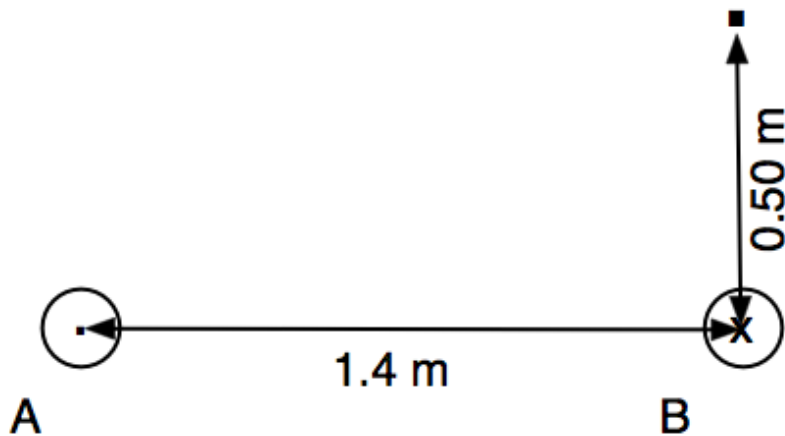


Physics 10164 - Exam 2B

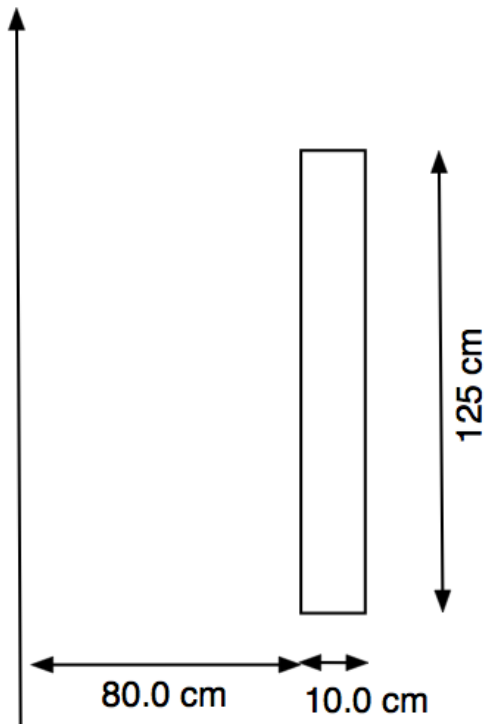
Partial credit will be given provided you show all work and are solving parts of the problem correctly. Points will be deducted if you don't show your work even if you get the right answer. Clearly indicate your answer with a circle or a box and remember to include correct units and significant figures.

1. (35 pts) Wire A passes vertically through the origin and points out of the page with a current of 5.5 A. Wire B passes vertically through $x = 1.4$ m and points into the page with a current of 3.4 A. Find the magnitude and direction of the net magnetic field at coordinates $(x = 1.4$ m, $y = 0.50$ m).



2. (35 pts) A thin rectangular wire loop with 225 turns and a resistance of 0.870 Ohms is in the same plane as a wire with a current of 3.35 Amps. As the current is increased to 9.10 Amps over a time interval of 0.422 seconds, what is the magnitude and direction of the induced current in the wire loop?

For the purposes of this problem, you can assume that the magnetic field within the rectangular loop due to the long straight wire is constant throughout the loop and has a magnitude equal to the magnetic field at the geometric center of the loop.



#3. (30 pts) An AC circuit contains a 120-Volt rms voltage source, a 1.7 Ohm resistor, a 65 mH inductor and a 1.5 μF capacitor.

- a) At what frequency does the rms current have its largest possible value?
- b) What is the largest possible value of the rms current?
- c) How much power is dissipated by the resistor when the circuit is operated at the frequency found in (a)?
- d) If the frequency is reduced by 20% of the value you found in part (a), what is the rms current in the circuit?
- e) How much power is dissipated by the resistor at this new frequency?