

IB Physics Electricity and Magnetism. Problem Set #3. Name _____

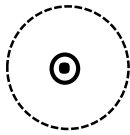
When solving the problems in this set, use this list of IB formulas.

Magnetic field due to a wire at a distance r from the wire, $B = \mu_0 I / 2\pi r$ $\mu_0 = 4\pi \times 10^{-7} \text{ T}\cdot\text{m/A}$

Magnetic field at the center of a single loop of radius R , $B = \mu_0 I / 2R$

Magnetic field at the center of a coil (solenoid) of length L with N turns, $B = \mu_0 n I$ $n = N/L$

1. A long, straight wire carries current from East to West. What is the direction of the magnetic field directly
(a) Above the wire. (b) Below the wire.
2. If the current in the wire from #1 is 1.5 A, find the magnitude of the magnetic field at a distance of 2.5 cm from the wire.
3. A wire carries current out of the page, as shown below. Draw the directions of the magnetic field using the given circle, above, below, to the left, and to the right of the wire.



4. A single loop of wire carries current of 4.2 A and has a radius of 3.5 cm. Calculate the magnitude of the magnetic field at the center of the loop.
5. A 500 turn solenoid, 8.5 cm long carries a current of 2.75 A. Find the magnetic field at the center of the solenoid.