WAMC Lab Template

Math Concept(s): Exponential functions. Growth and Decay

Source / Text:

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Attach the following documents:

- Lab Instructions
- Student Handout(s)
- Rubric and/or Assessment Tool

Lab Plan

Lab Title: Exponential Growth and Decay

Prerequisite skills: Students should have a basic knowledge of how to make a table, and how to graph given a table.

Lab objective: Students will cut tear and fold paper to learn the relationship of exponential functions to a real life situation.

Standards: *(Note SPECIFIC relationship to Science, Technology, and/or Engineering)*

Mathematics K–12 Learning Standards:

- **HSF-LE.A.2**

Construct linear and **exponential** functions, including arithmetic and geometric sequences, given a graph, a description of a relationship, or two input-output pairs (include reading these from a table).

- **HSF-IF.C.7.e**
  Graph **exponential** and logarithmic functions, showing intercepts and end behavior, and trigonometric functions, showing period, midline, and amplitude.

Standards for Mathematical Practice:

- 1. Make sense of problems and persevere in solving them.
- 2. Reason abstractly and quantitatively
- 5. Use appropriate tools strategically
- 6. Attend to precision

K-12 Learning Standards-ELA (Reading, Writing, Speaking & Listening):

- ELA- Literacy SL.11-12.1.c Propel conversations by posing and responding to questions that probe reasoning and evidence. Ensure a hearing for a full range of positions on a topic or issue. Clarify, verify or challenge ideas and conclusions and promote divergent and creative perspectives.

K-12 Science Standards

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Technology

- Desmos online Calculator- 1.c. Students use technology to seek feedback that informs and improves their practice and to demonstrate their learning in a variety of ways.

Engineering

- Conduct an investigation to produce data to serve as the basis for evidence that meet the goals of an investigation. (MS-LS1-1)

Leadership/21st Century Skills:

21st Century Interdisciplinary themes (Check those that apply to the above activity.)

☐ Global Awareness ☐ Financial/Economic/Business/Entrepreneurial Literacy ☐ Civic Literacy
☐ Health/Safety Literacy ☐ Environmental 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

- Teacher will need access to Desmos and a way to project it onto a screen or whiteboard.
- Paper and scissors for students

Set-Up Required:

- To do this lab effectively you can use the classroom, but have tubs where students can hole punch and cut their papers without making a mess or losing their holes of paper that need to be counted.

Lab Organization Strategies:

Leadership (Connect to 21st Century Skills selected):

- Be a responsible member to your partner. Complete work, collaborate effectively and participate in the lab or recording without delay.

Cooperative Learning:

- For this lab students should be placed in pairs. One student should be doing the cutting/ punching and the other should be counting and recording.

Expectations:

- To discover in a hands on way how an exponent and exponential equation functions.

Timeline:

- 5 minutes- Introduce the Lab and expectations
- 10 minutes- fold and punch paper(Growth), while recording data
- 10 minutes- fold and tear paper(Decay), while recording data
- 10 minutes- Teacher goes over making a table on Desmos, and students put data in.
- 10 minutes- Students answer remaining questions on formative assessment

Post Lab Follow-Up/Conclusions:

Discuss real world application of learning from lab

- Real world applications would be any field that requires employees to be able to follow simple instructions, working with peers to produce a product.

Career Applications

- The math specific content relates to careers as an economist, a mechanical engineer, or a stock trader to name some.

Optional or Extension Activities

- Make the starting value of folds something other than 0. Or change the number of punches for fold from 1 to more than 1.