

Part M Problems

1. Assume the magnetic field in this room points from left to right. If an electron is fired in front of you from the floor to the ceiling, what will be the direction of the magnetic force on the electron?
2. If a proton is fired near the Earth, parallel to the Earth's surface, from west to east, what would the direction along which the proton would be deflected?
3. A proton is fired toward the ground at the equator. What is the direction of the magnetic force on the proton, due to Earth's magnetic field?
4. Forty turns of wire form a square of side length 6.0 cm. The square faces a magnetic field whose strength is 0.01 T. Over a period of one millisecond, the magnetic field strength drops to zero. What was the average emf induced in the coil?
5. A circular coil consists of a 200 turns of wire; the coil faces a magnetic field whose strength changes from 0.01 T to 0.04 T in three milliseconds. During this time, the average induced emf in the coil is 500 volts. What is the radius of the coil?

Solutions

1. Toward you	2. upward	3. eastward
4. $V = 40(0.06)^2 -0.01 / 0.001$ = 1.44 volts	5. $500 = 200\pi r^2(0.03)/0.003$ $r = 0.28$ m	