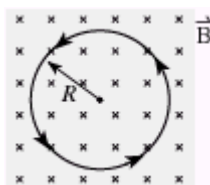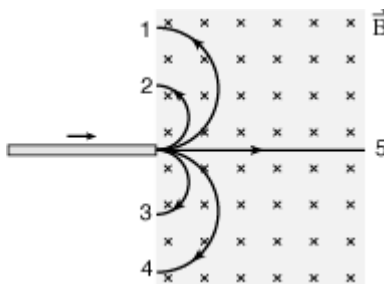1. A beam of electrons is accelerated in a cathode ray tube through 8.0 x 10^2 V and moves vertically upward through a horizontal magnetic field of 2.0 x 10^{-4} T. What is the radius (in m) of the path they follow?

2. A proton moving at 2.0 x 10^5 m/s perpendicularly to a magnetic field of 1.0 T, experiences a deflecting force which causes it to follow a circular path. What is the radius of this circle.

   A. 5.8 x 10^{-1} m
   B. 3.2 x 10^{-10} m
   C. 2.1 x 10^{-3} m
   D. 1.7 x 10^{-7} m

3. The path of a charged particle in a uniform magnetic field is circular when the initial velocity is perpendicular to the field.

   Which of the following is a valid expression for the radius of this orbit in terms of the magnetic field strength, and the particle's momentum and charge?

   A. $\dfrac{Bq}{p}$

   B. Bqp

   C. $\dfrac{Bp}{q}$

   D. $\dfrac{p}{Bq}$

4. A beam made up of ions of various charges and masses enters a uniform magnetic field as shown.

   One type of ion is observed to follow path **2**. Which path describes the one taken by an oppositely charged ion with twice the mass and twice the charge? (Assume all ions have the same speed.)

   A. Path 5
   B. Path 4
   C. Path 3
   D. Path 1

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An electron travelling at 7.7×10^6 m/s enters at right angles into a uniform magnetic field. Inside the field the path of the electron has a radius of 3.5×10^{-2} m.
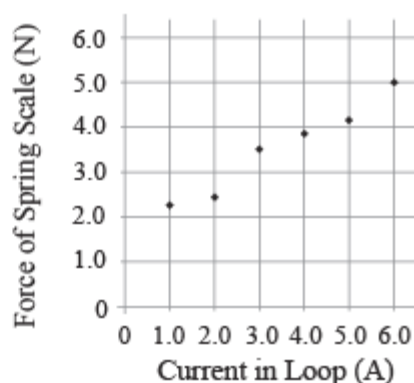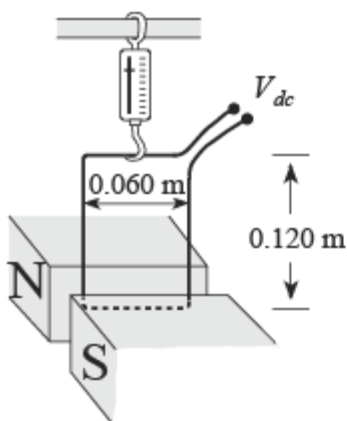
5. If the magnetic field is produced at the centre of a solenoid by a current of 0.62 A, what is the number of turns per unit length of the solenoid?

Protons travelling at 2.2×10^5 m/s enter at right angles to a magnetic field. The field is produced by a 0.16 m long solenoid. A current of 5.3 A flows through the 820 turns of wire of the solenoid.

6. What is the magnetic field in the solenoid?

A rectangular loop is suspended by a spring scale between magnetic poles. The loop is 0.060 m wide by 0.120 m high.
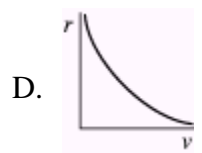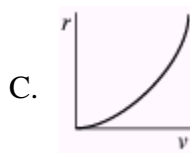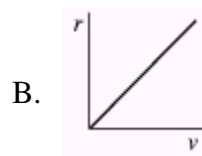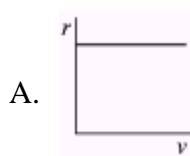
As the current in the loop is varied, the readings of the spring scale and current are plotted on a graph.

7. What is the weight, in newtons, of the loop?

8. What is the slope of the best fit line?

9. What is the magnitude of the magnetic field (in T)?

10. An electron enters a region having a magnetic field of 5.0 T and electric field E, at a speed of 2.0×10^5 m/s. The speed, magnetic field, and electric field are perpendicular to each other. What electric field is required to permit the undeflected passage of the electron?
    A. 2.5×10^{-5} N/C
    B. 1.6×10^{-13} N/C
    C. 1.0×10^6 N/C
    D. 4.0×10^4 N/C

11. A charged mass is accelerated to various speeds and then passed through a perpendicular magnetic field. Which of the graphs below is the best representation of how the radius of its circular path through the magnetic field varies with speed?

A.

B.

C.

D.

12. Charged particles having momentum p_1, pass perpendicularly through a magnetic field and their circular path has a radius of r. What would the radius be for particles with the same charge having momentum $p_2 = 2p_1$?
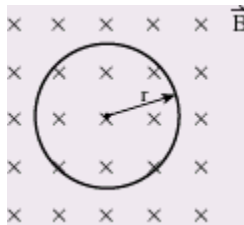
A. $\dfrac{1}{2}r$

B. 2r

C. $\dfrac{r}{\sqrt{2}}$

D. $\sqrt{2}r$

13. An electron circulates in a uniform 5.0×10^{-4} T magnetic field as shown. If the electron has 3.2×10^{-18} J of kinetic energy, what is its radius of orbit, r?

A. 3.0×10^{-2} m
B. 2.3×10^{-7} m
C. 4.6×10^{-4} m
D. 2.5×10^{-3} m