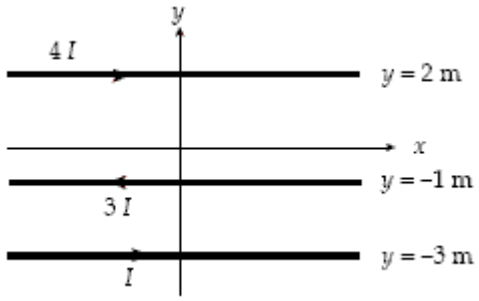
Physics 210 – Multiple Choice week 9

____ 1. One long wire carries a current of 30 A along the entire *x* axis. A second long wire carries a current of 40 A perpendicular to the *xy* plane and passes through the point (0, 4, 0) m. What is the magnitude of the resulting magnetic field at the point *y* = 2.0 m on the *y* axis?

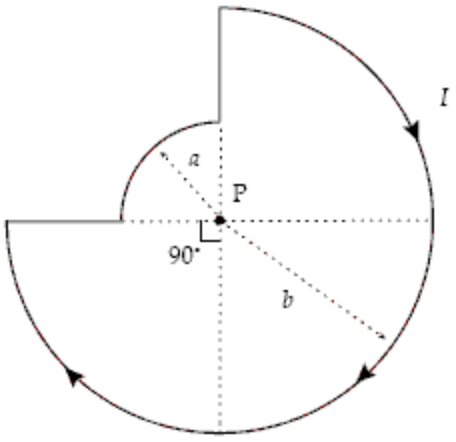
a. 4.0 μT
b. 5.0 μT
c. 3.0 μT
d. 7.0 μT
e. 1.0 μT

____ 2. Three long wires parallel to the *x* axis carry currents as shown. If *I* = 20 A, what is the magnitude of the magnetic field at the origin?



a. 37 μT
b. 28 μT
c. 19 μT
d. 47 μT
e. 58 μT

____ 3. In the figure, if *a* = 2.0 cm, *b* = 4.0 cm, and *I* = 2.0 A, what is the magnitude of the magnetic field at point P?

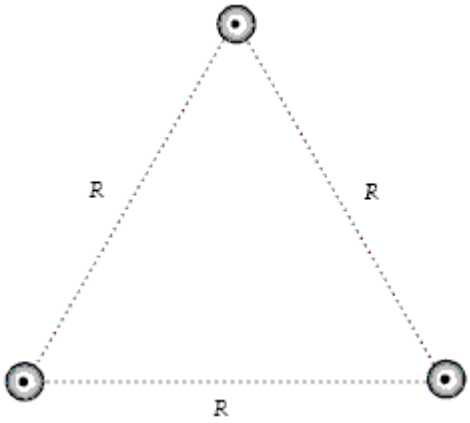


a. 49 μT
b. 39 μT
c. 50 μT
d. 69 μT
e. 13 μT

____ 4. Two long parallel wires are separated by 6.0 mm. The current in one of the wires is twice the other current. If the magnitude of the force on a 3.0-m length of one of the wires is equal to 8.0 μN, what is the greater of the two currents?

a. 0.20 A
b. 0.40 A
c. 40 mA
d. 20 mA
e. 0.63 A

____ 5. The figure shows a cross section of three parallel wires each carrying a current of 5.0 A out of the paper. If the distance R = 6.0 mm, what is the magnitude of the magnetic force on a 2.0-m length of any one of the wires?



a. 2.5 mN
b. 3.3 mN
c. 2.2 mN
d. 2.9 mN
e. 1.7 mN

____ 6. A long hollow cylindrical conductor (inner radius = 2.0 mm, outer radius = 4.0 mm) carries a current of 24 A distributed uniformly across its cross section. A long wire which is coaxial with the cylinder carries an equal current in the opposite direction. What is the magnitude of the magnetic field 3.0 mm from the axis?

a. 0.82 mT
b. 0.93 mT
c. 0.70 mT
d. 0.58 mT
e. 0.40 mT

____ 7. A long wire carries a current of 3.0 A along the axis of a long solenoid (radius = 3.0 cm, n = 900 turns/m, current = 30 mA). What is the magnitude of the magnetic field at a point 2.0 cm from the axis of the solenoid? Neglect any end effects.

a. 34 μT
b. 64 μT
c. 30 μT
d. 45 μT
e. 4.0 μT

____ 8. A solenoid 4.0 cm in radius and 4.0 m in length has 8000 uniformly spaced turns and carries a current of 5.0 A. Consider a plane circular surface (radius = 2.0 cm) located at the center of the solenoid with its axis coincident with the axis of the solenoid. What is the magnetic flux through this surface? (1 Wb = 1 T · m^2)

a. 63 μWb
b. 16 μWb
c. 0.25 mWb
d. 10 μWb
e. 5.0 μWb

____ 9. A conducting hollow cylinder (inner radius = *a*, outer radius = *b*) carries a current of 40 A that is uniformly distributed over the cross section of the conductor. If *a* = 3.0 mm and *b* = 6.0 mm, what is the magnitude of the (line) integral $\oint \mathbf{B} \cdot d\mathbf{s}$ around a circular path (radius = 5.0 mm) centered on the axis of the cylinder and in a plane perpendicular to that axis?

a. 50 μT · m
b. 30 μT · m
c. 22 μT · m
d. 37 μT · m
e. 47 μT · m

____ 10. When the number of turns in a solenoid and its length are both doubled, the ratio of the magnitude of the new magnetic field inside to the magnitude of the original magnetic field inside is:

a. 0.25
b. 0.50
c. 1
d. 2
e. 4

210
Answer Section

MULTIPLE CHOICE

1. ANS: B PTS: 1
2. ANS: C PTS: 1
3. ANS: B PTS: 1
4. ANS: B PTS: 1
5. ANS: D PTS: 1
6. ANS: B PTS: 1
7. ANS: D PTS: 1
8. ANS: B PTS: 1
9. ANS: B PTS: 1
10. ANS: C PTS: 1