Ohm's Law

OBJECTIVES
Students will…
- Discover the relationship between electric current, voltage, and resistance.

MATERIALS
- PASCO modular circuits kit, PASCO wireless voltmeter, PASCO wireless ammeter

SAFETY
- Be vigilant not to drop or break the electric circuit kit components.
- Leave your switches in the open position when not taking measurements.

PROCEDURE
1. Create a circuit that matches the schematic diagram below. Use the 100 Ω resistor. LEAVE THE SWITCH IN THE OPEN POSITION.
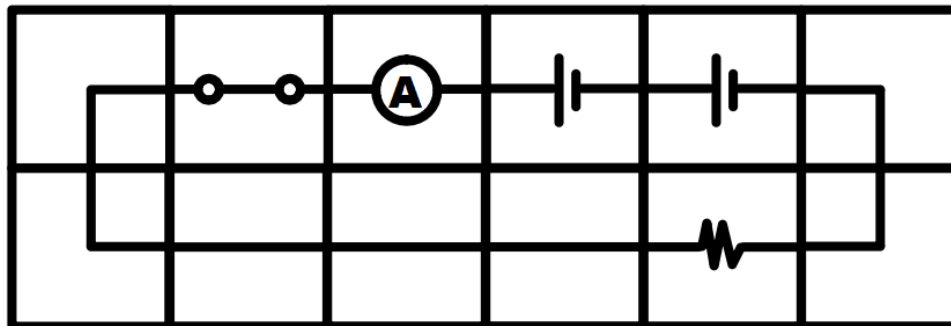
2. Open Capstone and create a graph of current versus time. Then use the symbol shown below to add a second graph. Put voltage on the y-axis and time on the x-axis.

3. Turn on the ammeter. This will allow you to read the current that runs "through" the circuit. Remember to leave the switch in the open position.
4. Turn on the voltmeter and clip the red lead onto the tab on the side of the resistor that is closest to the positive end of the batteries. Clip the black lead onto the tab on the side of the resistor that is closest to the negative end of the batteries. This will allow you to measure the voltage "across" the resistor. Remember that the switch should still be in the open position.

5. Press record on Capstone. Close the switch and allow current to run through the circuit for a second or two. THEN OPEN THE SWITCH and stop recording. Be sure that the switch is open when you are not recording.
6. Highlight the portion of the graph showing the time when the current ran through the circuit. Then press the ∑ symbol at the top of the graph to find the mean current. Record the mean current in a data table like the one below. (You will fill out other values later.)

Trial	Resistance (Ω)	Current (A)	Voltage (V)
1	100	Step 6	Step 7
2	Step 8	Step 8	Step 8
3	Step 9	Step 9	Step 9

7. Highlight the portion of the Voltage versus Time graph showing the time when the current ran through the circuit. (This should be the same time period as that measured in step six.) Then press the ∑ symbol at the top of the graph to find the mean voltage across the resistor. Record it in the data table where indicated.
8. Remove the 100 Ω resistor and replace it with the 33 Ω resistor and connect the voltmeter to the resistor as you did before to the 100 Ω resistor. Repeat steps five through seven.
9. Remove the 33 Ω resistor and replace it with the 10 Ω resistor. Repeat steps five through seven.
10. Crunch the numbers to discover a mathematical relationship between resistance, current, and voltage.

DATA TABLES & GRAPHS
Include the following:
*   The data table showing resistance, current, and voltage for each of the three trials.

CALCULATIONS
Show your work for the following:
*   In step ten you discovered a mathematical relationship between resistance, current, and voltage. Show this calculation as applied to each of your three trials.

CONCLUSION
Draw a conclusion about the objective of this lab. (Pro tip: State the relationship you discovered between resistance, current, and voltage and refer to your calculations for support.)