EE40
Lecture 3
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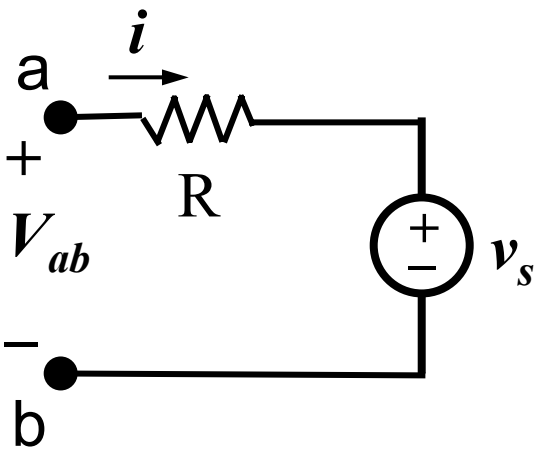
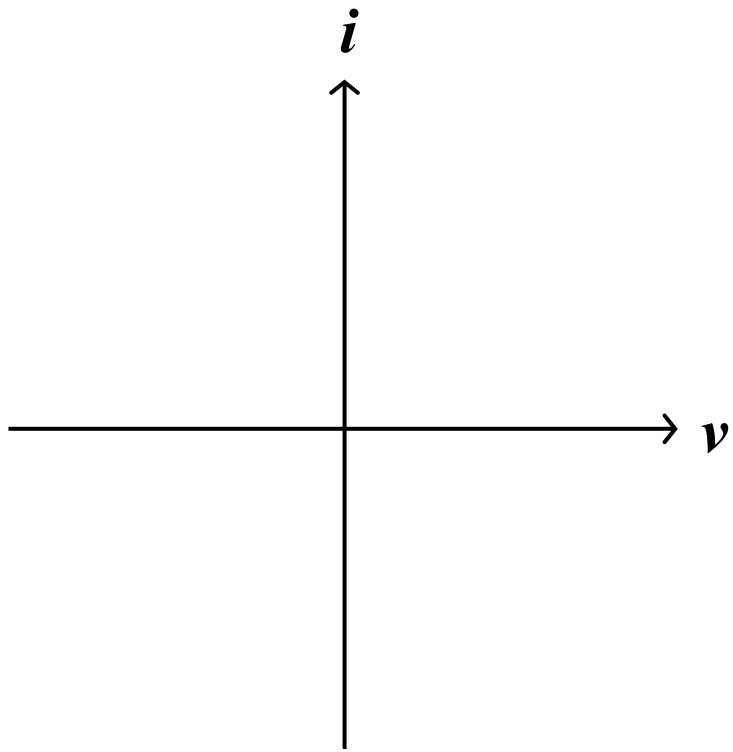
1/28/08

Reading: Chap. 2

I-V Characteristic of Elements



Find the *I-V* characteristic.



Short Circuit and Open Circuit

- Short circuit
  - R = 0 → no voltage difference exists
  - all points on the wire are at the same potential.
  - Current can flow, as determined by the circuit
- Open circuit
  - R = ∞ → no current flows
  - Voltage difference can exist, as determined by the circuit

Short Circuit and Open Circuit

Wire ("short circuit"):

- $R = 0$ → **no voltage difference exists**
  (all points on the wire are at the same potential)
- Current can flow, as determined by the circuit

Air ("open circuit"):

- $R = \infty$ → **no current flows**
- Voltage difference can exist, as determined by the circuit

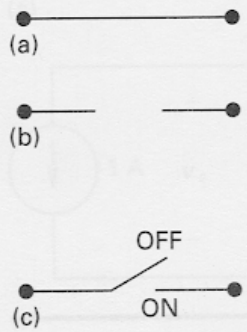


Figure 2.10 Circuit symbols. (a) Short circuit. (b) Open circuit. (c) Switch.

Example: Power Absorbed by a Resistor

$$p = vi = (iR)i = i^2R$$

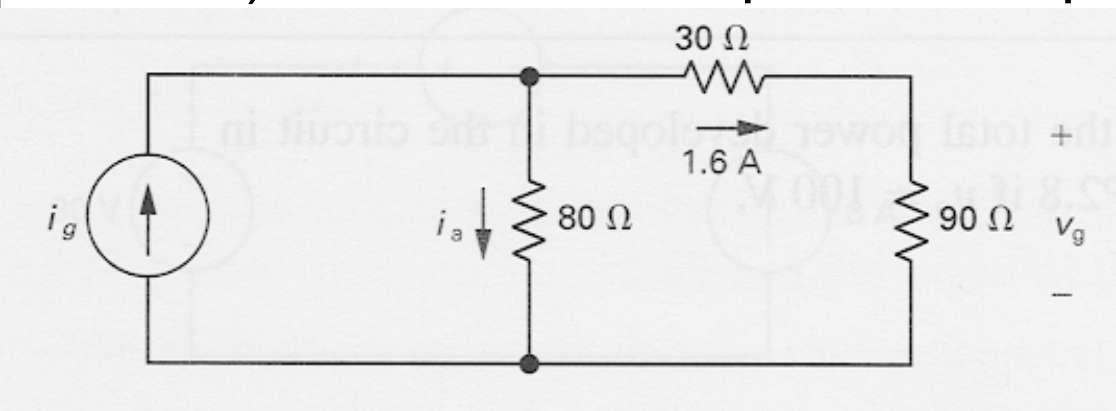
$$p = vi = v(v/R) = v^2/R$$

Note that $p > 0$ always, for a resistor → a resistor dissipates electric energy

Example:

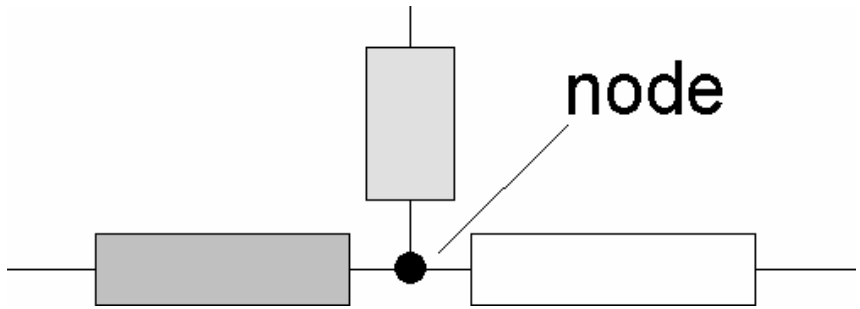
a) Calculate the voltage v_g and current i_a.

b) Determine the power dissipated in the 80Ω resistor.

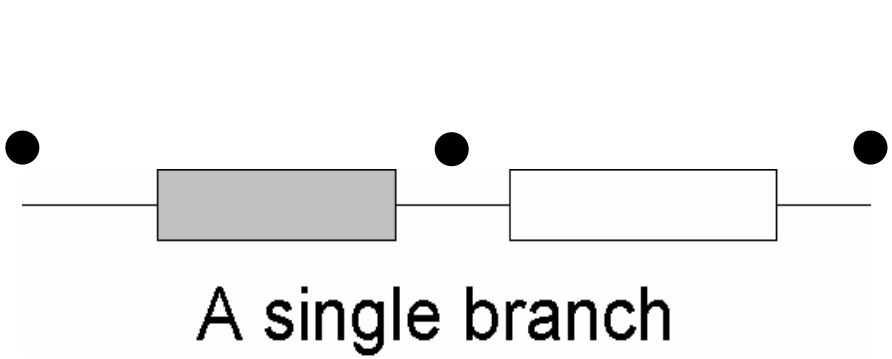


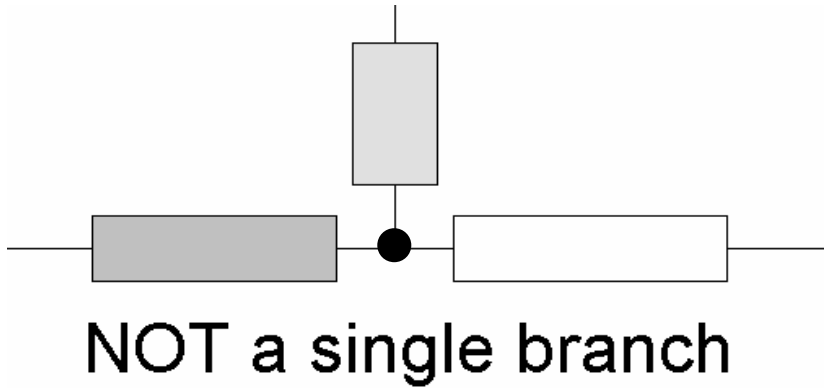
Terminology: Nodes and Branches

Node: A point where two or more circuit elements are connected



Branch:





Graph associated to a circuit

- First determine all the nodes in the circuit.
- Draw a line diagram where every pair of nodes that is connected by a circuit element in the circuit is connected by an edge in your diagram.
- This is called the graph of the circuit.

Circuit Nodes and Loops

- A ***node*** is a point where two or more circuit elements are connected.
- A ***loop*** is formed by tracing a closed path in a circuit through selected basic circuit elements without passing through any intermediate node more than once