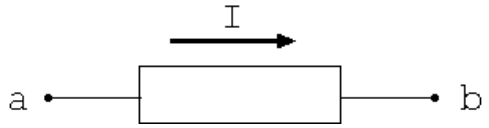
Lecture 1, Monday, January 18, 2022

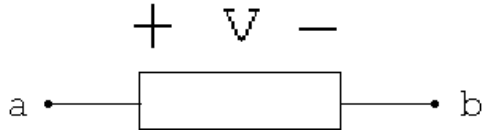
- *Current*: amount of net electrical charge per unit time passing in the direction of arrow.



$$I = \frac{dq}{dt} \begin{cases} > 0 \\ = 0 \\ < 0 \text{ going in opposite direction} \end{cases}$$

  - Units: Amperes: $A = \frac{C}{s}$

- *Voltage*: energy gain per Coulomb moved from $\ominus$ terminal to $\oplus$ terminal, or energy loss per Coulomb moved from $\oplus$ terminal to $\ominus$ terminal.



$$V = \frac{dW}{dq} \begin{cases} > 0 \\ = 0 \\ < 0 \text{ energy is lost, not gained} \end{cases}$$

  - Units: Volts: $V = \frac{J}{C}$

- Assignment of polarities and current directions
  - Can choose current directions any way we want
  - Can choose voltage polarities any way we want
  - Standard reference system (SRS) uses current going into $\oplus$ terminal

    All our equations will assume the SRS assignment

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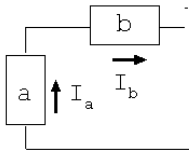
Lecture 1, continued from previous page...

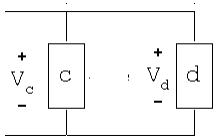
- *Series* element configuration



  – elements share one node, nothing else connected between them

  – elements have the same current

- *Parallel* element configuration



  – elements share same two nodes

  – elements have same voltage

