

**UNIT 3 • LINEAR AND EXPONENTIAL FUNCTIONS****Lesson 2: Sequences As Functions****Problem-Based Task 3.2.1: Which Tree Will It Be?**

Tree rings show the growth pattern of a tree. Each year a new ring forms, increasing the total diameter of the tree. Naturally, different species of trees have different growth rates. Listed below are growth formulas for three different tree species. These formulas can be used to calculate the diameter in centimeters of each tree species in any given year,  $n$ .

**Growth formula of Species A:**

$$a_n = a_1 \cdot 1.05^{n-1}$$

$a_1$ , the diameter of the first-year sapling, is 2 cm.

**Growth formula of Species B:**

$$b_n = b_1 \cdot 1.04^{n-1}$$

$b_1$ , the diameter of the first-year sapling, is 4 cm.

**Growth formula of Species C:**

$$c_n = c_1 \cdot 1.03^{n-1}$$

$c_1$ , the diameter of the first-year sapling, is 6 cm.

A city needs to purchase dozens of new trees for a downtown development project. Different interest groups are arguing about which species of tree to plant. City officials want small trees, so they prefer Species A. Historians want the state tree, Species B, which is medium sized. Community activists want larger trees to help provide shade and fresh air, and prefer Species C. You have been hired to end the argument by writing a report predicting the growth of the three tree species over the years. Which tree would you recommend and why? Consider the diameters of the trees after 5, 10, 25, 50, and 100 years.

NAME: \_\_\_\_\_

## UNIT 3 • LINEAR AND EXPONENTIAL FUNCTIONS

### Lesson 2: Sequences As Functions

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#### Problem-Based Task 3.2.1: Which Tree Will It Be?

##### Coaching

- a. What will be the diameters of each tree species after 5, 10, 25, 50, and 100 years?
  
  
  
  
  
  
  
  
  
  
- b. Which tree will have the largest diameter after 5 years?
  
  
  
  
  
  
  
  
  
  
- c. Which tree will have the largest diameter after 10 years?
  
  
  
  
  
  
  
  
  
  
- d. Which tree will have the largest diameter after 25 years?
  
  
  
  
  
  
  
  
  
  
- e. Which tree will have the largest diameter after 50 years?
  
  
  
  
  
  
  
  
  
  
- f. Which tree will have the largest diameter after 100 years?
  
  
  
  
  
  
  
  
  
  
- g. Which tree species would you choose and why?