Points 100 Not Published

Details Questions

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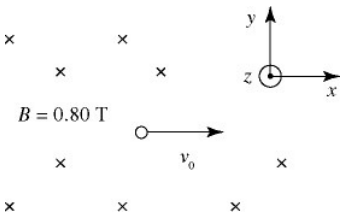
L09-01 8 pts

An electron traveling toward the north with speed [v] × 10^5 m/s enters a region where the Earth's magnetic field has the magnitude 5.0 × 10^{-5} T and is directed at 45° downward. What is the magnitude of the force F in F × 10^{-19} N that the Earth's magnetic field exerts on the electron? (e = 1.60 × 10^{-19} C) For example, if your answer is F = 11.1 x 10^{-19} N, enter 11.1 in the box as your answer. Answer F accurate to 1 decimal place.

L09-02 10 pts

A uniform magnetic field of magnitude 0.80 T in the negative z direction is present in a region of space, as shown in the figure. A uniform electric field is also present and is set at [E] x 10^4 V/m in the +y direction. An electron is projected with an initial velocity v_0=[v] x 10^4 m/s in the +x direction. Determine the y component F_y x 10^{-14} N of the initial force vector $\vec{F}$. (e=1.60 x 10^{-19}C). Answer F_y accurate to 1 decimal place.



L09-03 8 pts

A beam of electrons is accelerated through a potential difference of [V] kV before entering a region having uniform electric and magnetic fields that are perpendicular to each other and perpendicular to the direction in which the electron is moving. If the magnetic field in this region has a value of 0.010 T, what magnitude of the electric field E in V/m is required if the particles are to be undeflected as they pass through the region? (Hints: you need to convert the change in potential energy of the electron to kinetic energy, then calculate the velocity using $K.E. = \frac{1}{2}mv^2$ with m=9.11 x 10^{-31} kg.) Answer E accurate to 1 decimal place.

L09-04 5 pts

An electron moving perpendicular to a uniform magnetic field of 3.2 × 10^{-2} T moves in a circle of radius [r] cm. How fast v x 10^8 m/s is this electron moving? (m_{el} = 9.11 × 10^{-31} kg, e = 1.60 × 10^{-19} C)Answer v accurate to 2 decimal places.

L09-05 6 pts

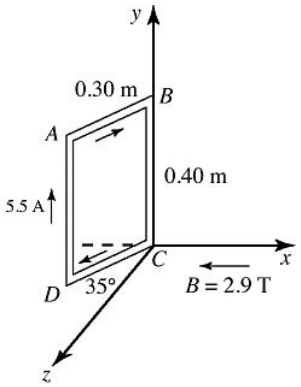
A doubly charged ion (charge 2*e*) with velocity [v] × 10^6 m/s moves in a circular path of diameter [D].0 cm in a magnetic field of 0.80 T in a mass spectrometer. What is the mass m x 10^{-27} kg of this ion? (*e* = 1.60 × 10^{-19} C) Answer m accurate to 2 decimal places.

L09-06 7 pts

A circular loop of diameter [D] cm, carrying a current of [A] A, is placed inside a magnetic field $\vec{B}$ = 0.30 T $\hat{k}$. The normal to the loop is parallel to a unit vector $\hat{n}$ = -0.60 $\hat{i}$ - 0.80 $\hat{j}$. Calculate the magnitude of the torque τ in milli Newton-meter (mN-m) on the loop due to the magnetic field. Answer τ accurate to 1 decimal place.

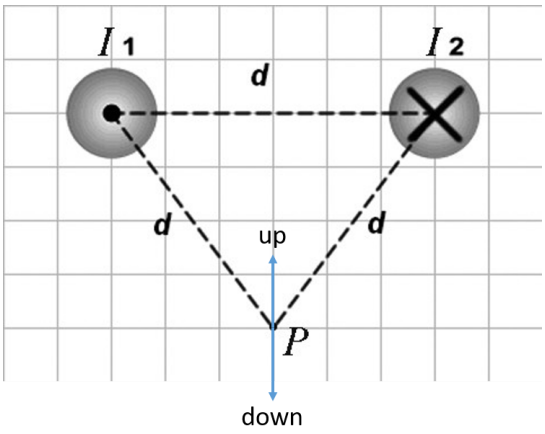
L09-07 10 pts

A rigid rectangular loop, which measures 0.30 m by 0.40 m, carries a current of [A] A, as shown in the figure. A uniform external magnetic field of magnitude [B] T in the negative *x* direction is present. Segment *CD* is in the *xz*-plane and forms a 35° angle with the *z*-axis, as shown. Find the magnitude of the external torque τ in N-m needed to keep the loop in static equilibrium. Answer τ accurate to 2 decimal places.



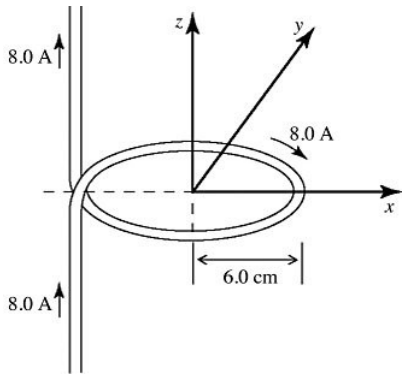
L10-01 6 pts

The figure shows two long, parallel current-carrying wires. The wires carry equal currents I_1=I_2=[I] A with I_1 pointing out of the page and I_2 pointing into the page. The wires are located a distance *d* = 0.5 m apart. Calculate the magnitude and direction of the magnetic field B in μT at the point *P* that is located an equal distance *d* from each wire. Assuming upward direction is +ve and downward direction is -ve. ($\mu_0 = 4\pi \times 10^{-7}$ T • m/A)



L10-02 10 pts

As shown in the figure, an insulated wire is bent into a circular loop of radius [R] cm and has two long straight sections. The loop is in the *xy*-plane, with the center at the origin. The straight sections are parallel to the *z*-axis. The wire carries a current of [I] A. What is the magnitude of the magnetic field in μT at the origin? ($\mu_0 = 4\pi \times 10^{-7}$ T • m/A)

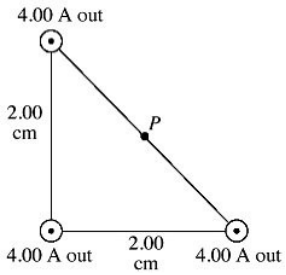


L10-03 6 pts

A solenoid having *N* turns and carrying a current of [I] A has a length of [L] cm. If the magnitude of the magnetic field generated at the center of the solenoid is [B] mT, what is the value of *N*? ($\mu_0 = 4\pi \times 10^{-7}$ T • m/A)

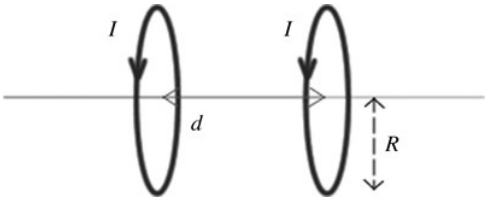
L10-04 6 pts

Three very long, straight, parallel wires each carry currents of 4.00 A, directed out of the page as shown in the figure. The wires pass through the vertices of a right isosceles triangle of side 2.00 cm. What is the magnitude of the magnetic field in μT at point *P* at the midpoint of the hypotenuse of the triangle?



L10-05 — 8 pts

Two coaxial circular coils of radius R = [R] cm, each carrying [I] A in the same direction, are positioned a distance d = [d] cm apart, as shown in the figure. Calculate the magnitude of the magnetic field halfway between the coils along the line connecting their centers. ($\mu_0 = 4\pi \times 10^{-7}$ T • m/A)



L10-06 — 5 pts

Two long parallel wires carry currents of [I] A in opposite directions. They are separated by 40 cm. What is the magnitude of the magnetic field in μT in the plane of the wires at a point that is 20 cm from one wire and 60 cm from the other? ($\mu_0 = 4\pi \times 10^{-7}$ T • m/A)

L10-07 — 5 pts

A very long thin wire produces a magnetic field of 0.0050×10^{-4} T at a distance of [d] mm from the central axis of the wire. What is the magnitude of the current I in mA in the wire? ($\mu_0 = 4\pi \times 10^{-7}$ T • m/A)

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