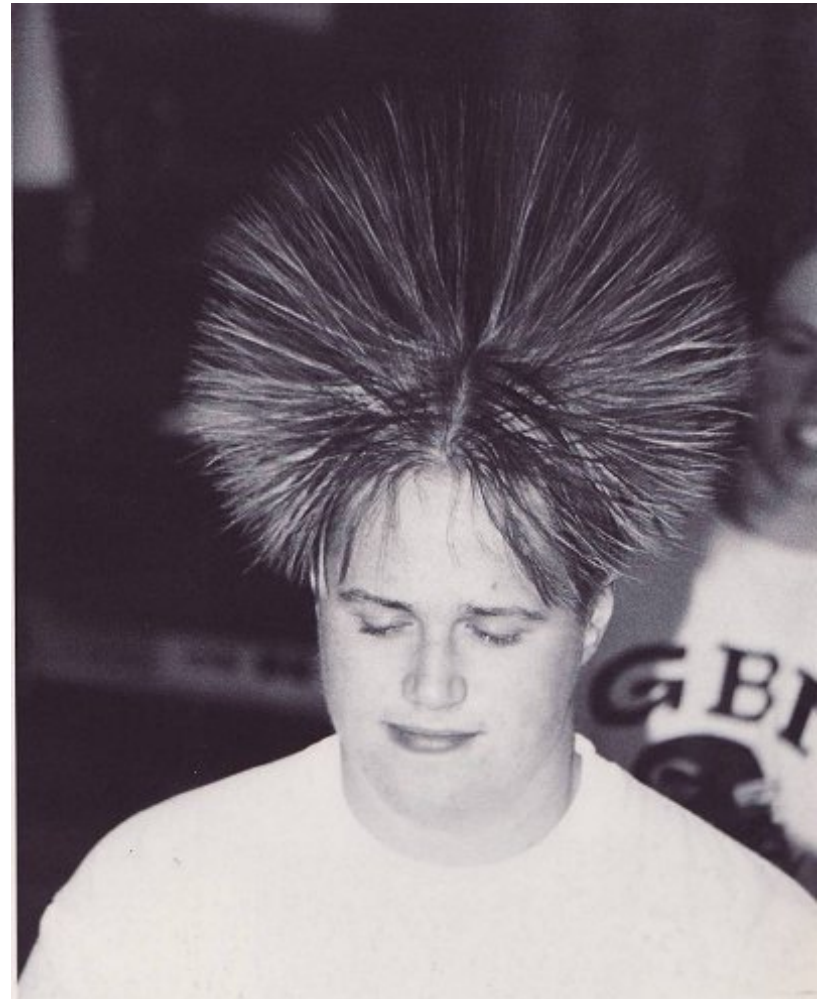
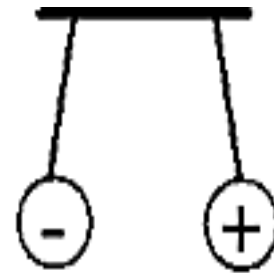
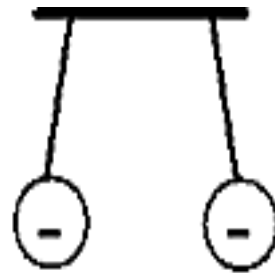
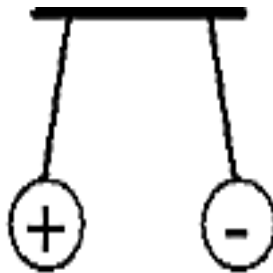
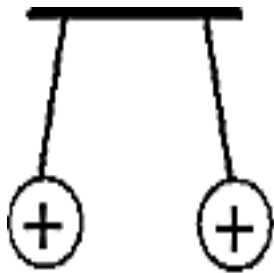


## 18.3 - Electric Current, Resistance, and Voltage



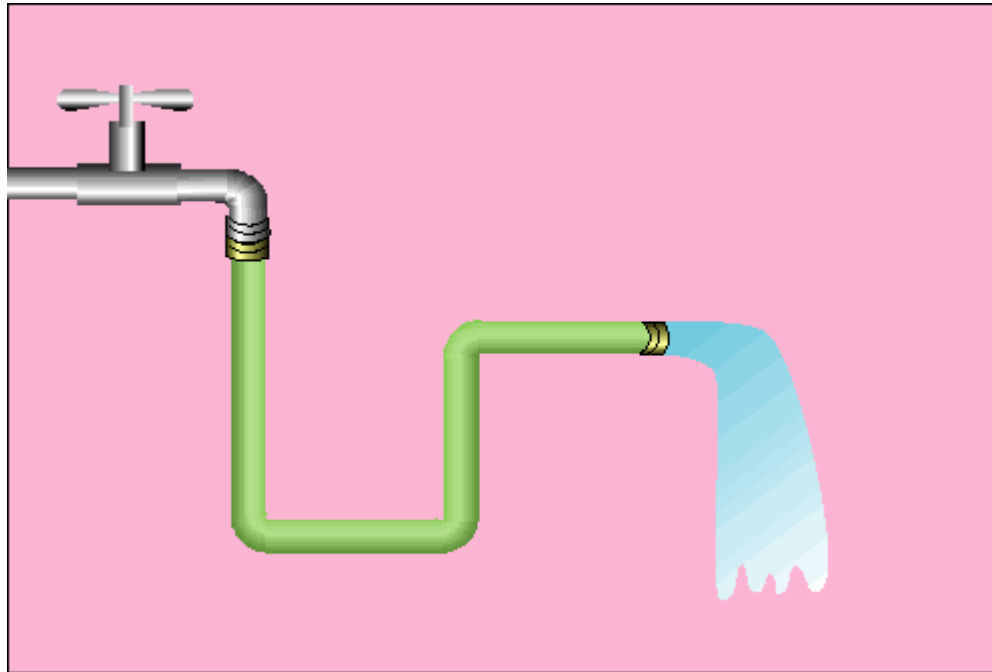
## Bell Work

In the pictures below, in each picture state whether the circles will repel or attract.



# Electricity

When we observe how electricity behaves, we can use water flowing thru a garden hose as an analogy.



# Electricity

**There are three variables which control how an electric circuit behaves:**

- 1. Current**
- 2. Resistance**
- 3. Voltage**

# Electric Current

## Electric Current

Electric Current is the **continuous flow** of electric charge.

There are two types of current:

1. **Direct Current (DC)**
2. **Alternating Current (AC)**

# Electric Current

## Direct Current (DC)

Electric charge that flows in **one direction**

### Example

**Battery in a Flashlight**

## Alternating Current (AC)

A flow of electric charge that regularly **reverses** its direction

### Example

**Electricity within a home or school**

# Electric Current

## Garden Hose Analogy

How does current relate to the garden hose?

*Electrical current flow through a wire is similar to the flow of water through the hose.*



# Conductors

## Conductors

- Materials where charges can **easily** flow.
- Conductors have atoms that **do NOT** tightly hold electrons.
- These electrons can easily be drawn away to carry **current**.

## Examples

**Metals such as copper, silver, aluminum**





# Insulators

## Insulators

- Materials that charge **cannot** easily flow
- Insulator atoms **do not** have freely moving electrons
- Does not allow **electric charge** to be transferred.

## Examples:

**Wood and rubber are good insulators.**

# Resistance

## Resistance

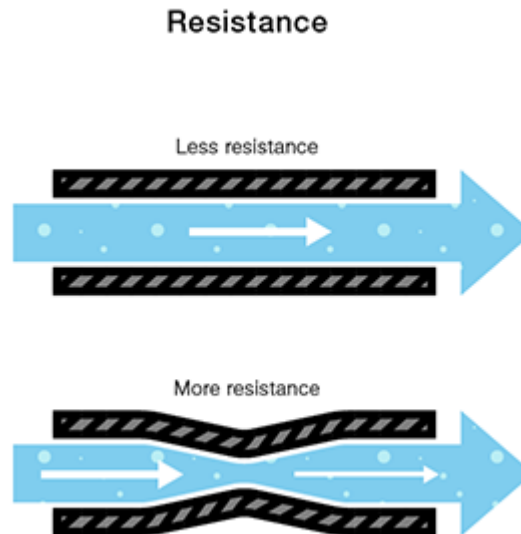
- The **opposition to the flow** of charges in a material.
- A material's **thickness, length, and temperature** affect its resistance
- As temperature **increases**, resistance **decreases**. Increased temperature frees up and spreads out electrons that current flows through

# Resistance

## Garden Hose Analogy

How does resistance relate to the garden hose?

*Electrical resistance opposes the flow of charges in a wire and the hose can restrict the flow of water thru bending of the hose or a kink in the hose.*



# Voltage

## Voltage

In order for charge to flow in a conducting wire, the wire must be connected to a **source of electrical energy**.

## Example

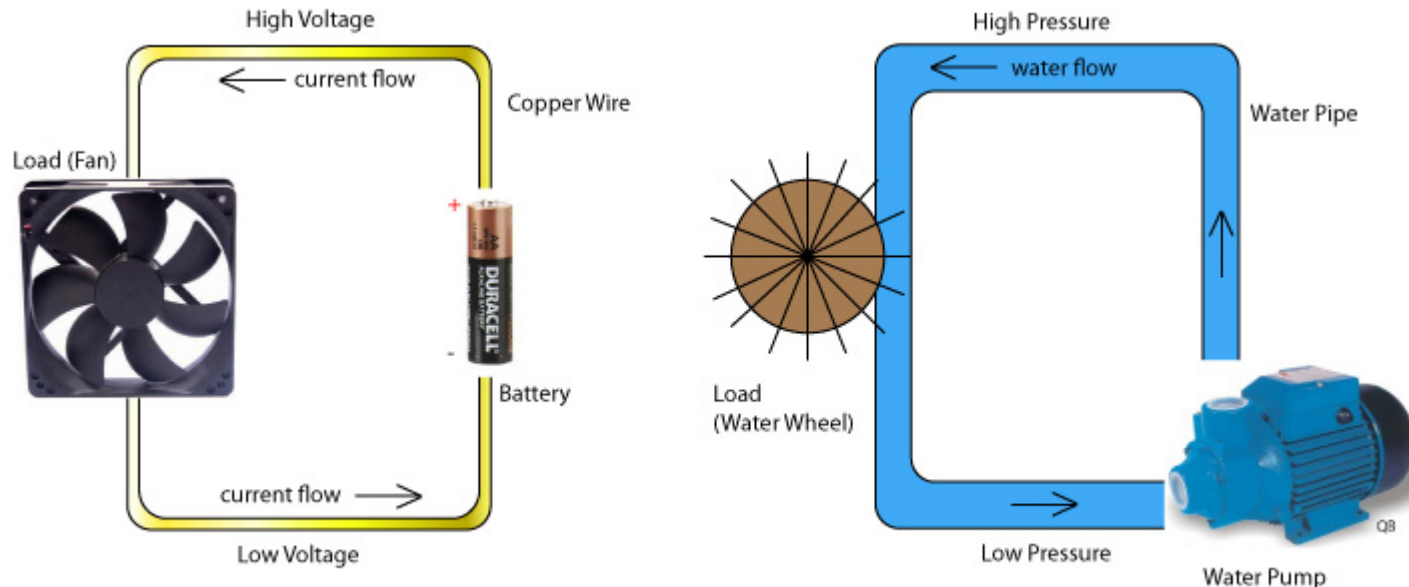
1. **Battery**
2. **Generator**

# Voltage

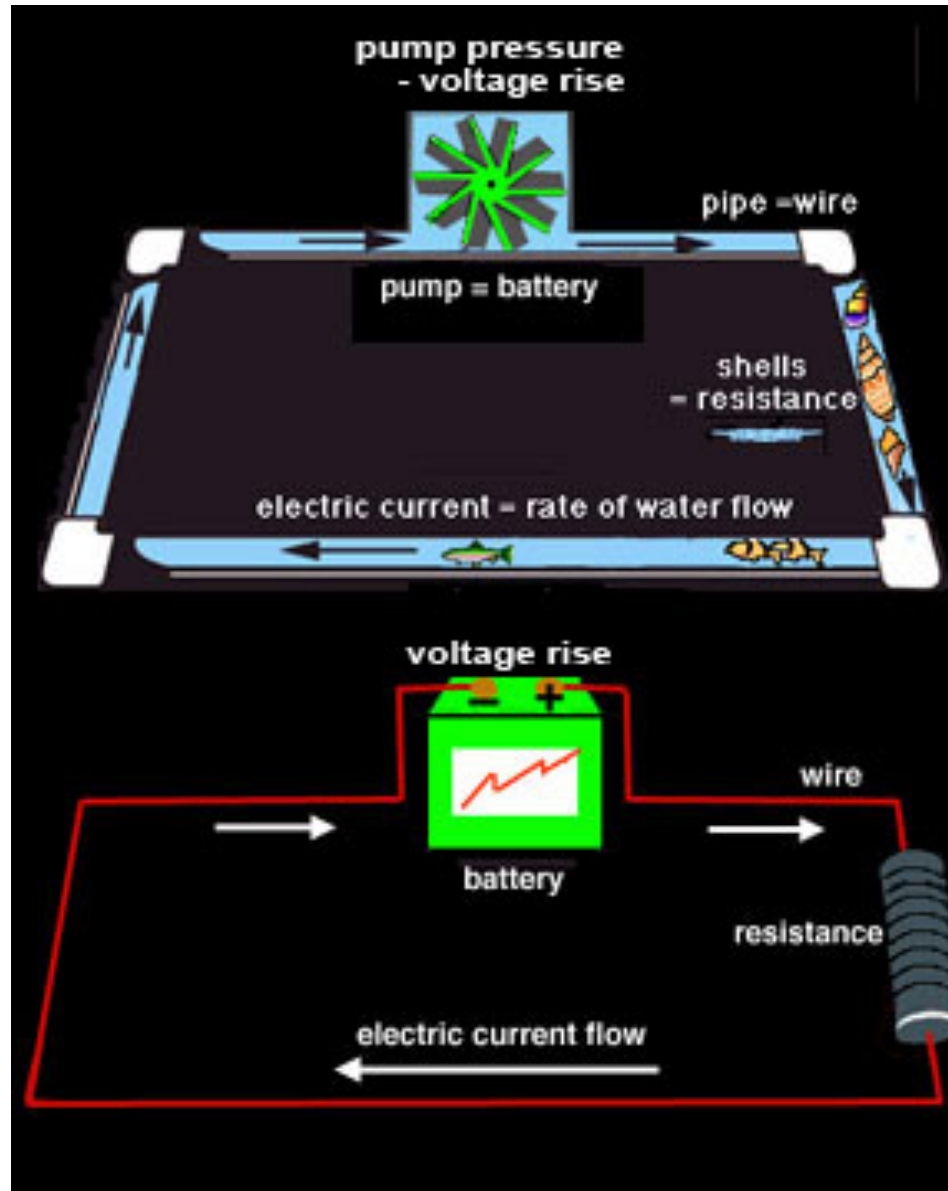
## Garden Hose Analogy

How does voltage relate to the garden hose?

*Electrical voltage provides the energy to push the electrons (Current) thru the wire, and a Pump provides energy to create the flow of water through the hose.*



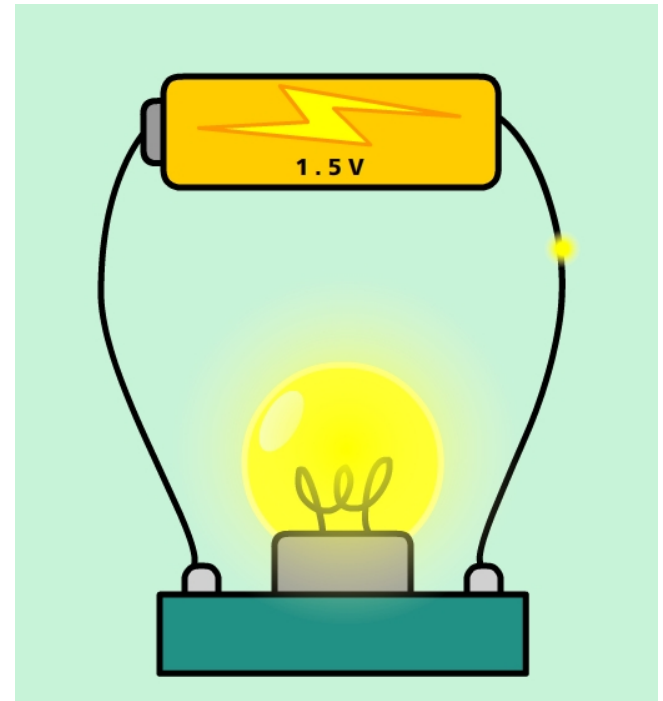
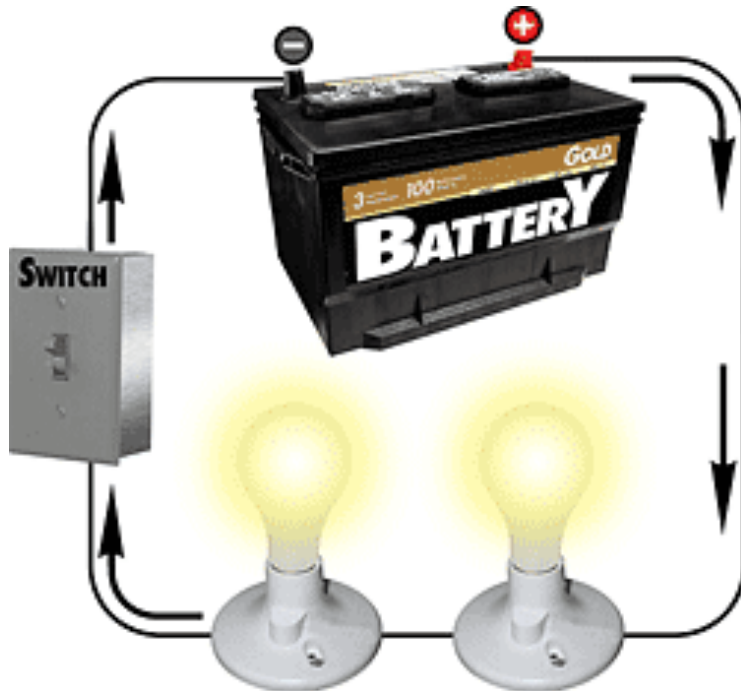
# Voltage



# Current Flow

## Current Flow

In order for charge to flow in a conducting wire, the wire must be connected in a **complete loop**



## 18.3 Assessment

### Question #1

List the two types of electric current?

1. *Direct Current (DC)*
2. *Alternating Current (AC)*

### Question #2

Name two good electrical conductors and two good electrical insulators



## 18.3 Assessment

### Question #3

What are the three variables that affect resistance?

1. *Thickness*
2. *Length*
3. *Temperature*

### Question #4

What causes charge to flow?

*A source of electrical energy causes charge to flow*

## 18.3 Assessment

### Question #5

What is required to have continuous flow of charge in a circuit?

*Complete Loop*

