

## SOL 5.4 Electricity

- electricity flows easily through conductors but not insulators;
- electricity flows through closed circuits;
- static electricity can be generated by rubbing certain materials together;
- electrical energy can be transformed into radiant, mechanical, and thermal energy;
- a current flowing through a wire creates a magnetic field.

Central Idea: Energy can move from one location to another through electrical circuits; this energy can then be transformed into different forms for multiple uses.

## ENERGY

- The flow of energy as a current through the circuit can be used to do work. The circuit is a system composed of various functioning components.
- Electricity is used every day. Humans transform electrical energy into different forms of energy to meet needs.

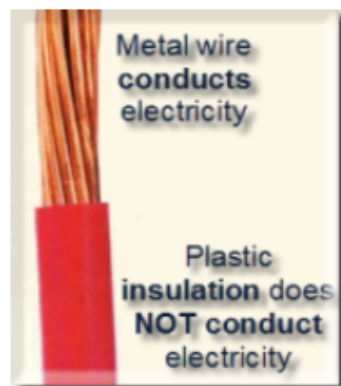


## CIRCUITS

- A **simple circuit** consists of a **bulb**, **battery**, and **wire**.
- A **closed circuit** allows electricity to **flow** within the circuit.
- If there is an **opening** in the circuit, electricity will **not** flow.

## CONDUCTORS AND INSULATORS

- Conductors** are materials which allow **electricity** to easily flow through them.
  - Examples of conductors include **metals**.
- Insulators** are materials that **do not allow** electricity to flow easily through them.
  - Examples of insulators include **rubber**, **wood**, and **plastics**.



## STATIC ELECTRICITY

- Static electricity** is the transfer of **negatively** charged particles between materials.
- Common examples of static electricity include **lightning**, **clothes sticking together** when coming out of a dryer, and getting a **shock** when touching a **door knob**.



Electrical to  
Mechanical (motion)



Electrical to  
Light (radiant)



Electrical to  
Thermal (heat)



### ENERGY TRANSFORMATIONS

- In a **lamp**, **electrical** energy is **transformed** into **radiant** energy.
- In a **fan**, **electrical** energy is **transformed** into **mechanical** energy.
- In a **toaster**, **electrical** energy is **transformed** into **thermal** energy.



### MAGNETIC FIELDS

- A **current flowing** through a **wire** creates a **magnetic field**.
- **Wrapping a wire** around certain iron-bearing metals (e.g., an iron nail) and creating a closed circuit is an example of a **simple electromagnet**.
- The **strength** of an electromagnet is mainly affected by the number of **coils**, the amount of **current**, the gauge of the **wire**, and the iron core.