Physics

Semester 2

Weeks 11 - 13

Monday / Tuesday (March 23 & 24)

- DCA Circuits

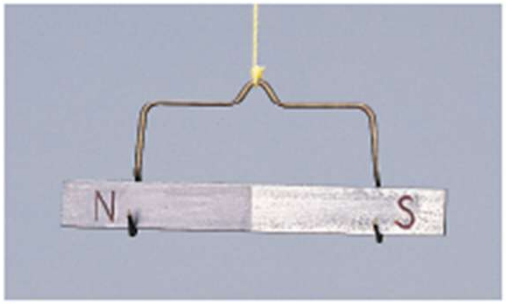
- T:6D - Analyze, design, and construct series and parallel circuits using schematics and materials such as switches, wires, resistors, lightbulbs, batteries, voltmeters, and ammeters.

6E - Calculate current through potential difference across, resistance of, and power used by electrical circuit elements connected in both series and parallel circuits using Ohm's law.

- O: I will demonstrate my understanding of circuits
- D: by taking the DCA for this unit
- A: series circuits, parallel circuits, combined circuits, current, voltage, resistance.
- Y: How are parallel and series circuits different?

Wednesday / Thursday (March 25 & 26)

- T: 6B - Identify and describe examples of electric and magnetic fields in everyday life such as generators, motors, and transformers.
- O: I will begin to understand how magnets work
- D: by watching a video, taking notes, and conducting a lab
- A: magnetic field lines
- Y: What are some properties of magnets?



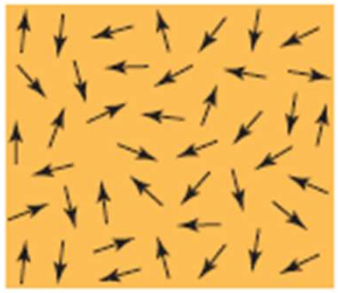
Properties of Magnets

- Polarized- has two poles of opposite charges
- If broken, still has two poles of opposite charge
- Temporary Magnets- magnets can temporarily magnetize other objects: (induced) nails, paperclips, etc
- Permanent Magnets- also induced but remain magnetized: Neodymium, Gadolinium, ALNICO V (Aluminum, Nickel, Cobalt)

Magnetic Domains

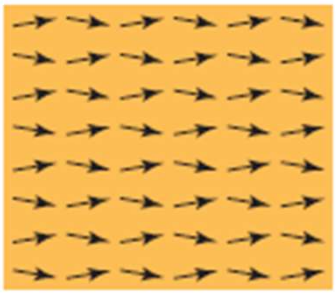
- Domain is a combination of electrons in a group of neighboring atoms that act as tiny electromagnets
- Iron is a great example:

- Not in a magnetic field



a

In a magnetic field



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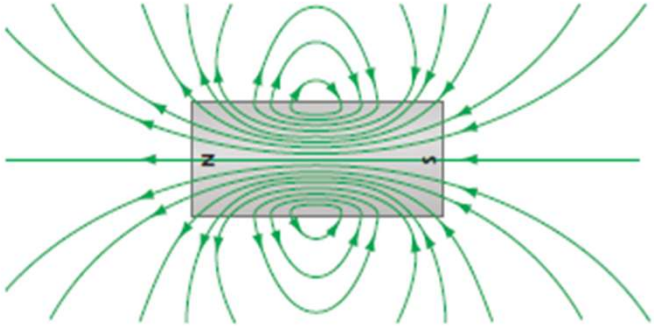
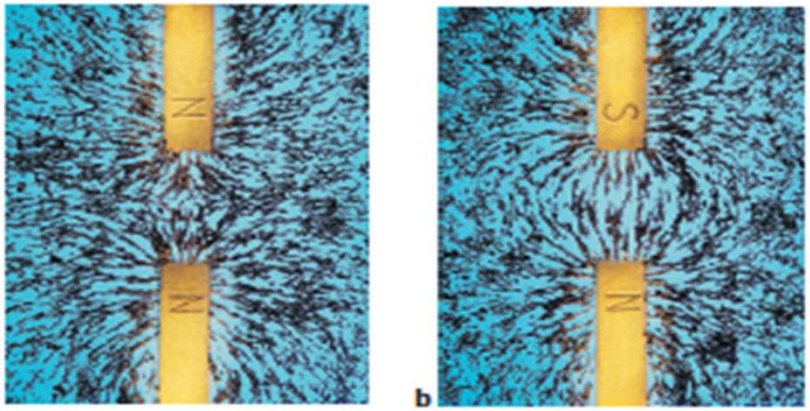
Magnetic Fields

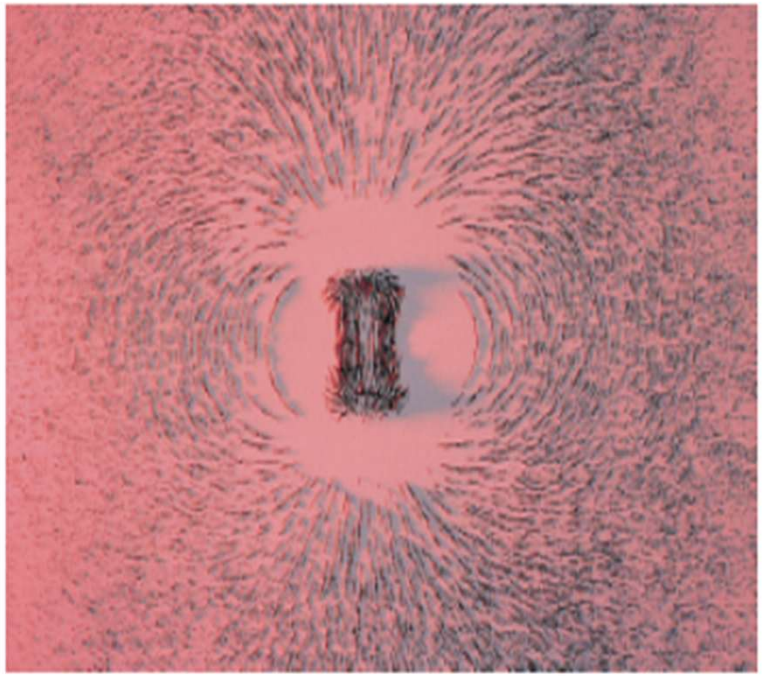
- Surround permanent magnets
- Two magnets attract and repulse depending on the side with which they are oriented
- Similar to how Gravitational and Electric forces act over a distance

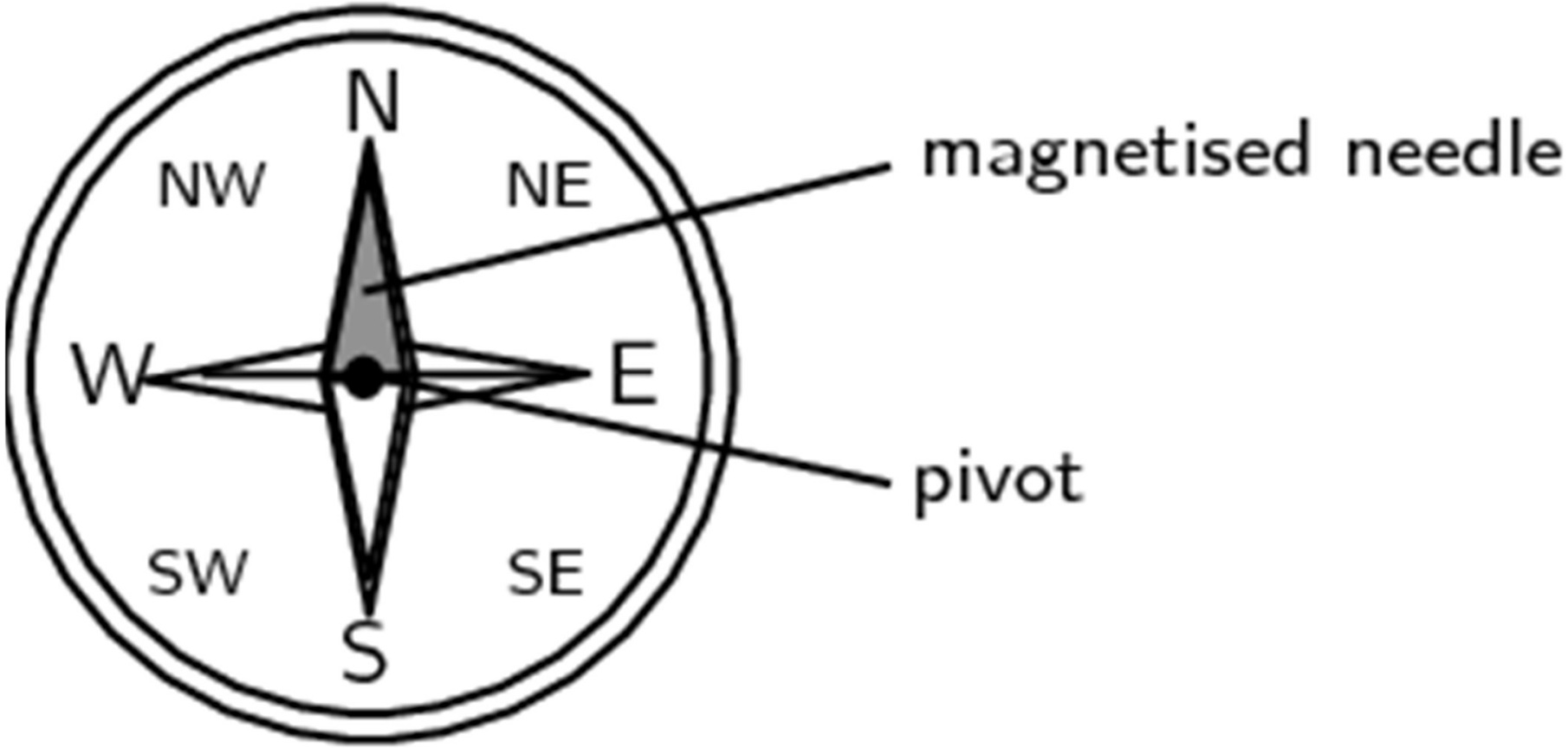


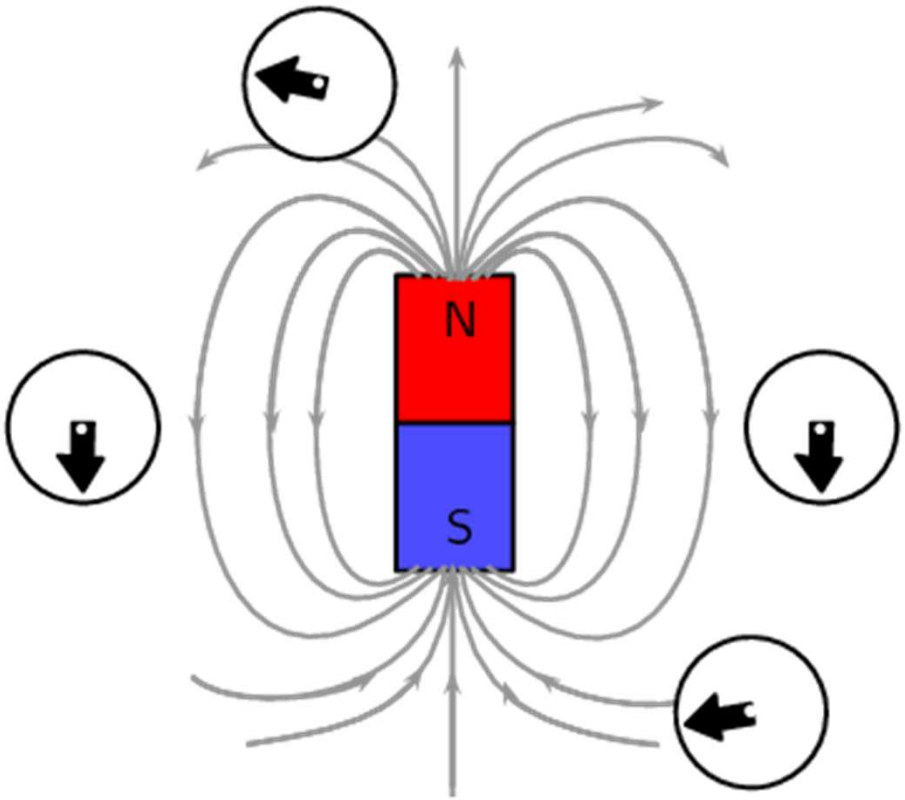


Magnetic Field Lines

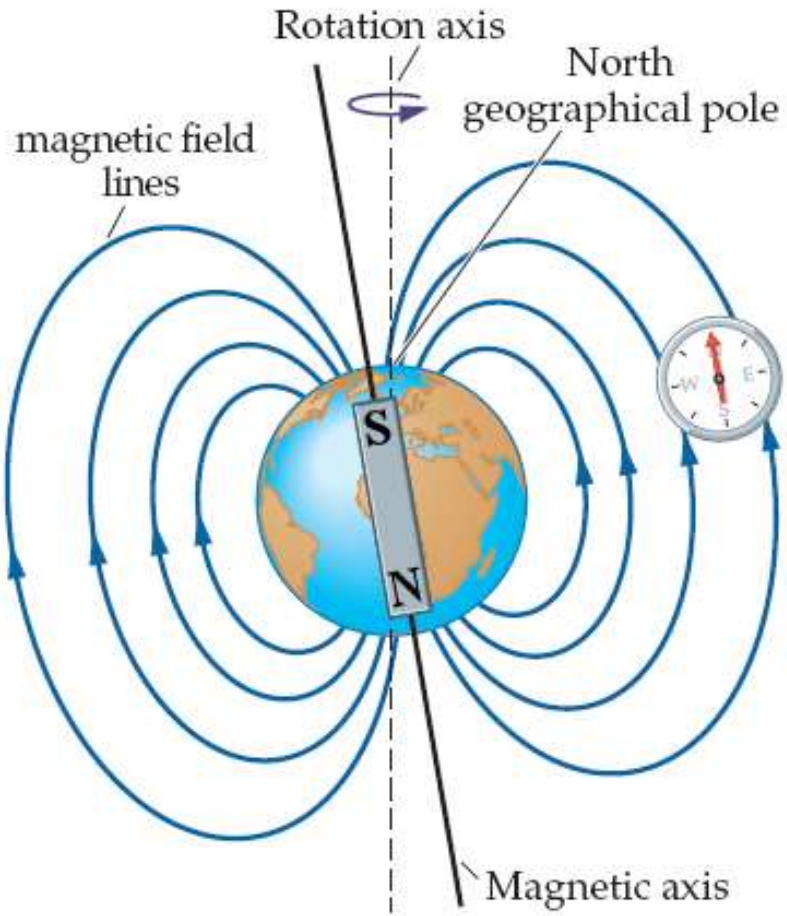
- They are imaginary but help us visualize the field and allow us to measure the strength
- Magnetic Flux- number of magnetic field lines passing through a surface
  - Flux / Area is proportional to Field Strength
- Direction of field is where the N-pole of a compass points when in the magnetic field

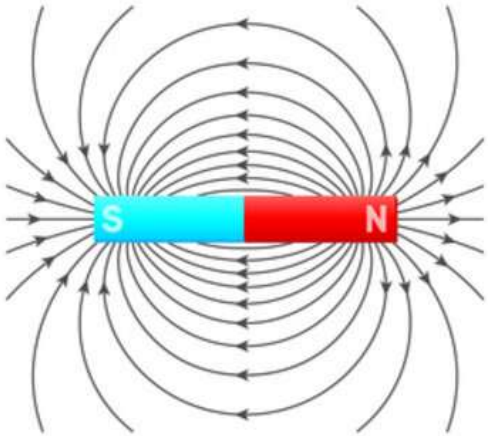



N
NW
NE
W
E
SW
SE
S
magnetised needle
pivot



The direction of the compass arrow is the same as the direction of the magnetic field


Rotation axis
North
geographical pole
magnetic field
lines
S
N
Magnetic axis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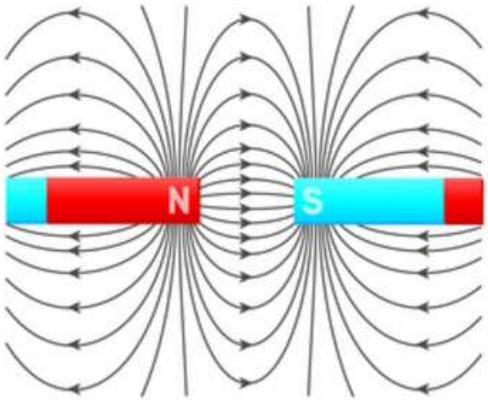
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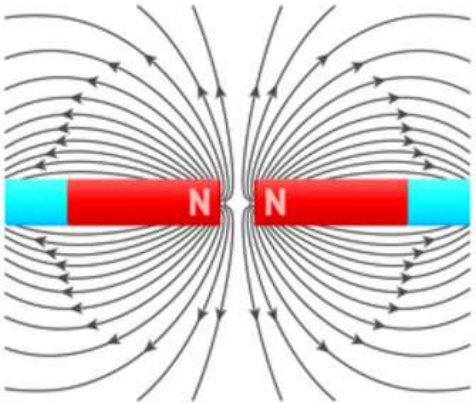

N
N

Friday (March 27)

- C-day

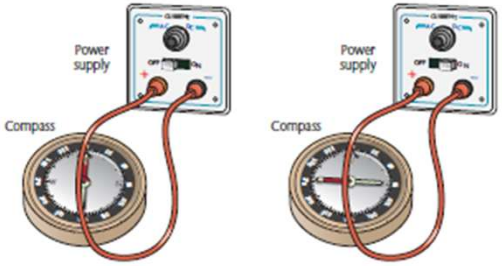
Monday / Tuesday (March 30 & 31)

- Substitute on 3/30
- PhETs

- T: 6B - Identify and describe examples of electric and magnetic fields in everyday life such as generators, motors, and transformers.
- O: I will be able to explore the ideas of how magnets affect electric fields
- D: by completing an Actively Learn PhET and a worksheet PhET.
- A: electromagnetics, Faraday, magnetic field, transformer
- Y: What factors affect the creation of electricity using magnets?

Wednesday / Thursday (April 1 & 2)

- T: Identify and describe examples of electric and magnetic fields in everyday life such as generators, motors, and transformers.
- O: I will be able to demonstrate my understanding of the right hand rule and how to calculate magnetic force
- D: by participating in a class lecture and completing a worksheet.
- A: right hand rule, force, magnetic field
- Y: How does the right hand rule explain the vectors of magnetic and electric forces?

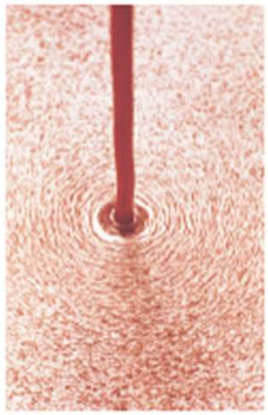


Electromagnetism

- 1820 Hans Christian Oersted experimented with circuits and attached a current carrying wire in a circuit and made the needle of a compass point towards the wire instead of North
- He discovered that the force of the magnetic poles of the compass was perpendicular to the current in the wire
- He also realized no current meant no magnetic forces

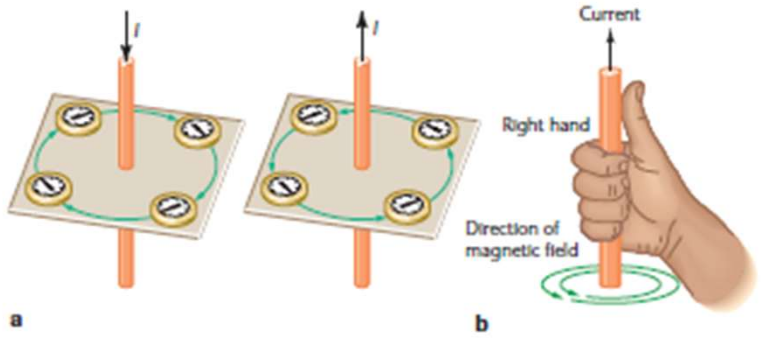
Electromagnetism

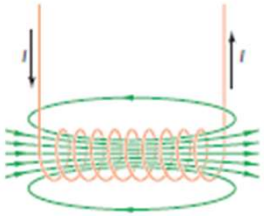
- The current through the wire in the compass experiment created a magnetic field around the wire
- Magnetic field is proportional to the amount of current in the wire
- Compass shows direction of field lines. Reverse current, reverse field lines



1st Right Hand Rule

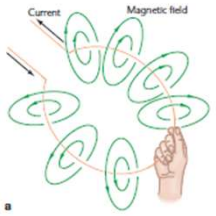
- Hold a current carrying wire with your right hand with your thumb pointing in the direction of the positive current
- The fingers point in the direction of the magnetic field





Magnetic field in a coil

- Current through a circular loop of wire forms a magnetic field all around the loop uniformly
- Electromagnet
  - Solenoid- a long coil of wire with many loops
    - Fields of each loop adds to the other loops fields
  - Electric current through solenoid creates field like a permanent magnet and repels the north pole of the magnet

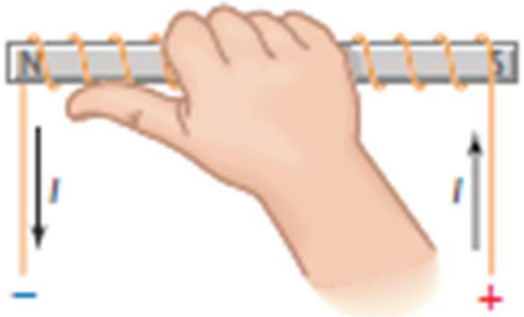


Electromagnet

- Current increased increases the strength of the magnetic field
- Increasing the number of coils increases the strength of the magnetic field
- Can also increase the magnetic field by placing a rod in the inside of the coils because it magnetizes the core

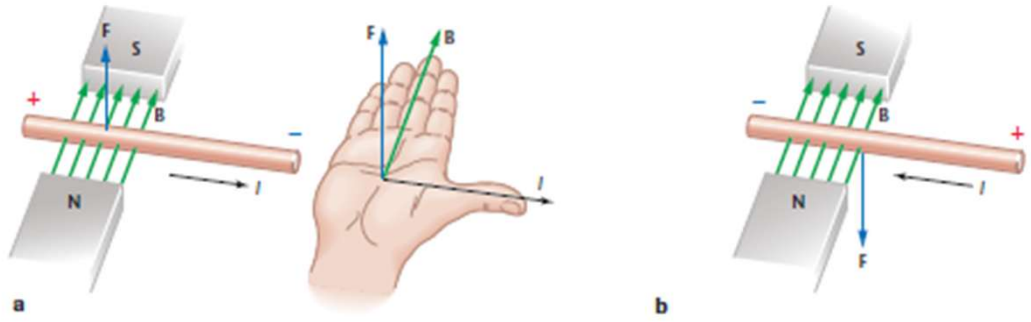
2nd Right Hand Rule

- Electromagnets- hold coil with your right hand with your fingers coiled in the direction of the current
- Thumb points towards the north end of the magnet



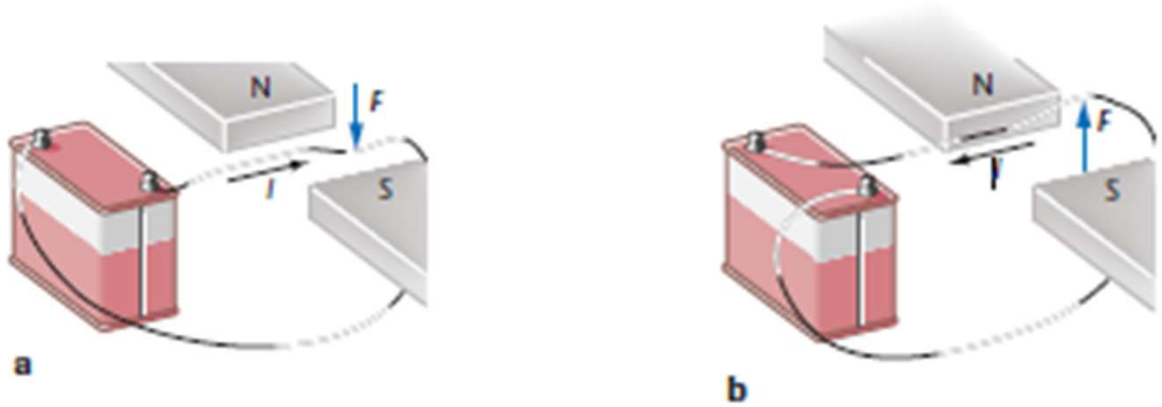
3rd Right Hand Rule

- Thumb points in the direction of the current, fingers in the direction of the magnetic field and the palm is in the direction of the force



Forces on Currents in Magnetic Fields

- Force exerted on a wire depending on the direction of the current
  - Up
  - Down



Force on a wire from a Magnetic Field

- F= BIL
- Force is equal to the magnetic field multiplied by the current and the length of the wire in the magnetic field
- Uses:
  - Loudspeakers- changes electrical energy to sound
  - Galvanometers- measures small currents
  - Electric Motors- converts electrical energy to kinetic energy

Unit of Measurement for Magnetic Field

- The SI unit of magnetic field intensity is **Tesla**. One tesla (1 T) is defined as the field intensity generating one newton of force per ampere of current per meter of conductor.

Strength on a Magnetic Field

- A straight wire that carries a 5.0 A current is in a uniform magnetic field oriented at right angles to the wire. When 0.10 m of the wire is in the field, the force on the wire is 0.20 N. What is the strength of the magnetic field, B?
- F = 0.20 N, L = 0.10 m, I = 5.0 A
- 0.20 = B x 0.10 x 5.0
- B = 0.40 N/A-m = 0.40 T

Friday (April 3)

- NO SCHOOL
- Good Friday

Monday (April 6)

- NO SCHOOL
- Purposeful Planning

Tuesday / Friday (April 7 & 10)

- T: ⁝ 6B - Identify and describe examples of electric and magnetic fields in everyday life such as generators, motors, and transformers.
- O: I will be able to extend my understanding of magnets and how they are involved with my everyday life
- D: by completing a close read and watching a video about electromagnets.
- A: electromagnets
- Y: How many electromagnets do you interact with each day?

Wednesday / Thursday (April 8 & 9)

- April 8 English I
- April 9 English II