

Lesson Element

Characteristic Curves

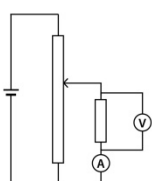
Instructions and answers for teachers

These instructions should accompany the OCR resource 'Characteristic Curves' activity which supports OCR A Level Physics A

**A LEVEL
PHYSICS A**

Lesson Element

Characteristic Curves




Equipment: Smooth power supply; rheostat/potentiometer; ammeter; voltmeter; connecting wires; range of components (ohmic resistor; diode; LED; thermistor; LDR)

Set up the circuit as shown in the diagram. **Make sure that the ammeter is initially set at the highest value to reduce chances of blowing the fuse.**

Task

1. To measure the characteristic curve for a component you must change the voltage and measure the current.
2. Find the maximum and minimum values of voltage that give appropriate readings, and then select the steps needed to give the required number of values.
3. Measure the current as the voltage is changed across a component.
4. Repeat the previous two steps with each of the components.
5. Draw the current – voltage curves for each component.
6. Calculate the resistance of the components.

Version 2



The Activity:



This activity offers an opportunity for English skills development.



This activity offers an opportunity for maths skills development.

Associated materials:

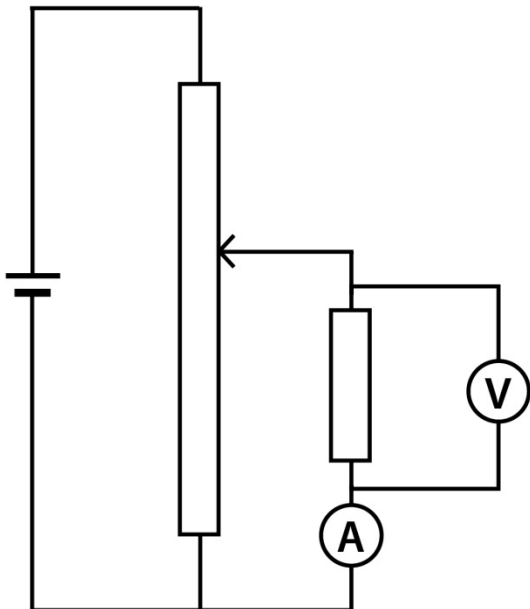
'Characteristic Curves' Lesson Element learner activity sheet.



A LEVEL PHYSICS A

Task

This is a typical approach, but should be adapted to fit the equipment within the school.



Equipment: Smooth power supply; rheostat/potentiometer; ammeter; voltmeter; connecting wires; range of components (ohmic resistor; diode; LED; thermistor; LDR)

Set up the circuit as shown in the diagram. **Make sure that the ammeter is initially set at the highest value to reduce chances of blowing the fuse.**

1. Use a standard text to set up the apparatus to control the voltage and measure the current through the component.
2. Measure the full range for each component and select the appropriate number of measurements thus creating the separation between values set on the voltmeter.
3. Set the voltage and measure the current for each device.
4. Note that the thermistor and LDR can be measured twice (or more) at different operating conditions: Warm and Cool for the thermistor and bright and dim for the LDR.
5. Draw I-V curves from the results.
6. Describe the changes in resistance for each of the components; calculate a value when the graph approximates to a straight line. **(Note that the resistance is calculated by dividing the corresponding values of V and I for any point on the graph. Beware of the misconception that gradient represents resistance, the gradient represents rate of change of voltage with respect to current, which is not linear for non-ohmic devices).**
7. Values for resistance can be checked against the data sheets for the components, often available from the supplier.



A LEVEL *PHYSICS A*

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