game recording sheet** that they can use to check the rules and point system and to keep track of the data. Allow students to play a few rounds as time permits.

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## Activity 4

# Students determine a question and display data sets

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After students have played the game, remind them of the characteristics of a statistical question. Have them think of statistical questions they could answer based on playing the Beaver Teeth Dice game. Have students share their questions. Display questions that are statistical and related to the game. Share the rationale for quality questions that students may be able to answer. Help steer students toward statistical questions that are related to the game. Let students know these examples may be used as they play the game again. They will use the question to gather data and display it one of two ways.

### Slide 16

Share the definition of a dot plot and frequency table.

### Slide 17

Share the visual example of a dot plot. Have students articulate characteristics of a dot plot. Refer back to one of the displayed questions and ask, *“What are some of the examples we might plot based on this question?”* Guide students to an understanding of the labels of a dot plot that would be applicable to the question. Promote examples and non-examples of what might be tracked in the game based on the question.

### Slide 18

Display the example of a dot plot to answer the question. **How often are the different combinations of dice thrown in a game of Beaver Teeth Dice?**

## Activity 4 (Continued)

### Slide 19

Share the visual example of a frequency table. Have students articulate the characteristics of a frequency table. Refer back to one of the displayed questions and ask, “What are some of the examples we might note about the frequency based on this question?” Guide students to an understanding of the labels of a dot plot that would be applicable to the question. Promote examples and non-examples of what might be tracked in the game based on the question. You may need to have a mini-lesson on tally marks and how to cluster the tally marks in groups of 5.

### Slide 20

Display the example of a frequency table to answer the question. **How often are the different combinations of dice thrown in a game of Beaver Teeth Dice?** Remind students that the display method they use should be based on the question they are trying to answer. For example, either a dot plot or a frequency table could be appropriate, but other questions may need different types of display. Review the class questions and have student identify which display might be a better fit.

### Say:

*Today, you and your team must either choose one of the statical question examples or develop one to answer while you play. Then, as a team, you must determine how you will display the data. While you play, you must track the data either with the dot plot or the frequency table. Play at least one round, gathering data to share and display with the class at the end of the period. If your team finishes early, you may play a second round and create another display for the data. You can keep the same question, and even the same type of display, you just need to create a new one for the new set of data.*

Allow students to play and gather data. Monitor the room for the question, the data elements, and the display. You may choose to have students play for a specific amount of time or a specific number of rounds.

