Electricity & Magnetism

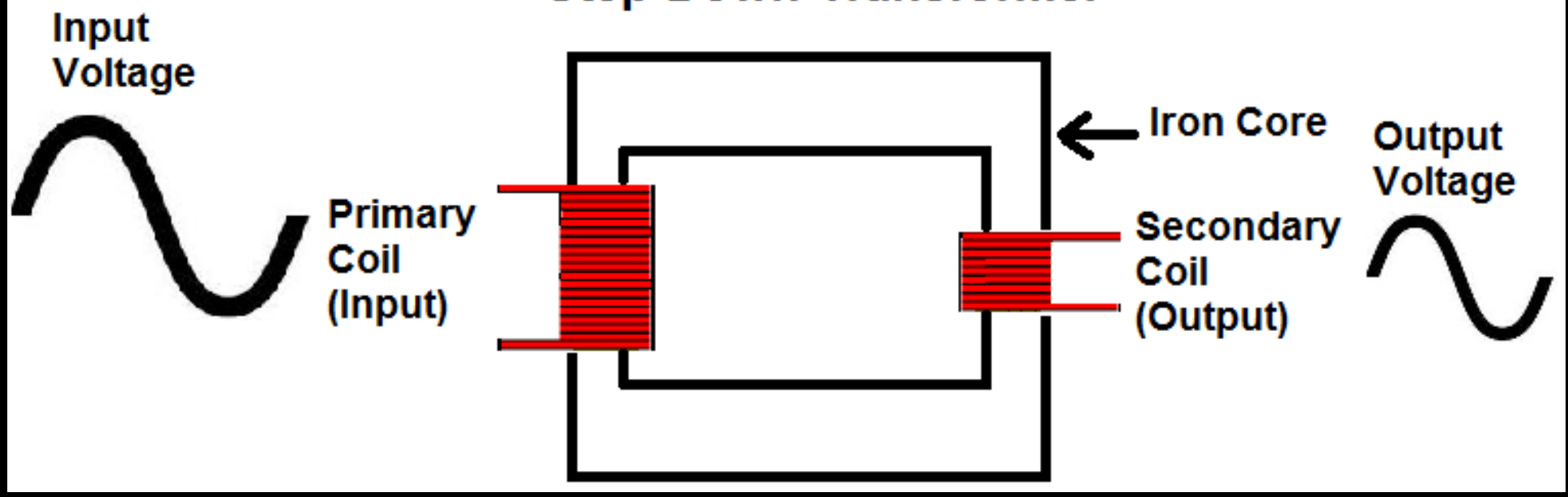
Transistors

- A transistor is an electronic component that uses a small electric current to produce a large one by one of two methods
  - Amplifier: A small electric current goes into the transistor and the transistor amplifies the signal to make it into a large one
  - Switch: A small electric current goes into the transistor and trips a switch that causes a larger current to flow through another part of the circuit

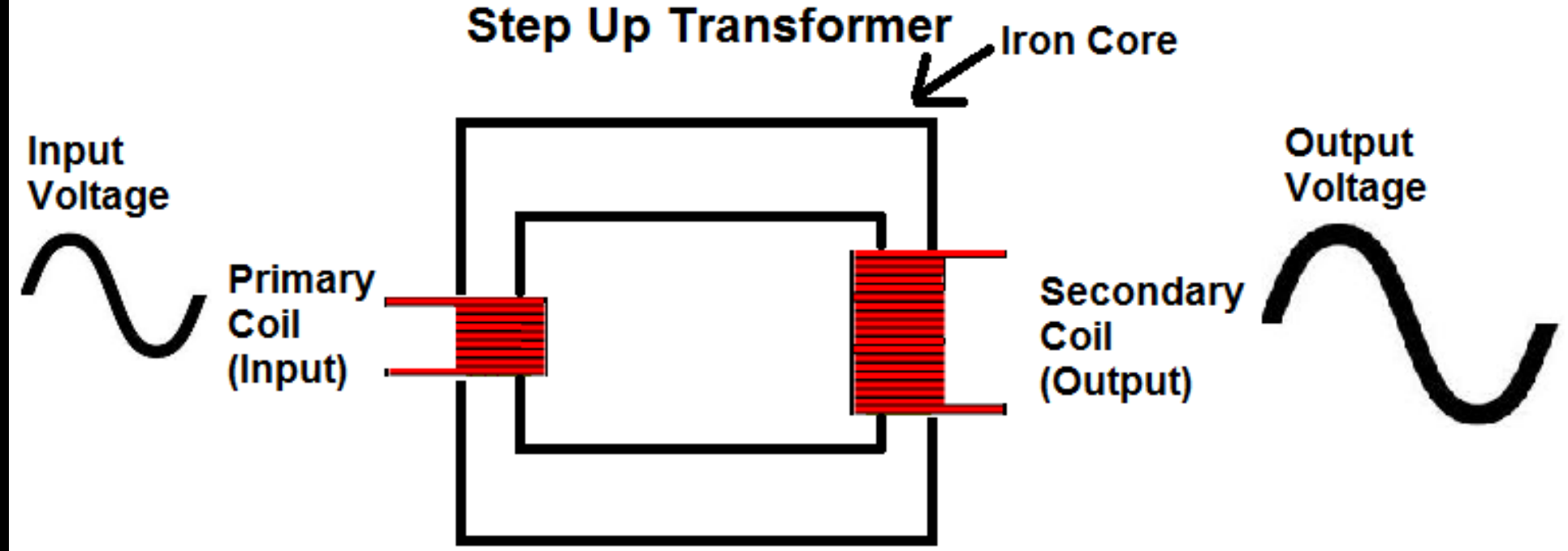
Transformers

- Transformers are devices that decrease or increase the voltage
  - Only works with alternating current
- Step-down transformers reduce the voltage
  - There are more turns on the primary coil than the secondary coil
- Step-up transformers increase the voltage
  - There are more turns on the secondary coil than the primary coil

Step Down Transformer



Step Up Transformer



Magnetism

- A magnet is a piece of metal (must contain iron, nickel, or cobalt) that applies a force to other metals and electrical currents, causing attraction or repulsion
  - Opposite ends of the magnet (north & south) attract while like ends of the magnet (north & north or south & south), repel
- Magnetic Domains
  - The magnetic fields of atoms are groups together and aligned with one another
    - Miniature magnets within a material

Magnetism

- Permanent Magnets
  - Hold magnetic properties for a long time
- Temporary Magnets
  - Hold their magnetic properties for a short time
  - Produced by being near a permanent magnet or with an electric current
- Breaking a bar magnet results in 2 smaller magnets, each with their own north and south pole

Magnetism

- Electromagnets
  - Temporary magnets are formed by passing an electric current through a wire wrapped around a metal core
  - Ways to increase electromagnet strength
    - Increase the turns of wire
    - Increase the voltage of the battery
    - Increase the size of the core
- A solenoid is an electric coil of with a moveable core at the center