WAMC Lab Template

Math Concept(s): understanding conversion from English standard to metric system. Understand the stopping distance formula for a vehicle and formula for different surfaces or drag factor of those surfaces.

Source / Text: Financial Algebra

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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):

Lab Plan

Lab Title: "Driving Safely"

Prerequisite skills: The students should have a working knowledge of the stopping distance formulas. Students should know how to solve for a given variable. Students should know how to graph their data on grid paper and properly label their graphs.

Lab objective: Write, interpret and use the distance formula. Use the formula for the relationship between stopping distance on different road sufaces.

Standards:

CCSS-M:

- A-CED4, A-SSE1b,A-SSE3,A-RE12
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Reading:

- A-SSE3, A-CED4, A-REI1

Writing:

- A-SSE3, A-CED4, A-REI1

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	INFORMATION, MEDIA & TECHNOLOGY SKILLS	LIFE & CAREER SKILLS	Productivity and Accountability
Creativity and Innovation	Information Literacy	Flexibility and Adaptability	
☐ Think Creatively	☐ Access and Evaluate Information	☐ Adapt to Change	☐ Manage Projects
☐ Work Creatively with Others	☐ Use and manage Information	☐ Be Flexible	☐ Produce Results
☐ Implement Innovations	Media Literacy	Initiative and Self-Direction	Leadership and Responsibility
Critical Thinking and Problem Solving	☐ Analyze Media	☐ Manage Goals and Time	☐ Guide and Lead Others
☐ Reason Effectively	☐ Create Media Products	☐ Work Independently	
☐ Use Systems Thinking		☐ Be Self-Directed Learners	

☐ Make Judgments and Decisions ☐ Solve Problems Communication and Collaboration ☐ Communicate Clearly ☐ Collaborate with 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

- Lab instructions. Scoring rubric, internet access, lab worksheet, Pencil or pen, and a calculator.

Set-Up Required:

- Chapter 5 in the financial algebra text should be covered before the lab is started.

Lab Organization Strategies:

Grouping/Leadership/Presentation Opportunities:

- When all of the students are done with the lab you can offer an opportunity for students to present their findings, and give reasoning as to why and how they came up with their data.

Cooperative Learning:

- I would allow students to work in groups of no more than 2.

Expectations:

Expectations are that each student completes the lab in full.

Timeline:

- I would provide 3 days to do this lab and a 4th day for presentations.

Post Lab Follow-Up/conclusions:

Discuss real world application of learning from lab

- Real world applications are that the students gain an understanding of drag factor as it relates to stopping distance of a vehicle. Students will also learn that different weather or road conditions can affect your driving safety.

Career Applications

- Police officer, travel agent, insurance agent, accident investigator.

Optional or Extension Activities

- You could have the students put together power points for their presentations. Although not necessary time allowing it would be a nice piece to add.

Driving Safely Lab Exercise

Name_____

Date_____

For this lab exercise you will need to determine the stopping distance for a vehicle using two different formulas. The first formula assumes a vehicle traveling on dry asphalt in ideal weather conditions. The second formula involves a vehicle traveling on a gravel road with a drag factor of .45 and brake efficiency of 70 %.

	D
10	
15	
20	
25	
30	
35	

Formula

After you have filled in both of your charts use the graph paper provide to graph both sets of data.

S	D
10	
15	
20	
25	
30	
35	

Formula: Solve for D

1. Now that you have completed your data charts and finished your graph use the two pieces of information to determine the exact speed with which the two formulas will produce the exact same stopping distance.

Hint: Set the two equations equal to each other.

2. Show your work for full credit and include your thinking. Use words, pictures, and numbers to show how you solved the problem and came up with your answer.

Group Lab Extension, Chapter 5 – Financial Algebra

Names:_____

Directions:
Carlos spent an evening, in the name of science, drag racing his car in a wide open grass field. He wanted to find the drag factor for a grass surface. To do this, he would reach a speed of 40mph and then fully apply the breaks. Carlos measured his skid and it came to 202 ft. He noticed that it was a particularly dry part of the field and so he wanted to try it again and got 166.7 ft. Carlos conducted multiple trials to be able to find a reliable range. The results are in the table below:

Trial number	Skid distance
1	202
2	166.7
3	95
4	222
5	444.5
6	111.1
7	64
Note:	40mph was the speed each time.

Your task is to find the drag factor range for grass surfaces. Here are the steps to do this:

- A) First create a box-and-whisker plot of the data
- B) Use the 1st and 3rd quartile distances as the upper and lower drag factor range.
- C) Solve the skid speed formula for f
- D) Use this equivalent equation to find the drag factor range.

Remember that the speed was 40, and his braking efficiency was 0.8

(Answer: f-range is .3-.7)
Grading Rubric:
A) 6 points: 2 points for setting up box and whisker correctly, 2 points for correct labels and 2 points for correct values.
B) 2 points for correctly recognizing quartiles
C) 6 points: 3 points for correct answer, 3 points for work shown
D) 6 points: 3 points for correct answer, 3 points for work shown

Quarter-inch Graph Paper