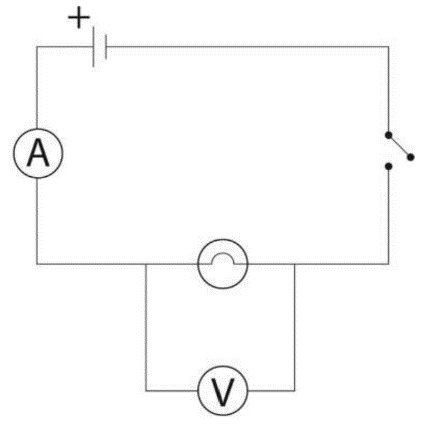
**Name: \_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_ Class: \_\_\_\_ Date: \_\_\_\_\_\_\_ Mark: \_\_\_\_ / 25**

**Year 9 Physical Sciences**

**TASK: Analysing an Ohm’s Law Experiment**

A student conducted an experiment to measure the resistance of two light globes using Ohm’s Law. A description of their experiment and results are given below.

“I connected the first globe and switch in series with a power pack. To measure the current through the globe, I added an ammeter in series with it. I connected a voltmeter in parallel to the globe to measure its voltage.

I set the power pack to 0 V, and recorded the voltage and current. Then I increased the voltage on the power pack to 2 V, and recorded the voltage and current again. I continued to increase the voltage by 2 V each time and repeated the measurements, until I reached 12 V.

I repeated my experiment with a different globe, to see if it had a different resistance.

Questions:

1. What was the student’s aim in this experiment? (1)

To measure the resistance of different light globes OR

To find out if different light globes have different resistances OR similar

1. For the student’s experiment, identify the: (4)
   1. Independent (changed) variable: Different light globes
   2. Dependent (measured) variable: Resistance of the globes
   3. Two controlled variables: Same power source, same connecting wires, same ammeter/voltmeter, same type of circuit etc. (Any 2 for 1 mark each)
2. Explain why the student connected the ammeter in series with the globe, but connected the voltmeter in parallel to the globe. (2)

The ammeter is connected in series to measure electron flow through it (1 mark)

The voltmeter is connected in parallel to measure the difference in energy of the globe (1 mark)

The student’s results are shown in the table below. Use the results to draw a graph and answer the questions.

|  |  |  |
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| **Voltage (V)** | **Current of Globe 1 (mA)** | **Current of Globe 2 (mA)** |
| 0 | 0 | 0 |
| 2 | 5 | 8 |
| 4 | 10 | 16 |
| 6 | 15 | 24 |
| 8 | 20 | 32 |
| 10 | 25 | 4 |
| 12 | 30 | 48 |

1. Plot a **scatter** graph of voltage vs current on the grid below. Include a key and lines of best fit. (7)

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|  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  | * Title: Voltage and Current of Two Light Globes or similar (1 mark) * X-axis: Correctly marked and spaced numbers (½ mark)   Axis label (½ mark)   * Y-axis: Correctly marked and spaced numbers (½ mark)   Axis label (½ mark)   * Accurately plotted data (1 mark) * Lines of best fit (1 mark each = 2 in total) * Key (1 mark)   -1 mark for swapped axes |
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1. An outlier is a data point that does not seem to fit the pattern of the rest of the data.
   1. Which of the student’s data points is most likely an outlier? (1)

Globe 2, 10 V measurement

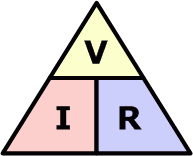
* 1. Based on the table or your graph, predict what this value should have been, if it followed the same pattern as the rest of the data. (1)

40 A

* 1. Propose what may have caused this incorrect measurement. (1)

Misreading the scale on the ammeter OR

Incorrect setting on power pack OR other reasonable reason



1. The student wants to calculate the resistance of each globe. Write down the equation they should use. (1)

R = V/I

1. Use the values in the table and Ohm’s law to calculate the resistance of the two globes. Globe 1: (3)

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| --- | --- | --- |
| **Given** | **Work** | **Final Answer** |
| 1 mark | 1 mark | 1 mark |

Globe 2: (3)

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| **Given** | **Work** | **Final Answer** |
| 1 mark | 1 mark | 1 mark |

1. What conclusion can the student make about the effect of resistance on the current flowing through a circuit? (1)

As the resistance is increased, the current decreases. OR

Lower resistance allows more current to flow. OR similar