

Magnetic Force Homework

1. A proton is traveling with initial velocity $1.8 \times 10^7 \hat{i}$ m/s in a uniform magnetic field of $140 \hat{k}$ G. Find the magnitude and direction of the magnetic force acting on the charged particle. Then determine the radius and period of its orbit as it moves in a circle.

2. A straight, inflexible conducting rod weighing 25 g is hung horizontally by light flexible leads. The rod is 40 cm long and carries a current of 5 A. If a horizontal uniform magnetic field is produced perpendicular to the wire in the correct direction it will produce an upward force on the rod. What field strength would be required to cause the rod to levitate in the air?

3. A proton is traveling directly towards the Jupiter's equator in the plane of the equator with a kinetic energy of 1.3 MeV and encounters a uniform magnetic field of 7×10^{-6} T directed towards Jupiter's north pole. Describe the motion of the proton, including its orientation, radius, and period.