2018 Ph H1 Q10

Section: Particles and Waves

Topic: Forces on Charged Particles

Brief summary of the question

A proton enters a region where the magnetic field is into the page. Which way does it first deflect?

Worked solution

Magnetic force: $F = q(v \times B)$.

For a positive charge (proton), the direction is the right-hand rule.

Typical entry: velocity to the right; field into the page.

$v \times B$ points up the page. Therefore the path bends towards the top of the page.

Final answer

C — deflects towards the top of the page.

Revision tips

- **Use v (thumb), B (index), F (middle) — right hand for positive charges.**
- **For negative charges, the force is the opposite way.**
- **Magnetic force is always perpendicular to velocity, so the path is curved.**