

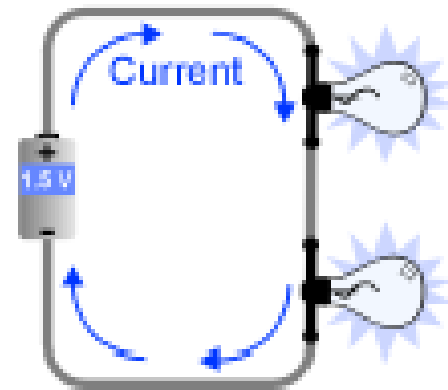
Chp 9

Series and Parallel Circuits

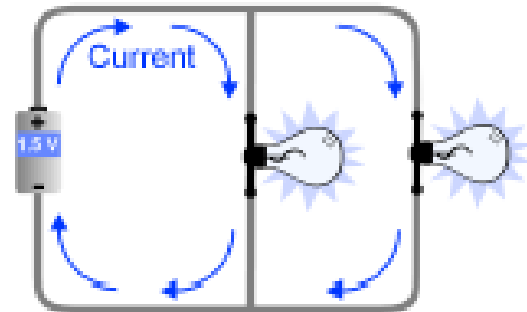
Circuits

- Series circuit the current can only take one path
- Parallel circuit the current has more than one path where the current can split up

Two bulbs
in a series circuit



Two bulbs
in a parallel circuit



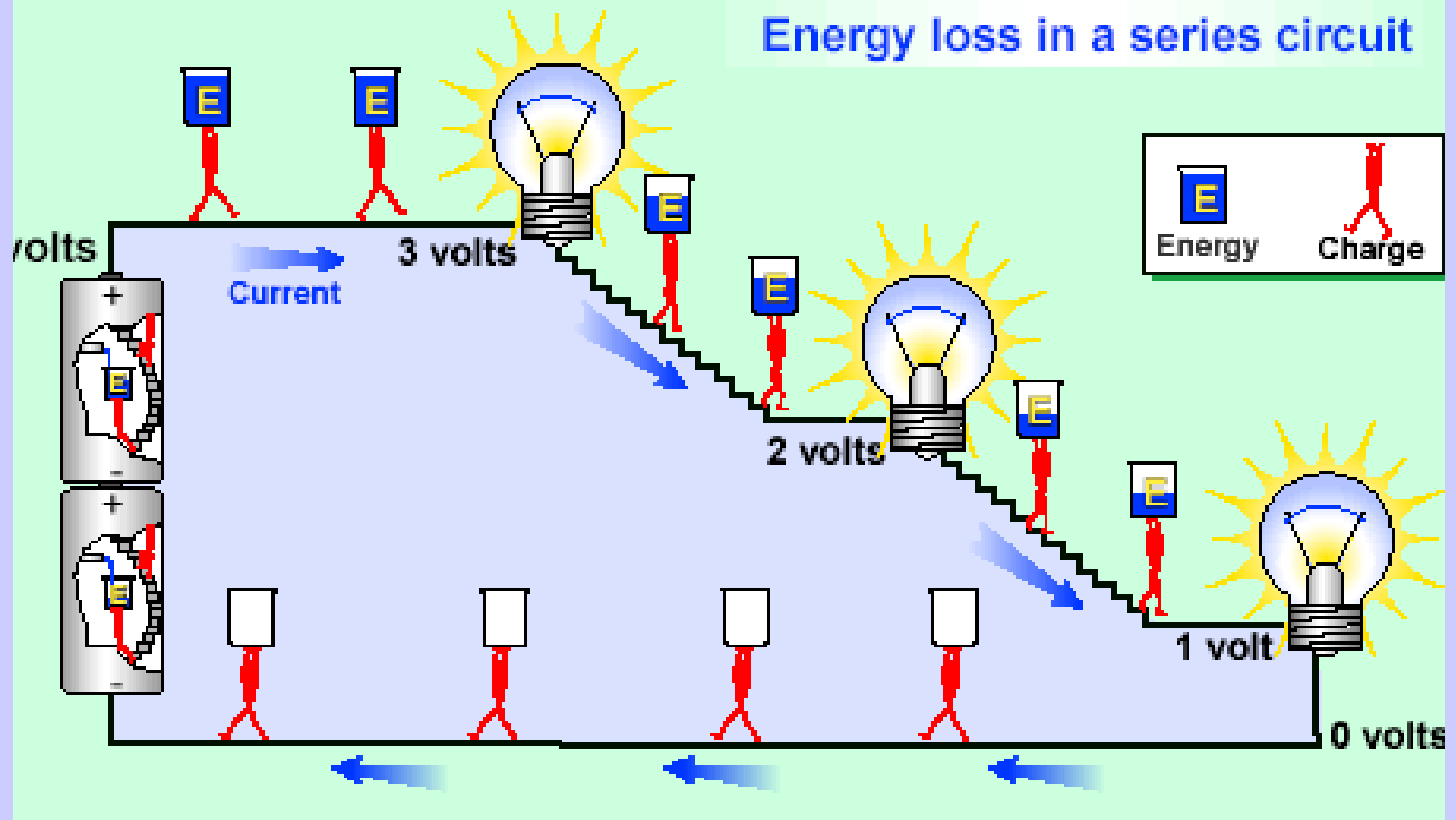
Household circuits

- Electrical Circuits in homes are parallel.
 - Parallel circuits mean that a light in your home can be on at the same time the TV is off. If the house was connected in series, turning anything electrical off in your house would turn everything off
- Most holiday lights are parallel. If one light bulb goes out, the rest stay on.

Series Circuits

- In a circuit, all the current flows through a single path.
- The current is the **SAME** at all points in the circuit.
- The amount of current is determined by the voltage and resistance of the circuit

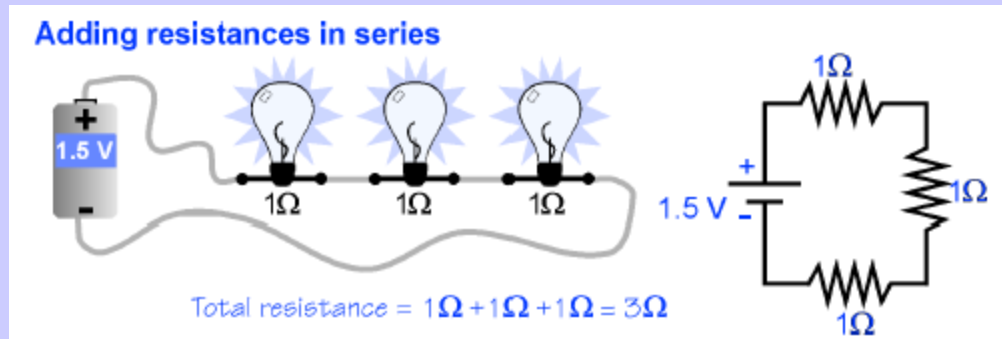
Energy loss in a series circuit



At the beginning, every charge has 3 volts of energy. As the charges move through the circuit, each light bulb is used by each bulb. All 3 volt of energy is used by the circuit

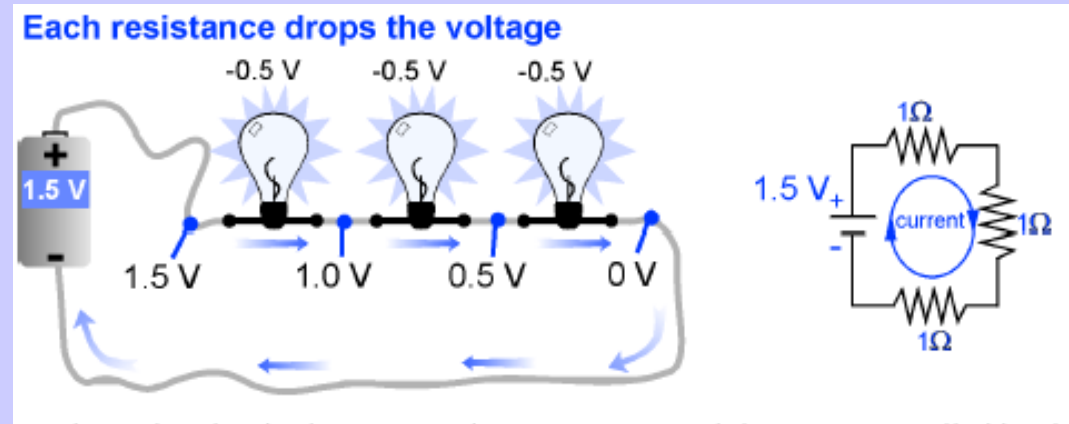
How to find current, resistance of a series circuit

- Each resistance in a series circuit adds to the total. Add together the resistance of each component in the circuit



- Once you know the resistance and the voltage use Ohm's Law ($I = V/R$) to calculate the current

Voltage



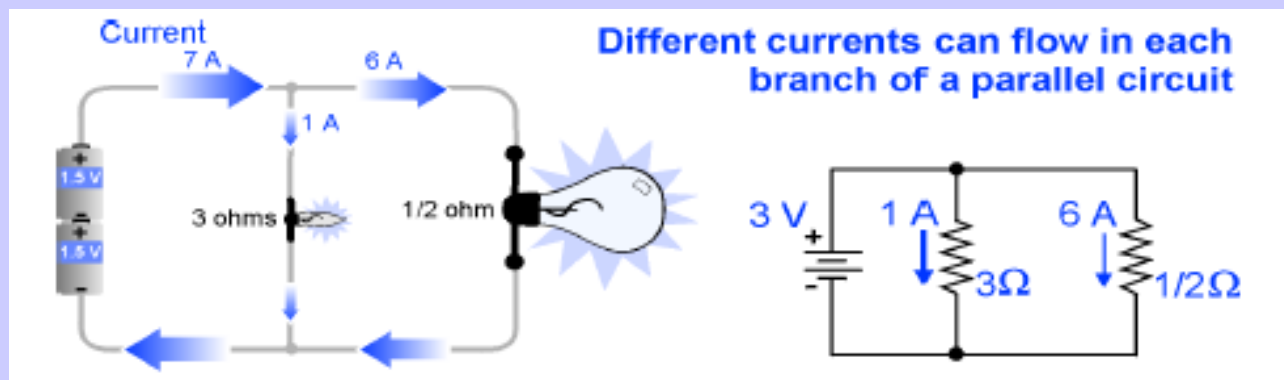
- As the current flows along a series circuit, each resistance uses up some of the energy
- If the voltage of the battery is 1.5 V then each light bulb will use part of the original voltage.
 - If you have 3 light bulbs than each bulb uses $\frac{1}{3}$ of the total voltage or $\frac{1}{3}$ of 1.5 = 0.5 V
 - If you have 2 light bulbs than each bulb uses $\frac{1}{2}$ of the total voltage or $\frac{1}{2}$ of 1.5 = 0.75 V

Parallel Circuit

- A parallel circuit has at least one point where the circuit divides. Each path is called a branch
- In a parallel circuit the voltage is the same across each branch. Each branch has a path back to the battery without any other resistances in the way

Current in a Parallel Circuit

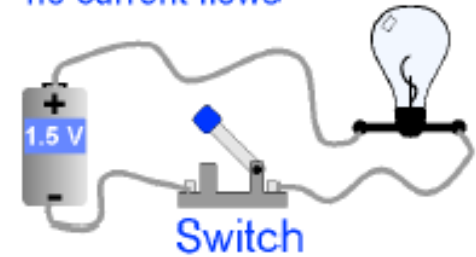
- The amount of current in each branch depends on the resistance in the branch.
- The lower the resistance in a branch means more current will flow through that branch



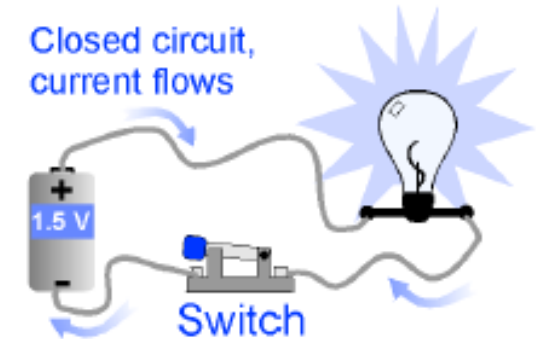
Short Circuit

- A short circuit is a circuit path with zero or very low resistance
- Since the resistance is very low, most of the current will travel through the short circuit
- Short circuits are dangerous because they generate a high current and a great deal of heat

Open circuit,
no current flows



Closed circuit,
current flows



Short circuit,
almost all current
through the short

