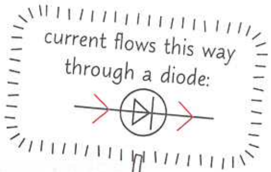
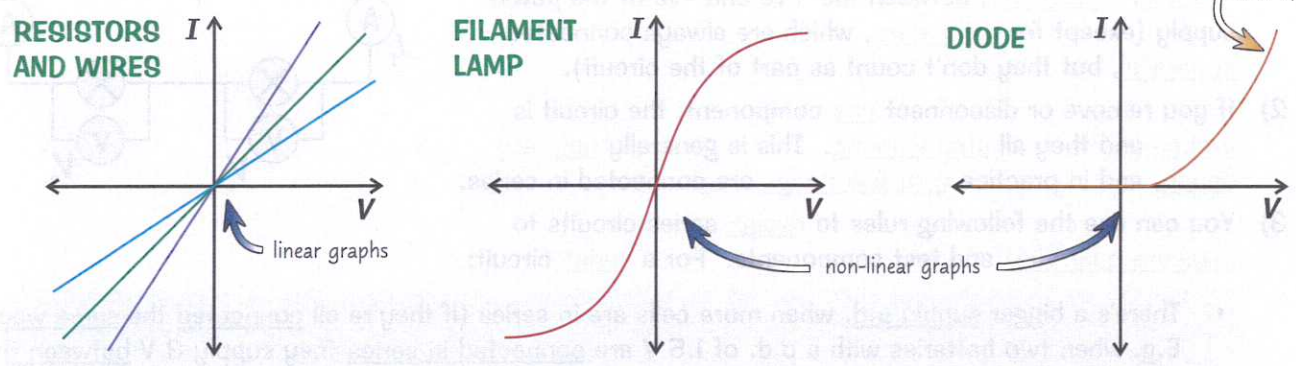
Circuit Devices

With your current and your potential difference measured, you can now make some sweet graphs...

Three Important Current-Potential Difference Graphs



I-V graphs show how the current varies as you change the potential difference (p.d.). Here are three examples, plotted from the experiment on the previous page:



Current is directly proportional to p.d. (if the temperature stays the same). Different resistors have different resistances, so their I-V graphs have different slopes.

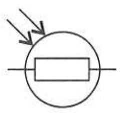
The increasing current increases the temperature of the filament, which makes the resistance increase (see p.185) so their I-V graphs are curved.

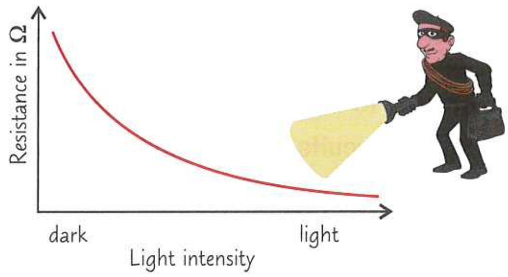
Current will only flow through a diode in one direction, as shown. The diode has very high resistance in the opposite direction.

1) Linear components have an I-V graph that's a straight line (e.g. a fixed resistor). Non-linear components have a curved I-V graph (e.g. a filament lamp or a diode).
2) For linear components, if the line goes through (0,0), the resistance of the component equals the inverse of the gradient of the line, or "1/gradient". The steeper the graph, the lower the resistance.
3) You can find the resistance for any point on any I-V graph by reading the p.d. and current at that point and sticking them into $V = IR$, p.185.

LDR is Short for Light Dependent Resistor

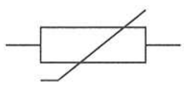
1) An LDR is a resistor that is dependent on the intensity of light. Simple really.
2) In bright light, the resistance falls.
3) In darkness, the resistance is highest.
4) They have lots of applications including automatic night lights, outdoor lighting and burglar detectors.

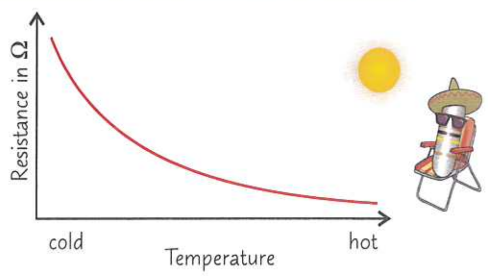




The Resistance of a Thermistor Decreases as Temperature Increases

1) A thermistor is a temperature dependent resistor.
2) In hot conditions, the resistance drops.
3) In cool conditions, the resistance goes up.
4) Thermistors make useful temperature detectors, e.g. car engine temperature sensors and electronic thermostats.





LDRs — Light Dependent Rabbits...

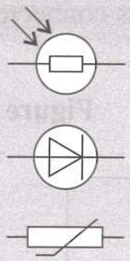
You may get given an I-V graph in your exam that you haven't seen before. Make sure you understand why these graphs have the shape they do, and you'll be ready for anything they throw at you.

Q1 Describe one everyday use for: a) an LDR b) a thermistor [2 marks]

Circuit Devices

Warm-Up

Draw lines to match each circuit symbol to the name of the component that it's representing.



thermistor

LDR

diode

1 The resistance of a thermistor changes depending on its surroundings. (Grade 4-6)

a) State what happens to the resistance of a thermistor as the surrounding temperature increases.

....

[1]

b) Give **one** example of a device that uses a thermistor.

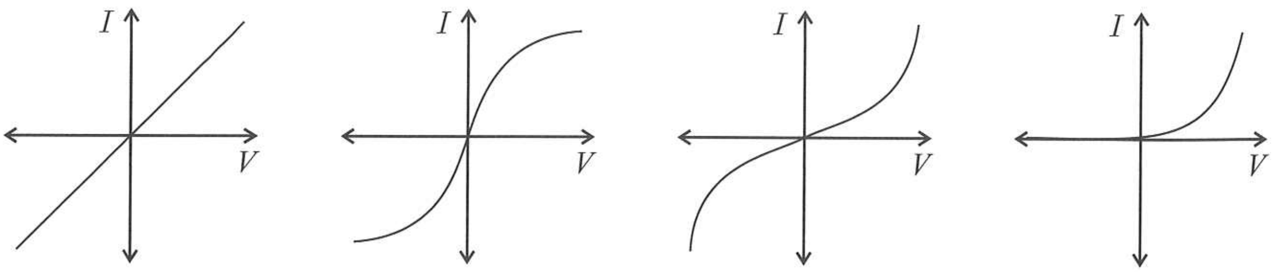
....

[1]

[Total 2 marks]

2 Filament bulbs are a common circuit component. (Grade 6-7)

a) Which is the correct I-V graph for a filament bulb?



☐ **A** ☐ **B** ☐ **C** ☐ **D**

[1]

b) Explain why the I-V graph for a filament bulb has this shape.

....

....

....

[2]

[Total 3 marks]

Exam Practice Tip

You'll need to know the I-V graphs for resistors, wires and diodes too, and whether they're linear or non-linear graphs. Plus, you'll need to be able to explain how the gradient of an I-V graph relates to the resistance of the component.