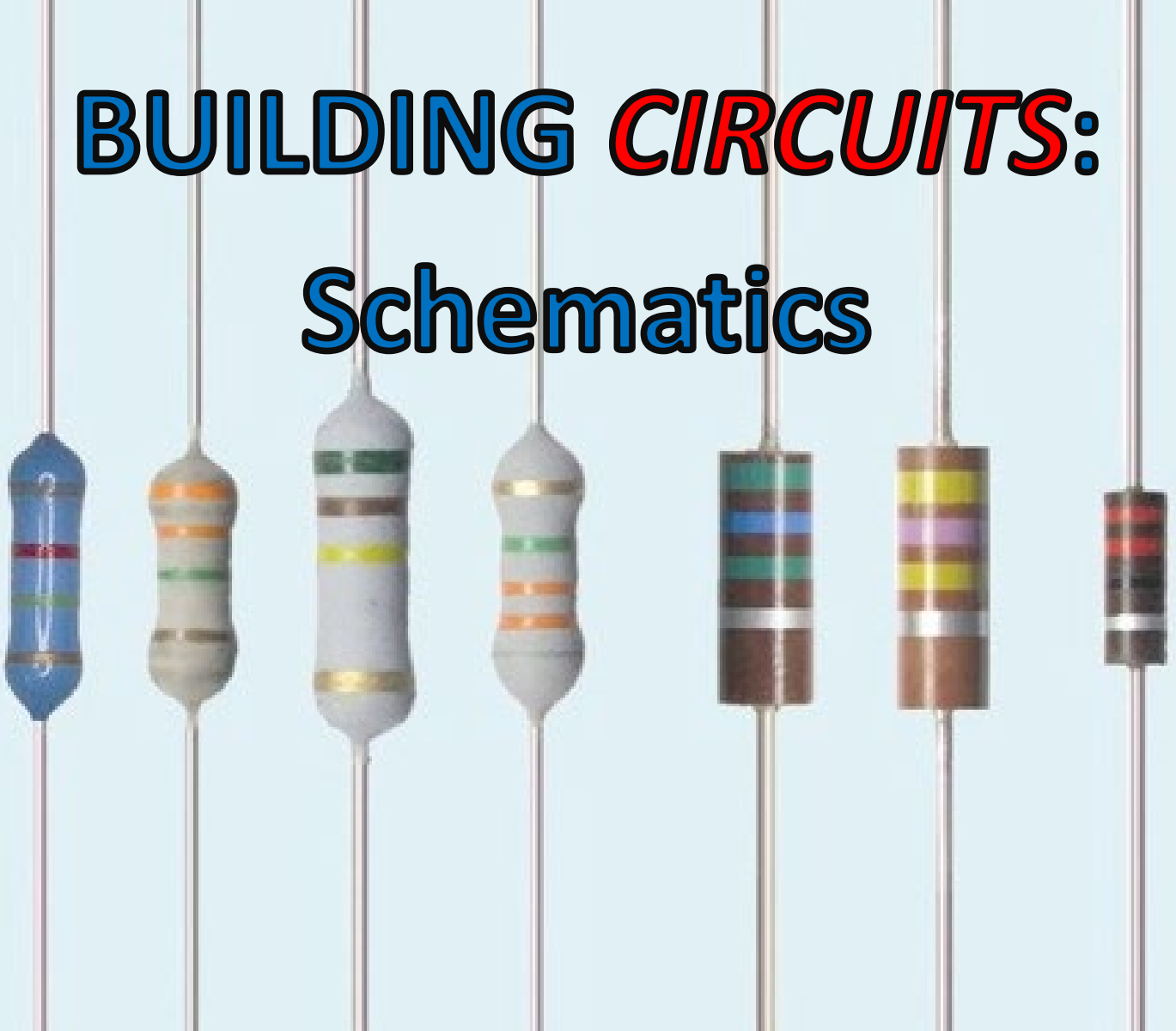


# BUILDING *CIRCUITS*:

## Schematics



# OUTCOME QUESTION(S):

**S1-3-13:**

**What is a schematic and how are they used as information for a circuit?**

## **Vocabulary & Concepts**

Circuit

Schematic

Battery

Switch

Series

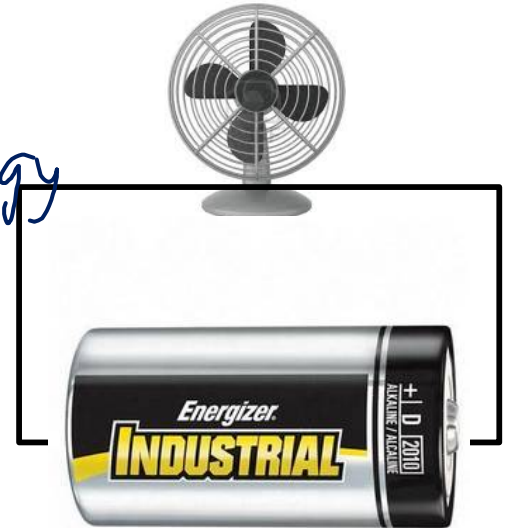
Parallel

*The flow of electrons through an unbroken conducting loop is called a **circuit***

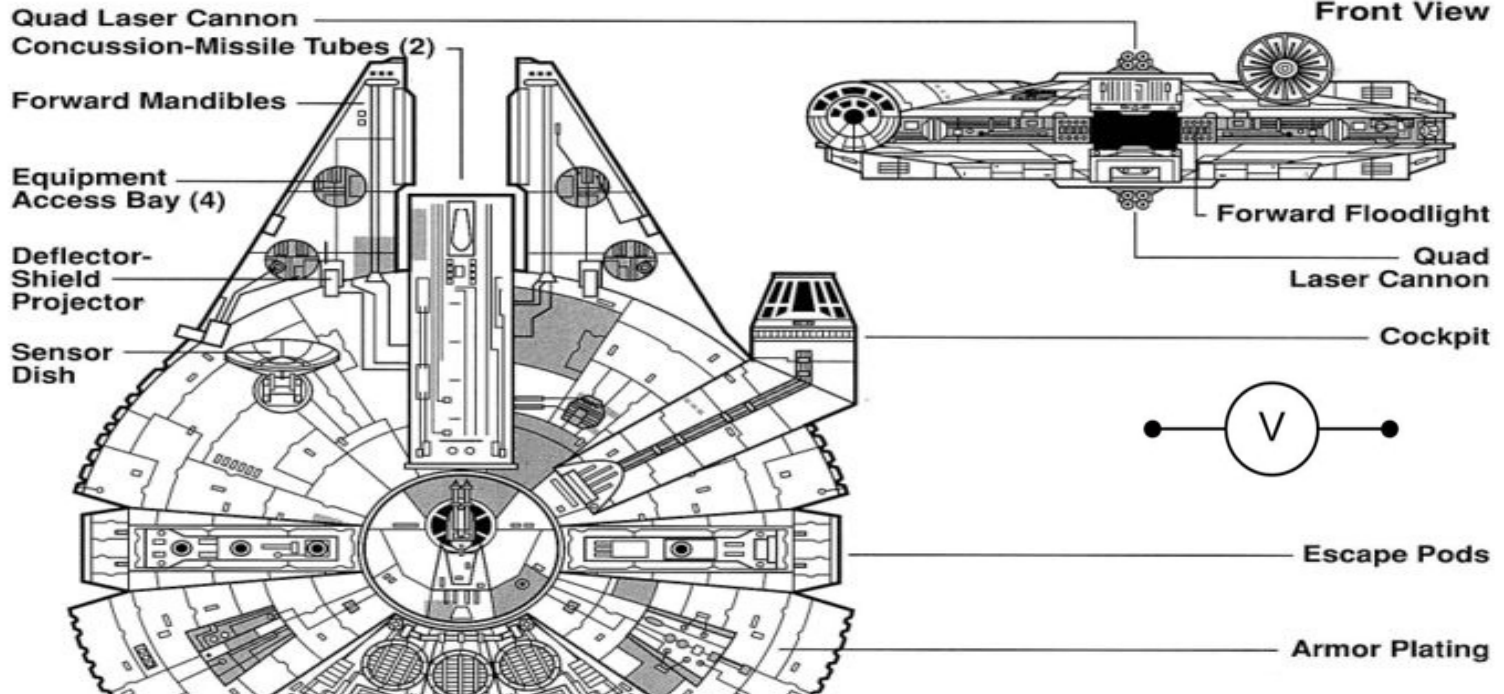
**Basic circuits must have:**

- Source or **power supply**
- Conducting loop or **wire**
- Load or **appliance**

The **load** could be any **device** that makes use of the energy or a **resistor**



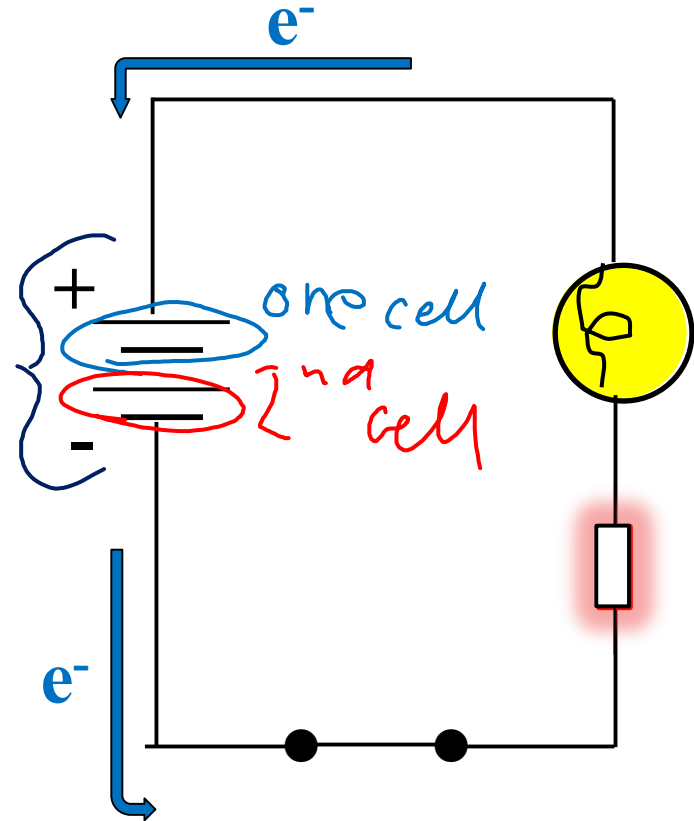
**Schematic:** a representative *drawing* of the components of a *system* including symbols.



Schematics can be used for more than just electrical circuits.

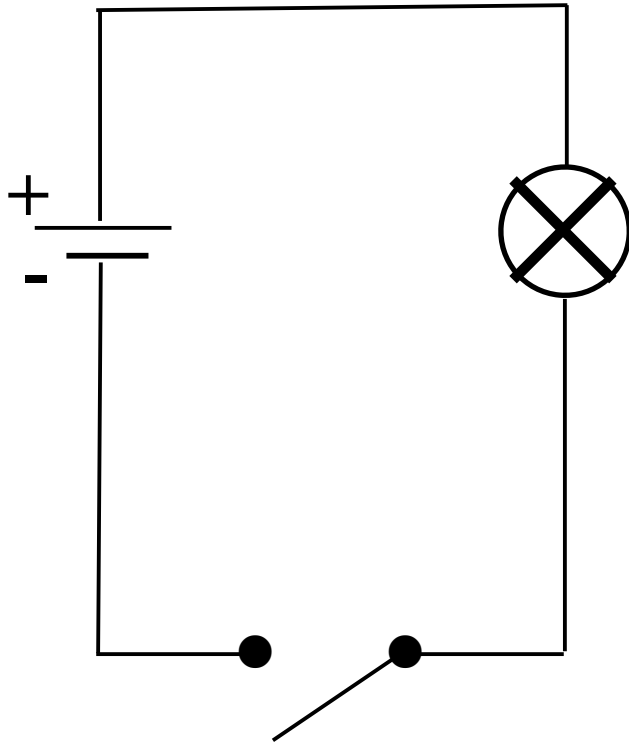
**For the source:** → battery  
Long stroke = (+) electrode  
Short stroke = (-) electrode

**Battery**: *multiple cells*  
connected in a row (*series*)

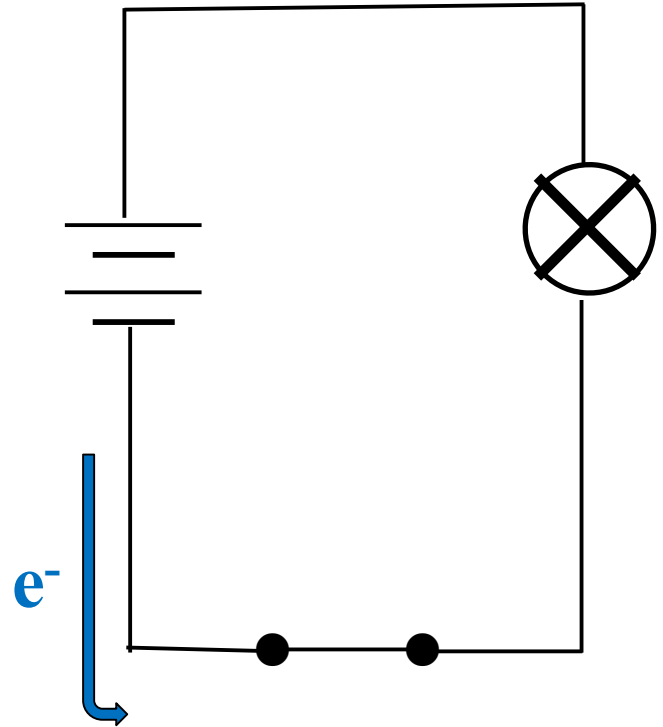


Including the (+) and (-) isn't necessary on the cell/battery but the direction the charges travel in the circuit must be known

Circuits can be opened or closed by a switch:

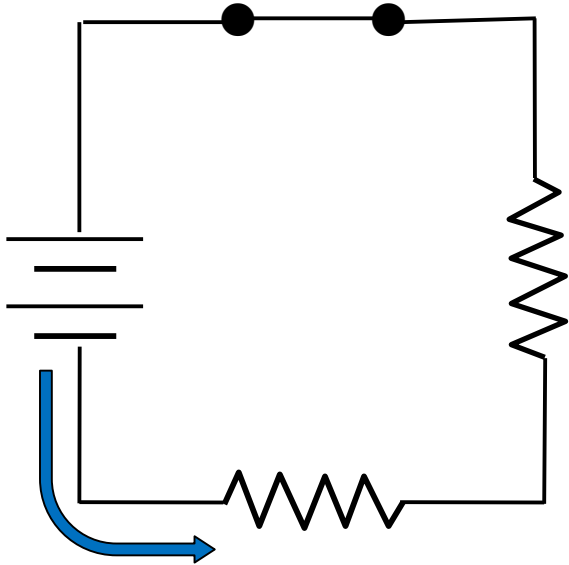


Open circuit (*off*)



Closed circuit (*on*)

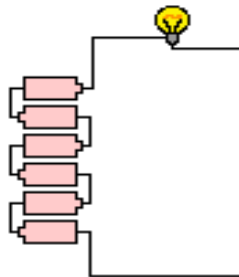
**Series circuit:** only *one path* for the current



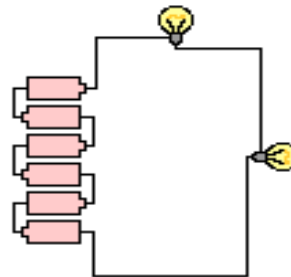
In **series** the electrons **pass through every component** of the circuit

**Series Connection of Light Bulbs**

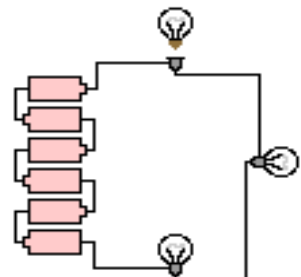
**1 Resistor**



**2 Resistors**

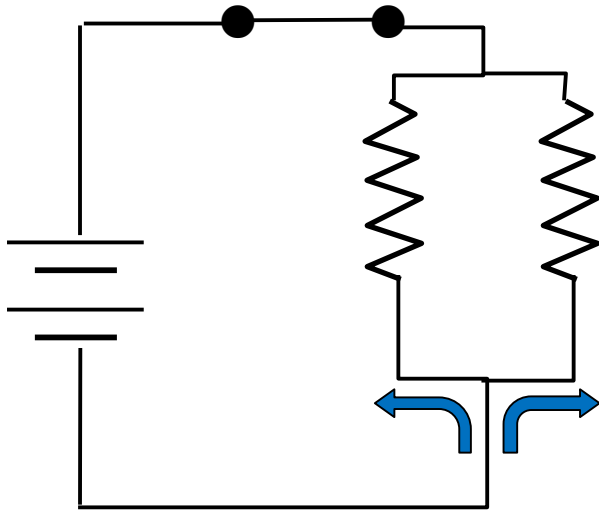


**3 Resistors**



**When one bulb is removed from its socket, the other bulbs in series "go out."**

# Parallel circuit: multiple pathways for current



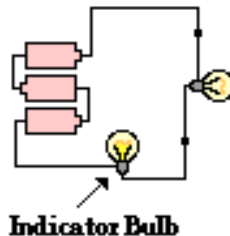
Notice there can be **multiple ideas present** in one circuit:

Here the *cells* are in *series* but the *resistors* are in *parallel*

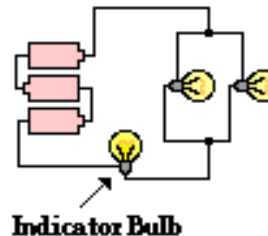
Where the wire splits or meets up again is called a ***junction***

## Parallel Connection of Light Bulbs

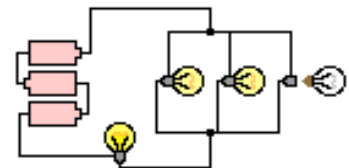
1 Resistor



2 Resistors



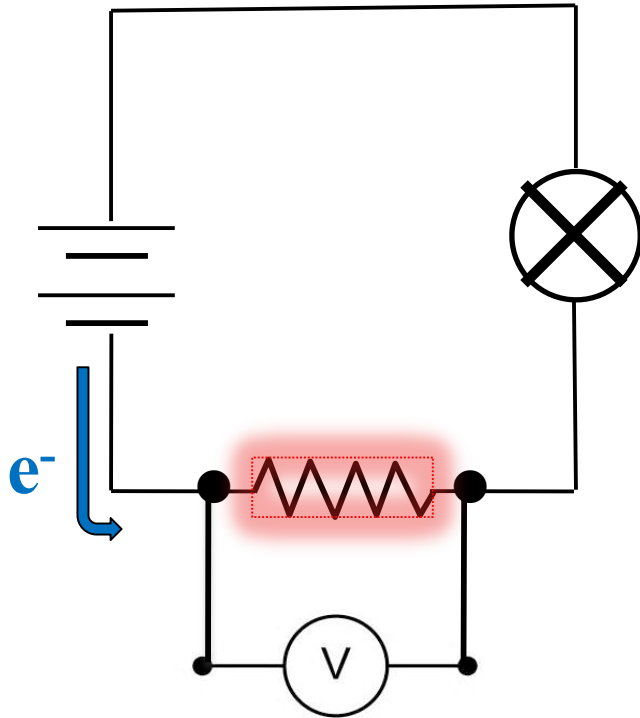
3 Resistors



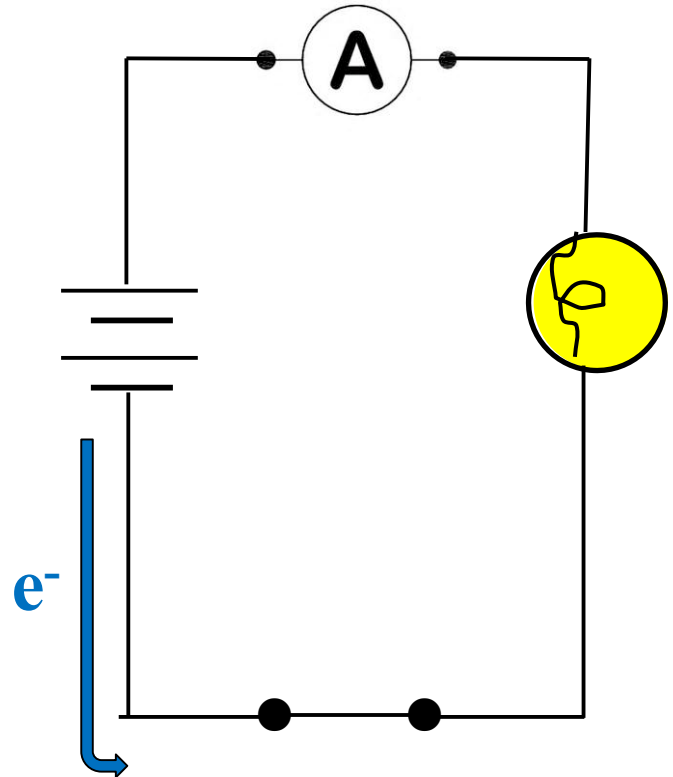
When one bulb is removed from its socket, the other bulbs in the parallel branches remain lit.



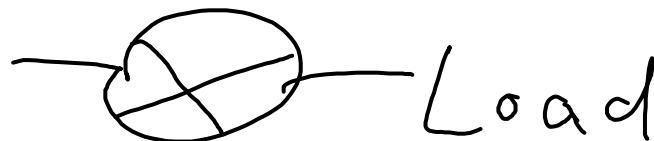
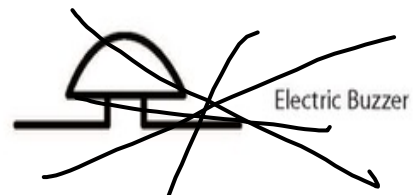
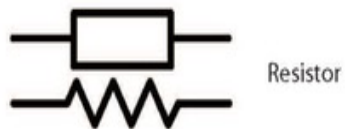
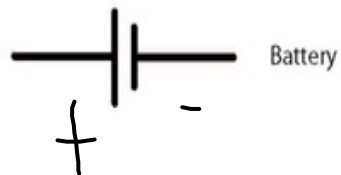
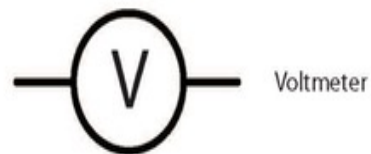
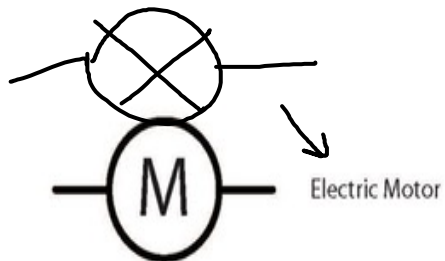
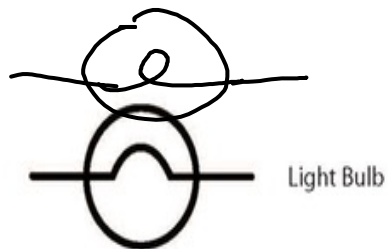
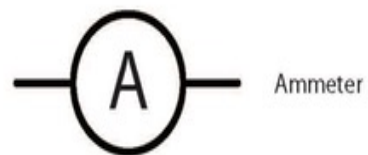
Measures energy difference



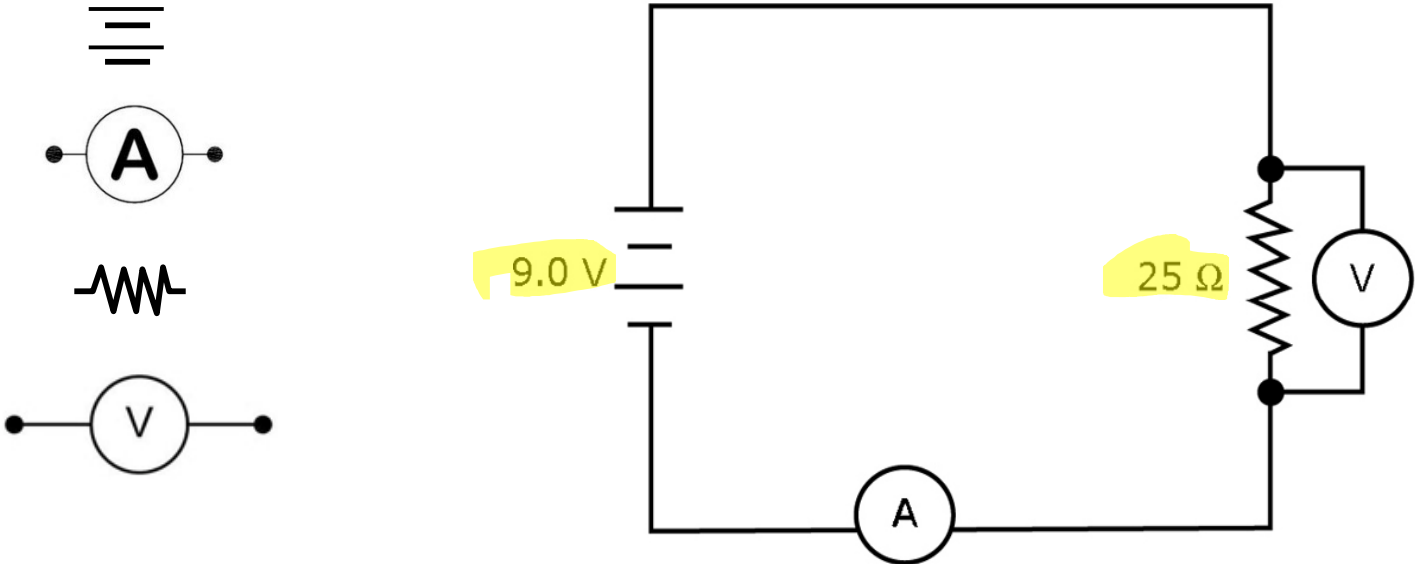
Count electrons per second



***Voltmeters*** are connected in ***parallel*** to component  
***Ammeters*** are connected in ***series*** with the circuit



Draw a schematic circuit of a **9.0 V battery**, an **ammeter**, and a **25  $\Omega$  resistor** in **series**. Add a **voltmeter** measuring the voltage drop across the resistor.



**Series:** electrons **pass** through **every** circuit **component**

## Schematic:

**4** – 1.5 V cells in *series*

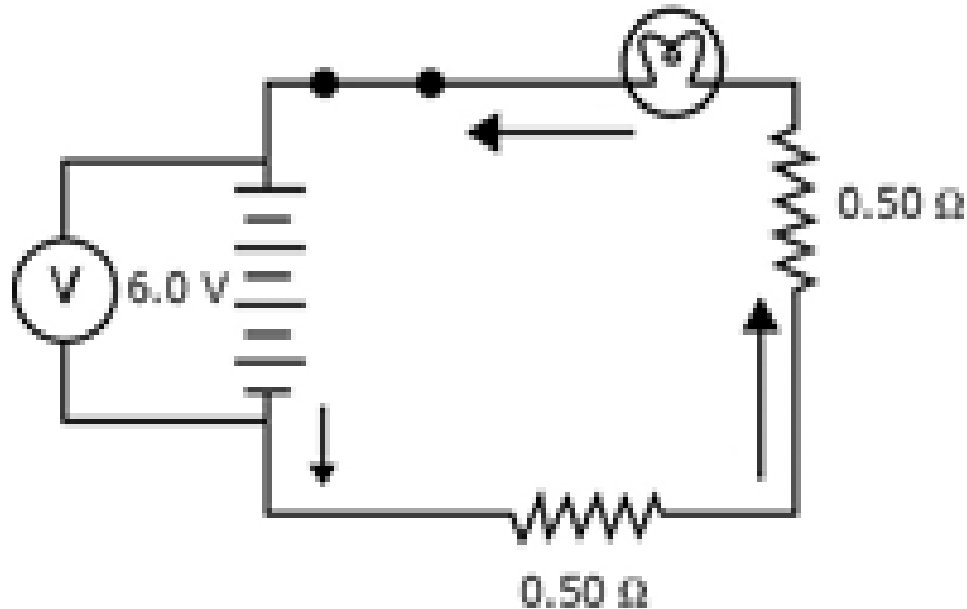
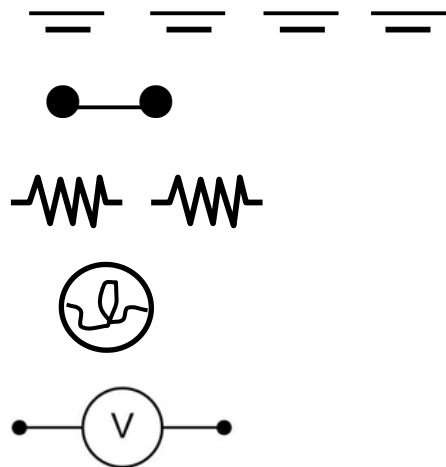
**1** – closed switch

**2** –  $0.50\ \Omega$  resistors in *series*

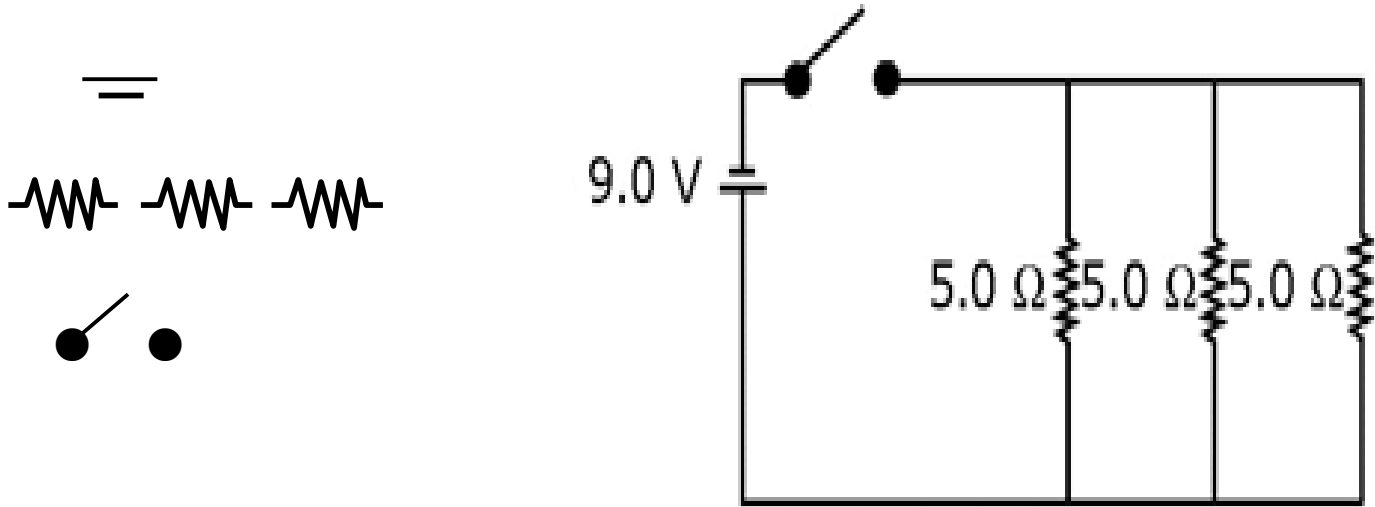
**1** – bulb

**1** – voltmeter across cells

*Show the direction in which the current flows.*



Draw a schematic of a **parallel** circuit consisting of a **9.0 V** electrical source, **three 5.0  $\Omega$  resistors**, an **open switch** *controlling* the electron flow in the *entire circuit*.



**Parallel:** electrons **pass** through **each branch** of circuit

# CAN YOU ANSWER THESE QUESTIONS?

**S1-3-13:**

**What is a schematic and how are they used as information for a circuit?**

## **Vocabulary & Concepts**

Circuit

Schematic

Battery

Switch

Series

Parallel