

NAME \_\_\_\_\_

DATE \_\_\_\_\_

**Scenario**

Dominique wishes to determine the resistivity of the graphite used to make mechanical pencil “lead.” She connects individual pieces of graphite of different lengths but of the same diameter (0.5 mm), one at a time, to a battery. She uses a voltmeter to ensure that the potential difference across the graphite is approximately constant and finds a value of about 1.20 V. Dominique also uses an ammeter to measure the different values of current passing through each piece of graphite on each trial. Her results are shown on the table to the right.

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Length (m)	Current (A)	
0.02	0.29	
0.04	0.15	
0.06	0.10	
0.08	0.07	
0.10	0.06	

**Using Representations**

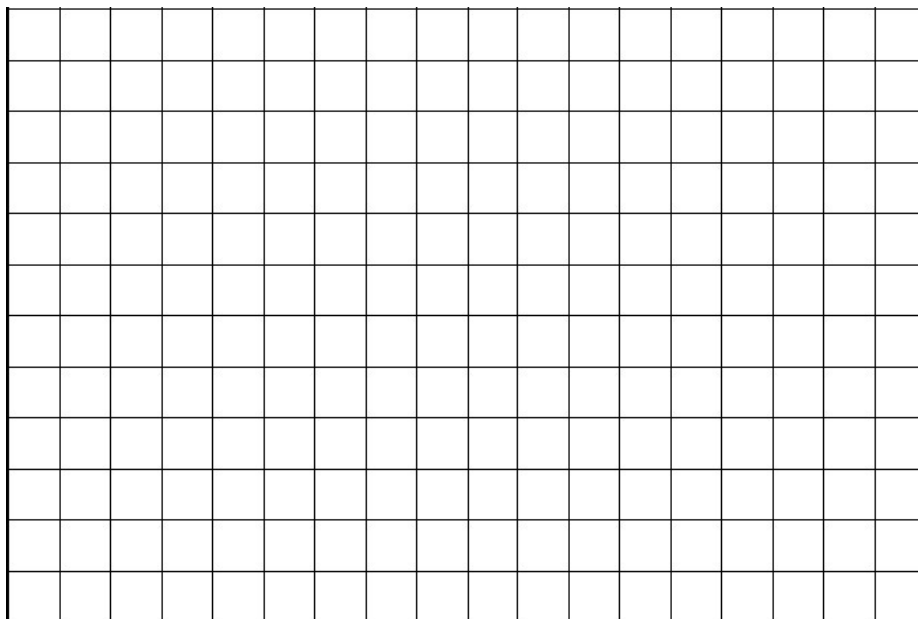
**PART A:** Draw a circuit diagram showing the battery, one piece of graphite, and the ammeter and voltmeter all connected correctly to make measurements in this experiment.

**PART B:** In the space below, state the quantities that should be graphed to yield a line whose slope can be used to calculate the resistivity of graphite. By manipulating basic equations, show why these two quantities yield a line when graphed and what the slope would represent. Then fill in one or both columns as needed with calculated values. Plot your linearized graph on the grid below and draw a best-fit line.

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### Quantitative Analysis

**PART C:** Use the slope of your graph to calculate the resistivity of graphite.

### Argumentation

**PART D:** Dominique finds that the value measured by the voltmeter increases very slightly as the length of the graphite used increases. She correctly claims that this has nothing to do with the graphite but instead is due to some property of the battery. Explain why she observes this increase.

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