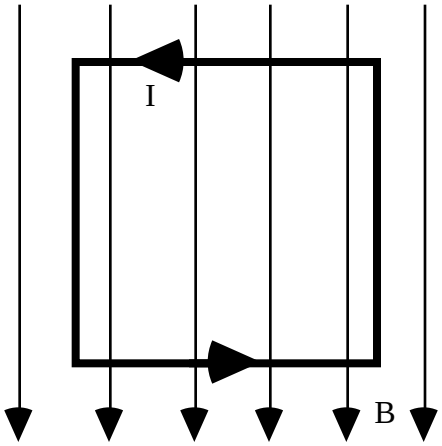
Physics 4B THIRD EXAM Chapters 23 - 32 Fall 1994

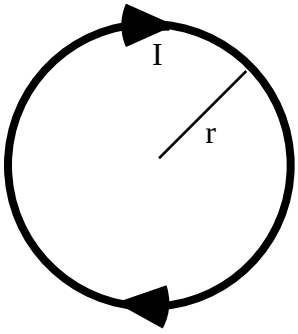
Name:_____

Solve the following problems in the space provided. Use the back of the page if needed. Each problem is worth 20 points. You must show your work in a logical fashion starting with the correctly applied physical principles which are on the last page. Your score will be maximized if your work is easy to follow because partial credit will be awarded.

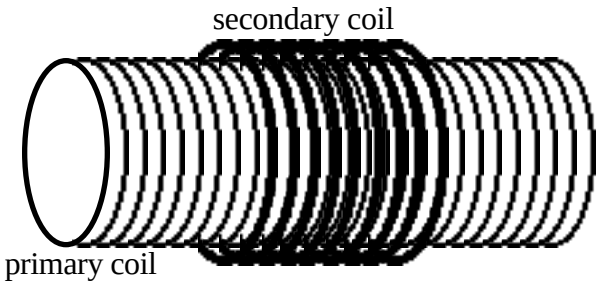
1. The square loop shown at the right has a current of 10.0A and its plane is parallel with a 2.00T magnetic field. Its sides are 10.0cm long. (a)Find the magnitude and indicate the direction of the force on each side of the loop. (b)Describe the resulting motion of the loop assuming that it is released from rest from the position shown.



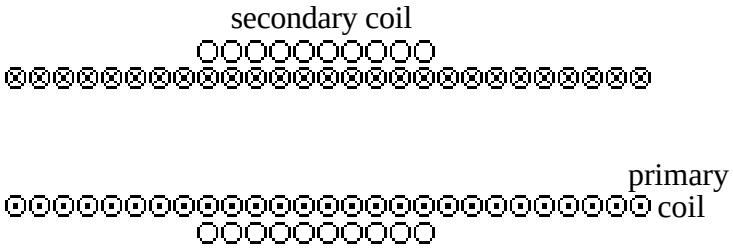
2. Find the magnitude and direction of the magnetic field at the center of the coil shown at the right. The coil has 100 turns, a radius of 5.00cm and carries 1.00A of current.



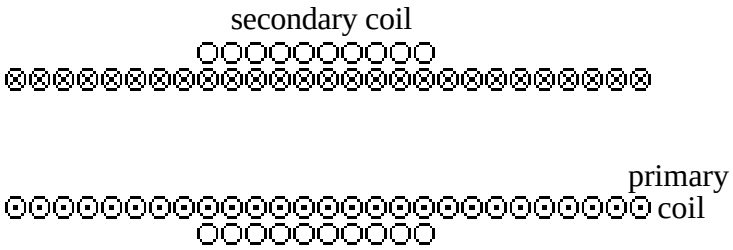
3. At the right is a drawing of the concentric coils that you studied in the lab. Current is provided to the primary coil by a battery. When the magnetic field of the primary coil has the right properties, currents appear in the secondary coil. The system is shown below in cross section for three cases. For each case sketch the magnetic field of the primary coil and indicate the direction of the current in the secondary coil. State the concepts or principles that you use to determine your answer.



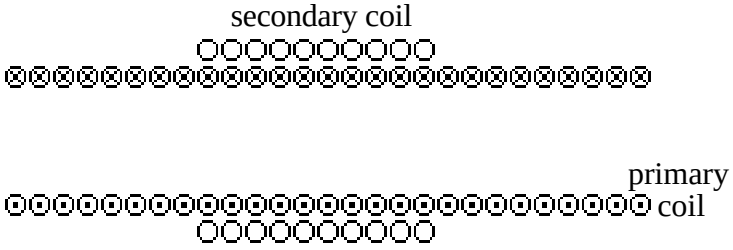
Case 1: The battery was recently connected. The current in the primary is in the direction shown and growing.



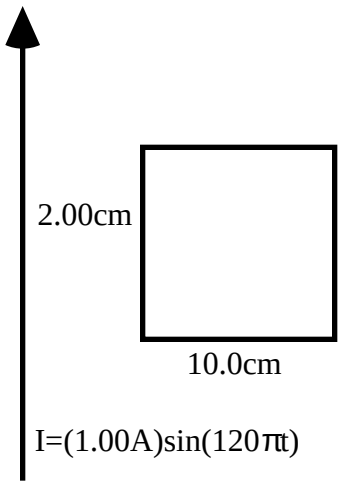
Case 2: The battery was connected long ago. The current in the primary is in the direction shown and constant.



Case 3: The battery was recently disconnected. The current in the primary is in the direction shown and dropping.



4. A wire carries a peak current of 1.00A that oscillates sinusoidally at 60.0Hz. A 100 turn square coil lies in the same plane 2.00cm away. The sides of the coil are 10.0cm long. Find the peak voltage induced in the coil.



5. The battery in the circuit at the right has been connected for a long time. (a)Find the current throught the resistor. (b)Find the current through the resistor 1.00s after the battery has been disconnected.