

Name \_\_\_\_\_

# STEM Bonsai

## ***How does the environment affect a plant?***

**Objectives:** Students will:

- Compare natural trees to bonsai trees.
- Evaluate how a bonsai's small size affects its structure.
- Create a proportional bonsai tree sculpture.

### **Introduction**

All living organisms have basic needs that need to be met in order to survive: water, light, air, nutrients, and space to grow. Bonsai trees need all of these elements to survive, yet they do so in a very limited space. Today with your class, you will explore the differences and similarities between full-sized trees and bonsai trees.

### **Activities**

1. Walk around the entire museum and look carefully at the bonsai. Any plant with a woody trunk can become a bonsai, yet certain species are preferred over others. For the species listed below, do you notice any patterns or trends? Do trees from the same species look the same or different? Think of size, shape, species, etc.

	<b>Patterns among trees?</b>	<b>If so, explain what patterns you observed</b>	<b>Other observations</b>
<b>Junipers</b>			
<b>Pines</b>			

<b>Maples</b>			
<b>Yews</b>			

2. Find a bonsai that is species that you are familiar with. Does the bonsai version of the tree look proportional to the full-size tree? This means the height, branches, and leaves all appear to scale with a full-sized tree. Draw the bonsai below and label what species it is.

Species:

Proportional to a full-size tree?:

Drawing of the bonsai:

3. Pick a species of tree. What type of environment does this tree normally grow in? You can use the **fact sheets** and **climate maps** documents to help you.
  - a. Species:
  - b. Native Region:
  - c. Temperature Range:

- d. Annual Precipitation:
- e. Other environmental factors:
- f. Hypothesize how these environmental conditions will affect the appearance of the tree:

4. Find a bonsai of this same species online. Does a bonsai of this species reflect their natural environment? Why or why not? If needed, draw a picture to help you explain.

5. Bonsai are kept small through the use of small containers, root pruning, and branch pruning. How do you think being in a small container would affect a plant's needs, such as air, water, light, and nutrients?

	How do you think the needs change for a bonsai?
Air	
Water	
Light	
Nutrients	

6. Find both the smallest and the largest bonsai in the museum. What do you notice about the size of the container each one is in?

7. Which do you think takes more care: a large bonsai or a small bonsai? Explain your answer.

# **Teacher's and/or Parent's Resources**

Field trips at Pacific Bonsai Museum are self-guided. Students and their chaperones can move at their own pace. We recommend that teacher's review all activities in advance to determine what is best for their students. The tasks on this worksheet build on skills learned in the classroom, such as:

- Proportions
- Effects of environment on plants

## **Post-Visit Activity**

### **Supplies Needed**

- Poster paper
- Markers
- Computer for looking up photos

### **Activity**

In groups, reflect on your visit to Pacific Bonsai Museum. Create a poster that shows:

- Similarities between bonsai and full-sized trees.
- Differences between bonsai and full-sized trees.
- How a plant is shaped by its environment (this includes living in a pot).
- Include specific facts and evidence

## **Standards**

### **NGSS**

- MS-LS1-5. Construct a scientific explanation based on evidence for how environmental and genetic factors influence the growth of organisms.
- MS-LS2-1. Analyze and interpret data to provide evidence for the effects of resource availability on organisms and populations of organisms in an ecosystem.

### **Common Core State Standards**

#### **ELA/Literacy**

- RI.5.1 Quote accurately from a text when explaining what the text says explicitly and when drawing inferences from the text. (5-LS1-1)

- RI.5.9 Integrate information from several texts on the same topic in order to write or speak about the subject knowledgeably. (5-LS1-1)
- RST.6-8.1 Cite specific textual evidence to support analysis of science and technical texts. (MS-LS2-1)
- RST.6-8.7 Integrate quantitative or technical information expressed in words in a text with a version of that information expressed visually (e.g., in a flowchart, diagram, model, graph, or table). (MS-LS2-1)
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- W.5.1 Write opinion pieces on topics or texts, supporting a point of view with reasons and information. (5-LS1-1)

### **Mathematics**

- MP.2 Reason abstractly and quantitatively. (5-LS1-1)