CONCEPT: MAGNETIC FIELD PRODUCED BY STRAIGHT CURRENTS

● Remember: Moving Charges PRODUCE A NEW FIELD → **B =** _____

● Currents are just charges moving in a wire. So currents ALSO produce new Magnetic Fields:

- MAGNITUDE → _____ (for very long wire) - Remember $\mu_o = 4\pi*10^{-7}$ N/A²
- DIRECTION → RIGHT HAND RULE: GRAB wire, with THUMB in direction of _____.
- TWO Fields at same location: Same Direction → _____ Opposite → _____

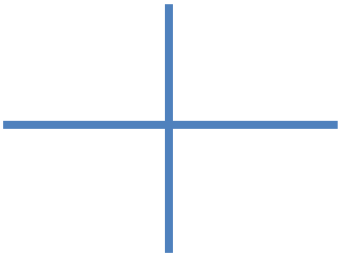
EXAMPLE 1: What is the direction of the magnetic field produced by a current on a very long wire if the current is oriented:

(a) up **(b)** left **(c)** into the page

EXAMPLE 2: The two wires shown below are 4 m away from the other. What is the magnitude and direction of the magnetic field that is produced at a point in the center of the two wires?

EXAMPLE: FIND MAGNETIC FIELD DUE TO TWO PERPENDICULAR CURRENTS

The very two long, perpendicular wires below intersect at (0, 0). The vertical wire carries 2 μA up, while the the horizontal wire carries 3 μA to the left. What is the net magnetic field at point P located at (-4, -9) cm**?**



EXAMPLE: FIND ZERO MAGNETIC FIELD

Two long, horizontal wires are 6 m away from each other. The bottom and top wires carry currents of 4 A and 5 A, respectively, both to the right. How far from the bottom wire is the NET magnetic field due to these currents zero**?**