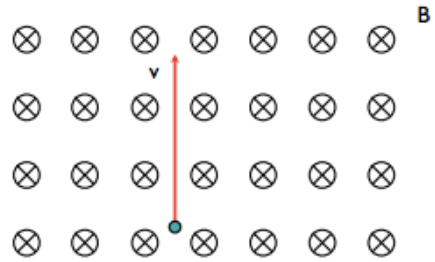
Chapter 19 – XtraWrk – Magnetism

19.1) A magnetic field exists in the +x direction. Determine the magnetic force on a charge moving in the following directions:

a) In the +y direction
b) In the –y direction
c) In the +x direction

19.2) For the situations below, determine the direction of the force on a proton moving through the magnetic field as shown. Then repeat, assuming the particle is an electron.

a)



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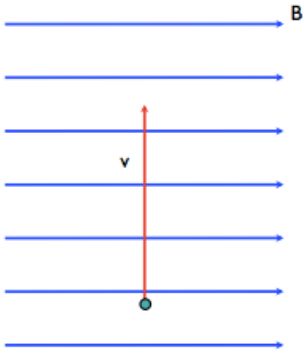

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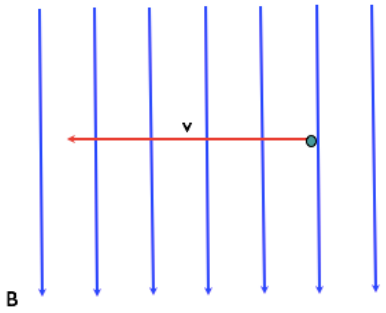
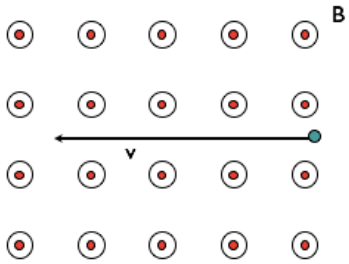
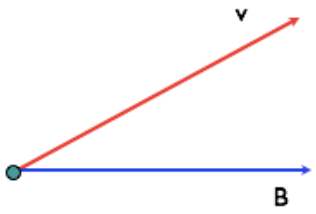


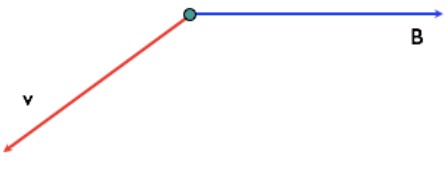
d)



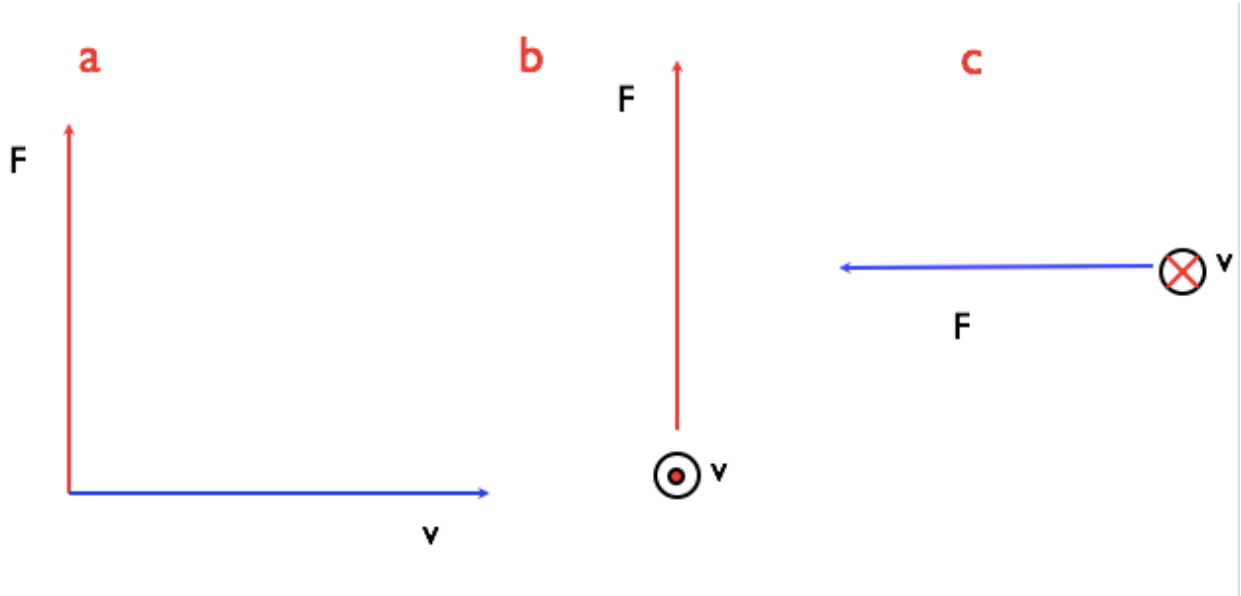
e)



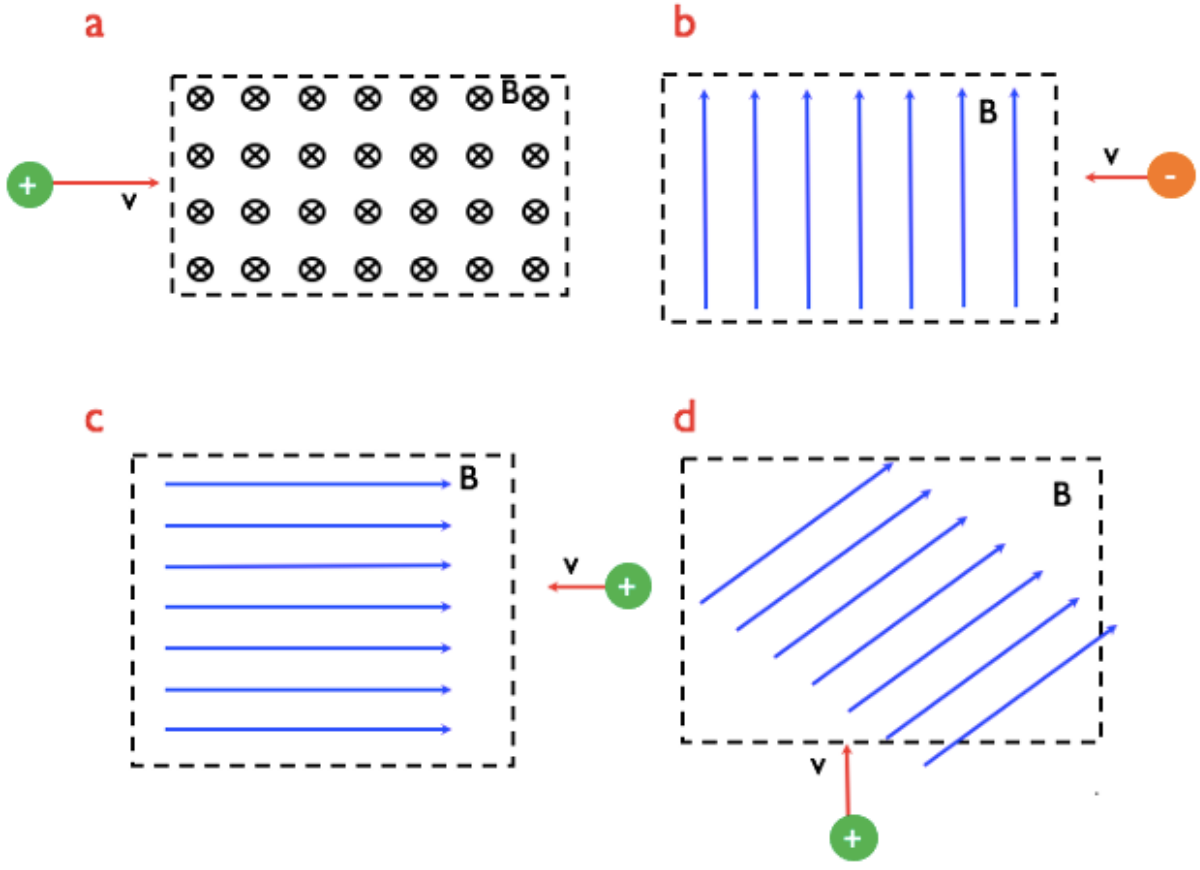
f)

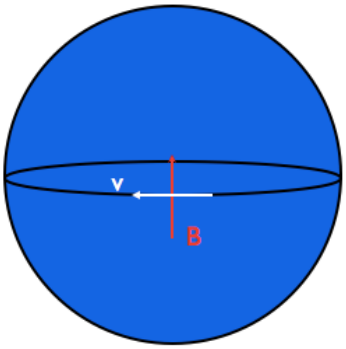


19.3) For each of the situations shown, a positive particle feels a force as shown as it moves with a velocity as shown. Determine the direction of the magnetic field.



19.4) For each of the situations shown, in what direction will the charged particle deflect as it enters the field?

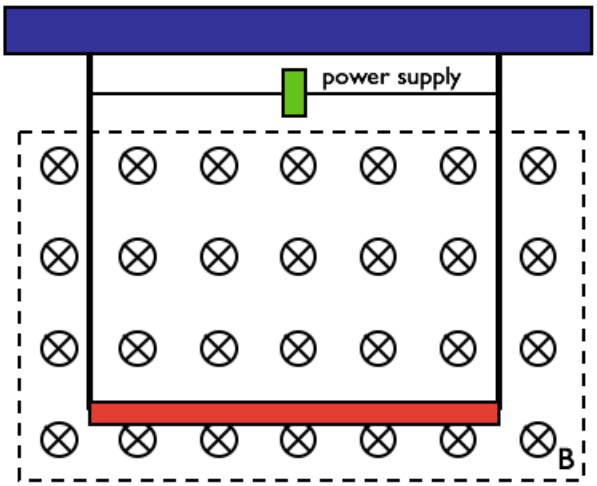


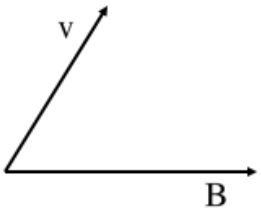


19.7) If the Earth's magnetic field is horizontal (parallel to the ground) and points directly north at the equator with a strength of 4.0×10^{-8} T, how fast would a proton need to be moving at a height of 1000 km to maintain a circular orbit?

19.16) A wire carrying 2.0 Amps of current horizontally southward has a m/L of 0.5 g/cm. What strength of magnetic field is required to lift the wire vertically, and in what direction should that field be?

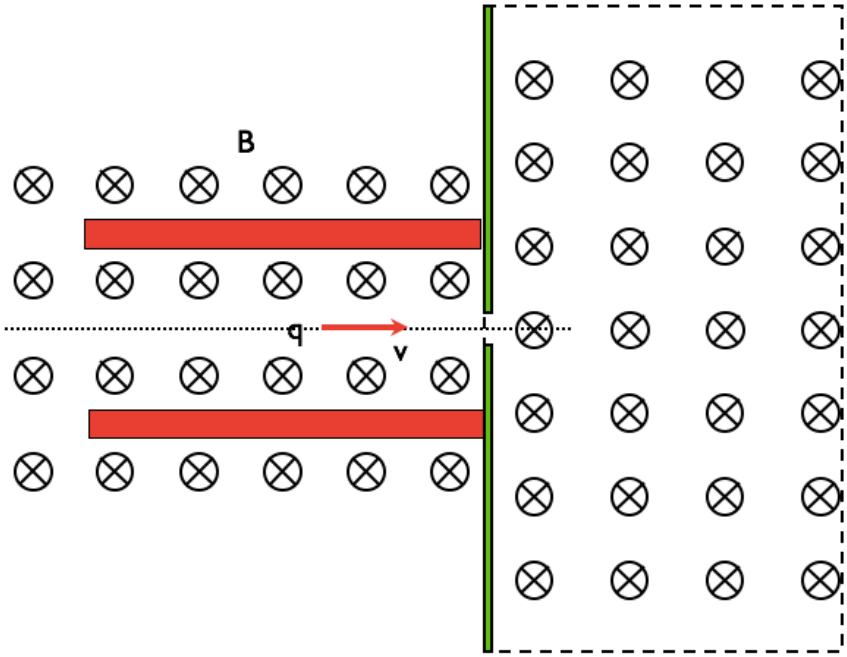
19.20) A conductor suspended by two flexible wires has a mass per unit length of 0.04 kg/m. What current is required (and in what direction must the current flow) to support the conductor in equilibrium if the magnetic field strength is 3.6 Teslas?

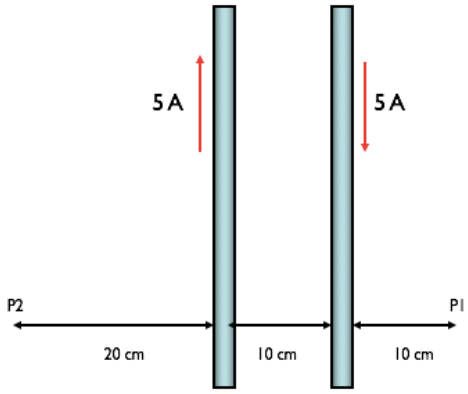




19.34) A proton travels at 5.02×10^6 m/s at a 60 degree angle to a 0.18 Tesla magnetic field. What is the magnitude of the force on the proton and its acceleration?

19.36) Shown to the right is something often called a "velocity trap." An electric field between two plates is directed downwards with a strength of 950 V/m, and an ionized (with the charge of one electron) particle of mass 2.18×10^{-28} kg is shot at some velocity between the plates. It exits the plates through a small slit into an area in which there is a magnetic field of magnitude 0.93 T pointed into the page; this magnetic field is also present where the plates are. What will the radius of the particle's deflection path be when it enters the open area?

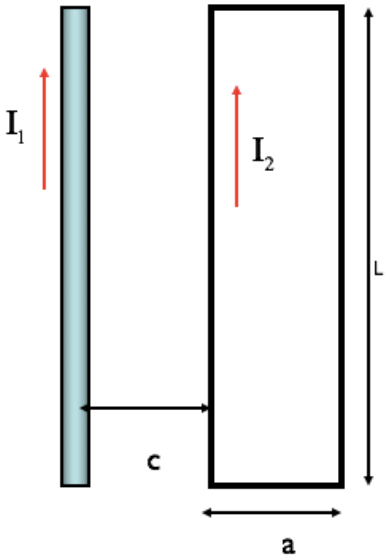


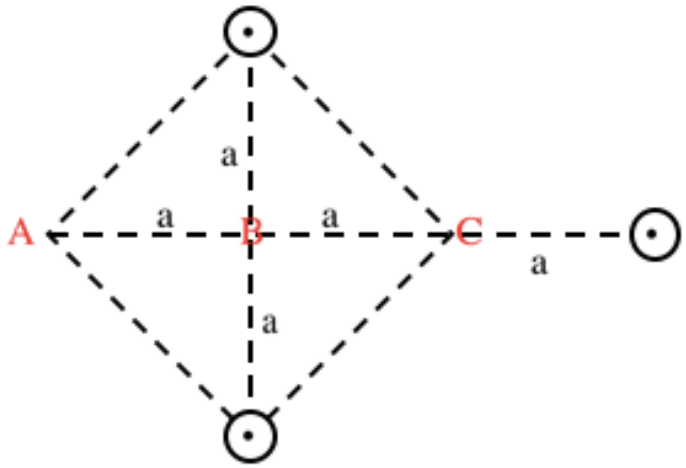


19.48) For the system of current-carrying wires shown:

a.) What's the direction and magnitude of the net magnetic field between the two wires?
b.) What's the direction and magnitude of the net magnetic field at point P1?
c.) Ditto for P2?

19.58) If the left wire current is 5 amps and the loop current is 10 amps, what is the magnitude and direction of the force exerted on the loop by the wire, assuming that a=0.15 meters, c = 0.1 meters and L=0.45 meters?





19.71) Assuming the current in each of the three wires coming out of the page is 2 A, and distance a = 0.01 m, determine the magnetic field at points A, B, and C.