UF | UNIVERSITY of FLORIDA

Pre-Health Post-Baccalaureate Program
PHY2054 Study Guide & Practice Problems

Date:

9/28 - 10/2

Topics Covered:

Currents

EMF

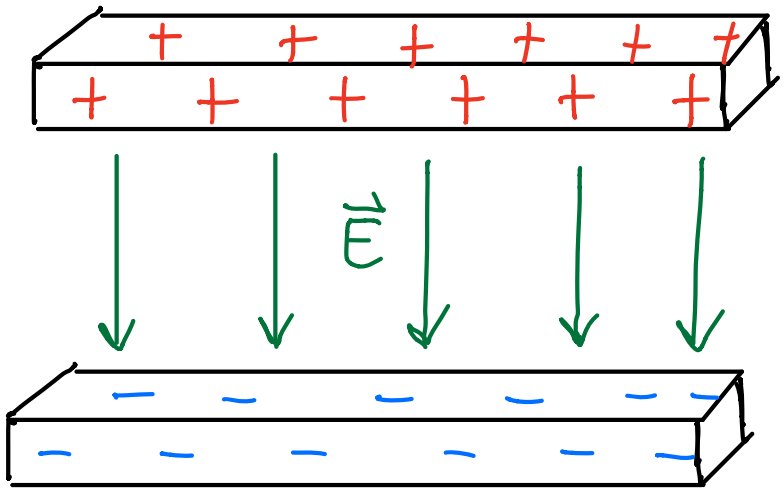
Ohm's Law

Resistance

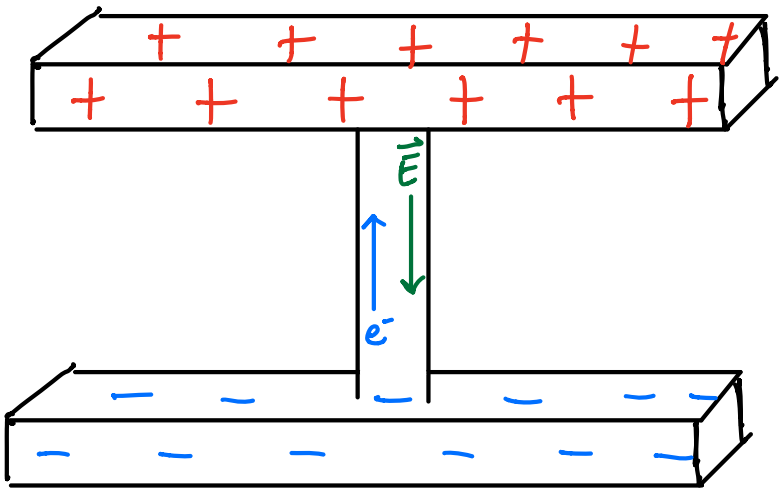
Power

Created by Isaac Loy

Recall that separation of charge creates an electric field:



If we connected the two plates in the conductor above, we would see electrons flood towards the positively charged plate. We would also create an electric field within the connecting piece moving from positive to negative:



The electric field in the connecting piece creates, and drives, the current. The current can be thought of as the flow of positive charge from the positive plate (terminal) to the negative plate (terminal).

Mathematically, current is represented by I, where:

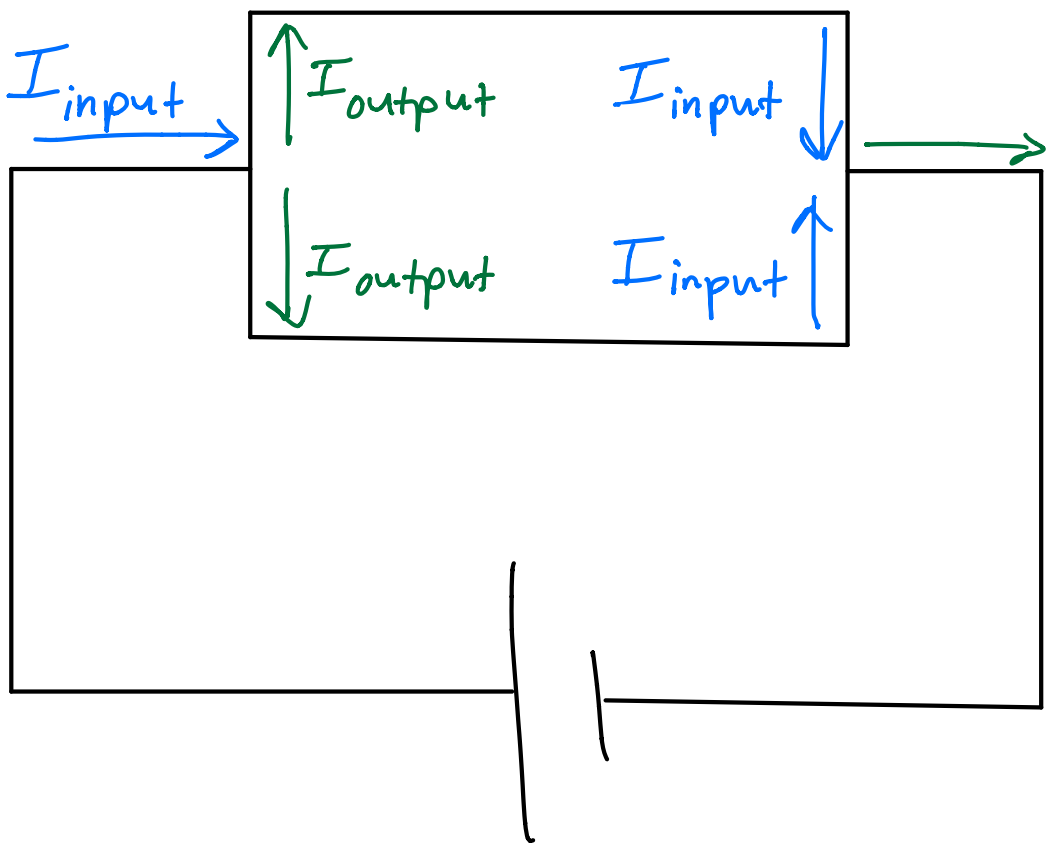
$$I = \frac{\Delta q}{\Delta t}$$

The unit for current is the ampere (A):

$$1\ A = 1\ C/s$$

When current arrives at a junction, Kirchhoff's Junction Law tells us that input current equals output current

$$\sum I_{input} = \sum I_{output}$$



A battery is is any device that separates charge (has positive and negative terminals) and is connected by a wire which allows charge to travel (current).

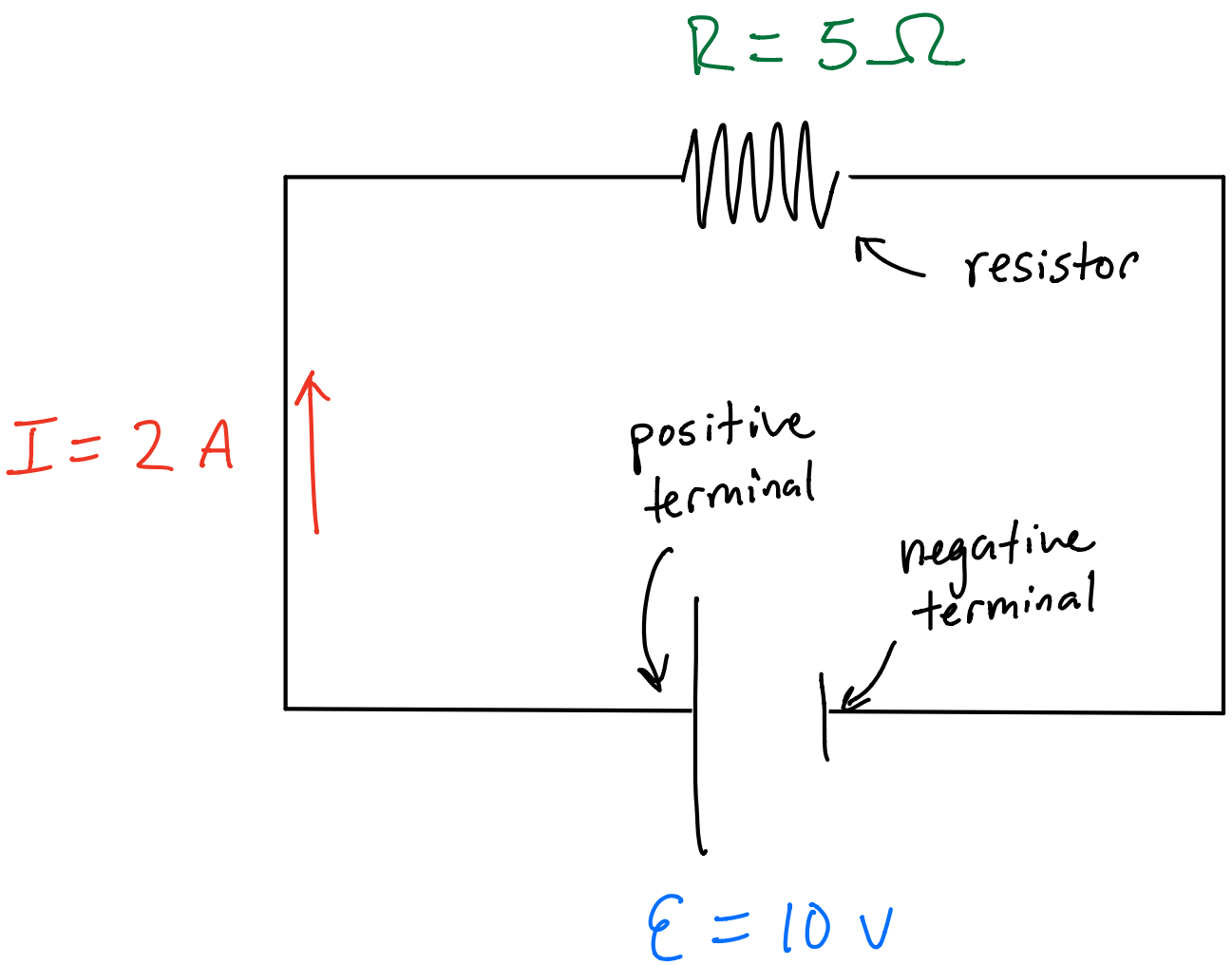
A battery establishes a potential difference (emf ($\mathcal{E}$), voltage (V)).

Batteries often have resistors, or areas of resistance to the flow of charge. Resistance is measured in Ohms (Ω).

The topics of potential difference / voltage / emf, current, and resistance are related through Ohm's Law:

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

Example battery diagram:



The power delivered by a battery is given by:

$$P_{emf} = I\mathcal{E}$$

power in terms of emf

Because $\mathcal{E} = V = IR$, we can substitute IR for $\mathcal{E}$ in the previous equation, allowing us to examine how much power the resistor dissipates:

$$P_R = I(IR)$$

$$P_R = I^2R$$

power in terms of resistance