GCSE

Rewarding Learning

CCEA GCSE TEACHER GUIDANCE

Double Award Science Practical Manual

Unit 7: Practical Skills

P6: Investigating Ohm's Law

For first teaching from September 2017

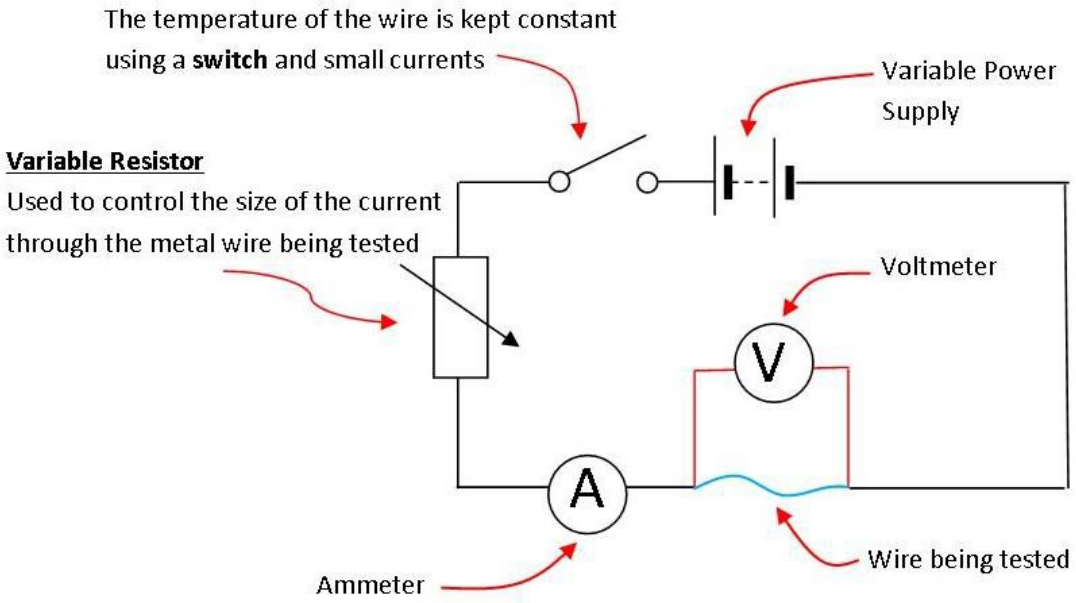
Investigating Ohm's Law

Use a voltmeter to measure the voltage across a metal wire and an ammeter to measure the current passing through the wire, and

- demonstrate understanding that the temperature of the wire is kept constant using a switch and small currents;
- demonstrate understanding of the need to obtain sufficient values of voltage and current so that a voltage-current characteristic graph (V-I graph) can be plotted, with voltage on the y-axis and current on the x-axis;
- recall that the V-I graph is a straight line that passes through the origin; and
- recall that this shows that the current and voltage are proportional for a metal wire at constant temperature, and that this is known as Ohm's law (Prescribed Practical P6).

Investigate the relationship between current flowing through a wire and the voltage across it

Method

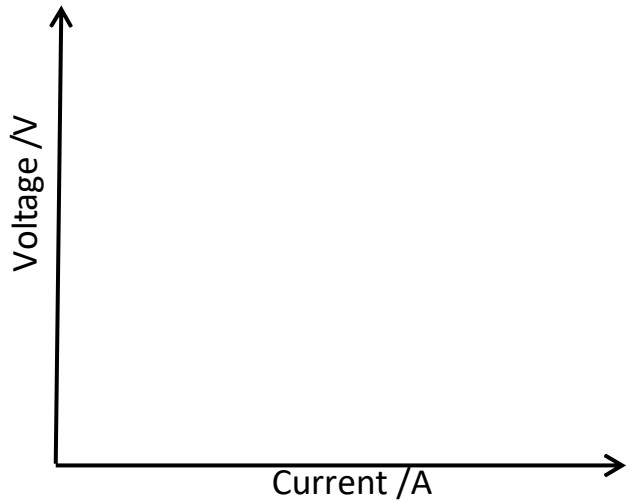


1) Set up the circuit as shown.
2) Close the switch.
3) Adjust the variable resistor so that the reading on the ammeter is 0A (i.e. there is no current flowing through the circuit).
4) Record the voltage from the voltmeter.
5) The switch should be opened after each reading to prevent the wire from heating up due to the current flow.
6) Repeat steps 2-5 adjusting the variable resistor each time so that the current flowing through the wire being tested is 0.1A, 0.2A, 0.3A, 0.4A and 0.5A.

Sample Results

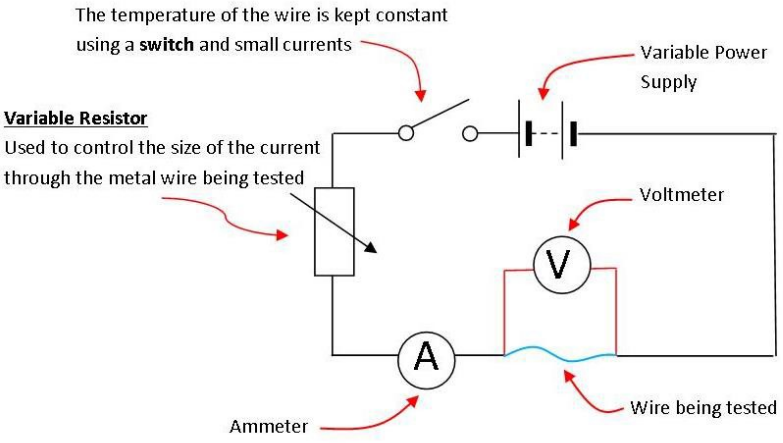
Current/A	Voltage/V
0.00	
0.10	
0.20	
0.30	
0.40	
0.50	

Plot a graph of current on the x-axis and voltage on the y-axis.



Conclusion

Teacher/Technician Notes



Apparatus per pupil/group

1 x Mains DC power supply 0-12V

~30cm 32 SWG Constantan (Eureka) wire

2 x crocodile clips with 4mm plugs

1 x Ammeter 0-10A x 0.01A DC

1 x Voltmeter 0-20V x 0.01V DC

1 x Rheostat (22Ω, 3.1A)

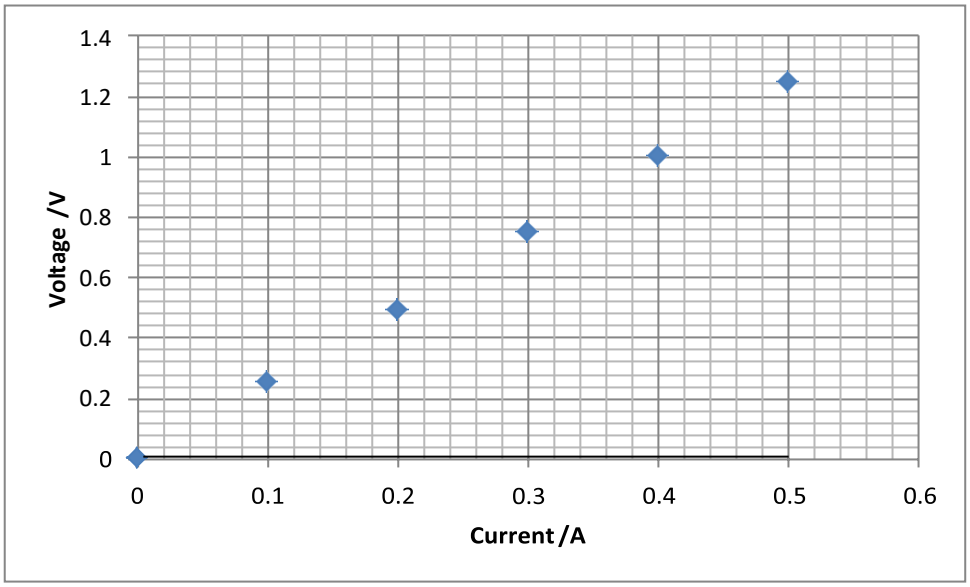
1 x switch

9 x connecting leads, fitted with 4mm plugs (0.25-0.5m long)

Sample Results

Current/A	Voltage/V
0.00	0.00
0.10	0.25
0.20	0.49
0.30	0.75
0.40	1.00
0.50	1.24

Plot a graph of current on the x-axis and voltage on the y-axis.



Conclusion

This graph shows that the metal wire obeys Ohm's law.

The current flowing through the wire is directly proportional to the voltage across it. We know this because the results give a straight line graph which passes through the origin.

The straight line also shows that the resistance of the wire remains constant.