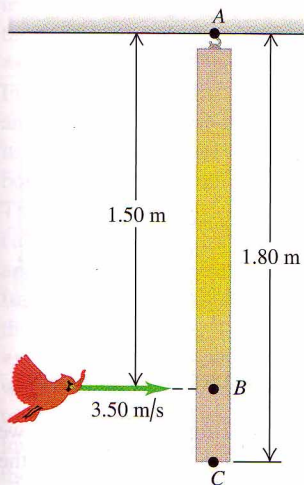


22. • Calculate the angular momentum and kinetic energy of a solid uniform sphere with a radius of 0.120 m and a mass of 14.0 kg if it is rotating at 6.00 rad/s about an axis through its center.
24. • A small 0.300 kg bird is flying horizontally at 3.50 m/s toward a 0.750 kg thin bar hanging vertically from a hook at its upper end, as shown in Figure 10.51. (a) When the bird is far from the bar, what are the magnitude and direction (clockwise or counterclockwise) of its angular momentum about a horizontal axis perpendicular to the plane of the figure and passing through (i) point A, (ii) point B, and (iii) point C? (b) Repeat part (a) when the bird is just ready to hit the bar, but is still flying horizontally.



▲ **FIGURE 10.51** Problem 24.

31. •• A uniform 4.5 kg square solid wooden gate 1.5 m on each side hangs vertically from a frictionless pivot at the center of its upper edge. A 1.1 kg raven flying horizontally at 5.0 m/s flies into this gate at its center and bounces back at 2.0 m/s in the opposite direction. (a) What is the angular speed of the gate just after it is struck by the unfortunate raven? (b) During the collision, why is the angular momentum conserved, but not the linear momentum?
33. •• A large turntable rotates about a fixed vertical axis, making one revolution in 6.00 s. The moment of inertia of the turntable about this axis is $1200 \text{ kg} \cdot \text{m}^2$. A child of mass 40.0 kg, initially standing at the center of the turntable, runs out along a radius. What is the angular speed of the turntable when the child is 2.00 m from the center, assuming that you can treat the child as a particle?