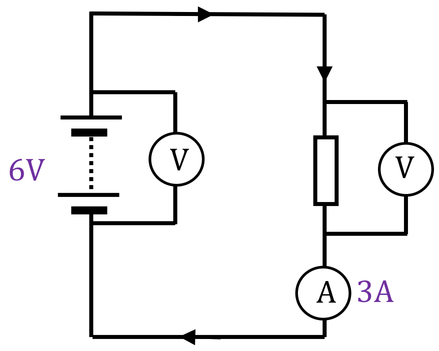
2.4.1 Current, voltage and resistance

Current (I) is the rate of flow of charge. It is measured in amperes (A), using an ammeter.

Voltage (V) is the energy that coulomb of charge carries. It is measured in volts (V), using a voltmeter.



In the circuit shown, a battery is connected in series with a resistor. Voltmeters have been connected to measure the voltage of the battery and the potential difference (p.d.) dropped across the resistor. An ammeter is used to measure the current that flows around the circuit.

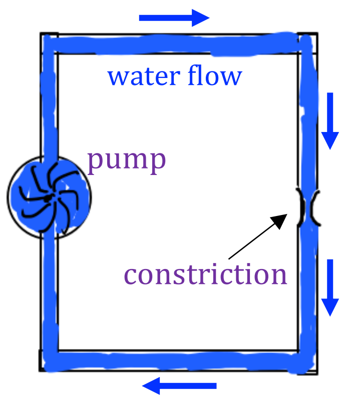
(1)✐What reading would you expect to see on the voltmeter which is connected across the resistor?

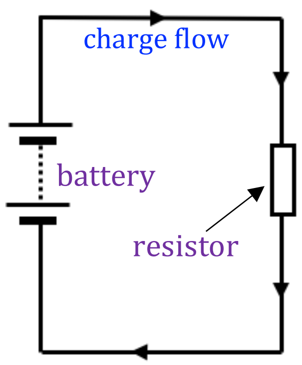
A useful model (as discussed in section 2.2) for simple circuits is a water model, with the flow of water representing the flow of charge (current). A water pump could represent the battery. A more powerful pump would represent a battery with a greater voltage. A more powerful pump can pump water more quickly.

(2)✐What would happen to the current if the voltage of the battery was increased?

Resistance (R) is a measure of the opposition to the flow of charge (current). Resistance is measured in ohms (Ω).

In the water model a constriction in a pipe can be used to represent a resistor. A constriction will slow down the flow of water.





(3)✏What would happen to the current if the resistance of the resistor was increased?

There is a relationship between current, voltage and resistance given by the equation:

$$V = I \times R$$

(4)✏Rearrange this equation to make R the subject (i.e. R= ….).

(5)✏Use values from the circuit at the start of the worksheet to work out a value for the resistance in ohms.

(6)✏Rearrange the formula to make I the subject (i.e. I=….)

(7) Looking at the formula in (6) and taking R to be a constant (which is true for a resistor), sketch a graph of I against V.