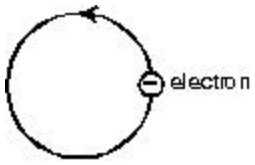
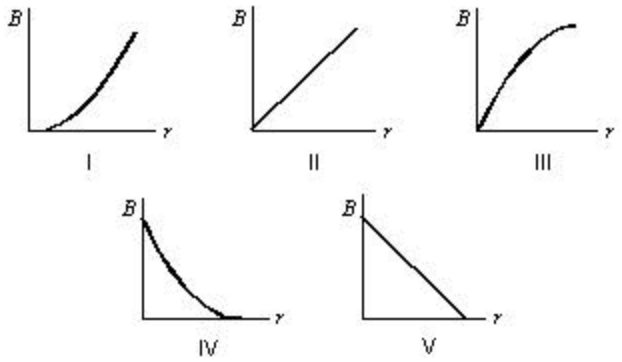
1. Electrons are going around a circle in a counterclockwise direction as shown. At the center of the circle they produce a magnetic field that is:




A) into the page
B) out of the page
C) to the left
D) to the right
E) zero

2. In an overhead straight wire, the current is north. The magnetic field due to this current, at our point of observation, is:
A) east
B) up
C) north
D) down
E) west

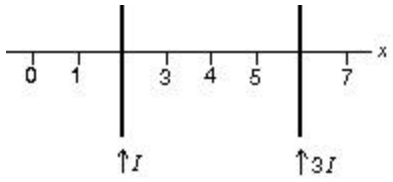
3. Which graph correctly gives the magnitude of the magnetic field outside an infinitely long straight current-carrying wire as a function of the distance *r* from the wire?




A) I
B) II
C) III
D) IV
E) V

4. Two long straight wires are parallel and carry current in the same direction. The currents are 8.0 A and 12 A and the wires are separated by 0.40 cm. The magnetic field in tesla at a point midway between the wires is:
A) 0 B) $4.0 \times 10^{-4}$ C) $8.0 \times 10^{-4}$
D) $12 \times 10^{-4}$ E) $20 \times 10^{-4}$

5. Two long straight current-carrying parallel wires cross the $x$ axis and carry currents $I$ and $3I$ in the same direction, as shown. At what value of $x$ is the net magnetic field zero?




A) 0
B) 1
C) 3
D) 5
E) 7

6. Two parallel wires, 4 cm apart, carry currents of 2 A and 4 A respectively, in the same direction. The force per unit length in N/m of one wire on the other is:
A) $1 \times 10^{-3}$, repulsive
B) $1 \times 10^{-3}$, attractive
C) $4 \times 10^{-5}$, repulsive
D) $4 \times 10^{-5}$, attractive
E) none of these

7. In Ampere's law, $\oint \vec{B} \cdot d\vec{s} = m_0 i$, the integration must be over any:
A) surface
B) closed surface
C) path
D) closed path
E) closed path that surrounds all the current producing $\vec{B}$.

8. A solenoid is 3.0 cm long and has a radius of 0.50 cm. It is wrapped with 500 turns of wire carrying a current of 2.0 A. The magnetic field in tesla at the center of the solenoid is:
A) $9.9 \times 10^{-8}$
B) $1.3 \times 10^{-3}$
C) $4.2 \times 10^{-2}$
D) 16
E) none of these

**Answer Key --**

1. A
2. E
3. D
4. B
5. C
6. D
7. D
8. C