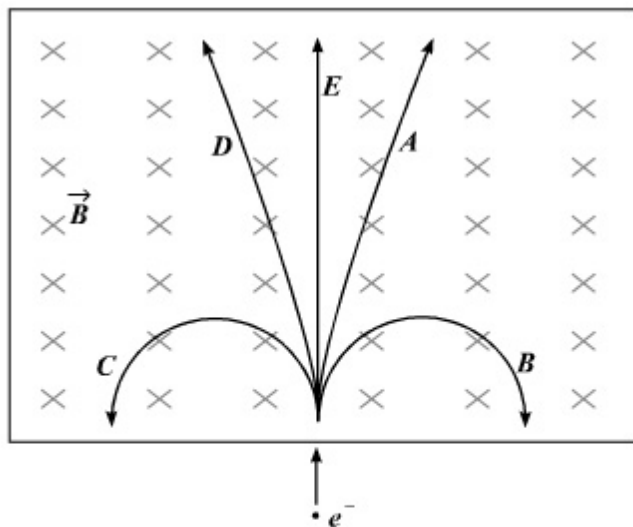


An electron is moving up when it encounters a region with a non-zero uniform magnetic field that is directed into the screen. Which path(s) shown in the figure might the electron follow?

<input type="checkbox"/>	D
<input type="checkbox"/>	E
<input type="checkbox"/>	C
<input type="checkbox"/>	B
<input type="checkbox"/>	A



A proton moves through a magnetic field at 25.1% of the speed of light. At a location where the field has a magnitude of 0.00607 T and the proton's velocity makes an angle of 117° with the field, what is the magnitude of the magnetic force acting on the proton?

Number

N

A charged particle is injected at 293 m/s into a 0.0833-T uniform magnetic field perpendicular to the field. The diameter of its orbit is measured and found to be 0.0397 m. What is the charge-to-mass ratio of this particle?

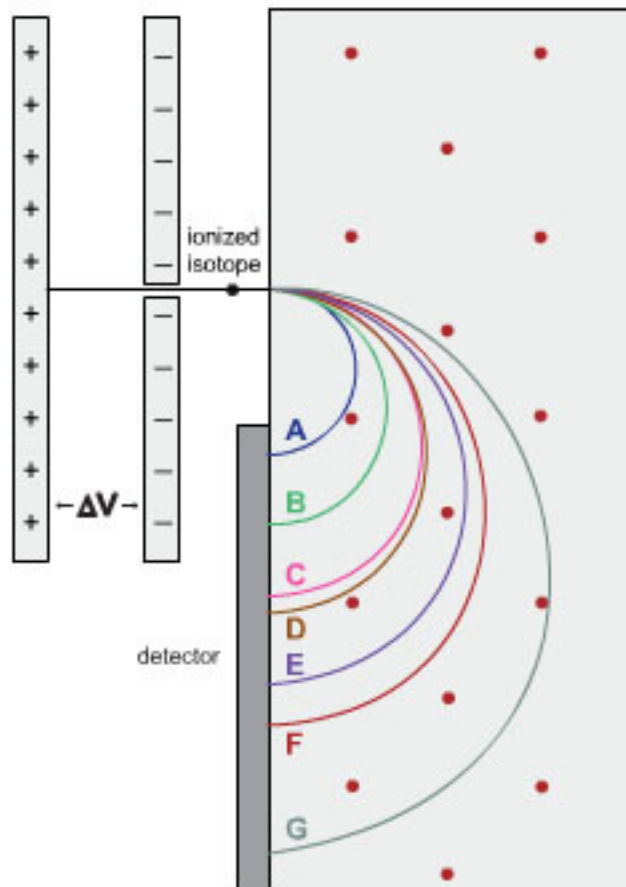
Number

C / kg

Elements that appear in the same column of the periodic table often share similar chemical properties. In the case of the alkaline earth metals, this is troublesome since the body treats calcium (necessary for proper bone growth) and radium (a radioactive element) as chemically similar, storing both in bone marrow. The radium then bombards nearby bone cells with alpha particles, causing them to "crumble."

Radium poisoning investigations often center on the identification of radium and its isotopes in bone samples using a mass spectrometer. Pictured is a schematic of a simplified mass spectrometer, showing the paths of calcium, barium (another alkaline earth metal) and radium isotopes entering the chamber. The region shown is immersed in a constant magnetic field of 0.452 T pointing **out** of the plane of the schematic. Motion of the positively-charged isotopes toward the right was initiated by a potential difference of 2567 V on the two plates shown.

Using the data shown in the table below, calculate the path radius of the Ca^+ ion.



Number m

(Scroll down for table and more questions)

Using the same data table, match the particles to their path label.

- | | | |
|--------|----------------------|------------------|
| Path A | <input type="text"/> | Ca^+ |
| Path B | <input type="text"/> | Ca^{2+} |
| Path C | <input type="text"/> | Ba^+ |
| Path D | <input type="text"/> | Ba^{2+} |
| Path E | <input type="text"/> | Ra^+ |
| Path F | <input type="text"/> | Ra^{2+} |
| Path G | <input type="text"/> | Ra^{3+} |

Isotope	Mass [$\times 10^{-25}$ kg]	Charge [$\times 10^{-19}$ C]
Ca^+	0.666	+1.602
Ca^{2+}	0.666	+3.204
Ba^+	2.28	+1.602
Ba^{2+}	2.28	+3.204
Ra^+	3.75	+1.602
Ra^{2+}	3.75	+3.204
Ra^{3+}	3.75	+4.806

A flat 158-turn current-carrying loop is immersed in a uniform magnetic field. The area of the loop is $7.29 \times 10^{-4} \text{ m}^2$ and the angle between its magnetic dipole moment and the field is 52.7° . Find the strength of the magnetic field that causes a torque of $1.85 \times 10^{-5} \text{ N}\cdot\text{m}$ to act on the loop when a current of 0.00325 A flows in it.

Number

T

Find the magnetic field 5.0 cm from a very long, straight wire that carries a current of 9.0 A. Be sure to include units.

Number	Units
<input type="text"/>	<input type="text"/>

Two long parallel wires are separated by 9.03 cm and carry currents 2.57 A and 3.01 A. Find the magnitude of the magnetic force that acts on a 3.55-m length of either wire.

Number

N

A 13.1-cm-long solenoid contains 707 turns and carries a current of 5.63 A. What is the strength of the magnetic field at the center of this solenoid?

Number

T

At some point not close to its ends within a solenoid of arbitrary length, calculate the approximate magnetic field if the solenoid carries a current 12.0 A and has 240.0 turns per meter of the solenoid's length.

Number

T

If we triple the number of turns per meter, the magnetic field will:

halve

triple

diminish to zero

Verify your answer by recalculating the magnetic field in this solenoid if we increase the number of turns to 7.20×10^2 per meter?

Number

T

What is the current required to produce a magnetic field of 0.001000 T within a similar solenoid that has 2000.0 turns distributed uniformly over the solenoid's length of 2.000 m?

Number

A