

## Activity: Tree Designs

### Mathematics Content Focus:

- Create representations of a quantity in multiple ways
- Decompose and Compose quantities
- Reason and justify your thinking about a problem with multiple solutions.
- Make sense of problems and persevere in solving them.

### Materials Needed:

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| <ul style="list-style-type: none"> <li>● 7 popsicle sticks per student</li> <li>● Post-its (2-3 per student)</li> <li>● Which One Doesn't Belong</li> <li>● Rock Garden Recording page</li> <li>● Oak Trail Post</li> </ul> | <ul style="list-style-type: none"> <li>● Tree Images 1-5</li> <li>● Additional popsicle sticks for students to explore</li> <li>● Crayons or Marker</li> </ul> |
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### Preparing for the Activity:

- Hang one picture of each Tree around the room.
- Print or Display Which One Does Not Belong Image
- Copy Rock Garden Recording Page for each student
- Copy Oak Trail Post for each student

### Conducting the Activity: (1 hour)

#### Launching the Lesson: (15 minutes)

1. Show students images of different trees, using the Which One Doesn't Belong attachment with all 5 images.
2. Allow students several minutes to look at the images. Ask students to determine which tree they think does not belong and be sure they can justify and explain their thinking or reasoning.
3. After looking at the images for approximately 1-2 minutes. Students should then find a tree image hanging in the room and go to the image that corresponds to the one they believe does *not* belong. In these groups, students should discuss their justifications and reasoning as to why the tree chosen does not belong with the others.

**Teaching Note:** You may want to ask students to consider what similarities or differences might a mathematician think about when considering if their tree belongs or does not belong.

4. In groups, students should record, label, circle, or draw their reasoning and thinking about their tree. They can record their ideas on chart paper, large art paper, or in their journals.
5. Be sure to highlight similarities and differences between the trees that students discovered. It is important that students understand there is not a right or wrong reasoning and there are many different perspectives that can be considered.

**Guiding Questions:**

- How did you determine if your tree did or did not belong?
- What did the other tree have that yours did not?
- What might a mathematician notice about the trees?

**Exploring the Task: (25 minutes)**

1. Explain to students the following scenario and task.

**Scenario:** After a recent storm, the trees along Oak Trail lost many branches and twigs. The Park Rangers thought this would make a great trail post for hikers to explore! They created a rock garden along Oak Trail for hikers to display their thinking and representations for the new trail post.

**Task:** Odo, Ursus, and Graham came across a new trail post from the Park Rangers while hiking on Oak Trail. The trail post said, *using seven sticks how many different types of tree images can you create? How do you see your seven sticks and how are your trees different? Be sure to place your representations in the Rock Garden!*

2. Give each student 7 popsicle sticks and a rock garden recording page. Ask students to create trees using all of their 7 popsicle sticks.
3. After students create a tree, they should record the arrangement on their rock garden recording page.
4. Students should continue to explore more arrangements using their 7 popsicle sticks. As students create their trees, use the guiding questions below to support their thinking.

### Guiding Questions:

- How are your trees changing?
  - How are you thinking differently about creating a tree?
  - What are similarities and differences between your trees?
  - How might you see the arrangement of your popsicle sticks in a tree in different ways? (Looking at the popsicle sticks how might they see 7 in different ways in one tree arrangement)
5. Be sure to encourage students to revisit the question from the task, *How many different tree images could be created and how do they know*. As students begin to make sense of this, encourage them to create a conjecture about patterns they notice, connections they made, and justify their reasoning.
  6. After students have had time to explore different arrangements. Have them choose 1-2 different arrangements to record on a post-it.

**Teacher Note:** Students should record one tree per post-it. It may be helpful for students to use a crayon or marker for their representations.

### Summarize the Learning: (20 minutes)

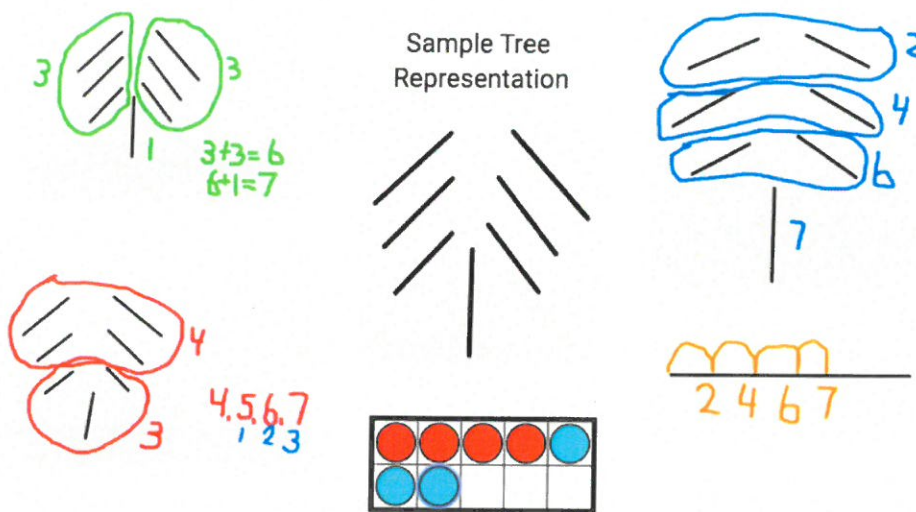
1. Have students bring their post-it and place it near a common meeting space (i.e. whiteboard or easel).
2. Students should take a look at the representations and look for similarities and differences.
3. Ask students to share what they notice. As a class, sort the representations into groups. Use student thinking to guide the sort. Consider the question from the task, *How many different tree representations could you make with 7 sticks?*

**Teacher Note:** Depending on how students sort the images, there may be duplicates that are not needed. Explain to students that you will keep one in the sort and take the other(s) down. This way students are not looking at several of the same type of representation.

4. Focus on one of the groups from the sort and choose 2-3 representations. Show one image at a time and ask students how did you see 7?
5. Allow students time to think independently before sharing out.

- Ask students to share their thinking. As they share, record their thinking with numbers and models. (See the example below)

**Teacher Note:** The purpose is for students to understand that quantities can be represented differently both numerically and visually. Additionally, students will be deepening their understanding of decomposing and composing numbers.



- Continue this for several tree images.
- Encourage students to look at the trees to discuss the following: *What happens if one stick is moved? Is that tree represented?*
- Discuss as a class, *How many different tree images could be created with 7 sticks? How do you know?*

**Teacher Note:** During the discussion, honor student thinking and justifications. Encourage students to ask questions of each other, create arguments and critique each other's thinking.

**Guiding Questions:**

- What strategy might we use to determine if we found all of the tree images?
- How will we know if we created all of the trees?

- How does moving 1 stick? 2 sticks change the tree? How could this help us?
- What would happen if we had 8 sticks? How many more trees might we have? How do you know? (This might could also be used additional exploration task)

10. Continue the discussion by emphasizing to students that everyone has different strategies and ideas to create a tree. As mathematicians it is important when we are learning mathematics, to understand that there are different ways of thinking and a variety of strategies that can be used when solving problems. These help us to make new connections and give us new ideas to try.

### Extending the Learning:

#### Activity: 1, 2, Tree!

1. Choose an image that students created. Show students the image for a few seconds. Then cover it up.
2. Have students create the image using their 7 sticks.
3. Show the image again.
4. Ask students to discuss their thinking and reasoning using the following questions.

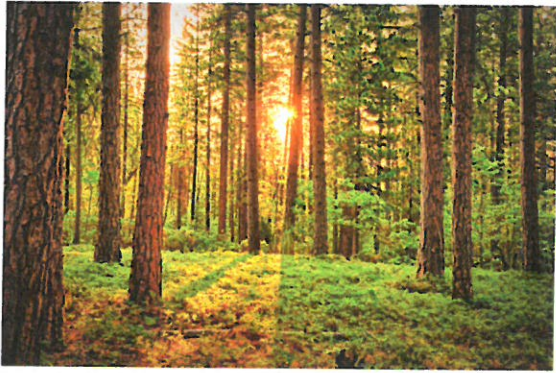
#### Guiding Questions:

- How did you change your image?
  - What strategy helped you to remember what your image looked like?
  - What did you use to help you?
  - How did you think about more than one stick to create your image?
5. Encourage students to discuss their thinking and reasoning for each image. This opportunity to justify their thinking builds a deeper understanding of number concepts, relationships, and ability to use what they know to solve unknown problems.
  6. Repeat with a new image.

**Teacher Note:** To continue to challenge students, show them a tree image with more sticks. You can have them record using paper and pencil or provide students with more popsicle sticks to represent.

# Which One Doesn't Belong

*Reasoning and Relationships*



1



2



3



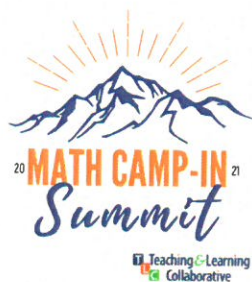
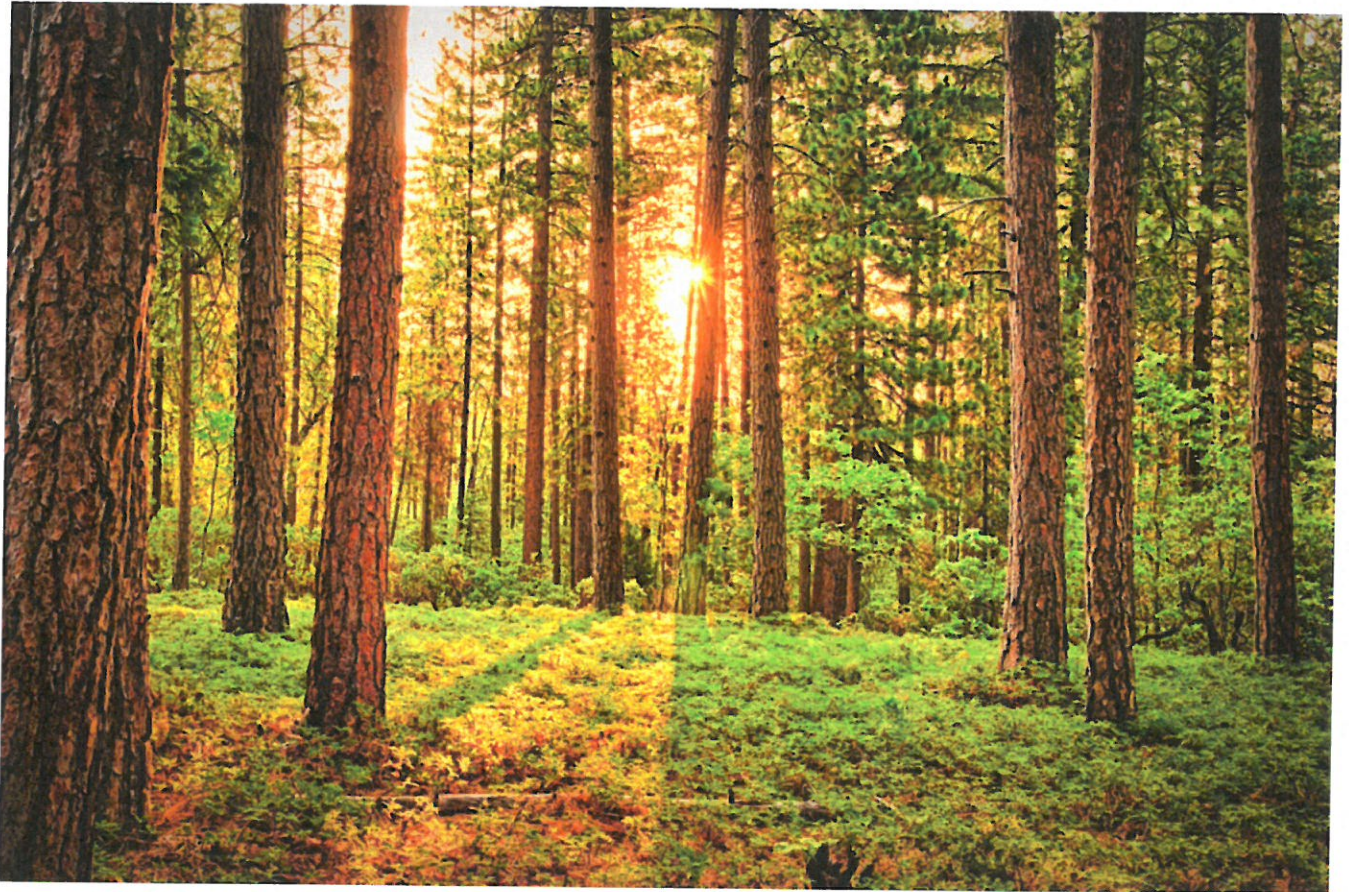
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5

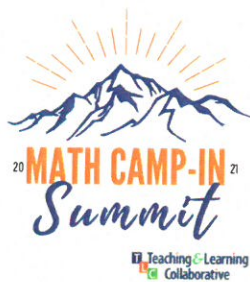
# Which One Doesn't Belong

1



# Which One Doesn't Belong

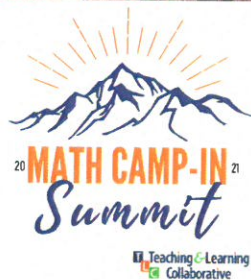
2





# Which One Doesn't Belong

3



# Which One Doesn't Belong

4



# Which One Doesn't Belong

5



A wooden post with a sign in a garden setting. The sign is dark brown with white text. The background is a blurred green garden.

### **Oak Trail Post:**

Using seven sticks how many different types of tree images can you create? How do you see your seven sticks and how are your trees different? Be sure to place your representations in the Rock Garden!

# Rock Garden

