WAMC Lab Template

Math Concept(s):

- Interpreting functions that arise in applications in terms of the content.
- Build a function that models a relationship between two quantities.
- Construct and compare linear, quadratic, and exponential models and solve problems.
- Interpret expressions for functions in terms of the situation they model.

Source / Text: CORD

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Attach the following documents:

Lab Instructions/Student Handout(s)

Assessment Tool

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

Lab Plan

Lab Title: Cars: Life is a Highway

Prerequisite skills:

Construct and create a graph

Calculate Slope

Convert minutes to hours

Build a function based on given data

Collect and record data

Solve for an unknown x value when given the value of y

Lab objective:

- Through this activity, students will;
 - Be able to calculate slope at various intervals.
 - Find missing information to solve problems.
 - Construct the function of both their data and the given data.
 - Use a data table to plot points on a graph and determine the trend line.

Student understanding will be assessed with a rubric upon completion of the student handout. Summative assessment will follow with use of State COE Task, Connor's Touchdown.

Standards:

CCSS-M:

- F-IF. 6: Calculate and interpret the average rate of change of a function
- (presented symbolically or as a table) over a specified interval.
- Estimate the rate of change from a graph.★
- F-BF.1.C: Write a function that describes a relationship between two quantities.★

- (+) Compose functions. For example, if T(y) is the temperature in
- the atmosphere as a function of height, and h(t) is the height of a
- weather balloon as a function of time, then T(h(t)) is the temperature
- at the location of the weather balloon as a function of time.
- F-LE. 1.B: Distinguish between situations that can be modeled with linear functions and with exponential functions.
- Recognize situations in which one quantity changes at a constant rate per unit interval relative to another.
- F-LE. 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).
- F-LE.5: Interpret the parameters in a linear or exponential function in terms of
- a context.

Standards for Mathematical Practice:

- MP.1: Makes sense of problems and persevere in solving them.
- MP.2: Reason abstractly and quantitatively.
- MP.3: Construct viable arguments and critique the reasoning of others.
- MP.4: Model with mathematics.
- MP.5: Use appropriate tools strategically.
- MP.6: Attend to precision.
- MP.8: Look for and express regularity in repeated reasoning.

State Standards addressed (2008 Washington State Mathematics Standards):

- A.1.6.D: Find the equation of a linear function that best fits bivariate data that are linearly related, interpret the slope and *y*-intercept of the line, and use the equation to make predictions.
- A.1.8.G: Synthesize information to draw conclusions, and evaluate the arguments and conclusions of others.

Reading:

• 1.3.2: Understand and apply content/academic vocabulary critical to the meaning of the text, including vocabularies relevant to different contexts, cultures, and communities.

Writing:

- 3.2.1: Analyzes audience and purpose and uses appropriate voice.
- 3.2.2: Analyzes and selects language appropriate for specific audiences and purposes.
- 3.3.1: Uses legible handwriting.

Leadership/21st Century Skills:

	ose that apply to the above activity.) ial/Economic/Business/Entrepreneurial Liter nmental Literacy	acy Civic Literacy	
21st Century Skills (Check those that students will demonstrate in the above activity.)			
LEARNING AND INNOVATION	INFORMATION, MEDIA &	LIFE & CAREER SKILLS	Productivity and
Creativity and Innovation	TECHNOLOGY SKILLS	Flexibility and Adaptability	Accountability
	Information Literacy		
☐ Work Creatively with Others		□ Be Flexible □	□ Produce Results
	☐ Use and manage Information	Initiative and Self-Direction	Leadership and
Critical Thinking and Problem Solving	Media Literacy		Responsibility
□ Reason Effectively	☐ Analyze Media	Work Independently	☐ Guide and Lead
☐ Use Systems Thinking	☐ Create Media Products	☐ Be Self-Directed Learners	Others

Information, Communications and Technology (ICT Literacy)

☑ Apply Technology Effectively

Social and Cross-Cultural

☐ Interact Effectively with Others
☐ Work Effectively in Diverse Teams

Be Responsible to Others

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

Materials

- Automobile or Pedometer (if modified)
- Watch/ Clock
- Handout
- Pencil
- Calculator
- Straight edge
- Driver/Recorder

Set-Up Required:

Copies of handouts and rubrics.

Lab Organization Strategies:

Grouping/Leadership/Presentation Opportunities:

- Students will be grouped in groups of 3-4 to collaborate and share the data they have collected.
- Students will work individually to complete the student handout.

Cooperative Learning:

- Students will collaborate in small groups at the beginning and end of the activity to discuss their data and reflect on their understanding.
- Students will work with a family member or friend to collect their data while taking a 20 minute or longer drive.

Expectations:

- Students will be expected to complete the graphs using the collected and given data.
- Calculate rate at each interval of collected data.
- Construct a function for the given data by plotting points, creating a trend line, and calculating slope, and using either point slope or another method to find b.
- Solve for an unknown variable using technology appropriately.

Timeline:

Two class periods or approximately 90 minutes.

Post Lab Follow-Up/conclusions:

Discuss real world application of learning from lab

- Police Officers determining your speed
- Calculating gas mileage
- Stats for sports and athletes

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Career Applications

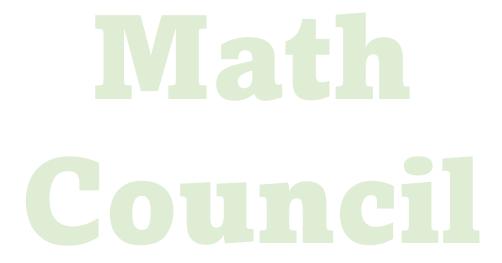
- Police Officer
- Sporting Scouts
- Sales Projections
- Travel Agents
- Stock Market

Alternative Strategies

- Peer tutor/ Driving partner (ELL)
- Modified for health by walking and calculating steps per second and convert to miles per hour.
- Advanced students will find the area below the curve on the graph they created and compare
 it to their mileage.
- Struggling students will be given additional instruction and time to make modifications on the formative assessment (Student Handout).

Optional or Extension Activities

- Calculating cost of a road trip based on miles per hour.
- Calculate area below the curve.



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