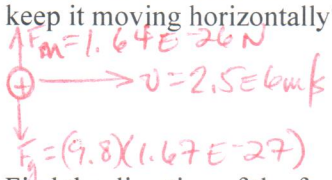
n° mass = 1.67E-27 kg | p⁺ q = +1.6×10⁻¹⁹ C, mass = 1.67E-27 kg | e⁻ q = -1.67E-19 C, mass = 9.11E-31 kg

1. A proton moves at 2.5 E 6 m/s horizontally to the east at a right angle to a magnetic field. What is the strength of the magnetic field required to exactly balance the weight of the proton (mass = 1.67 E –27 kg) and keep it moving horizontally? What direction should the magnetic field point?



$F_m = qvB$

$1.64E-26 = (1.6E-19)(B)(2.5E6)$

$B = 4.09E-14\ T$ – North (right hand rule)

2. Find the direction of the force

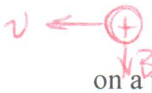
on a proton moving upwards in a magnetic field that points into the page.

force to ~~Right~~ Left

on a proton moving upwards where the B-field points to the right

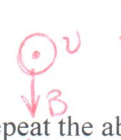
Force out of page

on a proton moving to the left and the B-field points downward



Force out of page

on a proton moving out of the page and the B-field points downward.



Force to the Right

3. Repeat the above examples for an electron.

~~Left~~ Right, into page, into page, Left

4. A proton (q = 1.6 E –19 C) moves at a speed of 2 E 7 m/s towards the right into a magnetic field of 3 T that is pointing out of the page. What is the magnitude and the direction of the force acting on the proton?

$q = 1.6E-19\ C$

$v = 2E7\ m/s$

$B = 3\ T$

$F_m = q \cdot v \cdot B$

$= (1.6E-19)(2E7)(3) = 9.6E-12\ N$, down page

5. A current of 15 A is moving through a wire of length 5 meters which is perpendicular to a uniform magnetic field. The wire experiences a magnetic force of 0.6 N. What is the magnitude of the B-field that puts a force on this wire?

$I = 15\ A$

$l = 5\ m$

$F_m = 0.6\ N$

$F_m = BIl$

$\frac{0.6}{5(15)} = \frac{B(15)(5)}{(5)(15)}$

$B = 0.008\ T$

6. A power transformer has 10000 coils in the primary and 1000 coils in the secondary. Is this a step up or step down transformer? By how many times does it step up or down? What does it step up, current or voltage? If 120 V and 1 Amp of current are run into the primary how much voltage is induced in the secondary? How much current will there be? How much power is put into the transformer? How much power will be produced?

$N_p = 10{,}000$

$N_s = 1{,}000$

- step down ($N_s < N_p$)
- ~~10~~ steps down ~~1:10~~
- or 10:1 – step down voltage to 12 V in secondary
- $I = 10$ A in second

Power on both is 120 W

STUDY YOUR NOTES!!!!!!

THIS REVIEW SHEET IS <u>NOT</u> THE END-ALL-BE-ALL OF STUDYING!!