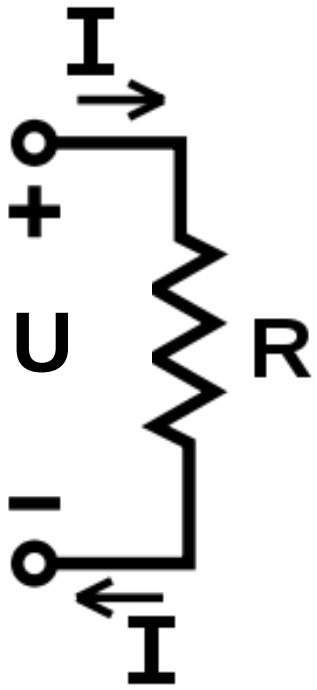
Ohm's Law

$$U = I \cdot R$$



• **V** is **Voltage**, the **Potential Difference** between two ends of a wire (or resistor, light bulb etc). Measured in **Volts [V]**

• **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].** $1\Omega = 1\,V/A$

POWER

$$Power = \frac{Work}{time}, \qquad \mathrm{P} = \frac{\Delta \mathrm{W}}{\Delta t}$$

- **W** may be mechanical work, or work done by a battery driving an electric current.

- In this definition, ***Work*** can also be replaced with ***Heat***. That will be thermal power rather than mechanical or electric one.

- Units of power are Watts [W]: 1W=1J/s (Joule per second)

POWER IN ELECTRIC CIRCUIT

$$Power = Current \times Voltage, \qquad \mathrm{P} = I \cdot V$$

Homework

Problem 1.

A typical AA battery has voltage 1.5 V , and can support current 0.01 A for 100 hours (it's called 1Ah or amp-hours). Suppose you want to replace such a battery with a capacitor charged to the same voltage, 1.5V. Estimate the charge of this capacitor in Coulomb (C)?

Problem 2

A 1.5V battery that store a charge of 1Ah (Amp-hour) is used to power a flash light. Resistance of the light bulb is 5 Ohm. Find the expected battery life in hours.

Problem 3

An electric motor is used to lift a load of mass **m=50 kg** to height **h=10m** , over time **t=10s**
Find the power of the motor and current that runs through it, if the voltage on the motor is **V=110V.**