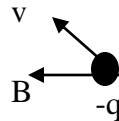
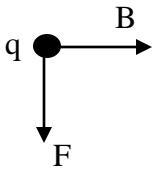


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Physics 1402 Test 2 SU2 2009

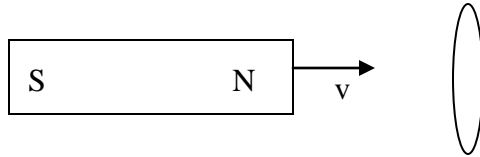
Please answer the following questions on the front of supplied paper. Show all work to receive credit justifying each calculation with the appropriate equation.

1. Each of the diagrams below represents a charged particle is moving through a magnetic field. In class we discussed how the force on the particle was related to the particle's velocity, and the magnetic field. Please indicate the direction of the missing term.

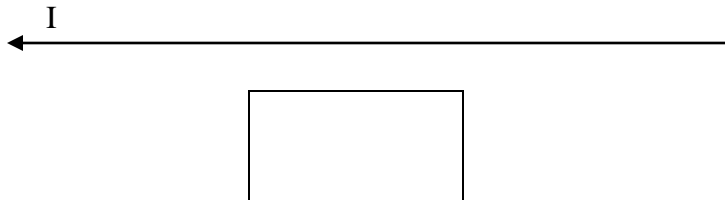


2. Consider a mass spectrometer. The electric field between the plates of the velocity selector is 950V/m . Calculate the magnitude and direction of the magnetic field required to give a system of Fe^+ ions a radius of $.0005\text{m}$. The atomic mass of iron is 55.85g/mol .
3. A wire carries a current $I_1 = 4\text{A}$ along the y axis and another wire carries a current $I_2 = 8\text{A}$ along the x axis. What is the magnitude and direction of the magnetic field at the point $(-5\text{m}, -2\text{m})$ if each current points in the positive direction respectively.
4. Three wires parallel to the x-axis and in the x-y plane crossing the y-axis at $y = 0.0\text{ cm}$ for wire 1, $y = 3.0\text{cm}$ for wire 2 and $y = 5.0\text{ cm}$ for wire 3. If $I_1 = 200\text{ A}$, $I_2 = 120\text{A}$ and $I_3 = 150\text{ A}$, with 1 and 2 in the same direction and wire 3 the opposite direction. Calculate the net force on one meter of wire 3 due to the other two wires.

5. Give the direction of the induced current at the top of the loop in the diagram below.



- B. Give the direction of the induced current in the loop if the current in the long straight wire is rapidly reduced to zero.



6. A strong electromagnet produces a uniform field of 1.6 T over a cross-sectional area of 0.2m^2 . We place a coil having 200 turns and a total resistance of 20Ω around the electromagnet. We then smoothly decrease the current in the electromagnet until it reaches zero in 20ms. What is the maximum current that could be induced in the coil?
7. A step up transformer has 25 turns on the primary coil and 750 turns on the secondary coil. If this transformer is to have a input of 1200 V with a 120-mA current, what output current and voltage of the transformer?
8. An RLC circuit is used to tune a radio to an FM station broadcasting at 88.9MHz. The resistance in the circuit is 12Ω and the inductive resistance is 1000Ω . What capacitance should be present in the circuit?
9. A $10\mu\text{F}$ capacitor and a 2H inductor are connected in series with a 60Hz source whose rms output is 100V. Find (a) the rms current in the circuit, (b) the voltage drop across the inductor, (c) the voltage drop across the capacitor, (d) the phase angle for the circuit, and (e) sketch the phasor diagram for this circuit. *Note there is no resistor in this problem.*