IMPORTANT TERMS:

- **Circuit**
- **In parallel**
- **In series**
- **Parallel circuit**
- **Schematic diagram**
- **Series circuit**

EQUATIONS:

$$current = \frac{voltage}{resistance}$$

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

$$1\,ampere = 1\,\frac{volt}{ohm}$$

Series Circuits

$$I = \frac{V_{source}}{R}$$

$$V_{tot} = V_A + V_B + \ldots.$$

$$R = R_A + R_B + \ldots.$$

Parallel Circuits

$$I_A = \frac{V}{R_A}$$

$$V_{tot} = V_A = V_B = V_C = \ldots$$

$$I = I_A + I_B + I_C$$

$$\frac{1}{R} = \frac{1}{R_A} + \frac{1}{R_B} + \frac{1}{R_C}$$

UNIT V: Electricity and Magnetism

Chapters 32-37

Chapter 35: Electric Circuits

I. A Battery and a Bulb (35.1)

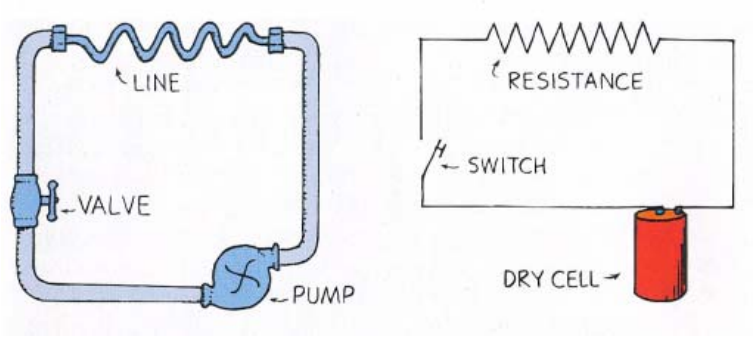
A. **Circuit-** A complete _____ for electrons to _____

1. Flow of _____ like flow of **water** in a closed system of pipes

a. The **battery** would be analogous to the _____

b. **Wires** analogous to the _____ _____

B. The water flows through the pump and the _____ flow through the battery



II. Electric Circuits (35.2)

A. **Electric Circuit**- any path along which _____ can flow

1. Must be a complete circuit with **no** _____

2. Gap usually provided by **electric** _____

B. Most circuits have more than one device that receives electrical energy. Devices can be connected in a circuit in one of two ways, _____ or _____.

III. **Series Circuits**(35.3)

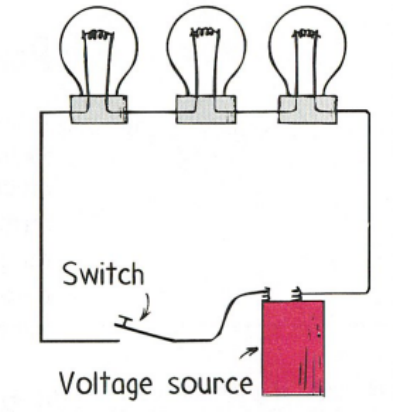
A. Electric current has but a _____ **pathway** through a series circuit. **Current is the** _____ through each electrical device in the circuit

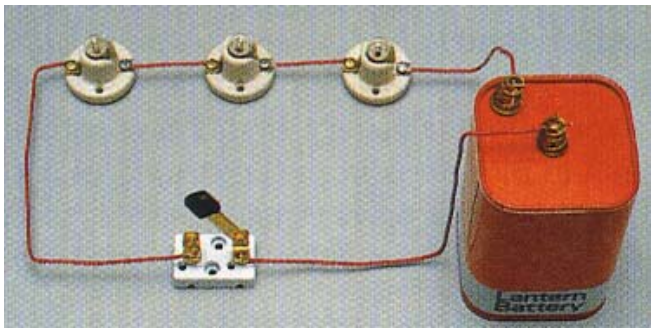
B. The **total resistance** to current in the circuit is the _____ **of the individual resistances** along the circuit path

C. The current in the circuit is equal to the **voltage supplied** by the source divided by the **total** _____ of the circuit (in accord with Ohm's law)

D. The **total voltage** impressed across a series circuit _____ among the electrical devices in the circuit so that the sum of the "voltage drops" across each device is equal to the total voltage supplied by the source.

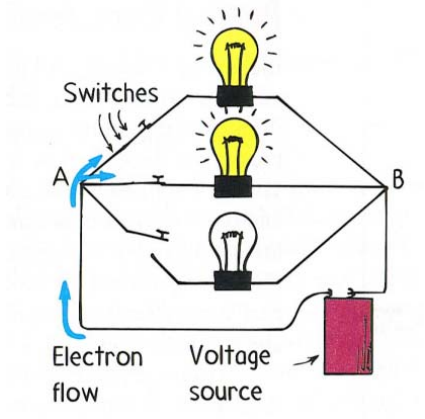
E. **The voltage drop across each device is proportional to its _____.** This follows from the fact that more energy is wasted as heat when a current passes through a high-resistance device than when the same current passes through a device offering little resistance.

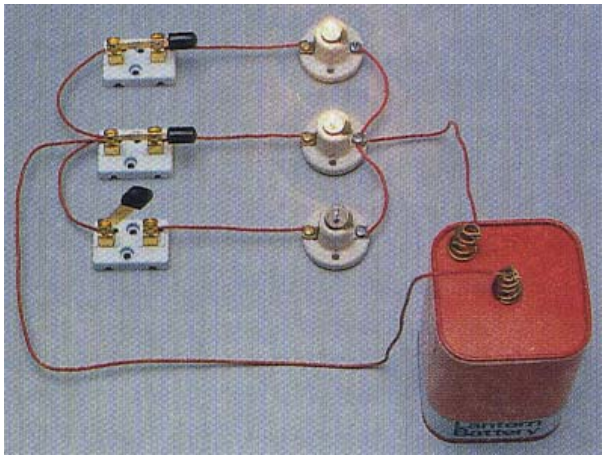




IV. **Parallel Circuit** (35.4)

A. Each device connects the **same two points A and B** of the circuit. The **voltage is therefore the _____ across each device**





B. The **total current** in the circuit _____ among the **parallel branches**. Because the **voltage across each branch is the same**, the **amount of current in each branch is inversely proportional to the resistance of the branch**

Remember that the voltage is the same across each of the branches

C. **The total current in the circuit equals the _____ of the currents in its _____ branches**

Where I_A, I_B, I_C are currents through the branches and I is the total current

D. **As the number of parallel branches is increased, the overall resistance of the circuit is _____** (just as more check-out cashiers at a supermarket decreases people-flow resistance). With each added parallel path, the overall circuit resistance is lowered. This means the **overall resistance of the circuit is _____ than the resistance of any one of the _____.**

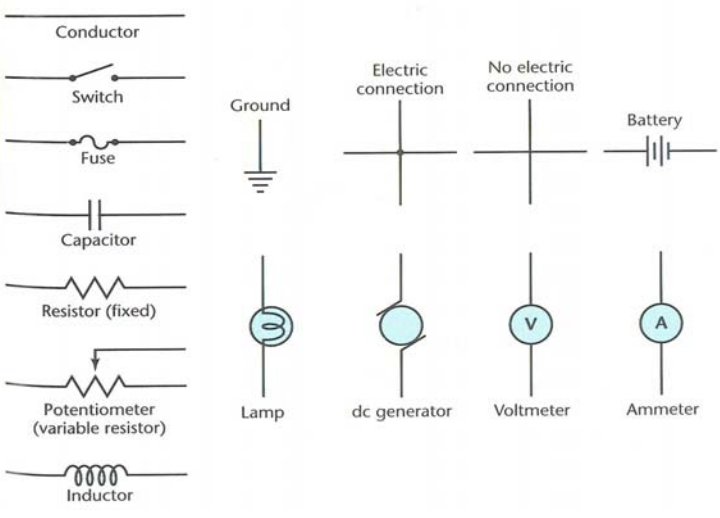
V. **Schematic Diagrams** (35.5)

A. **Schematic diagram**- simple diagrams to represent electrical circuits.

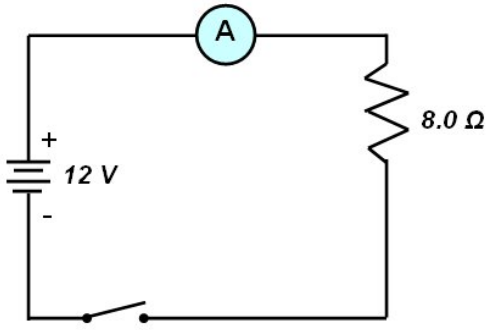
1. **Symbols** used to represent certain circuit elements

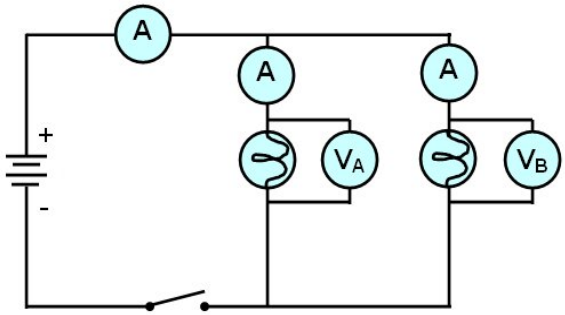
2. **Circuit diagrams (schematics) show electrical connections, not the _____ layout**

3. Common Symbols:



B. Examples of **Series** and **Parallel** circuits





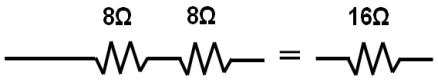
VI. Combining Resistors in a Compound Circuit (35.6)

A. Sometimes it is useful to know the _____ **resistance** of a circuit that has several resistors in its network

1. **Equivalent resistance**- value of the single resistor that would comprise the same _____ to the battery or power source

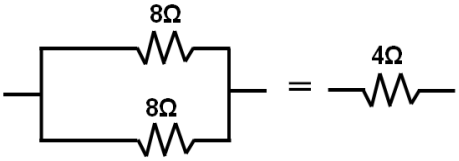
2. Calculate using the rules for _____ resistors in series and parallel

B. Series circuits- $R = R_A + R_B$



C. Parallel circuits- $\frac{1}{R} = \frac{1}{R_A} + \frac{1}{R_B} + \ldots$

$\frac{1}{R} = \frac{1}{8} + \frac{1}{8} = \frac{2}{8}$



VII. Parallel Circuits and Overloading (35.7)

A. When add more devices (pathways) in house, the combined **resistance** is _____ in the circuit

1. Therefore, <u>greater amount</u> of _____ occurs

2. Can overload circuit and may result in _____ (fire)

B. Connect fuses in series along supply line to protect (fuse or circuit breaker prevents _____)