The force on the particle is determined by the Lorentz force and hence will always be perpendicular to the velocity of the particle. The magnetic Lorentz force is expressed by

$$\overrightarrow{F} = q\ \overrightarrow{\mathbf{v}} \times \overrightarrow{\mathbf{B}}. \tag{1}$$

In the first problem, we have a proton whose velocity is in the positive x-direction and it is moving in a field with orientation in the positive y-direction. Let them be $\overrightarrow{v} = v\,\widehat{\mathbf{x}}$ and $\overrightarrow{B} = B\,\widehat{\mathbf{y}}$ respectively. Then the force will be $\overrightarrow{F} = qvB\,\widehat{\mathbf{z}}$, when we take the cross product. Now, the magnitude of the force will be $4.8 \times 10^{-14}\ N$ and its direction will be along the positive z-direction. Also, it's evident that the force become zero if the proton moves along the y-direction since the velocity then becomes parallel to the magnetic field making the cross product to vanish.

In case of an electron also, there will be no change in the magnitude of the force but its direction will be opposite due to the negative charge of the electron.

An alpha particle is having two proton and two neutron, not two electron since it is nothing but the nucleus of Helium. So we have its charge as the double of that of a proton. Hence the magnitude of the force will be $9.6\ \times\ 10^{-14}\ N$ with a direction along the positive z-axis, assuming the same velocity as before.

The same equation as above shows that if any one of these particles with velocity in the y-direction is moving in a uniform magnetic filed, there will be no force since the cross product vanishes. So they will move along the same straight line without any change.

1 Graphical Part

Now coming to the pictorial part, we can see that since the velocity is always perpendicular to the force, a uniform magnetic field cannot do any work on a charged particle moving in it. This in fact means that the kinetic energy of the particles doesn't change. Since the kinetic energy is

$$\begin{aligned} K.E. &= \frac{1}{2}mv^2 \\ &= \frac{1}{2}m(v_x^2 + v_y^2 + v_z^2),\ \mathit{and}\ v_y\ \mathit{is\ unchanged},\ \mathit{we\ have} \\ v_x^2 + v_z^2 &= v_\perp^2 \\ &= \mathit{constant}. \end{aligned}$$

This represents a velocity circle in the $x - z$ plane with a circle of radius

$$r = \frac{mv_\perp}{qB}.$$

Thus we can see that different particles traverses different circles in the plane perpendicular to the direction of motion. Thus it can be seen that if we proceed in the direction of the magnetic field, the particle's trajectory will be a Helix. The pitch of the Helix will be determined by the radius factor given above and in the given problem, by the value of $\frac{q}{m}$ of each particle. This is the working principle of cyclotrons, mass spectrographs etc. See the second file for a pictures.