**Hands-On Activity**

****

**Student Worksheet**

By Alicia Conklin

**Name:\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_**

**Goals:**

Students will explore various forms of measurements and estimations.

Students will determine estimations and mathematical formulas for future calculations.

**Objectives:**

Given several pine tree cores and measurement methods provided, the student will determine the trees’ age and height with 90% accuracy.

Given coordinated paper the student will graph the age and height of each example provided they have determined with 90% accuracy.

Given the graphed measurement data, the student will estimate each pine trees’ growth in 20 years with 90% accuracy.

Given the graphed measured data, the student will determine the logistical growth formula and use it independently and correctly with 90% accuracy to confirm estimations.

**Materials:**

* 12 Core slice samples of pine trees
* 4 Coordinated/Graph paper
* “Pine Key Measurement”

**Pine Key Measurement**

**Diameter = Height**

**1 inch = 4 Feet**

* 4 Metric rulers

**Definitions:**

* Ring- One ring is equal to one year of age to a tree
* Diameter- Length of a straight line through the center of a circle
* Height- The longest length measurement made of an object.
* Logistical Growth formula- ‘S’ shape graph that increases or grows quickly then begins to slow down and level off or flattens out at a certain point, which limits its size.

**Directions:**

Imagine that the pine cores in front of you are from the last pine trees on earth. By over using paper and too much carbon dioxide was killed all other trees in the area. The world is relying on you to demonstrate to them, with *data, graphs, and mathematical evidence*, the height of these plants twenty years from now. Then *provide* the public with a *simple formula* so that they may also come to the same answers.

|  |  |  |  |
| --- | --- | --- | --- |
|  | Tree Age  (Number of Rings) | Tree Core Diameter  (Measure in Inches) | Tree Height  (Diameter x 5 = # Feet) |
| Pine Tree 1 |  |  |  |
| Pine Tree 2 |  |  |  |
| Pine Tree 3 |  |  |  |

**Step 1:** Count the number of rings on Pine Tree 1’s core.

**Step 2**: Record the age in the correct square, under “Tree age,” of the table.

**Step 3:** Measure the diameter of Pine Tree 1’s core.

**Step 4:** Record the diameter in the correct square, under “Tree Core Diameter,” of the table.

**Pine Key Measurement**

**Diameter = Height**

**1 inch = 4 Feet**

**Step 5:** Use the Pine Key Measurement to change the measured diameter to the height of tree.

Note the change from inch to feet in the key. Look at table for additional help.

**Step 6:** Record the height in the correct square, under “Tree Height,” of the table.

**Step 7:** Repeat steps 1-6 for Pine Trees 2 and 3

Now that you have collected the data, graph the data on the provided graph paper in a scattered plot chart. Be sure to include a title and labels on your graph.

Go to my computer and add your data to the Excel program so that it will be shared on the graph with the class. Let us look at the relationship between our pine trees and by the graph let us estimate the height of our trees in about twenty years from their age.

|  |  |  |
| --- | --- | --- |
|  | Tree Height Now | Tree Height Guess in Twenty Years |
| Pine Tree 1 |  |  |
| Pine Tree 2 |  |  |
| Pine Tree 3 |  |  |

The public needs a formula so that they may be able to come to same conclusion and you can confirm your answer.

**Step 1:** Look and use the share graph for information: Limitations, Exponents, Slope, Y-Intercept, etc.

**Step 2:** Begin with the top, level off or flatten area. (Limitation)

**Step 3:** Then look to the increase of the data for the other parts of the formula. (Slope, Exponent, Y-Intercept)

**Step 4:** Write the new formula for the public to use.

|  |
| --- |
| Formula to Calculate Pine Height in Twenty Years |
|  |

Use the new formula to see how close your estimations were to the calculations of how high each pine tree of yours will be in twenty years for the world to use as a resource.

|  |  |
| --- | --- |
|  | Tree height in twenty years:  (Round to the nearest year) |
| Pine Tree 1 |  |
| Pine Tree 2 |  |
| Pine Tree 3 |  |