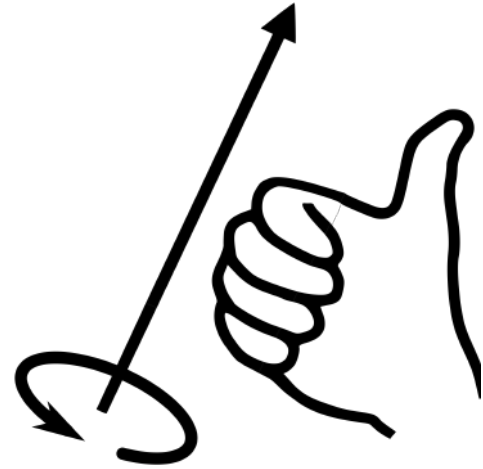
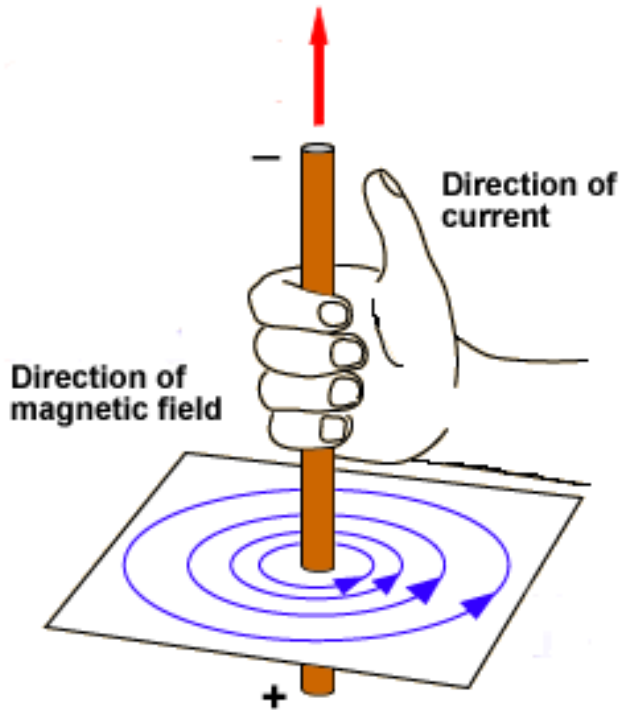


Right Hand Rules



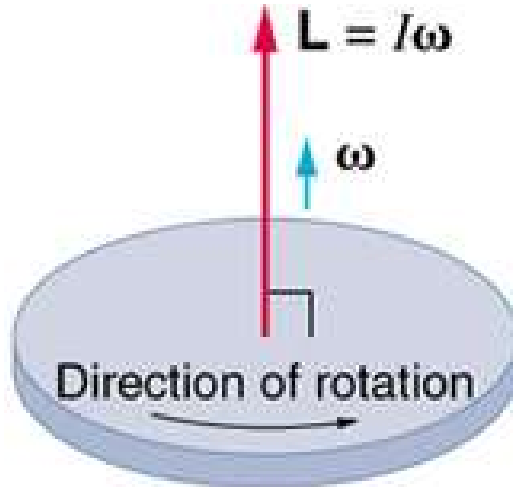
RHR #1 - Straight Wire



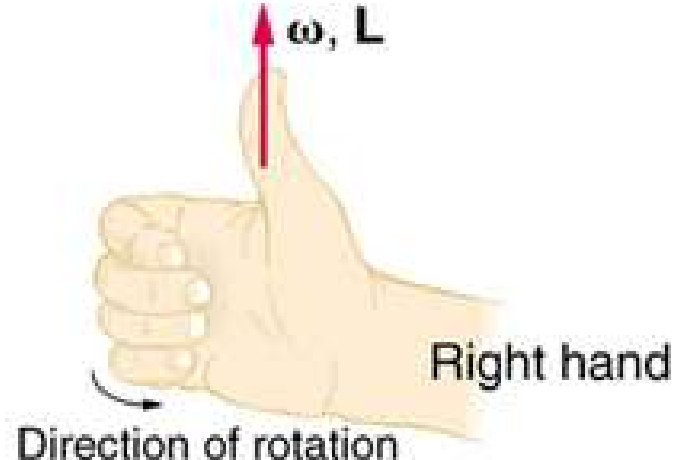
Thumb: direction of current (from + to -)

Fingers: curl in direction of magnetic (B) field

RHR #1: CW or CCW?



(a)



(b)

Practice Time!

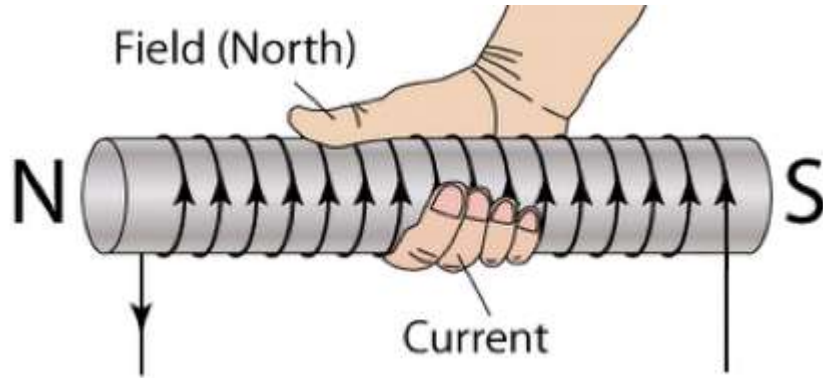
Current is going up?

Current is going
down?

Current is going to the
left?

Current is going to the
right?

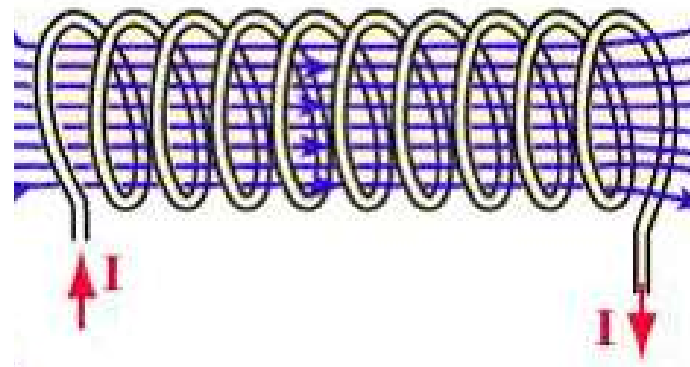
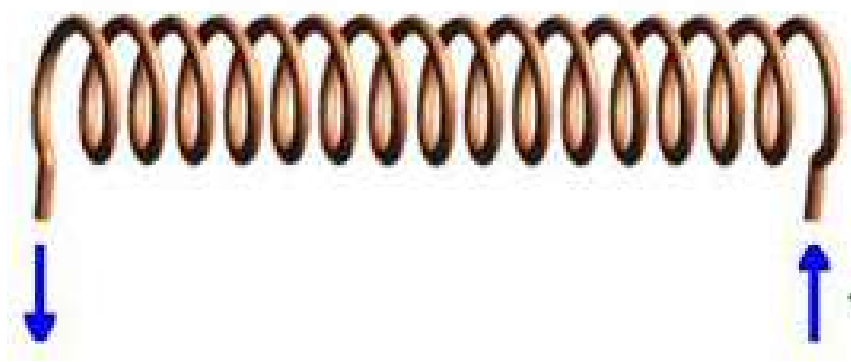
RHR #2: Solenoids



Fingers: curl in
direction of current

Thumb: points
towards the North
Pole

RHR #2



RHR #3: Moving Charge

Three players:

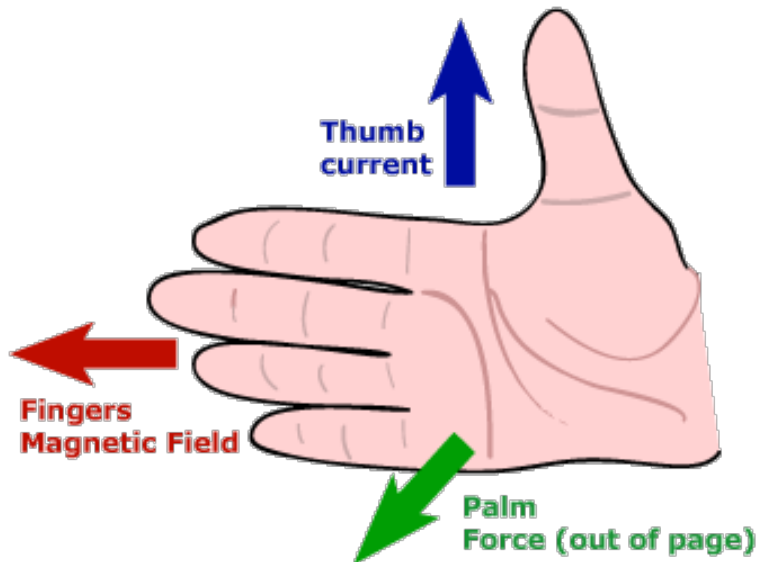
1. Electron(s) or Proton(s) with **Velocity**
2. Magnetic Field (**B**)
3. Deflection **Force**

Rules:

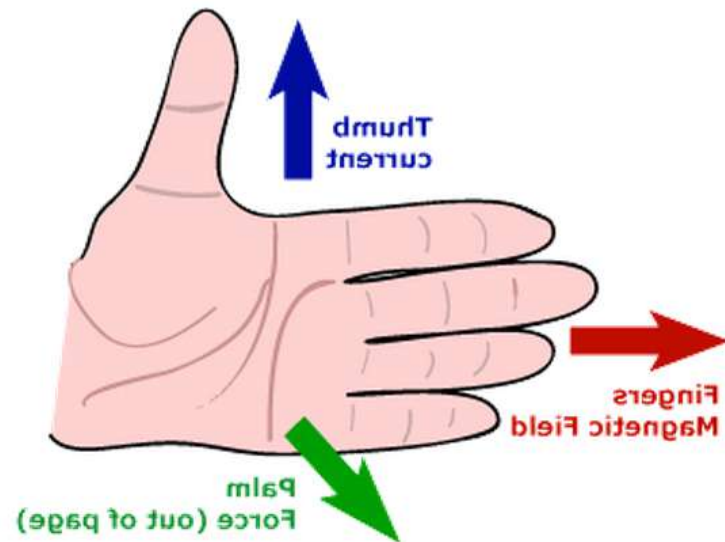
1. All have to be perpendicular to each other.

RHR #3: Particle Deflection

Right hand: Protons



Left hand: Electrons

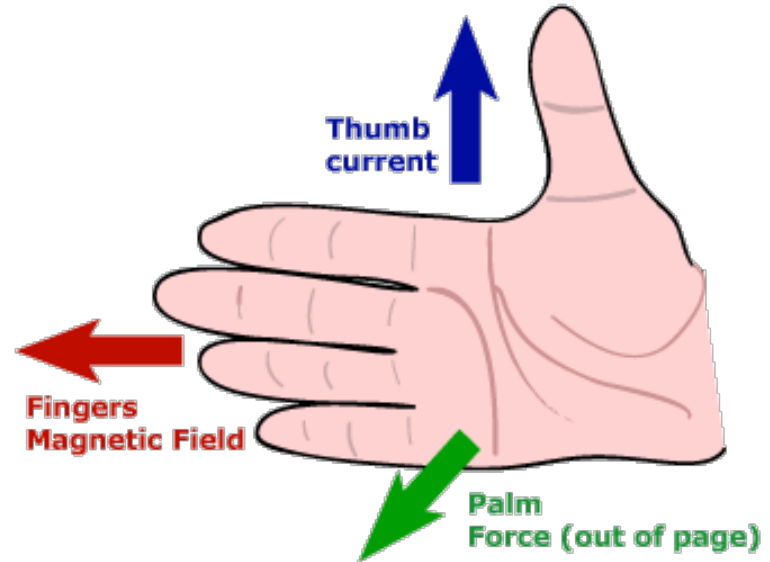


RHR #3: Particle Deflection

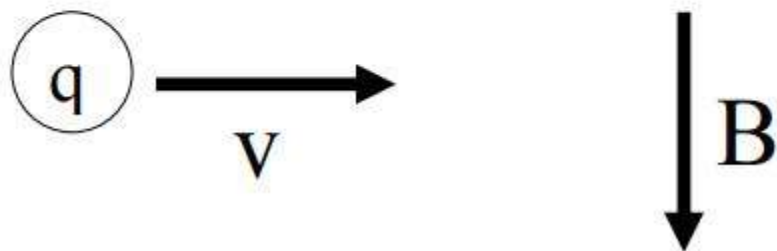
Thumb: Direction of current
or velocity of particle

Fingers: Direction of
magnetic field

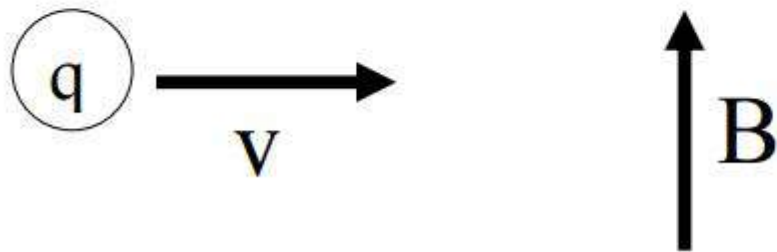
Palm: Deflection force



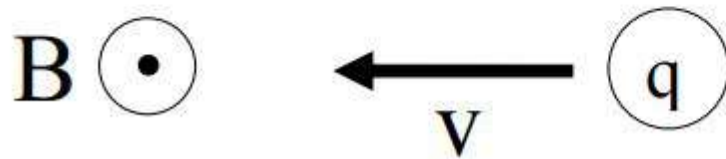
What direction is the force on a positive charge when entering a uniform B field in the direction indicated?



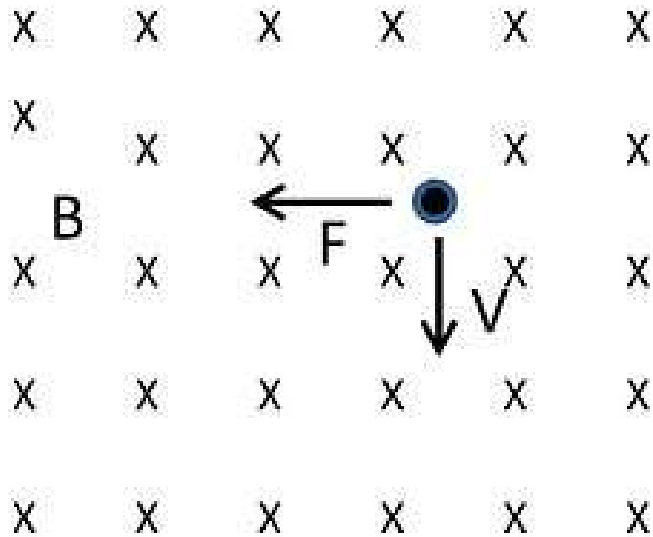
What direction is the force on a positive charge when entering a uniform B field in the direction indicated?



What direction is the force on a positive charge when entering a uniform B field in the direction indicated?



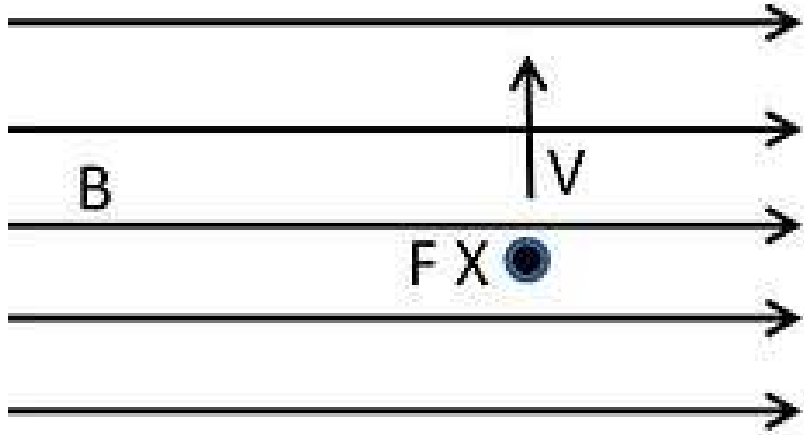
RHR #3: Particle Deflection



The magnetic force and velocity vectors are shown for a charged particle moving through the magnetic field.

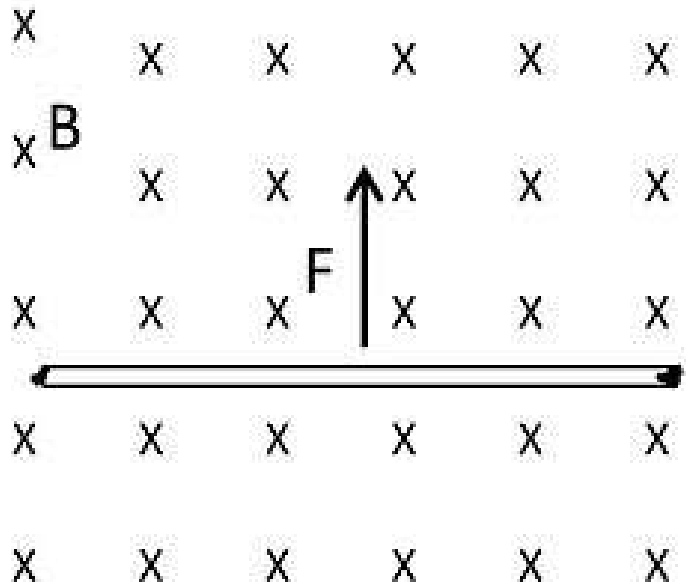
What sign is the charge?

RHR #3: Particle Deflection



What is the charge on the moving particle?

RHR #3: Particle Deflection



The magnetic force vector direction is shown for a current-carrying wire in a magnetic field.

What direction is the current?

Go to Extra Practice

Equations for RHR #3

Force on a current-carrying wire:

$$F = BIL$$

B= magnetic field strength
(measured in teslas, T)

I= current (Amps)

L = length of wire (meters)

Force on a charged particle:

$$F = Bvq$$

B= magnetic field strength
(measured in teslas, T)

v= velocity of the particle
(m/s)

q= charge of the particle
(Coulombs)

Force on a wire

The current through a wire that is 0.82 m long is 5.0 A. The wire is perpendicular to a 0.55 T magnetic field. What is the magnitude of the force on the wire?

Force on a moving charge

A beam of electrons moves at right angles to a magnetic field of 4.9×10^{-2} T. The electrons have a velocity of 2.5×10^6 m/s. What is the magnitude of the force on each electron?

Rest of the Unit

Tuesday: RHR Practice

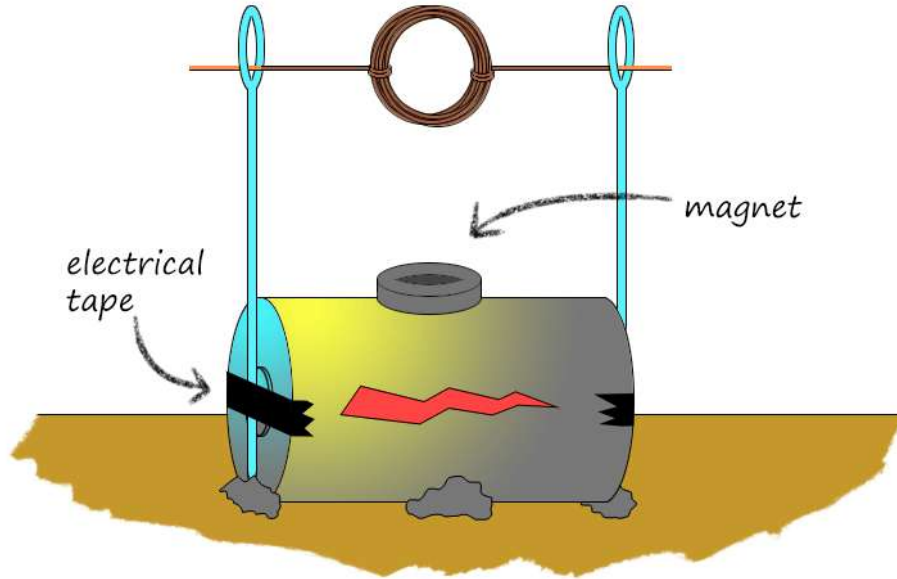
Wed: RHR Equation Practice

Thurs & Fri: Build a Motor (Test Grade!)

Monday: Review (Kahoot)

Tuesday: Magnetism Test

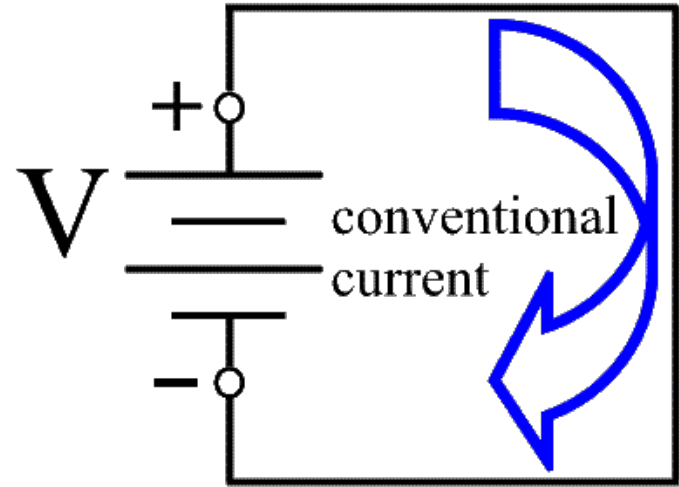
Build a Motor



Must have it working and a labeled diagram (without cup) on a white sheet of paper by the end of the hour!

How does a current flow?

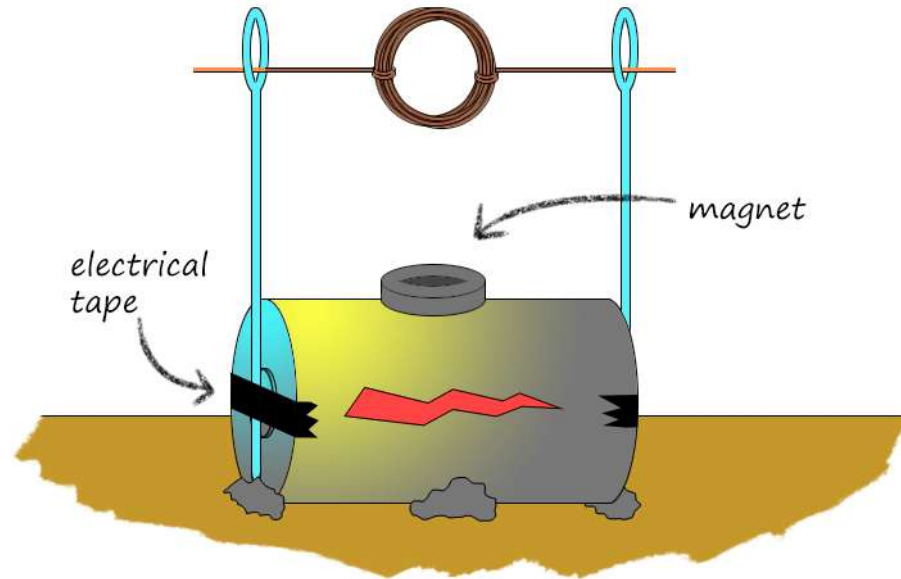
Positive to negative





<https://www.youtube.com/watch?v=UWBNxUzsgts>
https://www.youtube.com/watch?v=it_Z7NdKgmY

Magnetic field? RHR #3



Final Diagram

Add to your diagram...

- Label Current Flow
- Label North or South on Magnet (Top of magnet)
- Label Clockwise or counterclockwise coils
- Direction of force using RHR #3 at top and bottom of coil

Questions (On back of paper)

- 1) What happens to the spin when you change the orientation (CW/CCW) of your wire?
- 2) Describe how RHR #3 can be used to find the force
- 3) What can you do to the motor design increase/decrease speed? Choose at least two different ways to change it.

Turn in with all group members names

Due Today

- PhET Faraday Lab
- Practice Packet
- (Optional) Study Guide

$$F = BIL$$

Into the Page= Away from me

Out of the Page= Toward me

$$F = Bqv$$