

Question 1

Consider a solid sphere in which the mass is uniformly distributed throughout the sphere. The charge, however, is only distributed on the surface of the sphere.

Which of the following is true about the magnitudes of the magnetic dipole moment and the spin angular momentum?

1. $\mu = \frac{Q}{2M} S$
2. $\mu > \frac{Q}{2M} S$
3. $\mu < \frac{Q}{2M} S$

Question 2

A particle with magnetic dipole moment μ is placed in a magnetic field oriented along the x axis. The field has form

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

where $B > 0$ is the magnitude of the magnetic field and $\hat{x}$ 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 $+\hat{x}$ if $\mu_x > 0$ and along $-\hat{x}$ if $\mu_x < 0$.
3. The force is along $-\hat{x}$ if $\mu_x > 0$ and along $+\hat{x}$ if $\mu_x < 0$.
4. The force is along $+\hat{x}$ in both cases.
5. The force is along $-\hat{x}$ in both cases.