Physics

Semester 2

Weeks 5 - 6

Monday (February 2nd)

- See last week Thursday

Tuesday (February 3rd)

- Shutdown Day

Wednesday / Thursday (February 4 – 5)

- Worksheet day

Journal 4.3

- What are my post secondary educational plans?

- T: 6A - Use scientific notation and predict how the magnitude of the electric force between two objects depends on their charges and the distance between their centers using Coulomb's law.
- 6C - Investigate and describe conservation of charge during the process of induction, conduction, and polarization using different materials such as electroscopes, balloons, rods, fur, silk and Van der Graaf generators.
- O: I will continue to learn about static charge
- D: by beginning a group project that will be a major grade presentation.
- A: Coulomb's law
- Y: What methods of research and writing will ensure that I earn a good grade on my project?

Friday (February 6th)

- C-Day

Monday / Tuesday (February 9 – 10)

- Continue projects
- Practice presentation

- T: 6A - Use scientific notation and predict how the magnitude of the electric force between two objects depends on their charges and the distance between their centers using Coulomb's law.
- 6C - Investigate and describe conservation of charge during the process of induction, conduction, and polarization using different materials such as electroscopes, balloons, rods, fur, silk and Van der Graaf generators.
- O: I will continue to learn about static charge
- D: by working on my electrostatics project
- A: Coulomb's law
- Y: What are the requirements for a good grade on the project?

Wednesday / Thursday (February 11 – 12)

- Presenting projects

- T: 6A - Use scientific notation and predict how the magnitude of the electric force between two objects depends on their charges and the distance between their centers using Coulomb's law.
- 6C - Investigate and describe conservation of charge during the process of induction, conduction, and polarization using different materials such as electroscopes, balloons, rods, fur, silk and Van der Graaf generators.
- O: I will share what I have learned with my classmates
- D: by presenting my project.
- A: Coulomb's law
- Y: How does my effort affect not only my grade but the grade of my classmates?

Friday (February 13th)

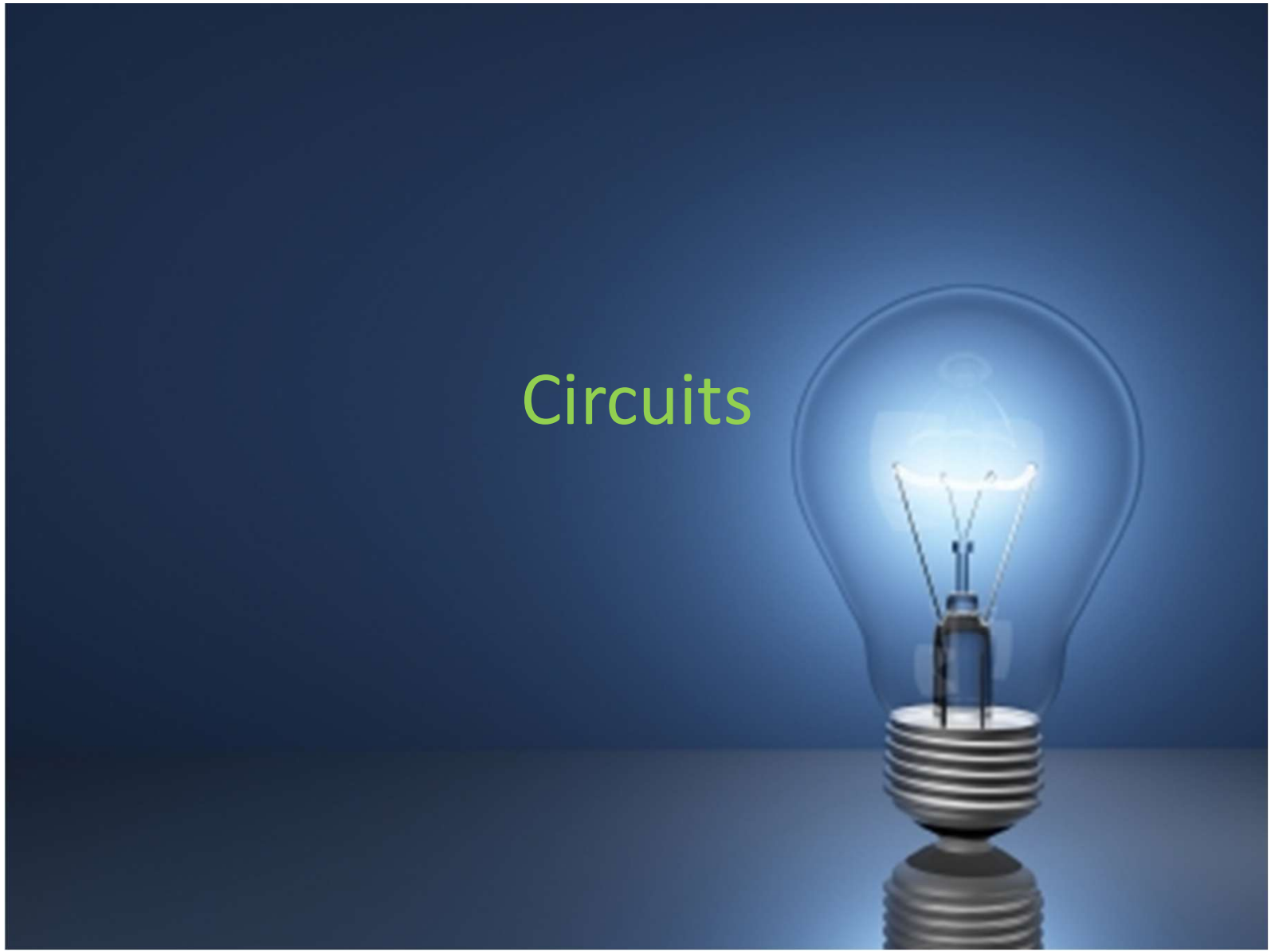
- No School.

Tuesday / Wednesday (Feb 17 – 18)

- Begin electrical circuits

- T: 6D - Analyze, design, and construct series and parallel circuits using schematics and materials such as switches, wires, resistors, lightbulbs, batteries, voltmeters, and ammeters.
- 6E - Calculate current through potential difference across, resistance of, and power used by electrical circuit elements connected in both series and parallel circuits using Ohm's law.
- O: I will be able to learn about electrical circuits
- D: by discussing a Page Keeley, taking notes, and solving problems.
- A: current, resistance, amperes, voltage (taking notes and discussing)
- Y: What relationship does Ohm's law provide us?

Circuits

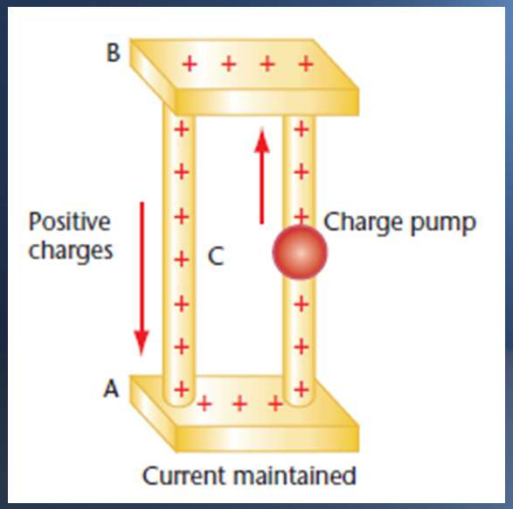


Electric Current

- Electric Current-
  - A flow of charged particles is a current
- Conventional Current-
  - A flow from higher potential difference to lower potential difference (+ to -)
- Battery
  - Converts chemical energy to electrical
- Photovoltaic (Solar) Cell
  - Converts light to electrical

Electric Circuits

- Electric Circuit
  - Closed loop that charges travel through
  - Includes charge pump which increases potential energy



Current

- Electric Current (I)
  - Rate of flow of electric charges
  - Measured in Amperes (A)
  - $I = q/t$
  - $1\ A = 1\ C/s$
  - Ammeter measures electric current

Voltage

- Voltage- Potential Difference- EMF (V)
  - Potential energy of the electrons- causes charges to move through the circuit.
  - Measured in Volts (V)
  - Voltmeter measures Voltage

Resistance

- Resistance (R)
  - Restricts the flow of current
  - Measured in Ohms (Ω) or Volts per Amp (V/A)

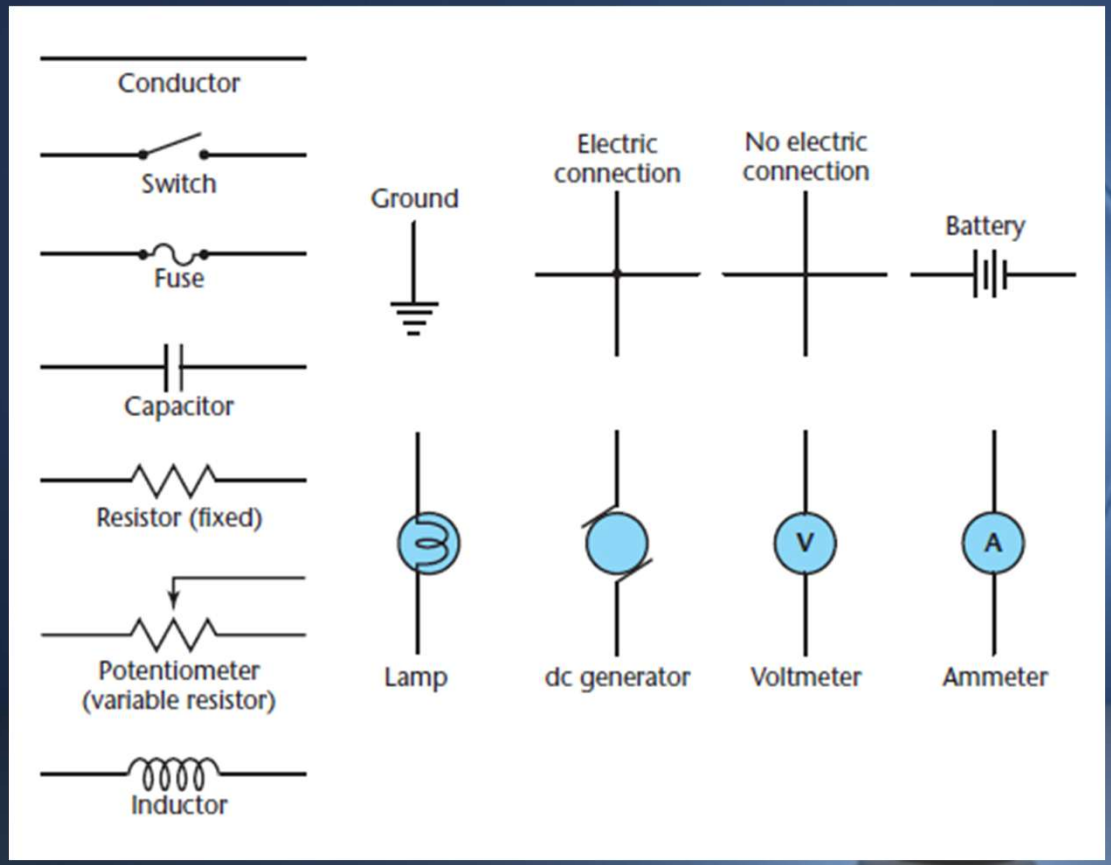
Resistors

- Resistors
  - produce potential differences by resisting flow of currents
  - Ex: Light bulbs, resistors
- Superconductor
  - Frozen conductors
  - Zero resistance
- Potentiometer
  - A variable resistor
  - Ex: Dimmer Switch

Power

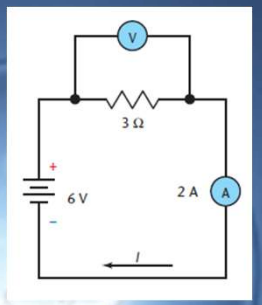
- Power
  - Energy delivered through the circuit per second
  - P (Power) = I (Current) x V (Voltage)
  - Measured in Watts
- Problem
  - A 6.0 V battery delivers a 0.5 A current to an electric motor. What is the power?
  - P = (0.5 A)(6.0 V)
  - P = 3.0 W

Diagramming Circuits

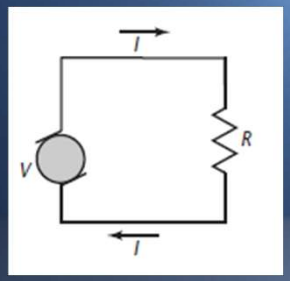


Types of Circuits

- Parallel Circuits
  - Multiple paths for current to flow



- Series Circuits
  - One current path



Series Circuit

- Imagine a Series Circuit as a Mountain River with random rapids
  - Water flow is current
  - Water falls are resistors
  - Height difference between
    Water falls is potential difference

Series Continued

- Water flow is the current
  - The amount of water never changes as it flows down the mountain
- Charge is conserved so what charge enters must also leave
  - Therefore: current is consistent throughout the circuit

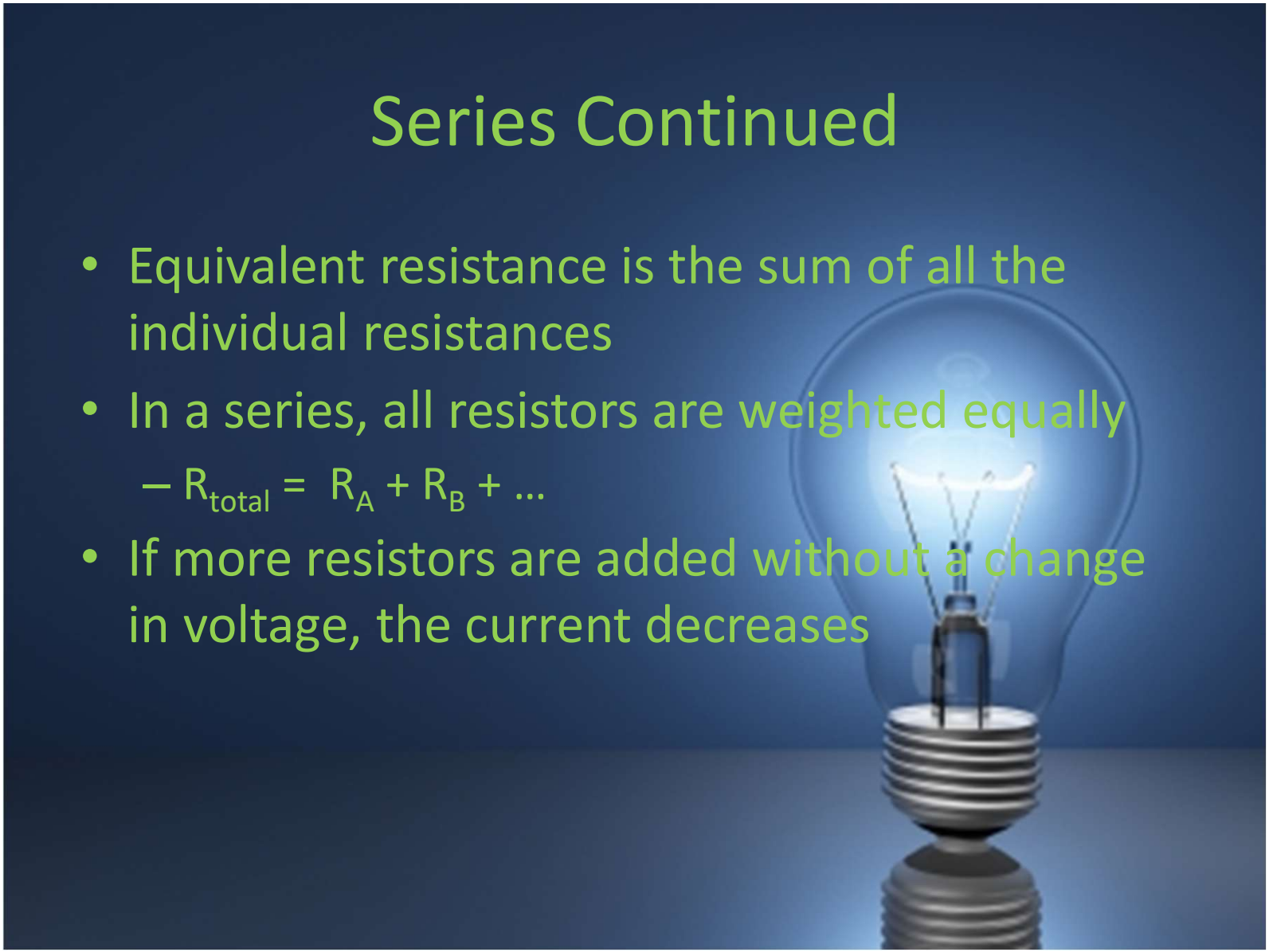
Series Continued

- The total height of the mountain is the same as the sum of the heights between the water falls
- Voltage at the source is equal to the sum of the voltage drops at each resistor
  - $V_{(source)} = V_A + V_B \ldots$
- Current is found by dividing the Voltage at the source by the sum of the resistors

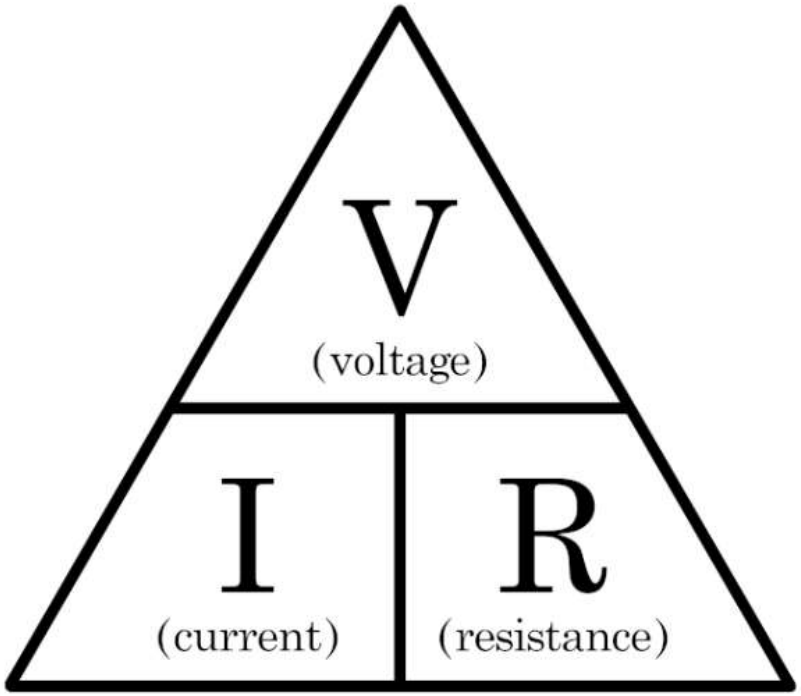
$$I = V_{(source)} / (R_A + R_B)$$

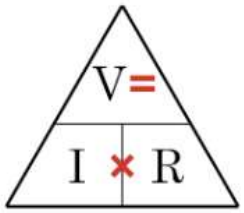
Series Continued

- Equivalent resistance is the sum of all the individual resistances
- In a series, all resistors are weighted equally
  - $R_{total} = R_A + R_B + \ldots$
- If more resistors are added without a change in voltage, the current decreases

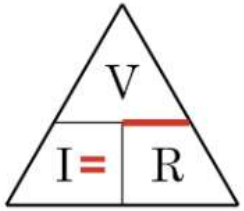


Ohm's Law Triangle

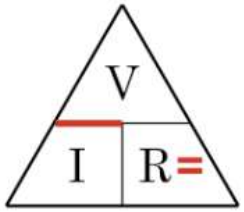




$$V = I \times R$$



$$I = V \div R$$



$$R = V \div I$$

Series Voltage Divider

- Used to produce a smaller voltage from a higher-voltage battery
  - Ex: You need 5 V of energy but have a 9V battery

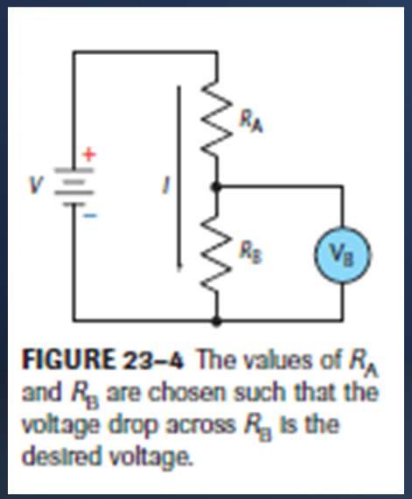
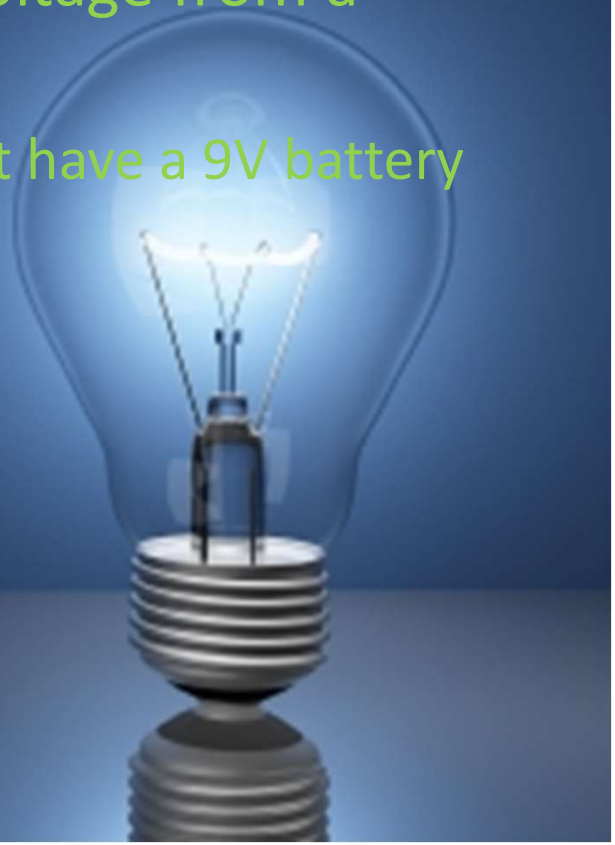


FIGURE 23–4 The values of R_A and R_B are chosen such that the voltage drop across R_B is the desired voltage.



Thursday / Friday (Feb 19 & 20)

- Major Grade (CER) Lab

- T:6D - Analyze, design, and construct series and parallel circuits using schematics and materials such as switches, wires, resistors, lightbulbs, batteries, voltmeters, and ammeters.

6E - Calculate current through potential difference across, resistance of, and power used by electrical circuit elements connected in both series and parallel circuits using Ohm's law.

- O: I will practice with real series circuits
- D: by conducting a lab and writing a CER for a major grade.
- A: series circuits, current, voltage, resistance.
- Y: What is the relationship between resistance and current in a series circuit?