Year 11 Physics

Electricity **Practical** Assessment

Mark:

(15)

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

Teacher: \_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_

**Determining the relationship between potential difference and current in a resistor.**

The amount of current flowing in a metallic conductor depends on the amount of charge flowing past a point per unit time.

If you apply a potential difference, V, across the ends of a conductor it will cause a current, I, to flow. You can use a voltmeter to measure the electrical potential difference, V, between the ends of a metal wire resistor and you can measure the current, I, in that resistor with an ammeter.

In this experiment you will investigate the relationship between current and potential difference.

|  |  |  |
| --- | --- | --- |
| **Equipment needed:** | | |
| Power supply (0-12 V DC)  Electrical leads (6 of)  Single globe (12 V) | Voltmeter (0-12V) Ammeter (0-5A) | Switch  Unknown resistor (1 only) |

Procedure:

|  |  |
| --- | --- |
| 1 | Before connecting the circuit using the voltmeter measure and record the terminal voltage of the power supply without any load in the **bold column** in the table below. |
| 2 | Connect the equipment as shown in the circuit diagram below.  V  Resistance (or load)  A  Power supply  Switch |
| 3 | Set the power supply to the minimum output with the unknown resistor connected to your circuit. Set both meters to the maximum reading before turning on the power supply to ensure correct polarity. With the meters working correctly continue with the lab test. |
| 4 | Adjust the power supply output to get five different readings of potential difference and current.  NB: Do NOT run the circuit for more than 15-20 seconds. If the current is too high it may overheat the resistor, damaging it. |
| 5 | Repeat steps 3 and 4, replacing the 12V globe as the unknown resistor. **(Check that the globe is 12 V)** |

**Part A: Group Work**

Processing results:

1. Record your results for the **unknown** resistor. Calculate & record the values for **V / I**.

|  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- |
| Reading | **Terminal voltage (V)** | Current (A or mA) | Potential difference (V) | | V / I |
| 1 |  |  |  | |  |
| 2 |  |  |  | |  |
| 3 |  |  |  | |  |
| 4 |  |  |  | |  |
| 5 |  |  |  | |  |
|  |  |  | | Average |  |

(1 marks)

2. Record your results for the 12 V globe. Calculate & record the values for **V / I**.

|  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- |
| Reading | **Terminal voltage (V)** | Current (A or mA) | Potential difference (V) | | V / I |
| 1 |  |  |  | |  |
| 2 |  |  |  | |  |
| 3 |  |  |  | |  |
| 4 |  |  |  | |  |
| 5 |  |  |  | |  |
|  |  |  | | Average |  |

(1 marks)

**Part B: Independent Analaysis**

1. Plot a graph of potential difference, V, against current, I, (ie current on the horizontal axis) for the resistor, and the 12 V globe. Use graph paper supplied. **Write your full name on the top of the graph paper.**

(4 marks)

QUESTIONS:

|  |
| --- |
| 1. State which component, if any, was ohmic or non-ohmic  Resistor (unknown) = \_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_ (1)  12 V Globe = \_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_ (1) |
| 2. (i) **On** your unknown resistor **graph** (V vs I) **show** your working for the values used in determining the slope (actual rise and run used) (2)  (ii) Show your working to calculate the slope of your unknown resistor graph.  (2) |
| 3. State the value of unknown resistor according to **your graph**.  Unknown resistor = \_\_\_\_\_\_\_\_\_\_\_\_  (1) |
| 4. Briefly state the relationship between slope and resistance exhibited on your graph.  (2) |

**End of practical assessment.**