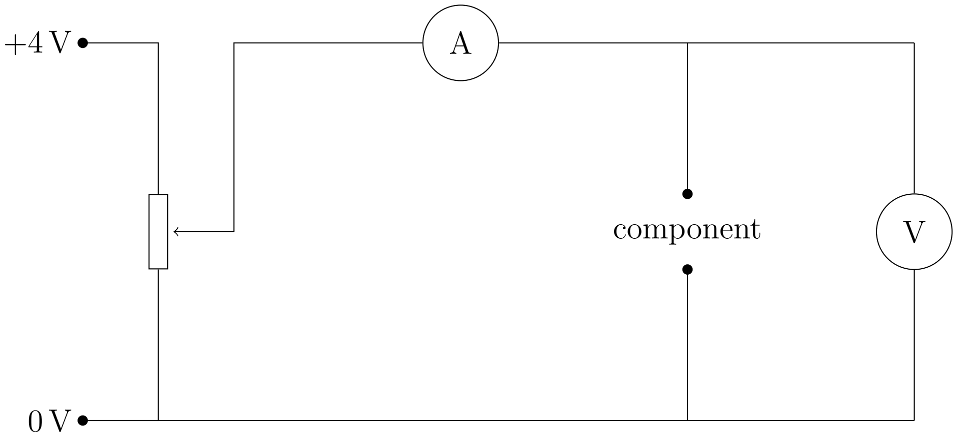
1 $I - V$ characteristics

This practical comprises three related experiments, which will allow you to plot $I - V$ graphs for an ohmic conductor, a filament lamp, and a diode.

Set up the circuit as shown below, noting the following points:

- Place the components in the board as shown, with the ohmic conductor (resistor) as the first component
- The ammeter is to be set on the 200 mA range
- the voltmeter is to be set on the 2V range
- Set the power supply voltage to about 4 V d.c. making sure the positive and negative are as shown



1. Using the variable resistor (and if necessary the voltage setting on the power supply), measure the current through the ohmic conductor for voltages between 0.00 V and 0.60 V, ion 0.10 V steps.

Voltage V / V	Current I / mA

2. Replace the ohmic conductor with the filament lamp, and repeat the experiment.

Voltage V / V	Current I / mA

3. Replace the filament lamp withthe diode. **Make sure that the diode is forward biased**, i.e. it faces in the direction of conventional current flow. Repeat the experiment, however this time increase the p.d. in steps of 0.10 V until 0.5 V, noting the current, then continue by increasing the current in steps of 20.0 mA, noting the voltage.

Voltage V / V	Current I / mA
0.00	
0.10	
0.20	
0.30	
0.40	
0.50	
	20.0
	40.0
	60.0

4. Plot a graph of I on the y-axis against V on the x-axis for each component **using the same scales (but different axes) for all.**

5. (a) Calculate the gradient of the graph for the ohmic conductor

(b) The resistance of the ohmic conductor is given by the reciprocal of this gradient. Calculate the resistance of the ohmic conductor.

(c) Using values from you table, calculate the resistance of the filament lamp for two different calues of voltage.

(d) Explain why the resistance of the filament lamp changes in this way.

(e) Explain the shape of the diode graph in terms of its resistance.

(f) What would the graph for the diode look like if it were to be placed in the reverse direction?