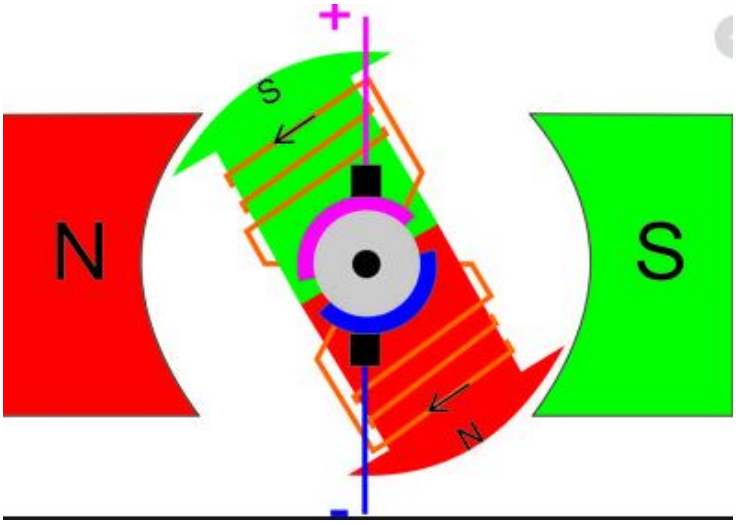
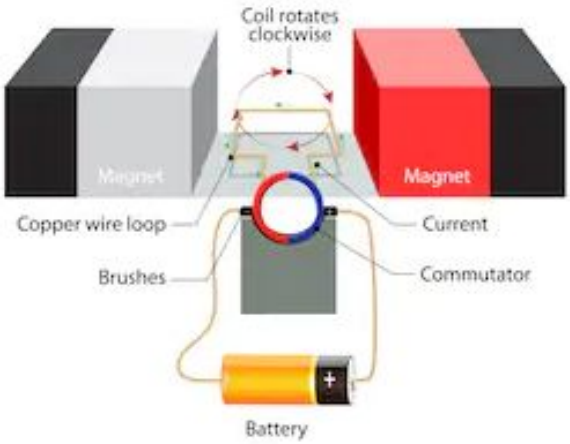
Applications of Electromagnetic Induction Notes

- Electric motor - a device that converts electrical energy into kinetic energy to turn an axle
    - Motion is produced by an electric current
    - 2 parts of an electric motor:
        - Permanent magnet
        - Centrally placed electromagnet

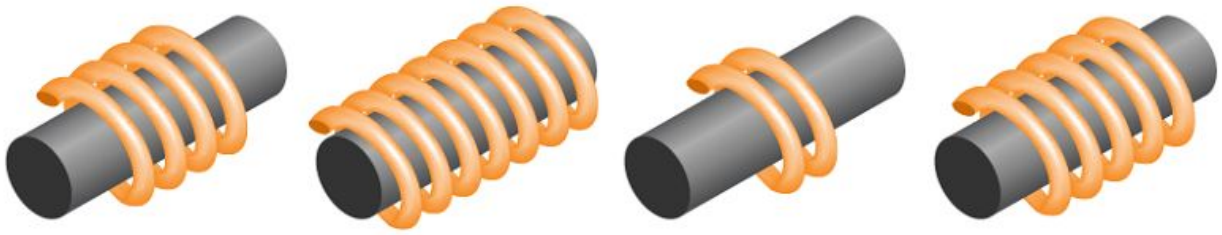


- Armature - a rotating coil of wires wrapped around an iron core
- Commutator - reverses the flow of current through an electric motor
- Brush - an electrical contact

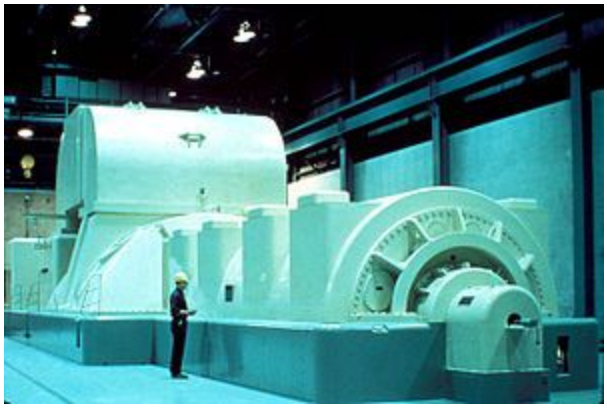


- How to make your electric motor stronger:
    - Increase the number of coils in the solenoid
    - Get a stronger permanent magnet
    - Send more current through the electromagnet
    - Decrease the space between the permanent magnet and the electromagnet

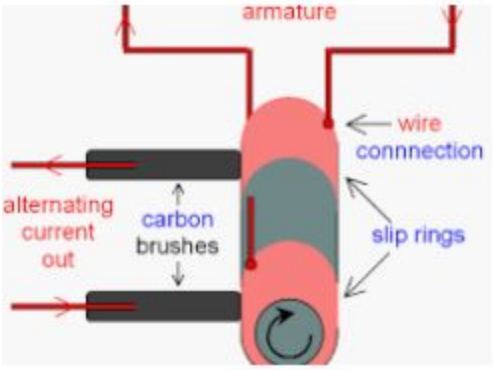
- Question: Which electromagnet is the weakest?



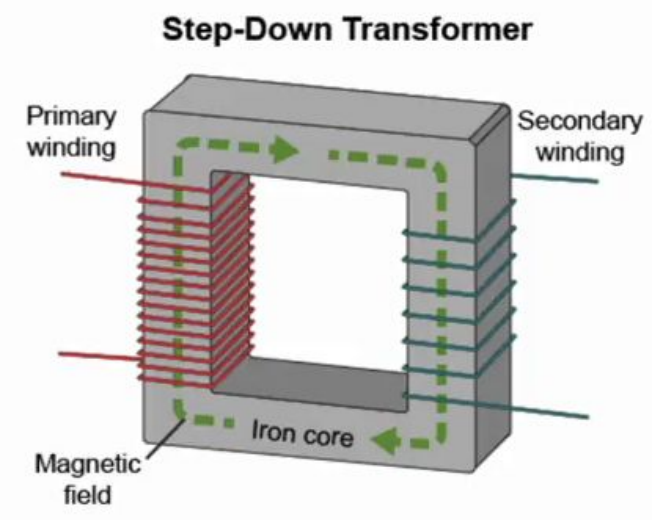
    - The third one is the weakest.
        - It has the fewest number of coils.
- Generator - converts kinetic energy into electrical energy



- Slip rings - material that creates a path for the current to leave the generator by rubbing against the brushes



- Transformer - a device that increases or decreases the voltage of alternating current (AC)



  - Made of:
    - Iron core
    - Primary winding - current enters with a high voltage
    - Secondary winding - current exits with a low voltage
  - Formula: $\frac{N_1}{N_2} = \frac{V_1}{V_2}$
    - N_1 = number of coils in the primary loop
    - N_2 = number of coils in the secondary loop
    - V_1 = voltage in the primary loop
      - Unit: V
    - V_2 = voltage in the secondary loop
      - Unit: V
  - Question: A primary winding with 12 coils carries a current of 400 V. What is the secondary voltage if the secondary winding has 8 coils?
    - Given: N_1 = 12 coils
      N_2 = 8 coils
      V_1 = 400 V
    - Unknown: V_2 = ?
    - Equation: $\frac{N_1}{N_2} = \frac{V_1}{V_2}$
    - Substitute: $\frac{12\ coils}{8\ coils} = \frac{400\ V}{V_2}$
    - Solve: (12 coils)(V_2) = (8 coils)(400 V)
      (12 coils)(V_2) = 3200 coils • V

$$V_2 = \frac{3200\ coils \cdot V}{12\ coils}$$

V_2 = 267 V