Name_____

Physics 111 Quiz #4, October 14, 2022

*Please show all work, thoughts and/or reasoning in order to receive partial credit. The quiz is worth 10 points total.*

*I affirm that I have carried out my academic endeavors with full academic honesty.*

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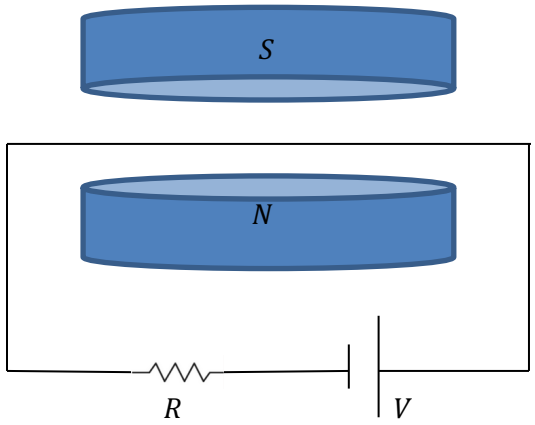
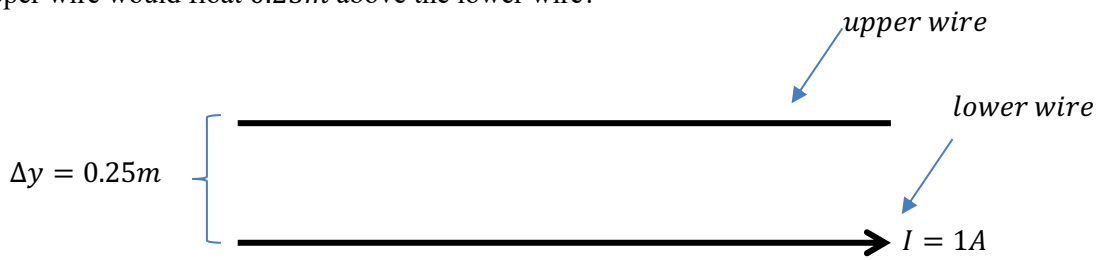
1. A gold wire (with dimeter $d_{wire} = 1mm$) is oriented parallel to the poles of a magnet of strength $B$, as shown below. The poles of the magnet are circular with a diameter $20cm$. Gold is known to have a density of $19300\frac{kg}{m^3}$, a molecular mass $197\frac{g}{mol}$ and donates one charge carrier per atom. If the wire is connected to a $100V$ battery and a $1000\Omega$ resistor, what is the drift velocity of the charge carriers in the gold wire?




2. If the magnet has a field strength $B = 0.2T$, what Hall voltage would be measured across the diameter of the wire?

3. What magnetic force would the wire experience in this magnetic field?

4. Suppose you have two long straight wires shown below. The upper wire is parallel to the lower wire and has a mass per unit length of $0.02\frac{kg}{m}$. The lower wire has a current of flowing from left to right (to east). What is the direction of the current that would have to flow in the upper wire so that the upper wire would float $0.25m$ above the lower wire?




5. What magnitude of current would have to flow in the upper wire so the upper wire will float $0.25m$ above the lower wire?