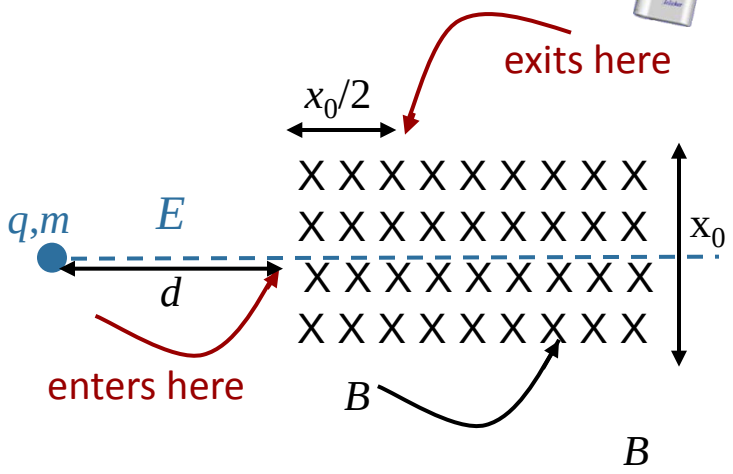
Calculation

A particle of charge q and mass m is accelerated from rest by an electric field E through a distance d and enters and exits a region containing a constant magnetic field B at the points shown. Assume q,m,E,d, and x_0 are known.

What is B?



Conceptual Analysis

What do we need to know to solve this problem?

A) Lorentz Force Law ($\vec{F} = q\vec{v} \times \vec{B} + q\vec{E}$)

B) E field definition

C) V definition

D) Conservation of Energy/Newton's Laws

E) All of the above

Absolutely ! We need to use the definitions of V and E and either conservation of energy or Newton's Laws to understand the motion of the particle before it enters the B field.

We need to use the Lorentz Force Law (and Newton's Laws) to determine what happens in the magnetic field.