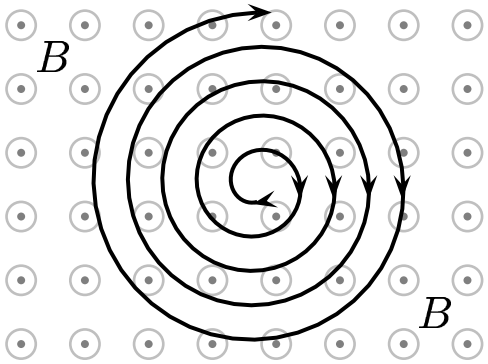
A uniform magnetic field is directed out of the page. A charged particle moves in the plane of the page following a clockwise spiral of increasing radius as shown.



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.

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.