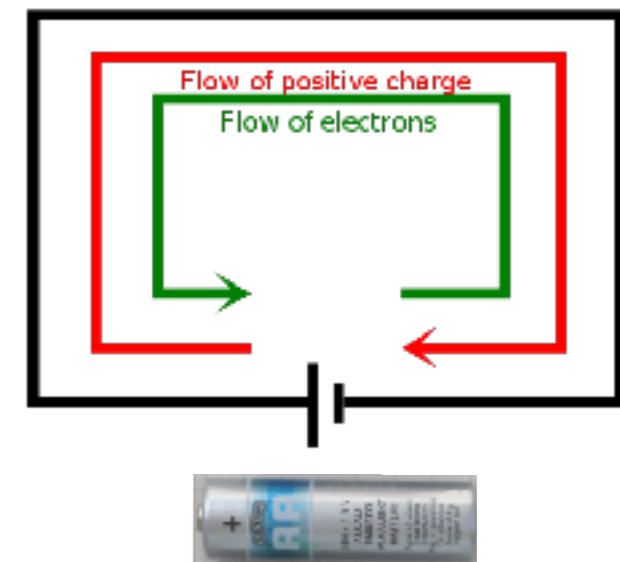# Electric Current (reminder)
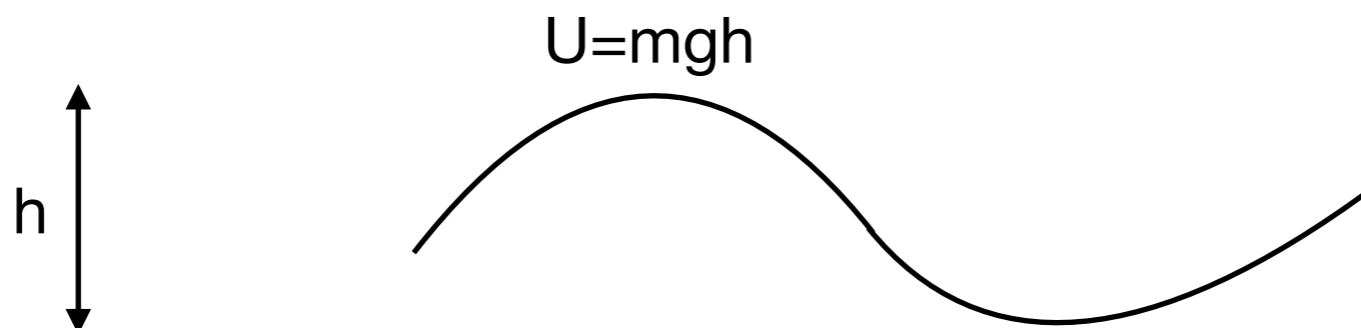
Electric Current (represented by letter **I**) is the total charge flowing through a given cross section of the wire in 1 sec. Current is measured in **Amperes [A]** (Coulomb per second) : **1A=1C/s**.

$$I = \frac{\Delta Q}{\Delta t}$$

Flow of positive charge

Flow of electrons

Potential Energy (reminder)

Potential Energy is the energy possessed by an object because of its position relative to other objects. Sometimes, we say, that potential energy is an ability to do work.

U=mgh

h

Gravitational potential energy

Ohm's Law

- **V** is **Voltage Drop**, the **Potential Difference** between two ends of a wire (or resistor, light bulb etc). **V** is the difference of electric potential energies of a unit charge between two points. Measured in **Volts [V]** (Joule per Coulomb): **1V=1J/C**

- **I** is **Electric Current**, the total charge flowing through the wire in 1 sec. Measured in **Amperes [A]** (Coulomb per second) : **1A=1C/s**

- **R** is **Resistance** of the wire. Measured in **Ohms [Ω]**. **1Ω=1V/A**
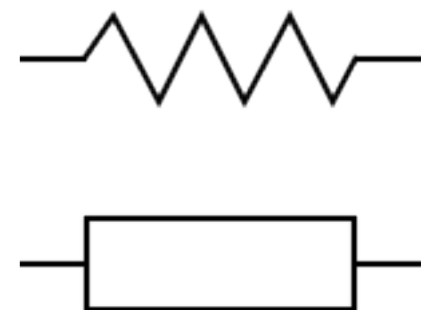
Ohm's Law: the current through a conductor between two points is directly proportional to the voltage across the two points. The voltage is, therefore, proportional to the current.
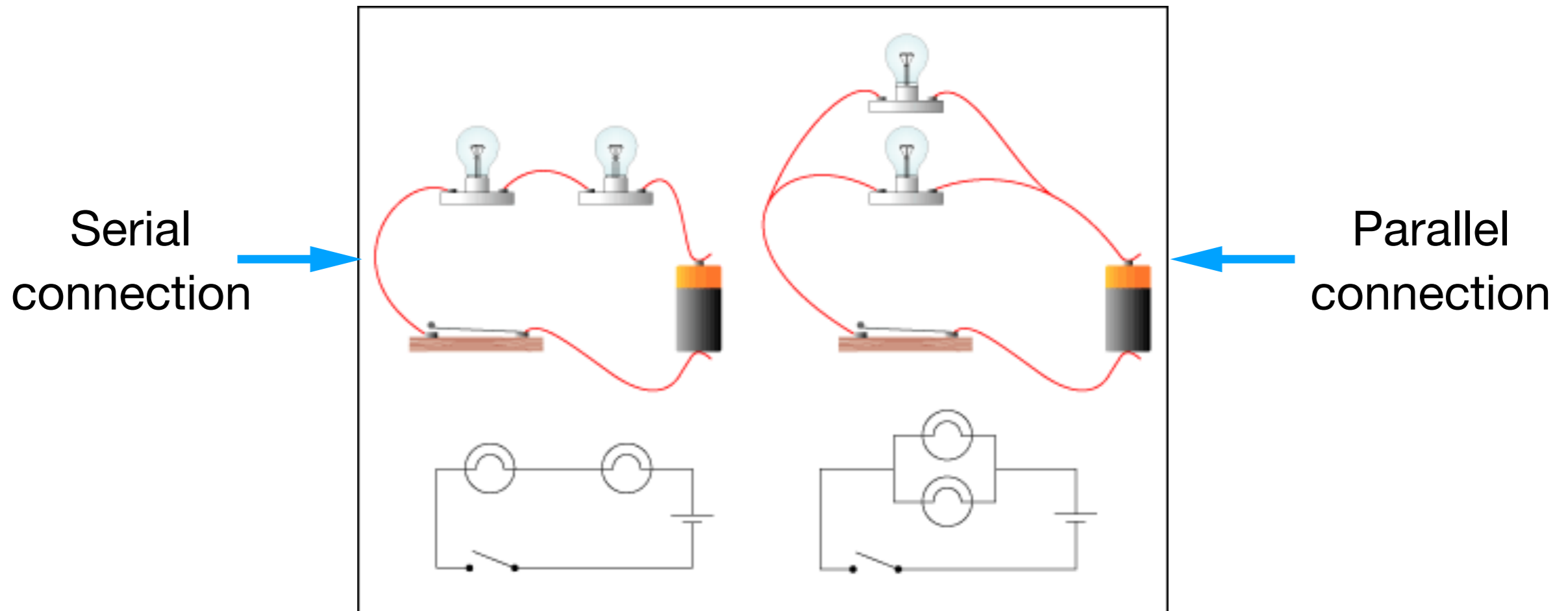
$$V = I \cdot R$$

The coefficient of proportionality is called **resistance** of the conductor

$$R = \frac{V}{I} \qquad I = \frac{V}{R}$$

Series and Parallel Circuits

Serial connection

Parallel connection

Series Circuit

- Currents are the same: $I_1 = I_2$

- Voltages are added: $V = V_1 + V_2$

Parallel Circuit

- Voltages are the same: $V_1 = V_2$

- Currents are added: $I = I_1 + I_2$

Homework

Problem 1

A resistor R=10 Ω is connected to a 1.5V battery. Sketch the circuit, and find the total current flowing via the battery.

Problem 2

Three resistors: R_1=10 Ω , R_2=20 Ω and R_3=30 Ω are connected in series as shown in the figure.

a) Current that runs through the first resistor is I=0.5A. Show the direction of the current. What are the currents that run through the other two resistors?

b) Find the voltage drop on each resistor, and the voltage supplied by the battery.