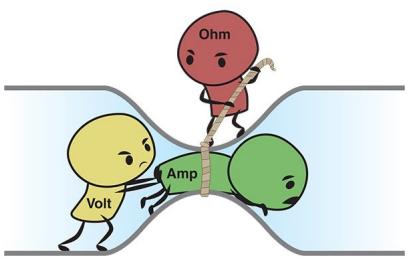
ECE 210 (AL2) – ECE 211 (E)

Chapter 1

Circuit Fundamentals



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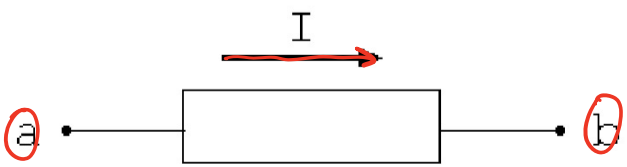
Outline

- Current and voltage
- Series and parallel configurations, SRS
- Kirchhoff's voltage and current laws (KVL and KCL)
- Ideal Resistors, Ohm's law
- Independent and dependent sources
- Absorbed power
- Ideal Capacitors and inductors
- Obtain voltages, currents and absorbed power in basic circuits using KVL, KCL and Ohm's law

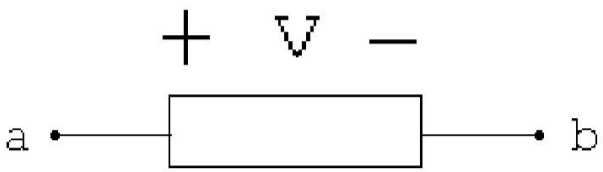
- Current: amount of net electrical charge per unit time passing in the direction of arrow.



$$I = \frac{dq}{dt} \qquad \begin{matrix} > 0 \\ = 0 \\ < 0 \end{matrix}$$

- Units: Amperes (A) = $\frac{Coulomb\ (C)}{second\ (s)}$

- Voltage: energy gain per Coulomb moved from "-" terminal to "+" terminal, or energy loss per Coulomb moved from "+" terminal to "-" terminal.

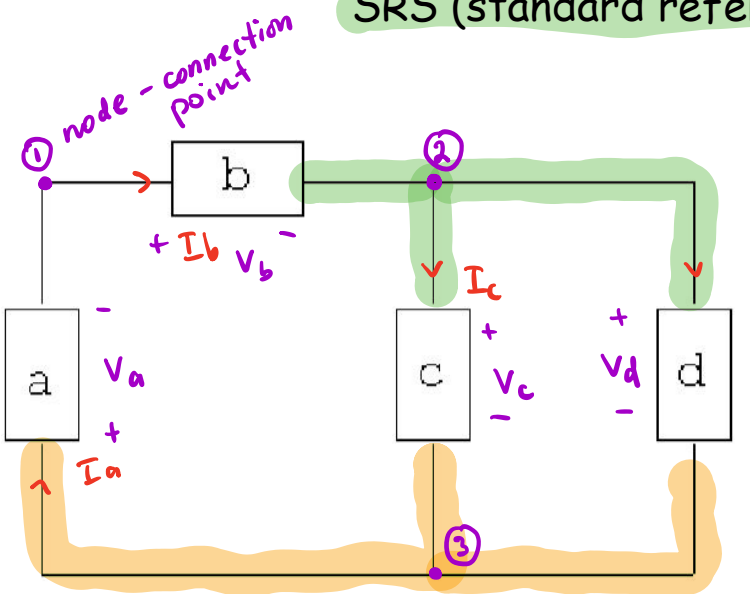


$$V = \frac{dW}{dq} \quad \begin{cases} > 0 \\ = 0 \\ < 0 \end{cases}$$

- energy gain from "-" to "+"
- energy loss from "-" to "+"

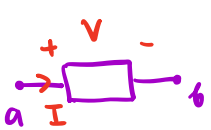
- Units: Volts (V) = $\frac{Joule\ (J)}{Coulomb\ (C)}$

- Example #1: assignment of polarities and current directions, SRS (standard reference system)



- Series vs Parallel:
  - Series : same current ($I_a = I_b$)
  - Parallel : connected to the same two nodes => same voltage, e.g. $V_c = V_d$

SRS: current goes into "+" terminal



- Node voltage: energy gain per Coulomb moved from a reference node to a specific node.