Ch30 (Homework)
Current Score : – / 27 **Due :** Monday, August 27 2018 02:28 PM CDT

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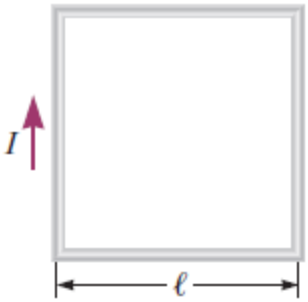
1. –/4 pointsSerPSE9 30.P.005.MI.FB.

Consider the following figure.



(a) A conducting loop in the shape of a square of edge length ℓ = 0.460 m carries a current I = 10.6 A as in the figure above. Calculate the magnitude and direction of the magnetic field at the center of the square.

magnitude [ ] μT

direction ---Select---

(b) If this conductor is reshaped to form a circular loop and carries the same current, what is the value of the magnetic field at the center?

magnitude [ ] μT

direction ---Select---

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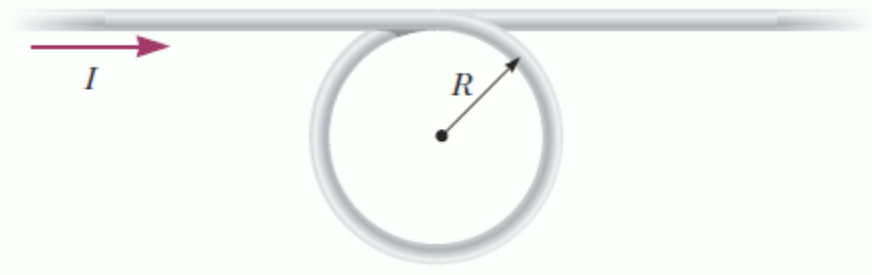
2. –/2 pointsSerPSE9 30.P.007.

A conductor consists of a circular loop of radius R = 12.0 cm and two long, straight sections as shown in the figure below. The wire lies in the plane of the screen and carries a current I = 2.90 A. Find the magnetic field at the center of the loop.

magnitude [ ] μT

direction ---Select---



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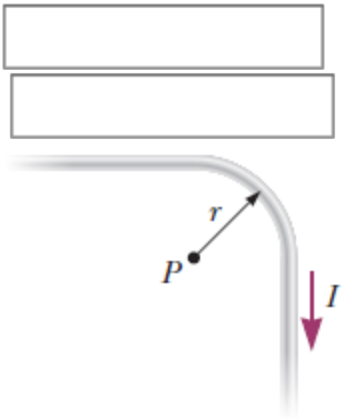
3. –/1 pointsSerPSE9 30.P.011.

A long, straight wire carries current I. A right-angle bend is made in the middle of the wire. The bend forms an arc of a circle of radius r, as shown in the figure. Determine the magnetic field at point P, the center of the arc. (Use any variable or symbol stated above along with the following as necessary: μ_0 and π.)

B =



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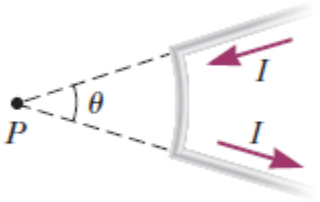
4. –/2 pointsSerPSE9 30.P.013.

A current path shaped as shown in the figure produces a magnetic field at *P*, the center of the arc. If the arc subtends an angle of θ = 30.0° and the radius of the arc is 0.600 m, what are the magnitude and direction of the field produced at *P* if the current is 5.00 A?

magnitude _____ nT

direction ---Select---



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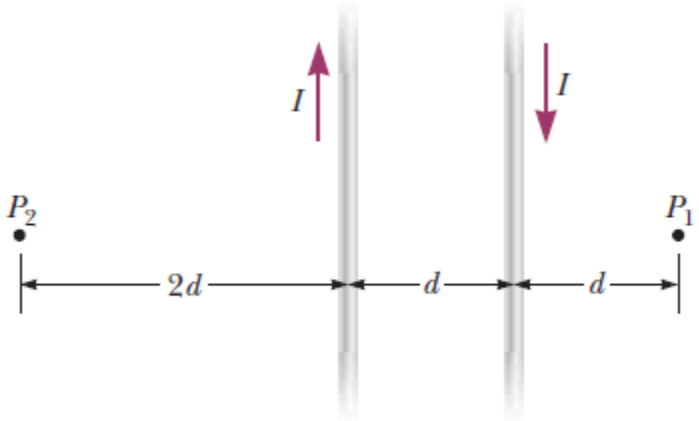
5. –/6 pointsSerPSE9 30.P.019.

The two wires shown in the figure below are separated by d = 10.7 cm and carry currents of I = 5.35 A in opposite directions.



(a) Find the magnitude and direction of the net magnetic field at a point midway between the wires.

magnitude [ ] μT

direction ---Select---

(b) Find the magnitude and direction of the net magnetic field at point P_1, 10.7 cm to the right of the wire on the right.

magnitude [ ] μT

direction ---Select---

(c) Find the magnitude and direction of the net magnetic field at point P_2, $2d$ = 21.4 cm to the left of the wire on the left.

magnitude [ ] μT

direction ---Select---

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6. –/3 pointsSerPSE9 30.P.022.

Two parallel wires separated by 3.55 cm repel each other with a force per unit length of 1.80×10^{-4} N/m. The current in one wire is 4.75 A.

(a) Find the current in the other wire.

[ ] A

(b) Are the currents in the same direction or in opposite directions?

- the same direction
- opposite directions

(c) What would happen if the direction of one current were reversed and doubled?

This answer has not been graded yet.

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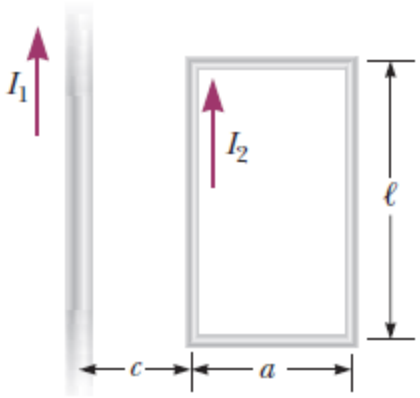
7. –/2 pointsSerPSE9 30.P.025.MI.FB.

In the figure below, the current in the long, straight wire is I_1 = 9.00 A and the wire lies in the plane of the rectangular loop, which carries a current I_2 = 10.0 A. The dimensions in the figure are c = 0.100 m, a = 0.150 m, and ℓ = 0.500 m. Find the magnitude and direction of the net force exerted on the loop by the magnetic field created by the wire.

magnitude [ ] μN

direction ---Select---



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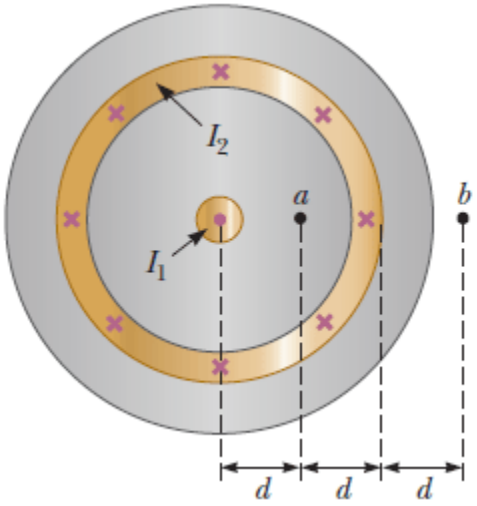
8. –/4 pointsSerPSE9 30.P.031.WI.

The figure below is a cross-sectional view of a coaxial cable. The center conductor is surrounded by a rubber layer, an outer conductor, and another rubber layer. In a particular application, the current in the inner conductor is I_1 = 1.20 A out of the page and the current in the outer conductor is I_2 = 3.16 A into the page. Assuming the distance d = 1.00 mm, answer the following.



(a) Determine the magnitude and direction of the magnetic field at point *a*.

magnitude [ ] μT

direction ---Select---

(b) Determine the magnitude and direction of the magnetic field at point *b*.

magnitude [ ] μT

direction ---Select---

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9. –/2 pointsSerPSE9 30.P.032.WI.

The magnetic coils of a tokamak fusion reactor are in the shape of a toroid having an inner radius of 0.700 m and an outer radius of 1.30 m. The toroid has 840 turns of large-diameter wire, each of which carries a current of 12.0 kA.

(a) Find the magnitude of the magnetic field inside the toroid along the inner radius.
[ ] T

(b) Find the magnitude of the magnetic field inside the toroid along the outer radius.
[ ] T

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10. –/1 pointsSerPSE9 30.P.044.

A solenoid 10.0 cm in diameter and 66.1 cm long is made from copper wire of diameter 0.100 cm, with very thin insulation. The wire is wound onto a cardboard tube in a single layer, with adjacent turns touching each other. What power must be delivered to the solenoid if it is to produce a field of 7.70 mT at its center?
[ ] W

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