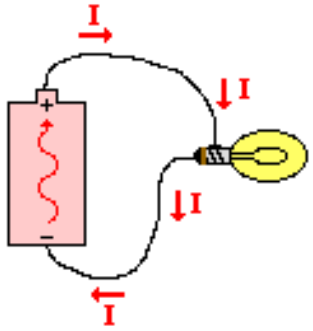
Electric current

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

current — charge — time



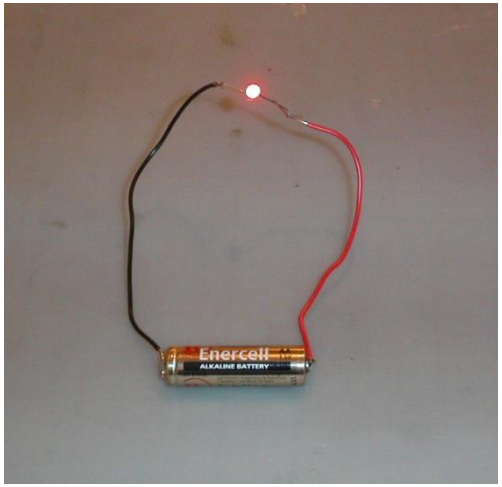
Electric current in the external circuit is directed from the positive to the negative terminal.

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

In most cases the current is the flow of electrons (negative charges), but the convention is to assume that current is the motion of positive charges. When electrons are moving to the right, it is the same as positive charge (and current) is moving to the left. Therefore, the current is flowing from '+' to '-' terminal of a battery.

Voltage

$$V = \frac{E_{potential}}{\Delta Q}$$



Voltage **V** is a potential energy of a unit charge. It tell you how much work the charge can do in an electric circuit. One typically measures a **Voltage difference** between two points in a circuit. It is similar to measuring height on a ski slope.

Homework

Tesla Model S has a battery pack made of approximately 7000 individual batteries. Each battery has voltage V=3.7V. It also has a “capacity” of 3.4 Ah (Ampere*hours). It means that it can run a current of 3.4 A for 1 hours (or, e.g. 1 Amp for 3.4 hours).

a) Find what is the maximum charge that a single battery can “pump” before it completely discharges (in Coulombs).
b) Using (a) find the total energy that a single fully charged battery can supply (remember that potential energy of a charge Q is Q*V)
c) What is the total energy stored by fully charged battery pack of Tesla Model S?