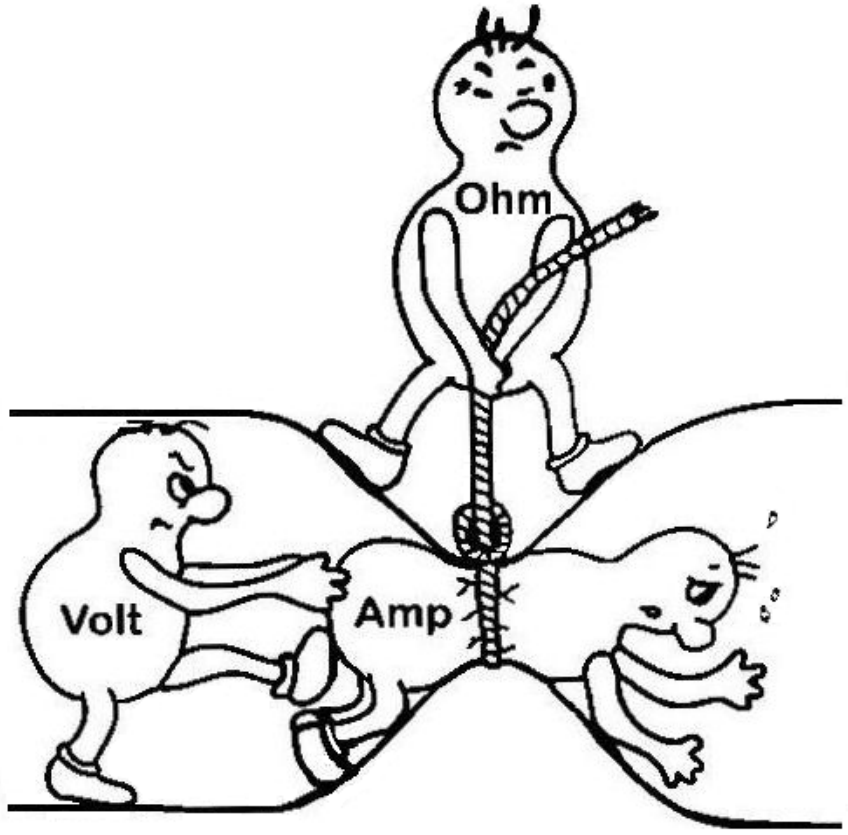
Relationships in Circuits



S1-3-14 Compare and contrast voltage (electric potential difference) and current in series and parallel circuits. Include: cells, resistance

S1-3-16 Investigate and describe qualitatively the relationship among current, voltage (electric potential difference), and resistance in a simple electric circuit

S1-3-16 Relate the energy dissipated in a circuit to the resistance, current, and brightness of bulbs

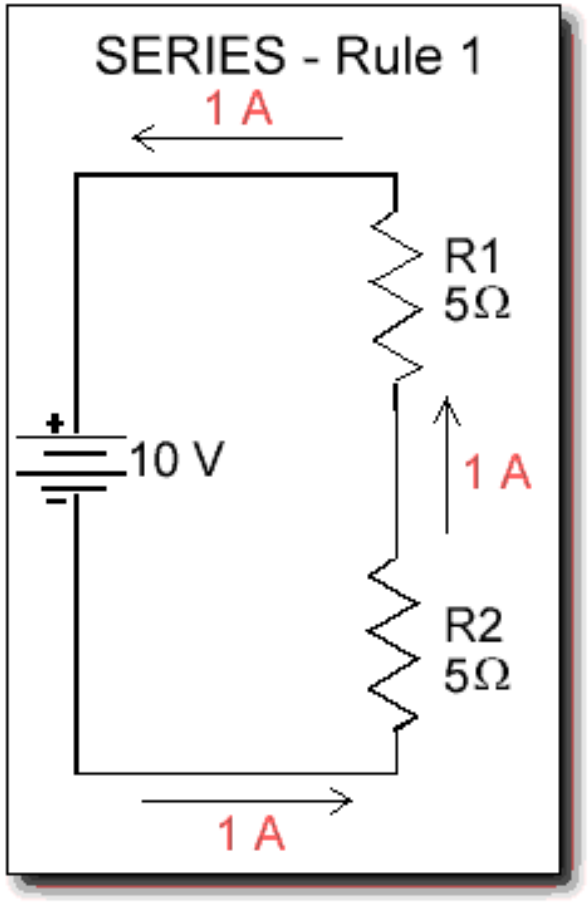
Relationships in Series Circuits…

Remember that a series circuit has only one path for electrons to follow. Because of this, there are basic relationships (rules) that are true in all series circuits:

1. The same current flows through each part of a series circuit.

- In a series circuit, the **AMPERAGE** (current) at any **POINT** in the circuit is the **SAME**.

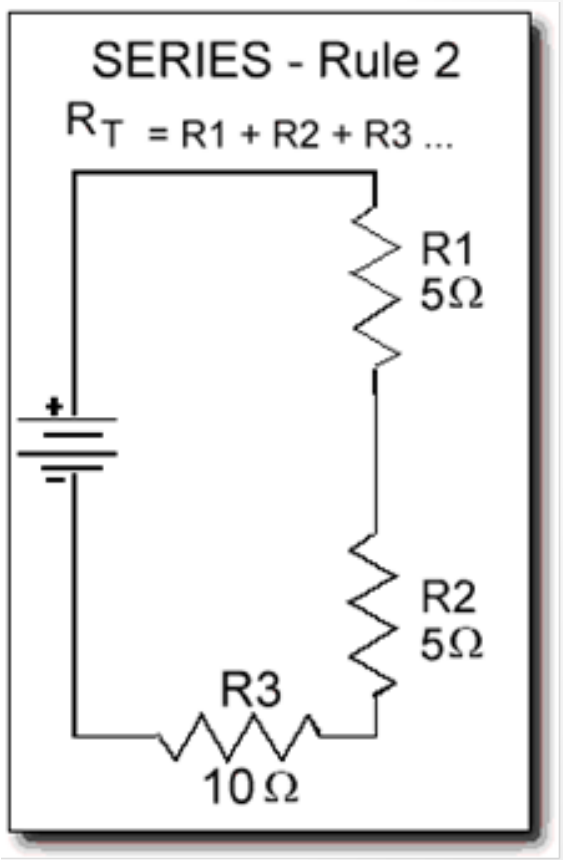
- Notice from the diagram that **1 AMP** continually **FLOWS** through the circuit.



Relationships in Series Circuits…

2. The total resistance of a series circuit is equal to the sum of individual resistances.

In a series circuit you will need to **CALCULATE** the **TOTAL RESISTANCE**. This is done by **ADDING** up the **RESISTANCE** of each component in series.



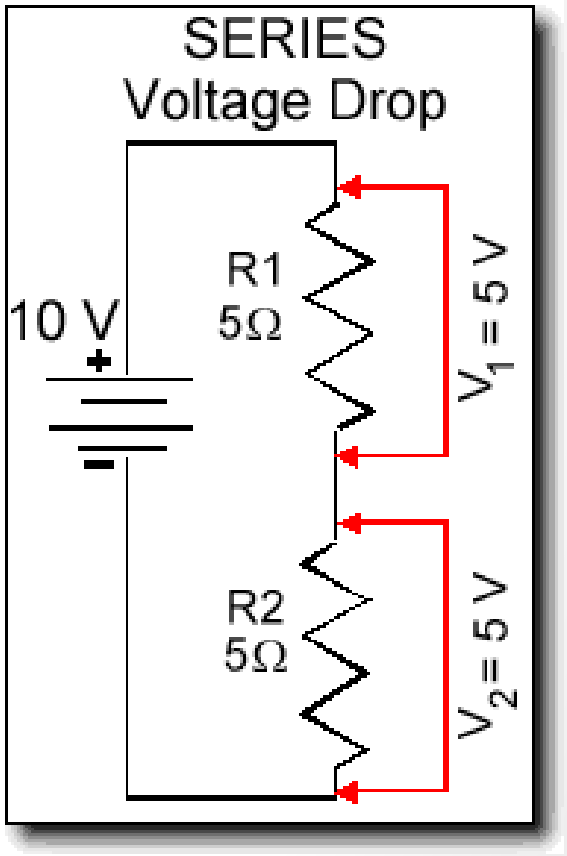
Relationships in Series Circuits…

3. The sum of the individual voltage drops equals the total voltage from the power source.

The voltage from the battery or cell is **DIVIDED** up amongst all the loads, so therefore:

$$V_{total} = V_1 + V_2 + V_3 \ldots$$

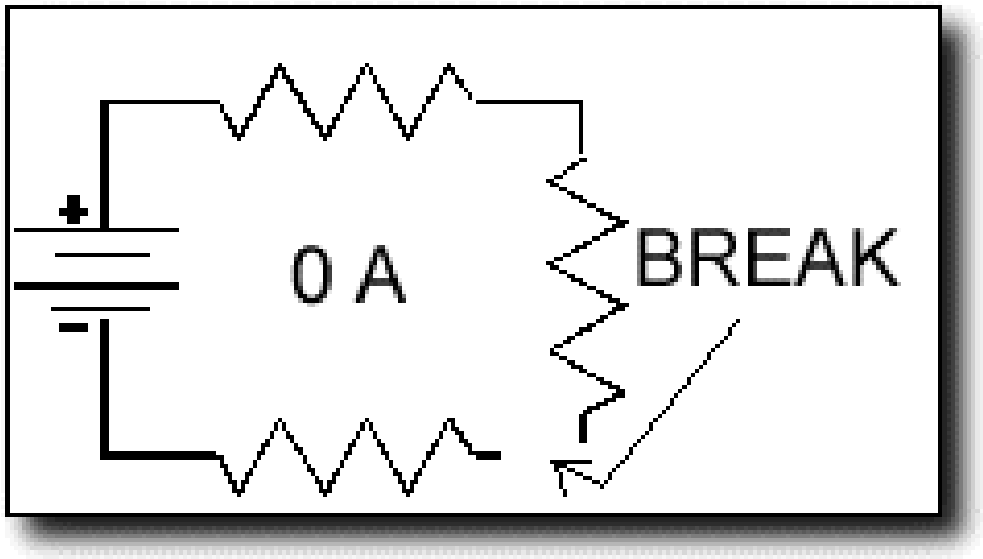
In our example, this means that ***5V + 5V = 10V.*** All the **ENERGY** going into the circuit is used by the **LOADS**.



Relationships in Series Circuits…

4. If the circuit is broken at any point, no current will flow.

The best way to illustrate this is with a string of **LIGHT BULBS**. If one is **BURNT** out, the whole thing **STOPS** working.



Relationships in Parallel Circuits…

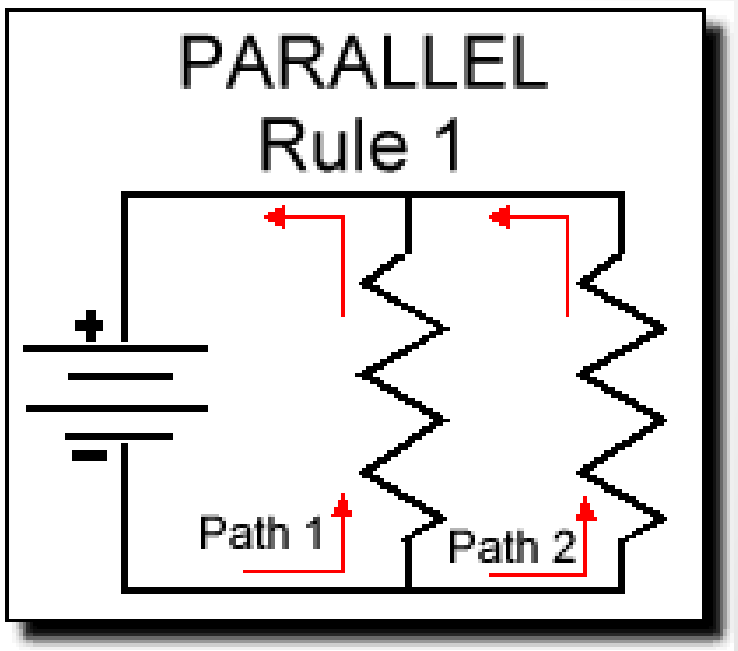
Remember that a parallel circuit has many paths for electrons to follow. Because of this, there are basic relationships (rules) that are true in all parallel circuits:

1. A parallel circuit has two or more paths for current to flow through.

Remember that **PARALLEL** means **TWO PATHS** up to **THOUSANDS** of **PATHS**.

The flow of electricity is **DIVIDED** between each according to the **RESISTANCE** along each route

Every time a path is **ADDED**, more current can **FLOW**.

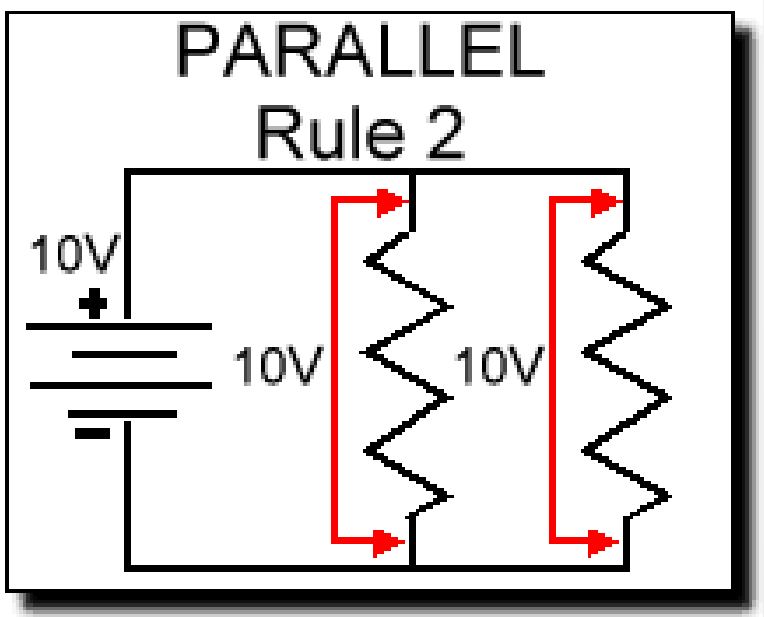


Relationships in Parallel Circuits…

2. Voltage is the same across each component of the parallel circuit.

Every path will get the **FULL AMOUNT** of **ENERGY** that the power source is **PRODUCING**.

This is why **LIGHTS** that are wired in **PARALLEL** are **BRIGHTER** than those wired in **SERIES**

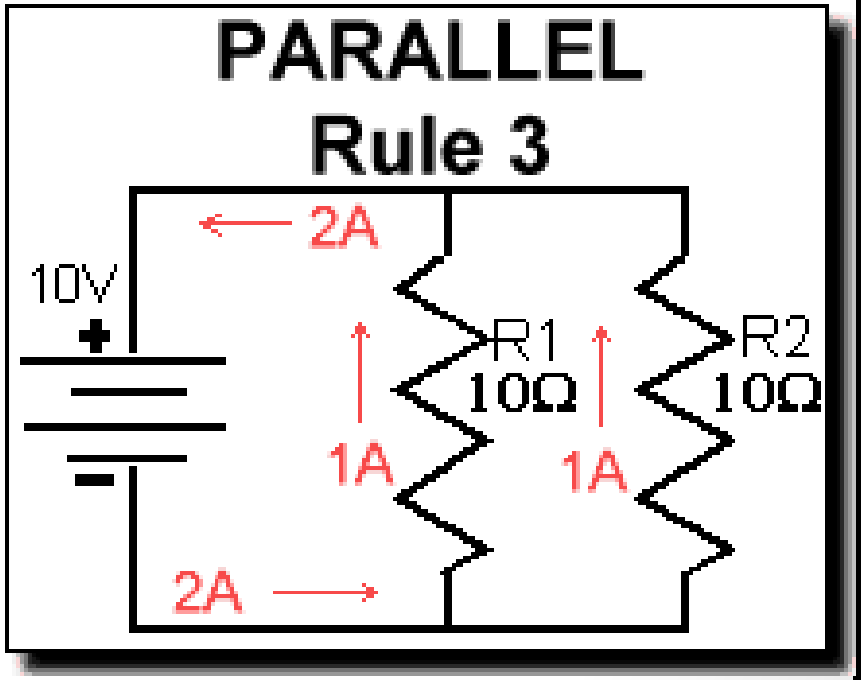


Relationships in Parallel Circuits…

3. The total current from the source is divided amongst each path.

The current in each path of the **CIRCUIT** must **ADD** to equal the **SOURCE** current.

Each time a new path is **ADDED**, the total current will **INCREASE**



Summary of Series and Parallel Circuits…

Relationship	Series	Parallel
Number of paths		
Current		
Voltage		
Resistance		
Brightness of Lights		
When a path is broken		