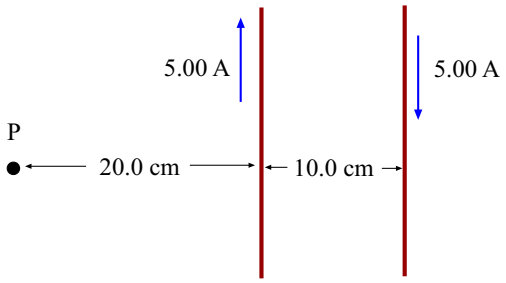
Name_____

Phys 2020 (NSCC), Spring 2006
Problem Set #5

1. A current of 17.0 mA is maintained in a single circular loop with a radius of 0.20 m. A magnetic field of 0.800 T is directed parallel to the plane of the loop. (That is, perpendicular to the normal.) What is the magnitude of the torque exerted by the magnetic field on the loop?

2. Two parallel wires are 10.0 cm apart, and each carries a current of 10.0 A. If the currents are in the same direction, find the force per unit length exerted on one of the wires by the other. (Are the wires attracted to or repelled by each other?)

3. The two wires shown here carry currents of 5.00 A in opposite directions and are separated by 10.0 cm. Find the direction and magnitude of the net magnetic field at the point P which is 20.0 cm to the left of the wire on the left.



4. Find the magnitude of the magnetic field at the center of a circular current of radius 15.0 cm and 30 turns if the current in the wire of the loop is 3.00 A.

5. What current is required in the windings of a long solenoid that has 1000 turns uniformly distributed over a length of 0.400 m in order to produce a magnetic field of magnitude 1.00×10^{-4} T at the center of the solenoid?

6. A Boeing 747 jet with a wingspan of 60.0 m is flying horizontally at a speed of $300\,\frac{\text{m}}{\text{s}}$ over Phoenix, AZ at a location where the vertical component of the Earth's magnetic field is $42.2\,\mu$T.

What voltage is generated between the wing tips?

7. A magnetic field of strength 0.30 T is directed perpendicular to a plane circular loop of wire of radius 25 cm. Find the magnetic flux through the area enclosed by this loop.

8. A wire loop of radius 0.30 m lies so that an external magnetic field of magnitude 0.30 T is perpendicular to the loop. The magnitude of the field changes to 0.10 T in 1.5 s (it keeps the same direction). Find the magnitude of the average induced emf in the loop during this time.