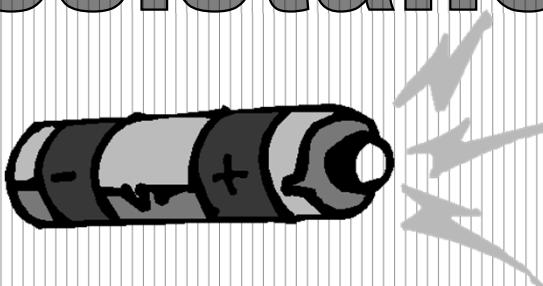


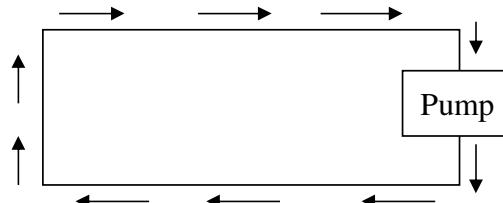
# Current and Resistance



1

## Electric Current

- movement of \_\_\_\_\_
  - flows between two points of different potential (voltage)



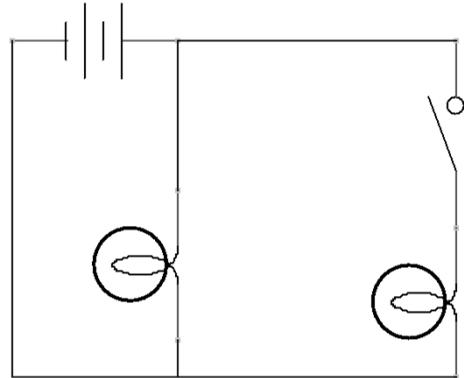
- maintained by a type of charge pump, which continuously changes the potential
- \_\_\_\_\_ flow from “-” to “+”
- \_\_\_\_\_ goes from “+” to “-”

2

1

## Electrical Circuit

- A closed electrical loop in which charge can flow
- Must have a high potential and low potential for current to flow



3

## Sources of Current

- Each source maintains a potential difference across their terminals by converting other forms of energy to electrical energy
  - Batteries
    - Converts \_\_\_\_\_ energy into electric energy
  - Photovoltaic Cell (Solar Cell)
    - Converts \_\_\_\_\_ into electrical energy
  - Generators
    - Converts \_\_\_\_\_ energy into electric energy

4

## Moving Charge

- Charges are not created or destroyed, only \_\_\_\_\_ from one side of the pump to the other
- Current (I) can be found using:

$$I = \frac{\Delta Q}{\Delta t}$$

- Ampere
  - amount of charge moved in a circuit every second  
1 C/s = 1 Amp
  - measured with an ammeter

5

## Current Kills

The Damage Caused by Electric Shock	
Current	Possible Effects
1 mA	mild shock can be felt
5 mA	shock is painful
15 mA	muscle control is lost
100 mA	death can occur

6

## Sample Problem

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- The amount of charge that passes through the filament of a certain light bulb in 2.00 seconds is 1.67 C. Determine the current in the light.



Answer: 0.835 A

7

## Moving Charges

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- Conventional Current
  - flow of \_\_\_\_\_ charge through a circuit
- Power
  - rate at which energy is used or converted to another form of energy

$$P = IV$$

$$E = Pt$$

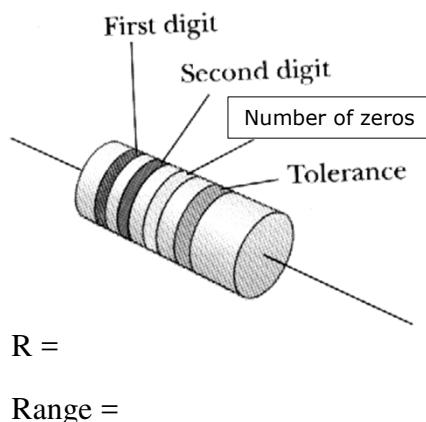
8

# Resistance

- The \_\_\_\_\_ to the flow of electric charge
- In a wire:
  - Longer wires have \_\_\_\_\_ resistance
  - Thicker wires have \_\_\_\_\_ resistance
  - Different materials affect the resistance
- Resistor
  - Carbon granules are mixed with varying amounts of clay can be molded into cylinders having a finite resistance.
  - Used to control the amount of \_\_\_\_\_ in a conductor

9

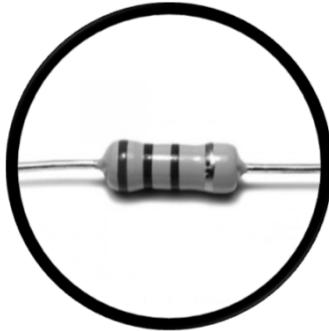
# Resistors



Color	Number	Tolerance
Black	0	
Brown	1	
Red	2	
Orange	3	
Yellow	4	
Green	5	
Blue	6	
Violet	7	
Gray	8	
White	9	
Gold		5%
Silver		10%

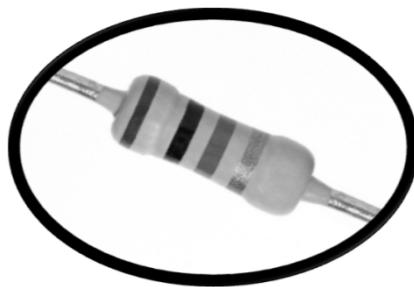
10

## Example Resistors



R =

Range =



R =

Range =

11

## Resistance (Ohms Law)

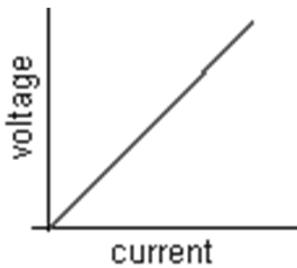
- The ratio of the potential difference across a conductor to the current it carries is constant.
- This constant is the resistance in the circuit.

$$R = \frac{V}{I} \quad \text{or} \quad V = IR$$

12

## Ohmic Materials

- \_\_\_\_\_ Ohm's Law and will have a constant slope on a V vs. I graph



13

## Non-Ohmic

- \_\_\_\_\_ follow Ohm's Law and **will not** have a constant slope on a V vs. I graph



14

## Sample Problem

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- A steam iron has a current of 6.4 A running through it when connected to a 120V outlet. What is the resistance of the iron?

Answer:  $18.75\Omega$