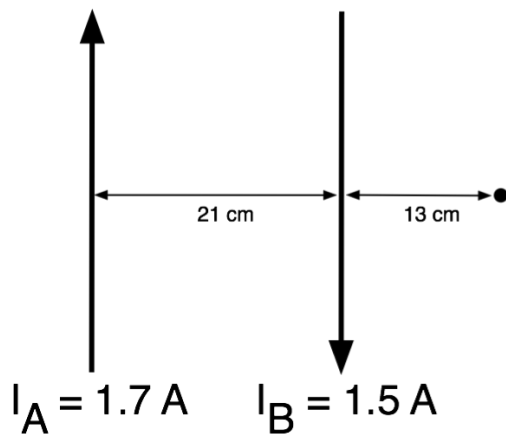


Physics 10164 - Exam 2D

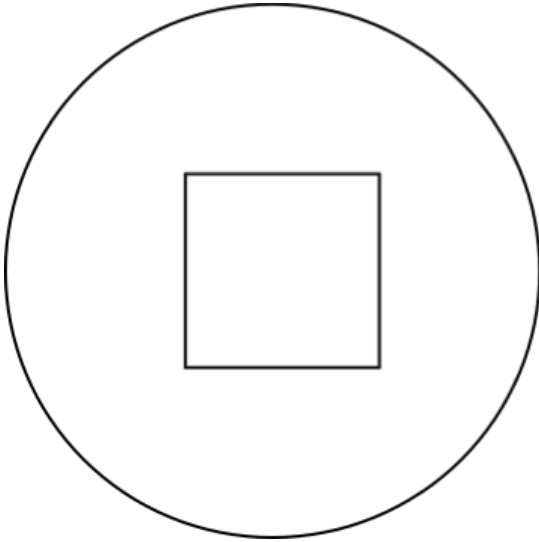
Partial credit will be given provided you show all work and are solving parts of the problem correctly. Points will be deducted if you don't show your work even if you get the right answer. Clearly indicate your answer with a circle or a box and remember to include correct units and significant figures.

1. (35 pts) Wires A and B are in the plane of the page, separated by 21 cm. Wire A carries a current of 1.7 A toward the top of the page (North), and wire B carries a current of 1.5 A toward the bottom of the page (South).
 - a) What is the magnitude and direction of the magnetic field at point P, which is 13 cm to the East of wire B?
 - b) If a singly-charged positive ion is moving through point P in the plane of the page in a direction 35° South of East with a speed of 3.0×10^5 m/s, what is the magnitude and direction of the magnetic force acting on that ion?



2. (35 pts) A solenoid is shown from an end-on perspective below. It has a radius of 5.0 cm, 540 turns/meter and an initial current of zero. The current in the solenoid increases in a clockwise direction to 2.4 Amps in 0.68 seconds.

Inside the solenoid is a 150-turn square loop, oriented so that the normal to the loop is parallel to the axis of the solenoid. The square loop is 2.8 cm on a side and has a resistance of $0.022\ \Omega$. What is the magnitude and direction of the induced current in the square loop during the 0.68 sec time interval?



#3. (30 pts) A generator delivers an EMF of $\varepsilon(t) = 140 \sin(68\pi t)$ to a circuit containing a capacitor and resistor in series. The power dissipated by the $8.0 \, \Omega$ resistor is 76 Watts.

- a) What is the capacitance (C) of the capacitor?
- b) At the instant when the current is equal to zero, what is the magnitude of the voltage drop across (i) the resistor, (ii) the capacitor and (iii) the generator? Explain each answer briefly.