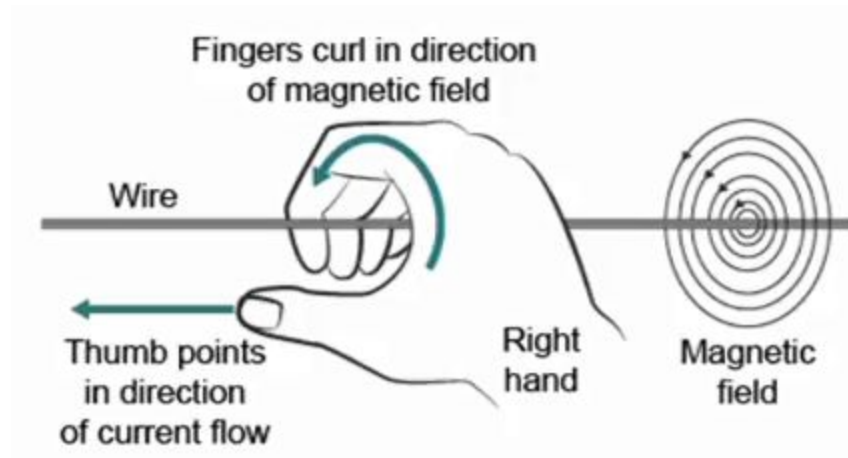


## Electromagnetic Induction Notes

- Electric currents and magnetic fields both have a direction
  - Flowing current generates a magnetic field
- **Electromagnetism** - the making of a magnetic field by an electric current
  - Discovered by Hans Oersted
    - Noticed that a flowing electrical current screwed up his compass
- **Right-hand Rule** - a way to determine the direction of a magnetic field
  - Thumb points in the direction of the flow of the electric current
  - Fingers curl in the direction of the magnetic field



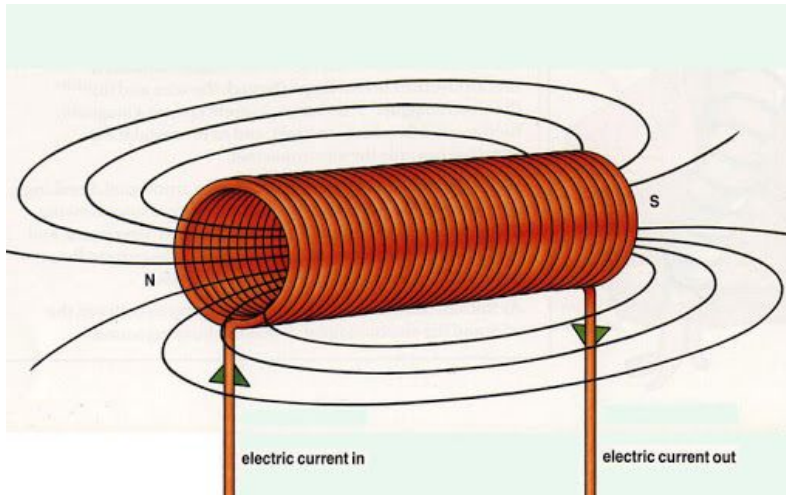
- **Question:** Use the image to answer questions about the right-hand rule.



Which direction is the current flowing? Which direction is the magnetic field flowing?

- His thumb is up, so the current is flowing up
- His fingers are curling counterclockwise, so the magnetic field is counterclockwise

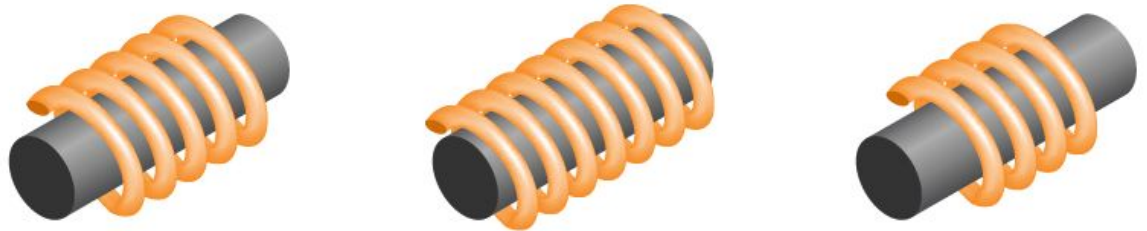
- **Solenoid** - when a current-carrying wire is looped repeatedly



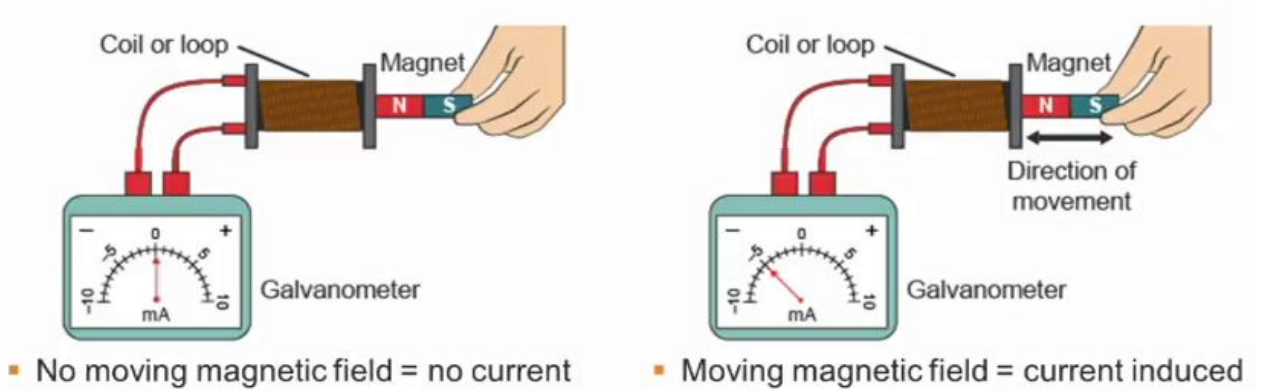
- You can see the magnetic field it produces, just like a bar magnet
- You can increase the magnetic field by
  - Making the loops closer together
  - Increasing the number of loops
  - Having more current flow through it
- **Electromagnet** - a metal core is wrapped inside a solenoid



- Iron and nickel are usually used for the core
- It only has magnetic properties when the current flows through the solenoid part
- **Question:** Which electromagnet is weakest?



- The third one is the weakest
      - It has less coils in its solenoid than the other two
  - **Electromagnetic induction** - the making on an electric current in a closed circuit by a changing magnetic field



- Discovered by Michael Faraday
- You need a changing magnetic field to create a current
- How to create more current:
  - Move the magnet faster
  - Move the circuit faster
  - Add coils to your solenoid
  - Use a stronger magnet
- How to change the current's direction
  - Move the magnet in the opposite direction
  - Move the wire in the opposite direction
  - Flip the magnet over North to South or South to North