

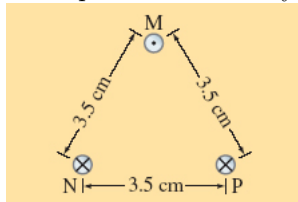
PHY114 S09 Problem Set 6

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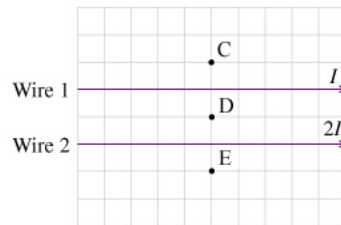
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6 Probs Due March 16

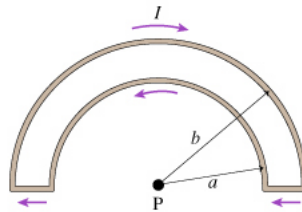
1. A motor run by a 8.8V battery has a 16 turn square coil with sides of length 4.8 cm and total resistance 27Ω . When spinning, the magnetic field felt by the wire in the coil is $2.3 \times 10^{-2} T$. What is the maximum torque on the motor?
2. 39 cm-long solenoid, 1.8 cm in diameter, is to produce a 0.50 T magnetic field at its center. If the maximum current is 4.8 A, how many turns must the solenoid have?
3. A 2.2 cm diameter copper wire carries a 36A current (uniform across its cross section). Determine the magnetic field at the surface of the wire. Determine the magnetic field inside the wire, 0.50 mm below the surface. Determine the magnetic field outside the wire 2.5 mm from the surface.
4. In the figure below, the top wire is a 1.0 mm diameter copper wire. Each of the two bottom wires carry a current of 46 A flowing into the page. If the top wire is suspended in air due to the magnetic forces from the two bottom wires, what must be the current (magnitude and direction) flowing in the top wire? To find the weight of the top wire you need to look up the mass density of copper.



5. Find the direction of the magnetic field (into the page or out of it) at each of the indicated points C, D, E. D is exactly midway between the two wires.



6. A loop of wire is in the shape of two concentric semicircles as shown.



The inner circle has radius a ; the outer circle has radius b . A current flows clockwise through the outer wire and counterclockwise through the inner wire. What is the magnitude, B , of the magnetic field at the center of the semicircles?