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NSF GK-12 Vibes and Waves in Action
CP Physics
Lesson 17: Ohm's Law Simulation

Summary of Lesson

Using the lab data from the previous class, the students were asked to plot the voltage vs current. Then make a line of best fit to plot. The R commands lm() and abline() were used for this purpose and and example was shown to the students. They were asked to recognize that the slope of the line was resistance. They were allowed to use the lm() and abline() commands to find the slope and the y-intercept of the line. The goal was for the students to recognize the equation of the line as Ohm's Law.

<h1 style="text-align:center">Honors Physics Lesson Plan</h1>

Text: Conceptual Physics, Paul G. Hewitt
Chapter: Ch 34- Electric Current (Sections 34.2, 34.3, 34.5, 34.6)
Objectives: Write a program in R to determine the relationship between voltage and current
Essential Question: How are current and voltage related?
Frameworks: Electromagnetism- 5.2, 5.3; SIS1, SIS2, SIS3, SIS4

L-Side Activities: Teacher	R-Side Notes: Students

At the Bell: Review lab data
 	
Agenda: 1. Explain the functionality of the lm() and abline() commands
      2. Write the program
      3. Answer the follow up questions
 	
Working It Out:
1. What does the lm() command do?
2. What does the abline() command do? Why is it necessary for this program?
3. Once you have the line of best fit, how can you get data about that line, such as slope and y-intercept?
4. In terms of a physical circuit, what does the slope of the line on the graph represent physically?
5. If you were to increase the voltage to 10 V, how much current would be flowing through the resistor?
6. If you want to achieve a current of 5A, how much voltage would you need?
 	
Class Activity: Using the lab data, students will plot Voltage vs. Current in R as points. Then they will find the line of best fit to the lab data and plot it on the same graph. Students will use graph and the results computed by the lm() command to answer the followup questions. Verify results with results from lab.
 	
Homework: None
	When plotting voltage vs current, the slope of the line is the resistance.
	
	The equation of the line should be the same as Ohm's Law, V=RI