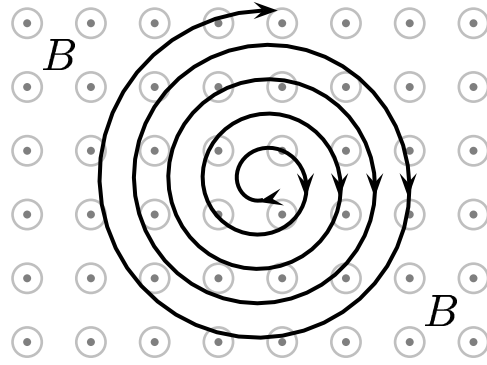


A uniform magnetic field is directed out of the page. A charged particle moves in the plane of the page following a clockwise spiral of increasing radius as shown.



A reasonable explanation is

- A) the charge is positive and speeding up.
 - B) the charge is positive and slowing down.
 - C) the charge is negative and speeding up.
 - D) the charge is negative and slowing down.
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We know that when a charged particle move in a uniform magnetic field with a constant speed, it undergoes a circular motion with the centripetal force provided by the magnetic force, namely

$$m \frac{v^2}{r} = q v B ,$$

so we know that the radius is in fact proportional to the speed,

$$r = \frac{m}{q B} v .$$

Since in this problem the particle follows a spiral of increasing radius, we can judge that it is speeding up.

The magnetic force $\vec{F} = q \vec{v} \times \vec{B}$ must be in the direction for the centripetal force $-\hat{r}$ (pointed inward) of this particle in counter-clockwise circular motion. Since $\vec{v} \times \vec{B}$ is in the negative \hat{r} direction, the particle has a positive charge.

Answer A.