Question 1

A particle with magnetic dipole moment $\boldsymbol{\mu}$ is placed in a magnetic field oriented along the x axis. The field has form

$$\mathrm{B} = xB\hat{\mathrm{x}}$$

where $B > 0$ is the magnitude of the magnetic field and $\hat{\mathrm{x}}$ is the unit vector along the x axis.

Which of the following is true?

1. There is no force on the magnetic dipole.
2. The force is along $+\hat{\mathrm{x}}$ if $\mu_x > 0$ and along $-\hat{\mathrm{x}}$ if $\mu_x < 0$.
3. The force is along $-\hat{\mathrm{x}}$ if $\mu_x > 0$ and along $+\hat{\mathrm{x}}$ if $\mu_x < 0$.
4. The force is along $+\hat{\mathrm{x}}$ in both cases.
5. The force is along $-\hat{\mathrm{x}}$ in both cases.

Question 2

The isotope of sodium, ^{23}Na, has a nucleus with spin $3/2$.

How many possible outcomes are there for a measurement of the z component of the nucleus' spin?

1. Two
2. $\frac{3}{2}$
3. Three
4. Four
5. Five
6. More than five.