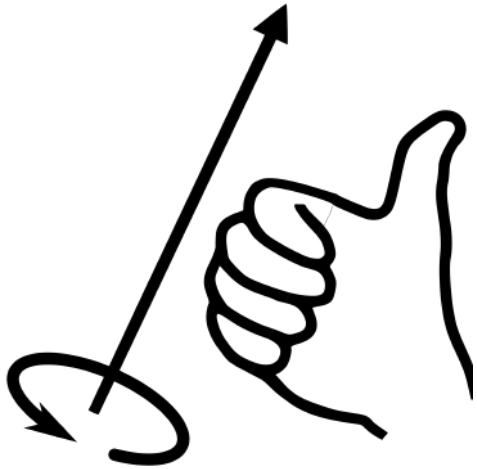
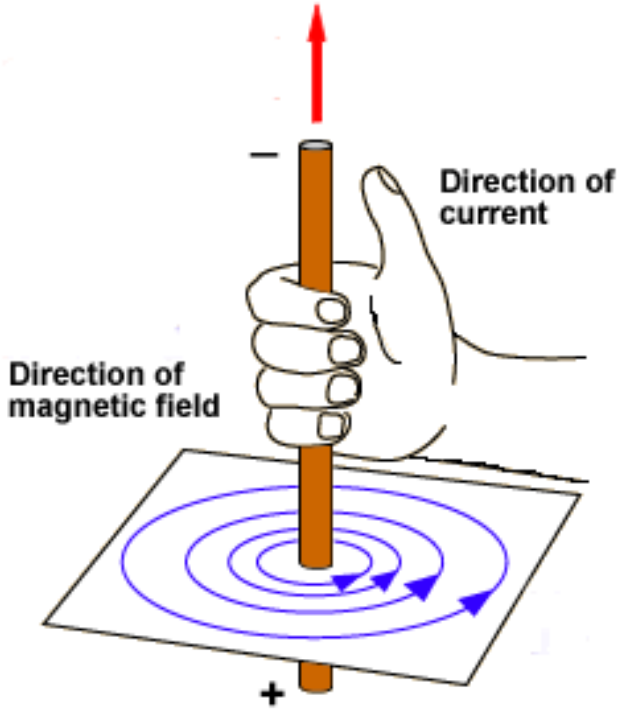
Right Hand Rules



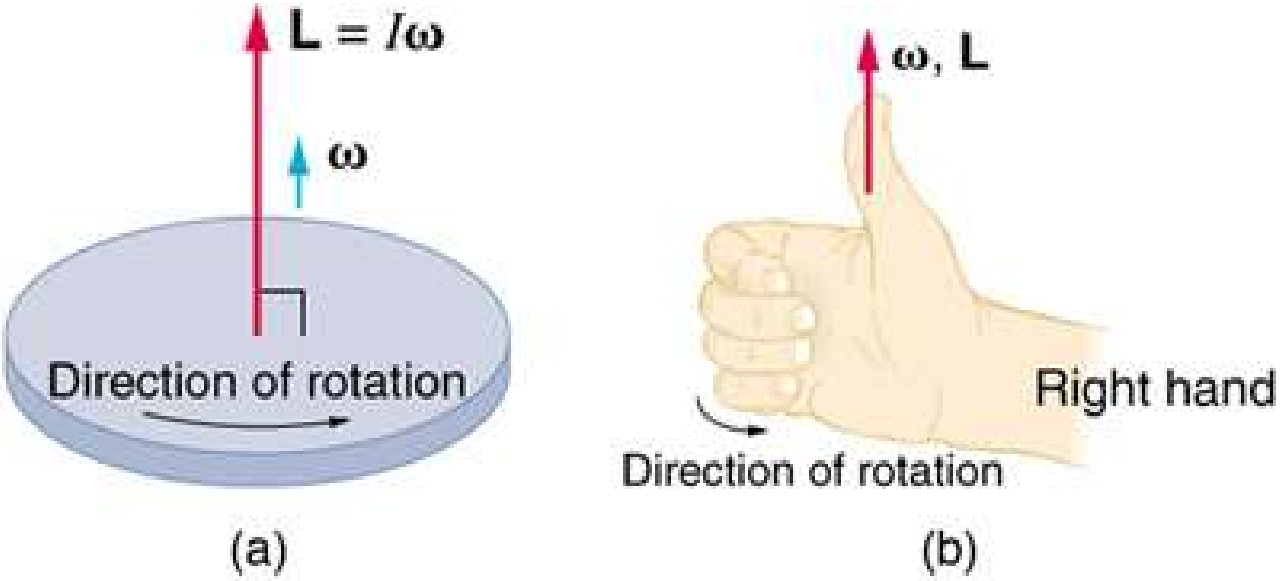
RHR #1 - Straight Wire



Thumb: direction of current (from + to -)

Fingers: curl in direction of magnetic (B) field

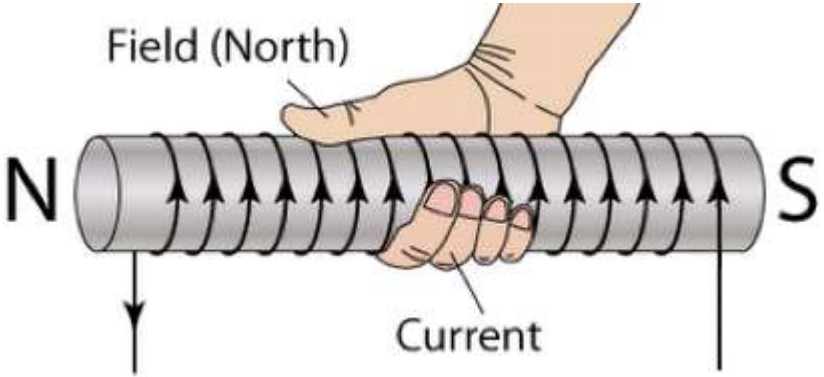
RHR #1: CW or CCW?



Practice Time!

Current is going up?
Current is going down?
Current is going to the left?
Current is going to the right?

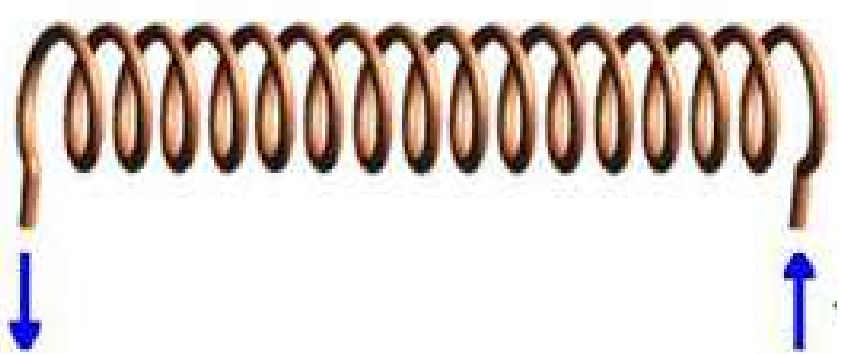
RHR #2: Solenoids

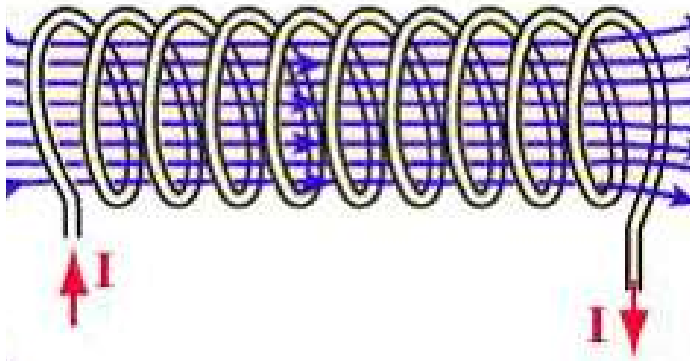


Fingers: curl in direction of current

Thumb: points towards the North Pole

RHR #2





RHR #3: Moving Charge

Three players:

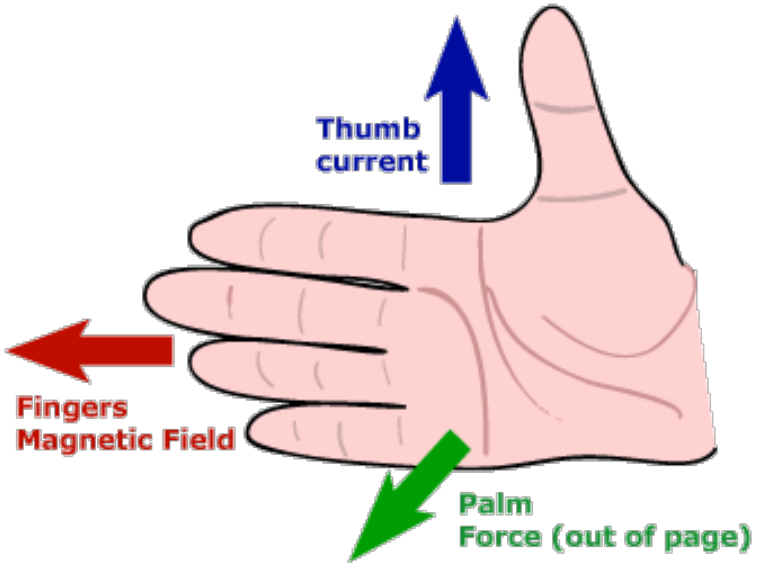
1. Electron(s) or Proton(s) with **Velocity**
2. Magnetic Field **(B)**
3. Deflection **Force**

Rules:

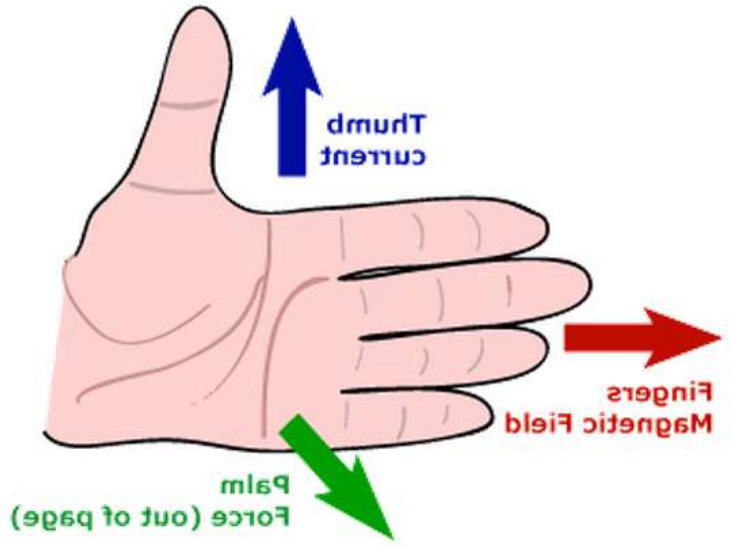
1. All have to be perpendicular to each other.

RHR #3: Particle Deflection

Right hand: Protons



Left hand: Electrons

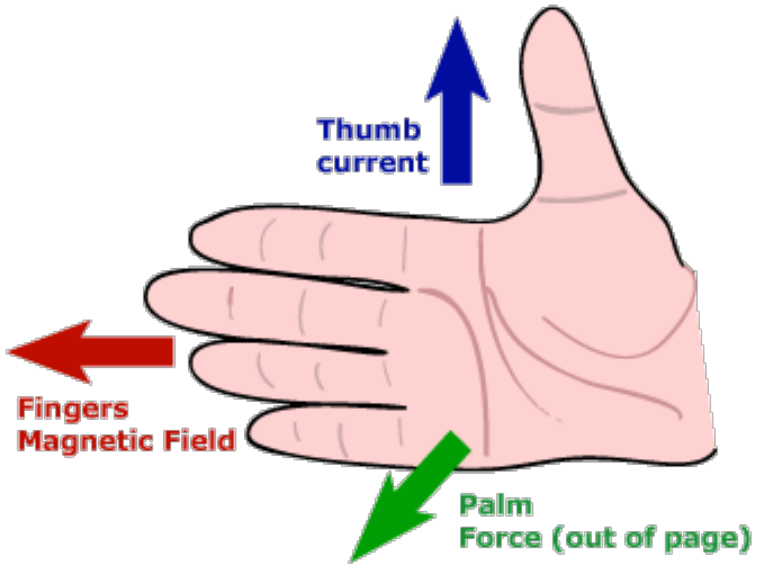


RHR #3: Particle Deflection

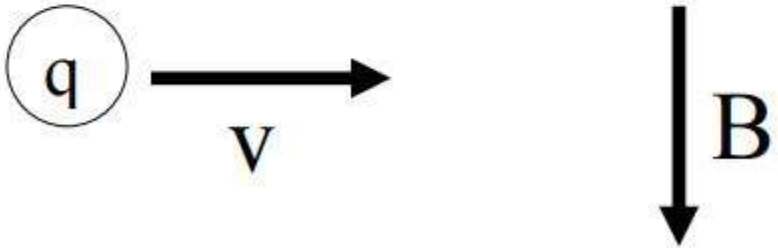
Thumb: Direction of current or velocity of particle

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?



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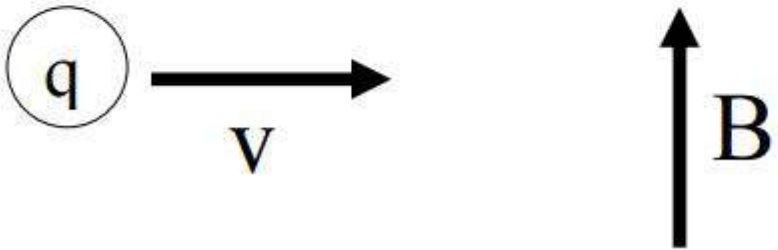

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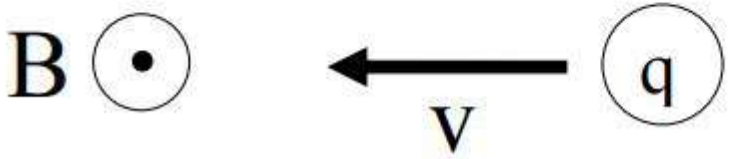
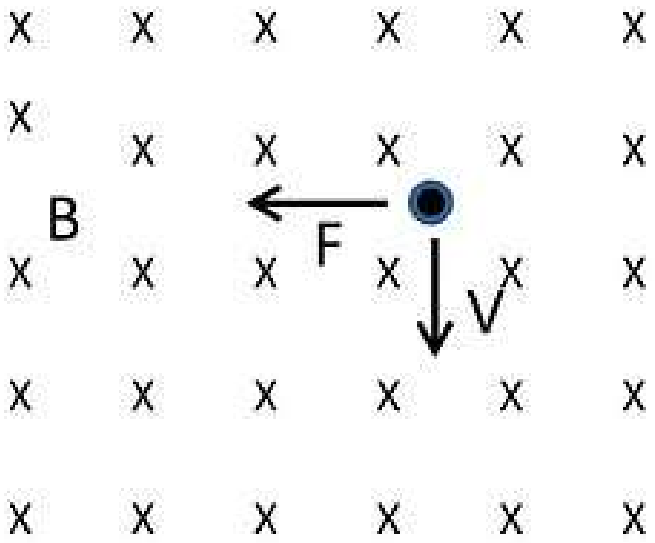


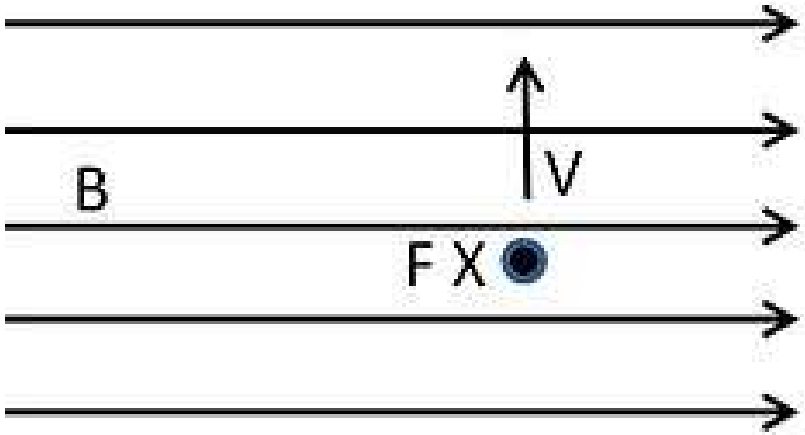
RHR #3: Particle Deflection



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

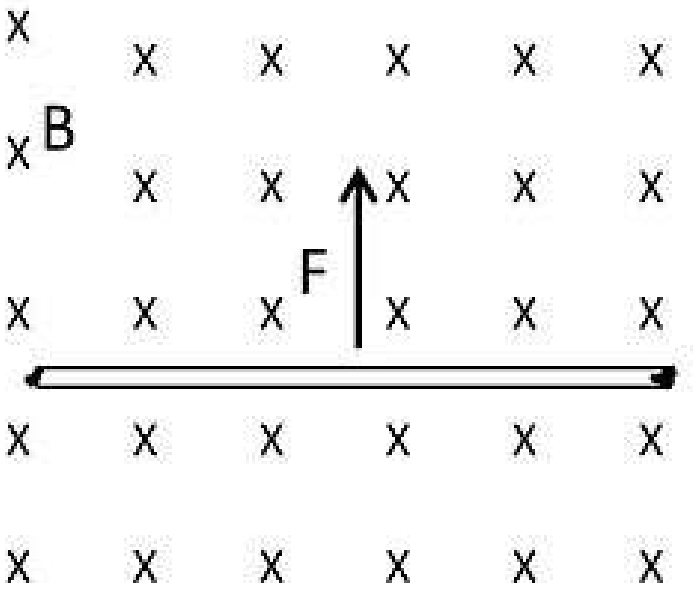
What sign is the charge?

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

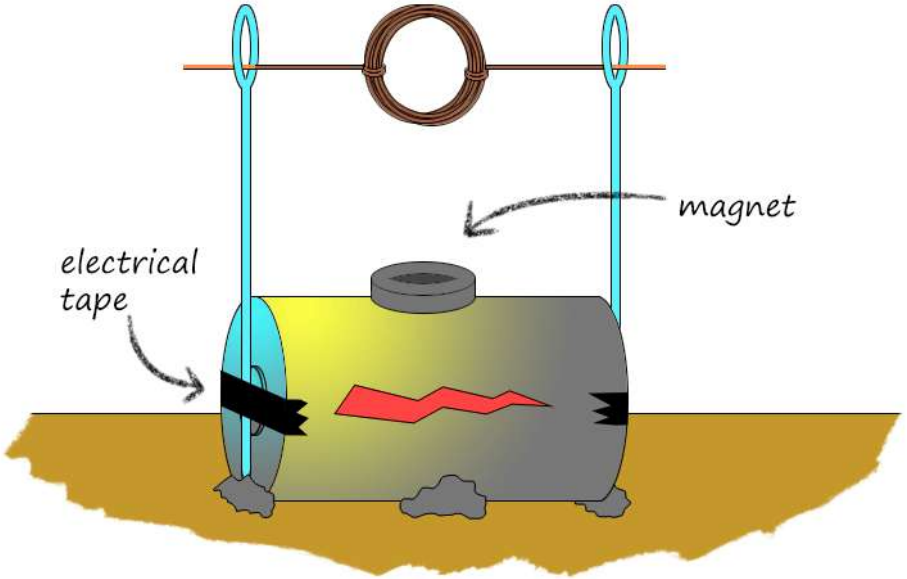
A beam of electrons moves at right angles to a magnetic field of 4.9×10^{-2} T. The electrons have a velocity of 2.5×10^{6} m/s. What is the magnitude of the force on each electron?

Rest of the Unit

Tuesday: RHR Practice
Wed: RHR Equation Practice
Thurs & Fri: Build a Motor (Test Grade!)

Monday: Review (Kahoot)
Tuesday: Magnetism Test

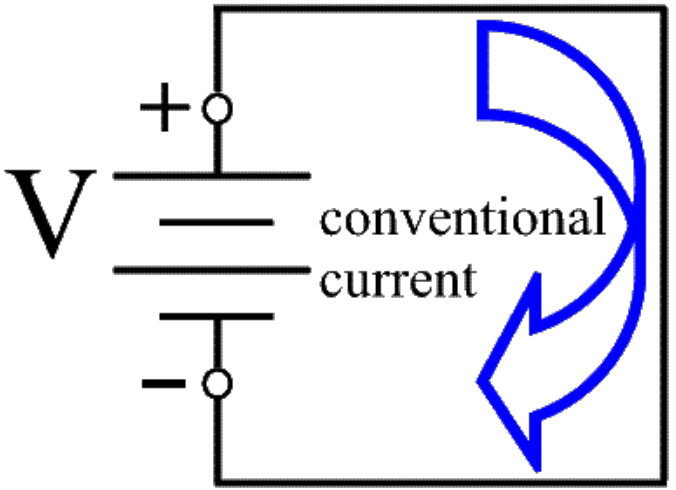
Build a Motor



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

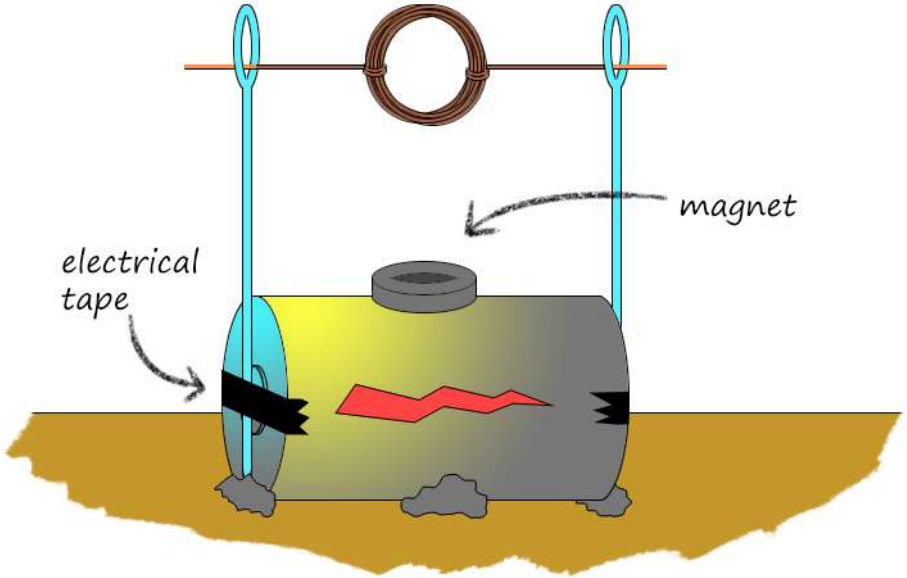
How does a current flow?

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 you 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

$F = BIL$ $F = Bqv$

Into the Page= Away from me

Out of the Page= Toward me