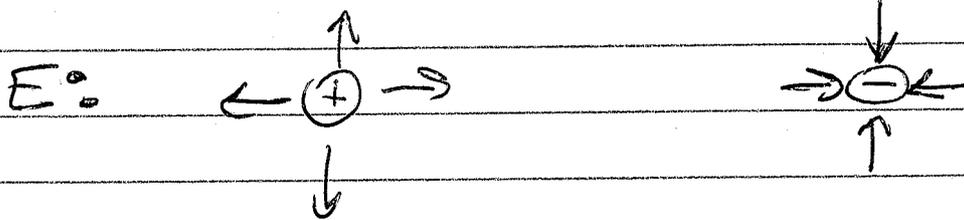


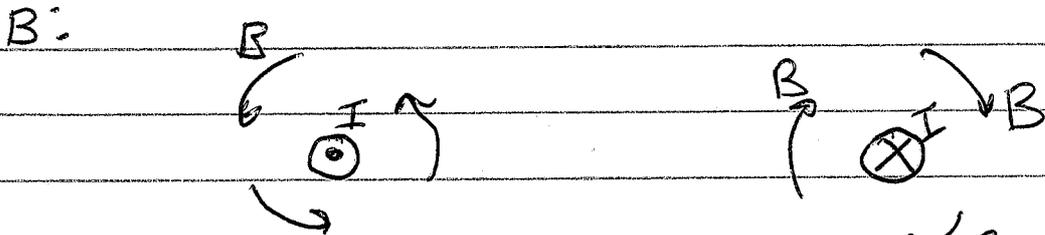
# Magnets - ~~are~~ generators of magnetic field

## $\vec{E}$ -Field vs $\vec{B}$ -Field

- Vector fields - have a value at every point.
- Generated by sources.
  - Source of  $E$  is charges.
  - Source of  $B$  is moving charges (ie currents).
- Sources affect magnitude of field.
- Sources affect direction of field.



$B$  is "stirred" by current.



$I$  points "out of page" vs. "into page"

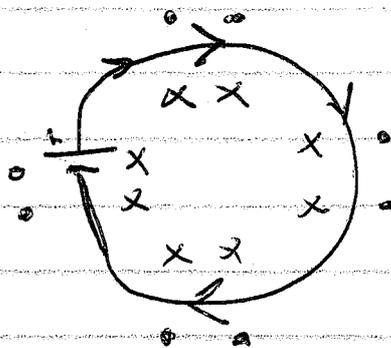
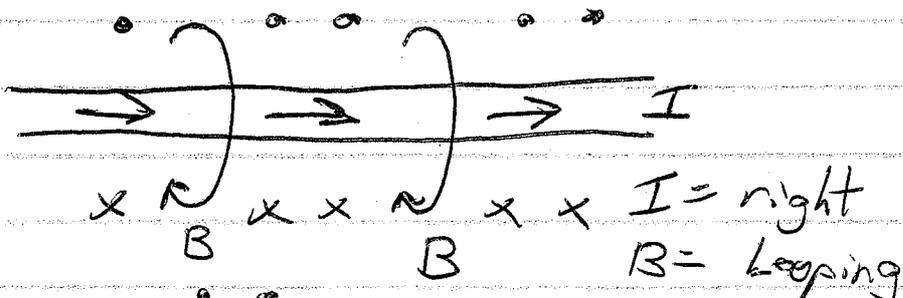
### Naming 3-D Directions

+/- x	Right/Left	E/W	R/L
+/- y	Top/Up / Down/Bot	N/S	F/B
+/- z	Out/In	Up/Down	Up/D

Math	Paper	World	Driving Car
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②

- $E$  &  $B$  Fields have "Field Lines" formed by stringing vectors together.
  - $E$  Lines start at  $\oplus$ , end at  $\ominus$
  - $B$  Lines always loop around currents.



$I = \text{CW}$

~~$B = \text{out of p.}$~~

$B = \text{into page}$   
inside loop

2<sup>nd</sup> Right-hand Rule

- Curl fingers w/ Current that loops.
- Thumb gives  $B$  inside coil.

•  $E$  &  $B$  affect "other" charges.

•  $E$  pushes  $q$ 's along  $E$

•  $B$  pushes  $I$ 's perpendicular to  $I$  and  $B$

•  $B$  torques magnets so they line up w/  $B$ .

(~~Compass~~ compasses point north)

e.g.

•  $B$  pulls magnets toward/away stronger  $B$ .