Name/Number: _____ Date: _____

# Electricity/Magnetism Study Guide (Answer Key)

**Standard 4.3:** SWBAT investigate & understand the characteristics of electricity and magnetism.

## Conductors and Insulators – 4.3a

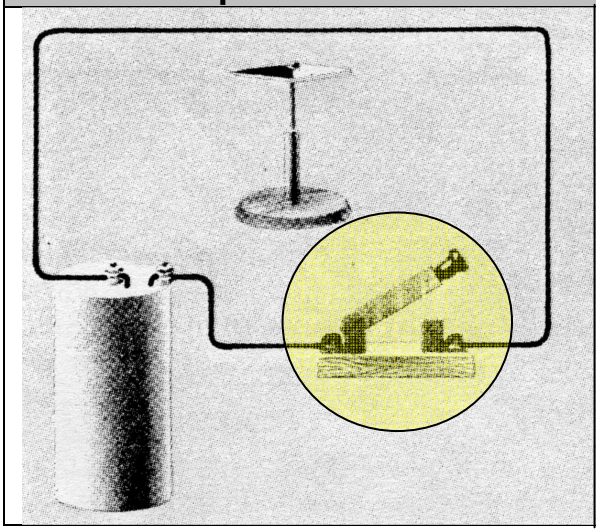
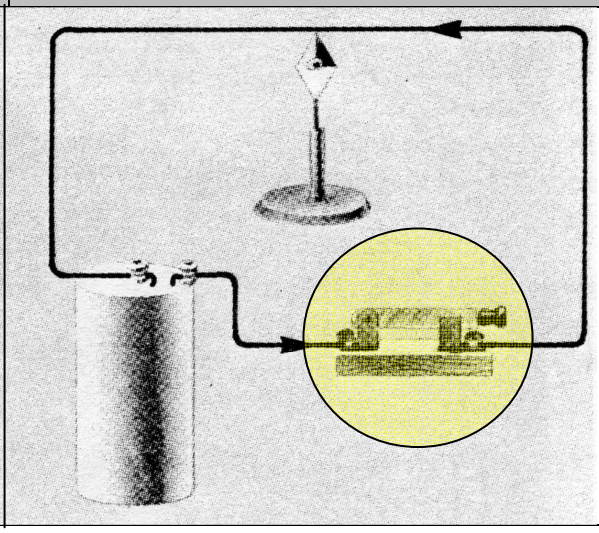
- Electrical energy moves through materials that are **conductors**.
- **Insulators** do not conduct electricity well.

| List Examples | |
|---|---|
| **Conductors** | **Insulators** |
| • Metal<br>• Water<br>• Wires | • Rubber<br>• Plastic<br>• Wood |

## Basic Circuits – 4.3b

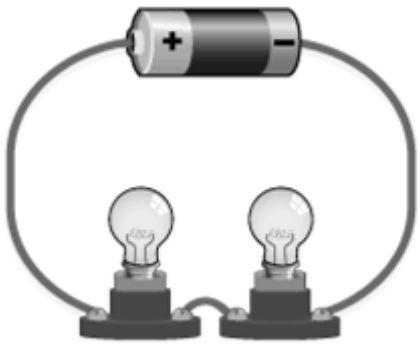
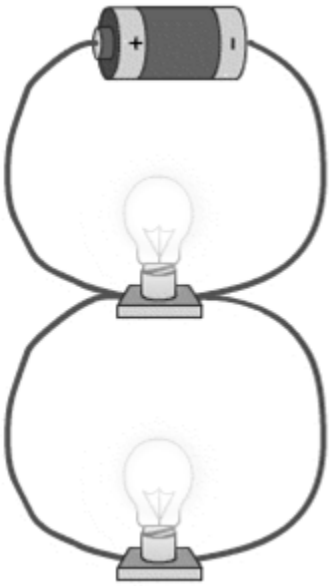
### Open/Closed

- A continuous flow of **negative** charges (electrons) creates an **electric current**.
- The pathway taken by an electric current is a **circuit**.
- Closed circuits **allow** the movement of electrical energy.
- Open circuits **prevent** the movement of electrical energy.

| Draw Examples | |
|---|---|
| **Open Circuit** | **Closed Circuit** |
|  |  |

**Series/Parallel**

- In a **series** circuit there is only one pathway for the current.
- In a **parallel** circuit there are two or more pathways for it.

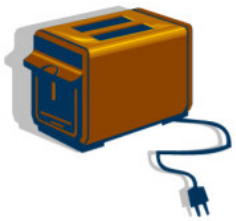
| Draw Examples | |
|---|---|
| **Series Circuit** | **Parallel Circuit** |
|  |  |

## Static Electricity – 4.3c

- Rubbing certain materials together creates **static electricity**.
- **Lightning** is the discharge of static electricity in the atmosphere.

## Transforming Electrical Energy – 4.3d

- Electrical energy can be transformed into:
  - **Heat** energy
  - **Light** energy
  - **Mechanical** energy

| List or Draw Examples | | |
|---|---|---|
| **Heat Energy** | **Light Energy** | **Mechanical Energy** |
|  |  |  |

## Electromagnets and Electricity – 4.3e

- **Magnetism** is another form of energy that is created by the movement of electrons.
- **Electricity and Magnetism are related.**
  - An electric current creates a **magnetic field**, and a moving magnetic field creates an **electric current**.
- Magnets are made of materials like **iron**, **nickel**, and **cobalt**.
  - All magnets have two ends called **poles**.
  - The poles called North are South are **attracted** to one another.
- There are **two** different types of magnets:
  - **Permanent** magnets are always magnetic.
  - **Electromagnets** are temporary magnets.
- A current flowing through a wire creates a **magnetic field**.
  - A simple electromagnet can be created by wrapping a **wire** around certain **iron-bearing** metals (iron nail) and creating a **closed** circuit.
- The strength of an **electromagnet** can be increased or decreased by:
  - Changing the number of **coils**
  - Changing the strength of the **electric current** flowing through the wire

## Famous Contributions to Electricity – 4.3f

**Benjamin Franklin**

- Founding Father of the United States
- Proved **lightning** was a form of electricity

**Michael Faraday**

- English scientist
- Discovered the relationship between **electricity** and **magnetism**

**Thomas Alva Edison**

- Improved the electric **light bulb**
- Figured out how to distribute **electricity** easily