CONCEPT: FORCE ON MOVING CHARGES AND THE RIGHT-HAND-RULE

- A charge moving through an existing Magnetic Field FEELS a Magnetic FORCE:
  - MAGNITUDE → _____
  - AKA Lorentz _____.
  - Angle **Θ** is between _____ and _____
  - UNIT of B-Field is TESLA (1 T = 1 N / A m)

EXAMPLE 1: When a 2 C charge moves perpendicular to a constant magnetic field with 3 m/s, it feels a force of 4 N. What must the magnitude of the magnetic field be**?**

- ALL DIRECTIONS in Magnetism problems will come from variations of the RIGHT HAND RULE **(RHR).**
  - WARNING**:** Different versions → Pick one and stick with it. If different from mine or your professor, double-check**!**
  - In 2D, we have Up/Down and Left/Right**.** In 3D, we need 2 more**:**
    - **(1)** AWAY from you = [INTO / OUT OF] the page/plane → Symbol**:**
    - **(2)** TOWARDS you = [INTO / OUT OF] the page/plane → Symbol**:**

- Fingers = _____
- Thumb = _____
- Palm = _____

  - RHR works for POSITIVE charges. For NEGATIVE charges, we use the LEFT Hand (same rule, different hand)**.**

EXAMPLE 2: Find the direction of the Magnetic Force on a moving charge in each of the following situations**:**

(a) proton moving left in a B-Field pointing up

(b) electron moving down in a B-Field pointing out of page

(c) electron moving down in a B-Field pointing left

(d) proton moving into the page in a B-Field pointing right

EXAMPLE: FORCE ON CHARGE MOVING AT AN ANGLE

What is the magnitude and direction of the magnetic force on a +3 C charge moving at 4m/s when it first enters a 5 T magnetic field that is directed along the positive x-axis if the charge is initially moving**:**

(a) in the positive y axis **(b)** in the negative x axis **(c)** in a direction that makes 30° with the +y axis