# Problem 29.2

The initial direction of deflection of a charge moving in a magnetic field (B-field) is the same as the direction of the force on the charge. The relationship that defines the force on a charge moving in a B-field is:

$$\vec{F} = q\vec{v} x \vec{B}$$

The direction of a cross product is perpendicular to both vectors being crossed, which means the force is perpendicular to the plane defined by $\vec{v}$ and $\vec{B}$.

a.)
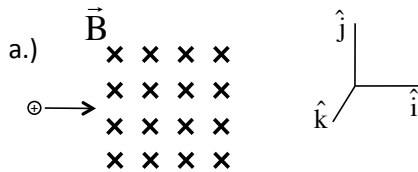
The force is perpendicular to a plane in the x-z plain. In other words, it will be in the + or −
y-direction. Using the right-hand rule, the direction is UPWARD.
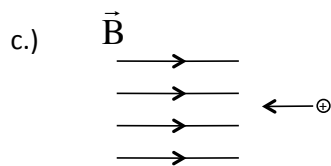
b.)
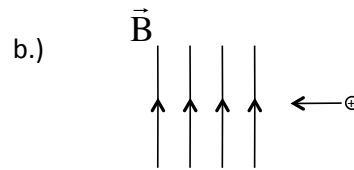
The force is perpendicular to a plane in the x-y plain. In other words, it will be in the + or − *z-direction*. Using the right-hand rule, the direction is INTO THE PAGE.
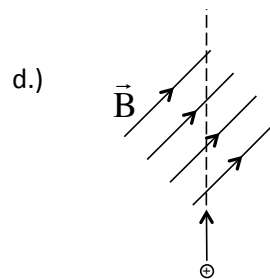
c.)

The force on a charge moving along B-field lines is *zero*. (Think about it:

$$\left|\vec{F}\right| = q\left|\vec{v}\right|\left|\vec{B}\right|\sin\theta$$

In this case, the angle between v and B is zero, so the sine (hence F) is zero!

d.)

The velocity and magnetic field vectors are in the page's plain. The direction is into or out of the page. Using the right-hand rule, the direction is INTO THE PAGE.