

WAMC Lab Template

Math Concept(s): Exponential and Logistic Functions

Source / Text: Clark Creative Education

Developed by: Cherin Erickson **E-Mail:** cerickson@sheltonschoools.org **Date:** 6/23/2022

Attach the following documents:

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

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

In “Cooties Outbreak”, students will plot data and use regression functions on graphing calculators to find a mathematical model for the data. Students will need a random number generator like those on a graphing calculator. Students will take the data and graph it. Students will then create 5 different regression models to assess the fits of each function and hopefully they will come to the logistic conclusion on their own. * Aspects of the project can be completed independently.

Lab Plan

Lab Title: Cooties: An Epidemic

Prerequisite skills: Student needs to have an understanding of exponential and logistic functions.

Lab objective: Use functions fitted to data to solve problems in the context of the data

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

Mathematics K–12 Learning Standards:

- HSS-IC.B.6 evaluate reports based on data
- HSS-ID.B.6a fit a function to data; use functions fitted to data to solve problems in the context of the data

Standards for Mathematical Practice:

- Construct viable arguments and critique the reasoning of others. Make sense of problems and persevere in solving them.

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

- Reading: 1.2 Use vocabulary (word meaning) strategies to comprehend text. 2.1 Demonstrate evidence of reading comprehension. Writing: 2.2 Write for different purposes, such as telling stories, presenting analytical responses to literature, persuading, conveying technical information, completing a team project, and explaining concepts and procedures

K-12 Science Standards

- HS-LS4-6. Create or revise a simulation to test a solution to mitigate adverse impacts of human activity on bio-diversity.

Technology

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Engineering

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Leadership/21st Century Skills:

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

- | | | |
|--|---|---|
| <input checked="" type="checkbox"/> Global Awareness | <input type="checkbox"/> Financial/Economic/Business/Entrepreneurial Literacy | <input type="checkbox"/> Civic Literacy |
| <input checked="" type="checkbox"/> Health/Safety Literacy | <input checked="" type="checkbox"/> 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

Math Council

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

Materials

- Graphing calculators or computer website: Desmos
- Pencil
- Daily handout
- Scratch paper

Set-Up Required:

- Gather and handout all materials
- Pair students up
- Read lab introduction to class

Lab Organization Strategies:

Cooperative Learning:

- Students will work with a partner in order to communicate and think critically while completing the assigned lab.

Expectations:

- Students will understand the function of disease and how rapidly it can be spread depending on the number of people affected.

Timeline:

- Lab will be completed within a three 60-minute class periods.

Post Lab Follow-Up/Conclusions:

Discuss real world application of learning from lab

- Students may see the importance of a medical career.
- This lab also applies to the field of Science and data collection and analysis.

Career Applications

- Medical Career
- Scientist
- Data collector
- Mathematician

Optional or Extension Activities

- Write a letter, including data collected, to the President to give him an update on the state of the union.

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WAMC Lesson Plan

Name(s): Cherin Erickson

Email Address: cerickson@sheltonschools.org

Lesson Title: Exponential and Logistic Functions

Date: 6/23/2022

Text: Big Ideas

STEM Correlation: Math

Lesson Length: 3 days

Big Idea (Cluster): A simulated epidemic	
Mathematics K–12 Learning Standards: -Write a function that describes a relationship between two quantities. -Construct linear and exponential functions. -Observe using graphs and tables that a quantity increasing exponentially eventually exceeds a quantity increasing linearly, quadratically, or as a polynomial function.	
Mathematical Practice(s): CCSS.MATH.PRACTICE.MP5 Use appropriate tools strategically	
Content Objectives: The objective of this lesson is to teach students how to use exponential functions to understand how quickly a disease can spread.	Language Objectives (ELL): Understand the vocabulary pertinent to this lesson with 90% accuracy.
Vocabulary: Exponential, Logistic, Function, Epidemic, linear	Connections to Prior Learning: Students must understand exponents, functions, and logistics.
Questions to Develop Mathematical Thinking: • “How can mathematical modeling be used to predict epidemics?”	Common Misconceptions: • There is no way to track the spread of disease.

Assessment (Formative and Summative):

- Formative: Worksheets with tables and graphs to show growth.
- Formative: Daily exit tickets
- Summative: Unit test

Materials:

- Description of problem
- Worksheets with tables and graphs
- Pencil
- Calculator
- Exit tickets
- Unit test

Instruction Plan:

Introduction: Students should come in and start on the Entry Task. After roughly 5 minutes, go over the entry task with students, and discuss possible answers to the prompt.

Explore: Ask students, “How can you use a data to analyze statistics?” Go over exponents and explain how they can help analyze statistics. Present worksheet from Lesson 6.3 from text and go over the directions with them. Once students are done with the worksheet or there are 10 minutes left in class, students should work on the Exit Ticket (formative assessment).

When I observe students: As I walk around the room checking for understanding I will be sure to pay particular attention to those who are not engaged with the lesson.

Questions to Develop Mathematical Thinking as you observe: How do exponents help you understand the spread of disease?

WAMC Lesson Plan

Answers: It shows how the rate of transmission increases as the number of people infected increases.

Summarize: To get a clear understanding of the use of exponents, all students must be completely engaged in the learning process of this lesson. To do this, one must follow directions and use data collected. Give students the Exit Ticket for this lesson to be turned in at the end of the period.

Career Application(s):

- Medical, Scientific, Mathematical

Leadership/21st Century Skills:

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

- | | | |
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