Name: _____   Date: _____

Student Exploration: Measuring Trees

Vocabulary: circumference, cross section, diameter, drought, growth ring, precipitation

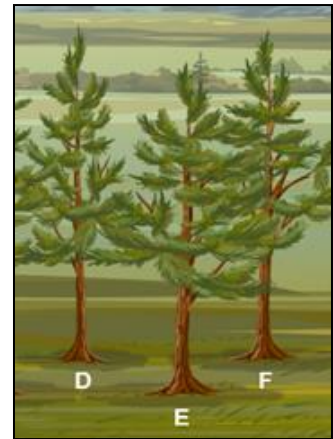**Prior Knowledge Questions** (Do these BEFORE using the Gizmo.)

1. Trees grow throughout the year. During which season(s) do you think trees grow fastest?

   _____

2. During which season(s) do trees grow most slowly? _____

3. What weather conditions could make trees grow more quickly than normal? _____

   _____

4. What weather conditions could make trees grow more slowly than normal? _____
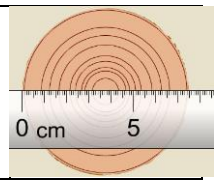
   _____

Gizmo Warm-up
The *Measuring Trees* Gizmo shows part of a forest. Click tree **E** to select it. On the right side of the Gizmo, a **cross section** of the tree is displayed. Click **Show larger view** for a larger image.

1. The rings on the tree are called **growth rings**. Click **Zoom in** for

   a clearer view. How many rings can you count? _____

2. Click **Return to forest**, and then click **Advance year** once. How

   many growth rings are there now? _____

3. Click **Advance year** again and count the rings. How many are there now? _____

4. What does the number of rings tell you about the tree? _____

   _____

Activity A: Measuring trees	Get the Gizmo ready: • Click **Return to forest**, and then click **Reset**. • Check that the **Preset forest** is shown (text at top). If not, click **Refresh** or **Reload** on your browser.	

Question: How can you measure a tree?

1. Observe: Look at the trees in the forest.

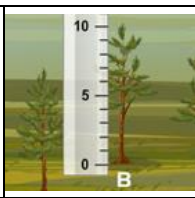   Which tree do you think is the youngest? _____   Oldest? _____

2. Collect data: Measure each tree in the following ways. (Tree **A** has been done for you.)
   - Click the tree you want to measure. Estimate the height to the nearest tenth of a meter using the draggable ruler. (For example, the height might be 2.6 meters.)
   - Click **Show larger view**. Determine the age of the tree by counting growth rings. Use **Zoom in** as needed. (Hint: Do not count the bark of the tree as a separate ring.)
   - The **diameter** is the width of the tree trunk. Measure the diameter using the ruler. Write the diameter to the nearest tenth of a centimeter.
   - The **circumference** is the distance around the tree trunk. Click **Find circumference** to measure the circumference to the nearest tenth of a centimeter.

Tree	Height	Age	Diameter	Circumference
A	6.9 m	9 years	7.4 cm	23.3 cm
B				
C				
D				
E				
F				

3. Analyze: How does the age of a tree relate to its size? _____

   _____

4. Extend your thinking: Compare the circumference values to the diameters. About how many

   times the diameter is the circumference? _____

   _____

Activity B: Tree growth	Get the Gizmo ready: • If necessary, click **Return to forest** to see the forest view.	

Question: How does precipitation (rain, snow, sleet, or hail) affect tree growth?

1. Observe: Use the Gizmo to explore how precipitation affects tree growth. You can alter the amount of precipitation using the slider. Click **Advance year** to advance one year forward.

2. Form hypothesis: If there is more precipitation, how will tree growth change? _____

   _____

3. Experiment: Click **Reset** and select tree **E**. Set the **Precipitation** to 20 cm per year to show a period of low precipitation, or **drought**. Click **Advance year**. Measure the tree and record its height in the table below. Repeat these steps two more times.
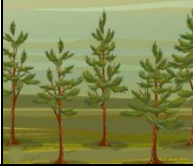
   Now set the **Precipitation** to 160 cm per year and click **Advance year** three times, recording the height of the tree after each click in the table below.

Year	2	3	4	5	6	7
Precipitation	20 cm/yr	20 cm/yr	20 cm/yr	160 cm/yr	160 cm/yr	160 cm/yr
Height						

4. Analyze: Click **Show larger view**. Click **Zoom in** twice to see the rings up close.

   A. Describe the six outermost rings. _____

      _____

      _____

   B. About how wide are the growth rings for the drought years? _____

   C. About how wide are the growth rings for the rainy years? _____

5. Draw conclusions: How does precipitation affect the growth of the tree? _____

   _____

   _____

Extension: Graphing growth	Get the Gizmo ready: - If necessary, click **Return to forest**. - Click **New forest**.	

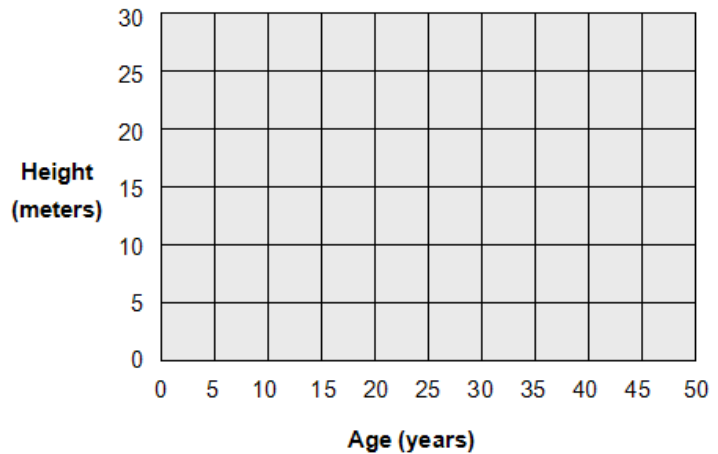**Question: At what point in its life does a tree grow most quickly?**

1. <u>Form hypothesis</u>: Do you think a young or old tree grows more quickly? _____

   Why do you think so? _____

   _____

2. <u>Collect data</u>: Set the **Precipitation** to 120 cm per year. Select a small tree and measure its age and height. Fill in the blank in the **Age** column with the starting age of the tree.

   Click **Advance year** until the tree is ten years old and measure its height again. Measure and record the tree's height at age 20, 30, 40 and 50 as well.

Age (years)	Height (meters)
10	
20	
30	
40	
50	

3. <u>Make a graph</u>: Plot a point on the graph for each row of data you have. Draw a line to connect the points in order.

4. <u>Analyze</u>: Which part of the graph shows the fastest growth? _____

   How do you know? _____

5. <u>Extend your thinking</u>: How is the growth of a tree similar to the growth of a person? _____

   _____

   _____