Name: _____ **Per.** _____

Underfunded Police Dept.

Magnetism: Worksheet 4

If you wish to make an apple pie from scratch, you must first invent the universe. — Carl Sagan

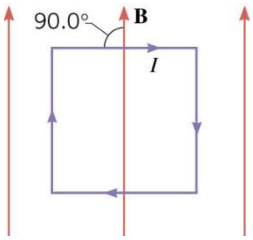
1. A long straight wire carries a current of 48 A. The magnetic field produced by this current at a certain point is 8.0×10^{-5} T. How far is the point from the wire?

2. In a lightning bolt, 15 C of charge flows in a time of 1.5×10^{-3} s. Assuming that the lightning bolt can be represented as a long, straight line of current, what is the magnitude of the magnetic field at a distance of 25 m from the bolt?

3. A +600 μC charge is moving with a speed of 7.50×10^{4} m/s parallel to a very long, straight wire. The wire is 5.00 cm from the charge and carries a current of 67.0 A in a direction opposite to that of the moving charge. Find the magnitude and direction of the force on the charge.

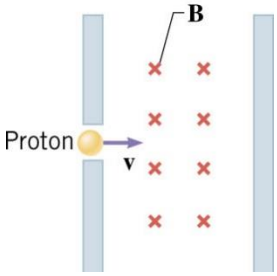
4. A wire carries a current of 0.66 A. This wire makes an angle of 58° with respect to a magnetic field of magnitude 4.7×10^{-5} T. The wire experiences a magnetic force of magnitude 7.1×10^{-5} N. What is the length of the wire?

5. A square coil of wire containing a single turn is placed in a uniform 0.25-T magnetic field, as the drawing shows. Each side has a length of 0.32 m, and the current in the coil is 12 A. Determine the magnitude of the magnetic force on each of the four sides.



6. Two rigid rods are oriented parallel to each other and to the ground. The rods carry the same current in the same direction. The length of each rod is 0.85 m, while the mass of each is 0.073 kg. One rod is held in place above the ground, and the other floats beneath it at a distance of 8.2×10^{-3} m. Draw a force diagram and determine the current in the rods.

7. Two long, straight parallel wires A and B are separated by a distance of one meter. They carry currents in opposite directions, and the current in wire A is one-third of that in wire B. On a line drawn perpendicular to the wires, find the point where the net magnetic field is zero. Determine this point relative to wire A.



8. A proton with a speed of 3.5×10^{6} m/s is shot into a region between two plates that are separated by a distance of 0.23 m. As the drawing shows, a magnetic field exists between the plates, and it is perpendicular to the velocity of the proton. What must be the magnitude of the magnetic field, so the proton just misses colliding with the opposite plate?

9. A charge of 12 μC traveling with a speed of 9×10^{6} m/s in a direction to the top of the page experiences a uniform magnetic force of 8.7×10^{-3} into the page. A) What is the magnitude and direction of the magnetic field? B) Determine the path of the charged particle. C) If the mass of the charge is 4×10^{-6} kg, then what is the radius of the path of the particle.