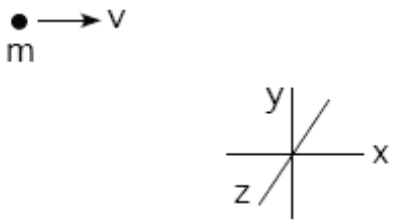
Angular Momentum
Concept Questions

Question 1: Angular Momentum



In the above situation where a particle is moving in the x-y plane with a constant velocity, the magnitude of the angular momentum $\left|\vec{\mathbf{L}}_0\right|$ about the origin

1. decreases then increases,
2. increases then decrease,
3. is constant,
4. is zero because this is not circular motion.

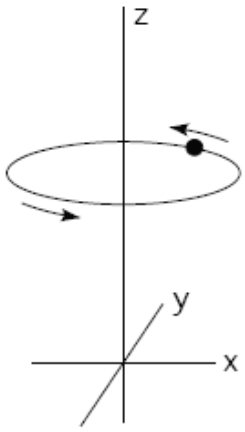
Question 2: Angular Momentum

The diagram above shows six possible combinations of position and velocity for a particle of mass m and speed v moving in the x-y plane. How many distinct values of the angular momentum $\vec{\mathbf{L}}_0$ relative to the origin does this represent?

1) 1
2) 2
3) 3
4) 4
5) 5
6) 6

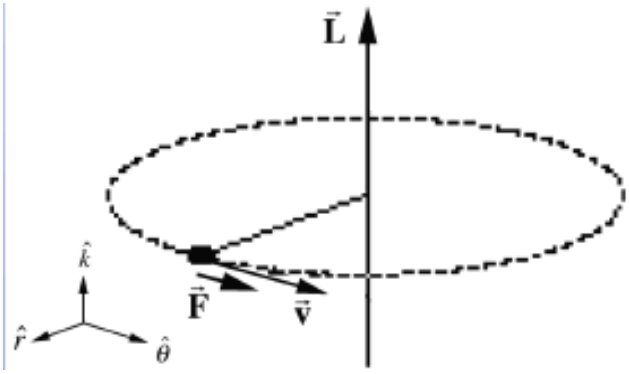
Question 3: Angular Momentum

A particle of mass m moves in a circle of radius R at an angular speed ω about the z axis in a plane parallel to but above the x-y plane. Relative to the origin



1. $\vec{\mathbf{L}}_0$ is constant.
2. $\left|\vec{\mathbf{L}}_0\right|$ is constant but $\vec{\mathbf{L}}_0 / \left|\vec{\mathbf{L}}_0\right|$ is not.
3. $\vec{\mathbf{L}}_0 / \left|\vec{\mathbf{L}}_0\right|$ is constant but $\left|\vec{\mathbf{L}}_0\right|$ is not.
4. $\vec{\mathbf{L}}_0$ has no z-component. .

Question 4 Change in Angular Momentum: A person spins a tennis ball on a string in a horizontal circle with velocity $\vec{\mathbf{v}}$ (so that the axis of rotation is vertical). At the point indicated below, the ball is given a sharp blow (force $\vec{\mathbf{F}}$) in the forward direction.



This causes a change in angular momentum $\Delta\vec{\mathbf{L}}$ about the center of the circle in the

1. $\hat{\mathbf{r}}$ - direction
2. $\hat{\boldsymbol{\theta}}$ - direction
3. $\hat{\mathbf{k}}$ -direction

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