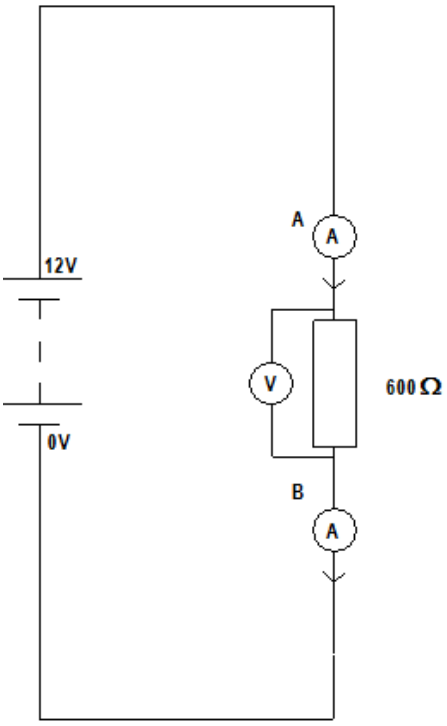
PRE-COURSE MATERIAL: YEAR 12 ELECTRONICS

Exercise One

The course is designed for students who have not studied Electronics before. However a facility with the basic rules of current electricity covered at GCSE Physics or GCSE Science is essential.



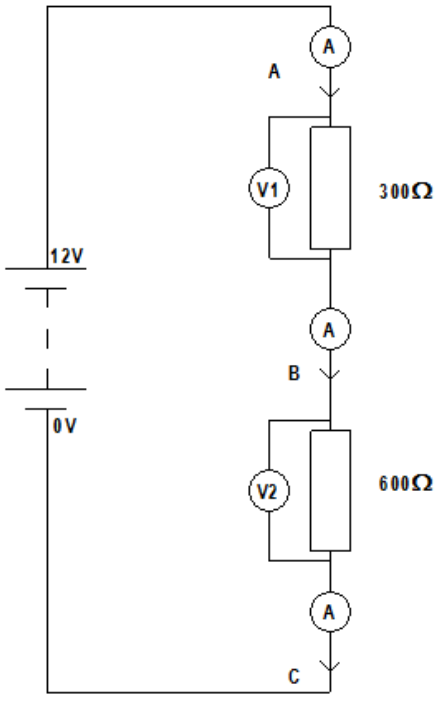
For example, would you be able to show that the reading on Ammeter A was 0.02A?

What would the Voltmeter reading be?

Would you be able to say what the reading on Ammeter B was?

If the battery was changed to one with a value of 9V, what would it do to the current?

0.02A could be written in milliamps. What is the value of 1 milliamp and what is 0.02A in milliamps?



In this second circuit, what is the total resistance?

What is the reading on Ammeter A, Ammeter B and Ammeter C?

What is the reading on Voltmeter 1 and Voltmeter 2?

On Line Resources

SHOCK AND AWE: THE STORY OF ELECTRICITY
This was a BBC programme presented by Professor Jim Al-Khalili. It is repeated occasionally on BBC4 and is then available on the BBC iPlayer. However, there are usually high quality versions available on YouTube. It is a 3 part series and although all 3 are worth watching, part 3 reflects in detail on the impact of Electronics in the modern world.

WJEC
Download the AS/A2 Specification
http://www.eduqas.co.uk/qualifications/electronics/as-a-level/
Read through the Core Concepts PDF document available at
http://resources.eduqas.co.uk/Pages/ResourceSingle.aspx?rIid=937

REVISOMATIC
https://reviseomatic.org/rOmV4/
This is great site for revising and reading around the A2 specification.

Although we begin the course from a very basic understanding of electricity, it is fair to say that more successful students have good background interest and are happy with units, multiples and submultiples. They can transpose simple equations, work with fractions and indices.

Exercise Two
Can you convert the following?

a) 0.01mA into A
b) 50nA into A
c) 120 kilohms into ohms
d) 120 kilohms into megohms

Exercise Three
Show that
$(12 \times 10^3 + 2 \times 82 \times 10^3) \times 22 \times 10^{-6}$ is equal to 3.872

Exercise Four
Revise how resistance is affected when resistors are connected in series and in parallel. Show how you would work out the total resistance of four 10kilohm resistors wired in SERIES and then for four 10kilohm resistors wired in PARALLEL.

Exercise Five
Fill in the blanks (test your answers on Revisomatic)

Electric Current (I)	A net flow of _____. Currents only flow if there is a complete circuit (no gaps). Currents only flow if there is a potential difference causing it to flow. Currents flow **THROUGH** circuits.
Current Units	A--- or A------.
Ammeter	Measures current in _____. The Voltage across an ideal ammeter is _____.

	Connect the ammeter in _____ with the component who's current you want to measure. At a junction, if you add up all the currents entering the junction, this value equals the sum of all the currents _____ the junction. Cars at road junctions behave in the same way.
Conductor	A material where the Electrons are free to move.
Insulator	A material where the Electrons are **NOT** free to move.
Voltage (V)	Electron Moving Force (EMF = Electromotive Force). Voltage is measured _____ circuits.
Voltage Units	Volts
Voltmeter	Measures Volts. The current through an ideal voltmeter is zero. Connect the voltmeter in _____ with the component who's voltage you want to measure. The sum of the voltages in a series circuit is equal to the sum of the power supply or battery voltages.
Potential	Is measured in Volts relative to the zero volt earth reference.
Potential Difference	Is measured in Volts between any two non-earth points.
Charge (Q)	Is measured in _____. A neutral or uncharged object has the normal number of electrons. A negative charge occurs if extra electrons are added. A positive charge occurs if electrons are removed. A continuous non-random flow of charge is an electric current.
Analogue Signal	A smoothly varying Voltage or Current with in infinite number of possible values. These values are proportional to measurements taken from the natural world.
Digital Signal	This has only two values: ON/OFF or LOW/HIGH or 0/1 or TRUE/FALSE
Transducer	A device that **converts** non-electrical **energy types** to or from electrical energy. **INPUT:** A device that converts a measurement from the natural world into a Voltage or a Current. **OUTPUT:** A device that converts a Voltage or a Current back into the natural world as light, heat, sound or movement for example.
Power (P)	Is measured in Watts. **Power = Volts x Amps**
Resistance (R)	Is measured in Ohms Ω. Here is a way to think of resistance: It tells you how many volts are needed to make one amp flow. You'd need 10 Volts to make an amp flow through a circuit with a resistance of 10 Ohms.
Frequency	The number of cycles per second measured in Hertz (Hz).
Period	The length in seconds of a pulse or complete cycle of a wave. Period = 1 / Frequency

Should you read this material and become overwhelmed, simply see your subject teacher at the start of the year. Individuals have begun the Electronics A-Level course with **no** prior knowledge of circuits and been awarded top grades by the end of their time at Calday.