**2019 Year 11 Physics**

**Task 6: Resistance – Validation Test**

Name: \_\_\_\_\_\_\_\_\_\_\_\_\_\_\_

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# Question 1 (1 marks)

In your experiment, why did you need to measure your data at multiple points?

**Question 2 (1 marks)**

In your experiment, how do you think temperature could impact your results?

**Question 3 (2 marks)**

Show mathematically how the resistance of a material decreases when the cross sectional area increases.

**Question 4 (7 marks)**

Two wires A and B of the same material have resistances of 6.0 Ω and 54.0 Ω, respectively. The length of A is double the length of B.

1. What is the ratio of the diameter of wire A to the diameter of wire B? (3 marks)
2. If two wires are connected in parallel across a 6.0V battery, what is the current in each wire? (4 marks)

**Question 5 (13 marks)**

Two physics students conducted an experiment to examine the effect that length has on the resistance of a wire, the wires were made of the same material and had the same diameter (0.6mm). Their results are shown in the table below.

*Table 1: Student’s results table*

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| --- | --- |
| **Length of wire (m)** | **Resistance (mΩ)** |
| 0.45 | 26.5 |
| 0.60 | 34.9 |
| 1.20 | 70.2 |
| 1.80 | 105.9 |
| 2.00 | 116.5 |

1. Produce a linear graph from the independent and dependent variables in the table, using the background information as a guide. (4 marks)

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1. Draw a line of best fit on the graph on the previous page. (1 mark)
2. From the graph, calculate the gradient of your line of best fit (2 mark)
3. Using the data given above and your graph, calculate the experimental value for the resistivity of the wires. Using the gradient, determine the resistivity value of the wires used by the students used in this experiment. (3 marks)
4. The students looked up the manufacturer of the wire and saw they claimed an accuracy of with ± 2% of expected values.

Look at the chart below and state what material the wire most likely is and then calculate the percentage difference between the experimental value you calculated in part d) and the accepted value. Comment on whether your experimental result is within the accepted range or not.

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| Material | Resistivity (ohm m) | |
| Silver | 1.59 | x10-8 |
| Copper | 1.68 | x10-8 |
| Copper, annealed | 1.72 | x10-8 |
| Aluminium | 2.65 | x10-8 |

(3 marks)