Ambiguous phrasing:

1) The total kinetic energy of the wheel at any point can be calculated from the change in potential energy due to gravity minus the work done by friction.

Better phrasing:

2) The total kinetic energy of the wheel at any point can be calculated from the change in potential energy due to gravity minus a non-zero work done by friction.

A person spins a tennis ball on a string in a horizontal circle (so that the axis of rotation is vertical). At the point where the object is moving in the X direction, the ball is given a sharp blow in the forward direction. This causes a change in linear momentum dp in the

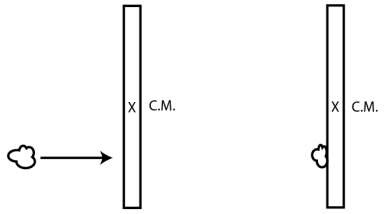
1) $+x$ direction
2) $+y$ direction
3) $+z$ direction
4) $-x$ direction
5) $-y$ direction
6) $-z$ direction
7) None of the above

A person spins a tennis ball on a string in a horizontal circle (so that the axis of rotation is vertical). At the point when it is moving in the X direction, the ball is given a sharp blow in the forward direction. This causes a change in angular momentum dL in the

1) $+x$ direction
2) $+y$ direction
3) $+z$ direction
4) $-x$ direction
5) $-y$ direction
6) $-z$ direction
7) None of the above

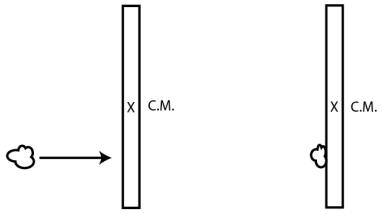
A dumbbell is rotating about its center as shown. Compared to the dumbbell's angular momentum about its center, its angular momentum about a point parallel to the axis but beyond one of the balls at the end of the rod is

1) bigger.
2) the same.
3) smaller.
4) cannot tell without knowing how far away point B is located from point A.



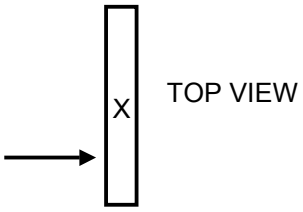
A moving blob of mass m hits a rod of mass M that is initially stationary. Both blob and rod are sliding on a horizontal, frictionless surface. After the collision, the blob sticks to the rod. What will happen to the rod+blob combination?

1) It rotates clockwise but doesn't move sideways.
2) It rotates counterclockwise but doesn't move sideways.
3) It doesn't rotate but does move sideways.
4) It rotates clockwise and moves sideways.
5) It rotates counterclockwise and moves sideways.
6) cannot tell without knowing the length of the rod and where the blob hits



A blob of mass **m** moving at speed **v** hits a rod of mass **M** that is initially stationary. After the collision, the blob sticks to the rod. What is the speed of the center of mass of the rod right after the collision?

1) mv/M
2) mv/(M+m)
3) Mv/m
4) Mv/(M+m)
5) $\frac{1}{2}mv^2/M$
6) $\frac{1}{2}mv^2/(M+m)$
7) cannot tell without knowing the length of the rod and where the blob hits



A uniform rod of mass **M** and length **L** is initially stationary on a horizontal, frictionless surface. It is given a kick at an off-center point as shown. After the kick, the center of mass of the rod will:

1) move mostly to the right but also curve towards the top of the page.
2) move only to the right.
3) move mostly to the right but also curve towards the bottom of the page.
4) not move to the right at all as the rod rotates clockwise.
5) not move to the right at all as the rod rotates counterclockwise.
6) cannot tell without knowing the length of the rod and where the kick is done.