PHYSICS 242 BLOCK 5 DRILL SET, SPRING '17 NAME _____

Slide this paper under Marteena 308's door any time *before* 7:50 AM Friday, February 17, or give it to me in Marteena 312 *by* 8:00 AM that day. Each problem uses one different equation from the Block 5 objectives.

For DIRECTION, choose **only** from these: right (→), left (←), toward the top (↑), toward the bottom (↓), into the paper (⊗), out of the paper (⊙), UNDETERMINED (for a zero magnitude vector), or NONE (for a scalar).

1. A coil has a magnetic dipole moment of 0.144 A·m$^2$ directed to the left (←). It is in a huge uniform external magnetic field of 45 T directed toward the bottom (↓). Find the torque the huge field exerts on the coil.

| **VECTOR** EQUATION USED | SOLUTION | ANSWER |
|---|---|---|
| $\vec{\ }$ = | I find the magnitude using __ = (___)(___)(sin __).<br>I use $\phi$ = ___°.(Put *symbols* in the four blanks above.)<br>(Write a *number* above for $\phi$.) | _____<br>MAGNITUDE<br><br>_____<br>DIRECTION |

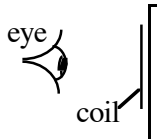
2. A straight wire segment is 2.54 cm long and carries a substantial current of 99 A toward the top (↑) through a huge uniform external magnetic field of 45 T directed toward the bottom (↓). Find the force exerted by the field on the segment.

| **VECTOR** EQUATION USED | SOLUTION | ANSWER |
|---|---|---|
| $\vec{\ }$ = | I find the magnitude using __ = (__)(__)(__)(sin __).<br>I use $\phi$ = ___°. (Put *symbols* in the five blanks above.)<br>(Write a *number* above for $\phi$.) | _____<br>MAGNITUDE<br><br>_____<br>DIRECTION |

3. A uniform magnetic field makes an angle of 20.0° with a flat surface. Thus it makes an angle of 90.0° – 20.0° = 70.0° with the normal to the surface. The area of the surface is $5.55 \times 10^{-5}$ m$^2$. The resulting magnetic flux through the surface is 57.0 nWb. Calculate the magnitude of the magnetic field to three significant figures.

| EQUATION USED (ONE EQUAL SIGN) | SOLUTION | ANSWER |
|---|---|---|
| = | | |

4. We see the *edge* of a 45 turn flat circular coil of magnetic dipole moment 0.144 A·m$^2$ in magnitude. The eye (not ours) looks along the coil's axis, "seeing" a *counterclockwise* current of 6.4 A. Find the coil's area vector. (The "DIRECTION" answer is *relative to the paper*, **not** relative to the eye, so answer "right (→)" or "left (←)".)

| **VECTOR** EQUATION USED | SOLUTION | ANSWER |
|---|---|---|
| $\vec{\ }$ = |  | _____<br>MAGNITUDE<br><br>_____<br>DIRECTION |

5. An electron is moving out of the paper (⊙) at $2.46 \times 10^8$ m/s through a huge external magnetic field of 45 T directed toward the bottom (↓). Find the force the huge field exerts on the electron.

| **VECTOR** EQUATION USED | SOLUTION | FORCE ANSWER |
|---|---|---|
| $\vec{\ }$ = | I find the magnitude using __ = (___)(__)(__)(sin __).<br>I use $\phi$ = ____°. (Put *symbols* in the five blanks above.)<br>(Write a *number* above for $\phi$.)<br>In this problem, the direction of $\vec{v} \times \vec{B}$ is _____. | _____<br>MAGNITUDE<br><br>_____<br>DIRECTION |