WAMC Lab Template
Math Concept(s): A-SSE.A: Interpret the structure of expressions. F-LE.A: Construct and compare linear, quadratic, and exponential models and solve problems
Source / Text:
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Attach the following documents:
Lab Instructions: See student handout

Student Handout(s)

Rubric and/or Assessment Tool

Short Description (Be sure to include where in your instruction this lab takes place):

Lab Plan
Lab Title: Exponential Tennis

Prerequisite skills: Be familiar with exponential equations

Lab objective: Learn about the recursive formula for geometric sequences.

Standards:
CCSS-M:
- A-SSE.A.1b: Interpret complicated expressions by viewing one or more of their parts as a single entity.
- F-LE.A.1c: Recognize situations in which a quantity grows or decays by a constant percent rate per unit interval relative to another
- F-LE.A.2: Construct linear and exponential functions, including arithmetic and geometric sequences, given a graph, a descriptions of a relationship, or two input-output pairs (include reading theses from a table).

Standards for Mathematical Practice:
- MP 1, MP 3, MP 5, and MP 7.

State Standards addressed (2008 Washington State Mathematics Standards):
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Reading:
-

Writing:
-

Leadership/21st Century Skills:

21st Century Interdisciplinary themes (Check those that apply to the above activity.)
- ☐ Global Awareness
- ☐ Health/Safety Literacy
- ☐ Financial/Economic/Business/Entrepreneurial Literacy
- ☐ Environmental Literacy
- ☐ Civic Literacy

21st Century Skills (Check those that students will demonstrate in the above activity.)

LEARNING AND INNOVATION
Creativity and Innovation
- ☐ Think Creatively
- ☐ Work Creatively with Others
- ☐ Implement Innovations

Critical Thinking and Problem Solving
- ☒ Reason Effectively
- ☐ Use Systems Thinking
- ☒ Make Judgments and Decisions
- ☒ Solve Problems

Communication and Collaboration
- ☒ Communicate Clearly
- ☒ Collaborate with Others

INFORMATION, MEDIA & TECHNOLOGY SKILLS
Information Literacy
- ☒ Access and Evaluate Information
- ☐ Use and manage Information

Media Literacy
- ☐ Analyze Media
- ☐ Create Media Products

Information, Communications and Technology (ICT Literacy)
- ☐ Apply Technology Effectively

LIFE & CAREER SKILLS
Flexibility and Adaptability
- ☐ Adapt to Change
- ☐ Be Flexible

Initiative and Self-Direction
- ☐ Manage Goals and Time
- ☐ Work Independently
- ☒ Be Self-Directed Learners

Social and Cross-Cultural
- ☒ Interact Effectively with Others
- ☐ Work Effectively in Diverse Teams

Productivity and Accountability
- ☐ Manage Projects
- ☒ Produce Results

Leadership and Responsibility
- ☐ Guide and Lead Others
- ☐ Be Responsible to Others

Teacher Preparation: (What materials and set-up are required for this lab?)

Materials
- Tennis balls
- Tape measure/yardstick

Set-Up Required:
- None

Lab Organization Strategies:

Grouping/Leadership/Presentation Opportunities:
- Group of 4

Cooperative Learning:
-

Expectations:
-

Timeline:
- One period

Post Lab Follow-Up/conclusions:

Discuss real world application of learning from lab
- Other applications of exponential equations – used to measure things in nature beyond bacteria and money

Career Applications
-

Optional or Extension Activities
-

Materials:
- 1 Tennis (or other) ball
- Yard stick

Task:
Part A:
- Design an experiment using a tennis ball and the yardstick to model the function created comparing the number of bounces to the height of each bounce of the tennis ball.
- Label the starting value and the common ratio (rate of change) between each bounce on a table, graph, and equation.

Equation: Graph:

Table:

x ( )	y ( )

Part B:

- Given the general recursive formula below, create the recursive formula for your equation. Identify each part of the formula and explain how it relates back to each representation (equation, table, and graph).

Recursive Formula for Geometric Sequence	Explanation
a_0 = initial value	a_0 = initial value
$a_n = a_{n-1} \cdot r$	a_n means "any value" a_{n-1} means "previous value" r means "common ratio"

Exponential Equation:
Recursive Formula:

Explain how the recursive formula relates to the exponential function. Be specific – show how each part of the recursive formula matches with each part of the exponential equation.