



S2 Science—Voltage



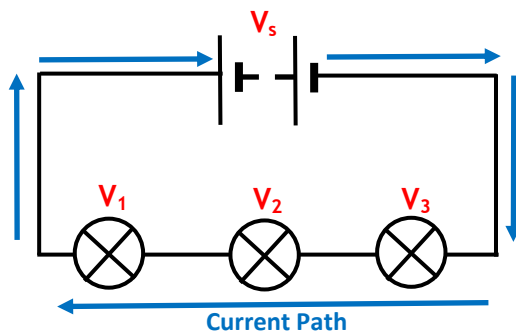
Voltage (V) is a measure of the energy given to each of the charge carriers in an electrical circuit. You can think of it as the 'push' given to each charge carrier to move it around the circuit.

The battery (or cell) in a circuit supplies the charge carriers with the energy to go around the circuit, hence charge carriers can never have more energy than the battery supplies them with.

Series Circuit

In a series circuit there is only one path for the charge carriers to take.

Consider the following circuit:



Each charge carrier has to pass through all 3 of the bulbs to get back to the battery.

To get through each of the bulbs and cause it to light up, it must give up some of its energy.

Therefore, for a series circuit, we can say:

$$V_s = V_1 + V_2 + V_3$$

Measuring Voltage

We measure Voltage (V) in units called Volts, or V for short.

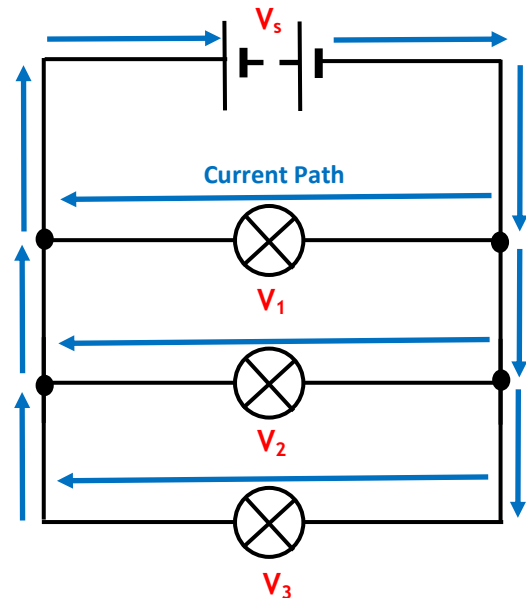
We use a device called a Voltmeter to measure current, that must be placed in **parallel**



Parallel Circuit

In a parallel circuit there is more than one path for the charge carriers to take.

Consider the following circuit:



Each charge carrier only has to pass through **one** bulb to get back to the battery.

To get through each of bulb and cause it to light up, it must give up all of its energy (as it only goes through one).

Therefore, for a series circuit, we can say:

$$V_s = V_1 = V_2 = V_3$$

Task

- 1) Draw the following circuits out either on paper or by using an online package (link below):
 - a) A series circuit with two bulbs, a battery, and a voltmeter measuring the voltage of one of the bulbs.
 - b) A parallel circuit with two bulbs, a battery, and a voltmeter measuring the voltage of one of the bulbs.
- 2) Two bulbs in a series circuit with a battery have their voltage measured with a voltmeter. Each bulb has a voltage of 5V measured across it. What is the voltage of the battery?
- 3) Two bulbs are placed in a parallel circuit with a battery and have their voltage measured with a voltmeter. Each bulb has a voltage of 5V measured across it. What is the voltage of the battery?

Online circuit builder (Note, not all circuit symbols will be the same):

https://phet.colorado.edu/sims/html/circuit-construction-kit-dc/latest/circuit-construction-kit-dc_en.html