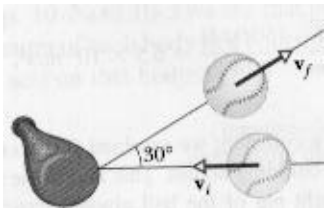
Name:_____

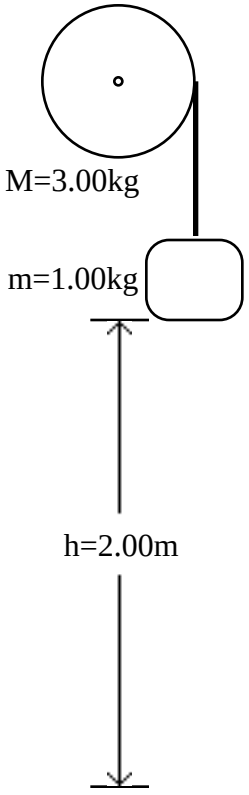
Solve the following problems in the space provided. Use the back of the page if needed. Each problem is worth 20 points. You must show your work in a logical fashion starting with the correctly applied physical principles which are on the last page. Your score will be maximized if your work is easy to follow because partial credit will be awarded.

1. A 80.0kg running back traveling downfield at 10.0m/s slams into a stationary 95.0kg guard that grabs him to make a tackle. Assuming that the forces exerted by the ground on the athletes are small during their collision, find their combined speed just after the collision.

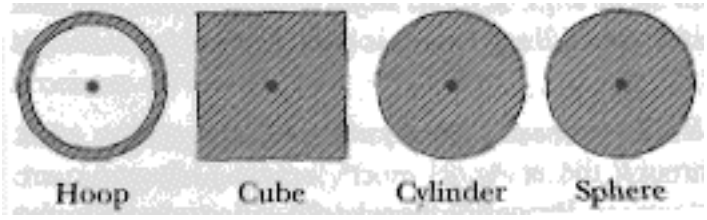
2. A pitcher throws a 150g ball so that it is traveling horizontally at 39.0m/s when it strikes the 1.20kg bat. The ball leaves the bat with a speed of 45.0m/s at an angle of 30.0˚ above the horizontal. Find the force that the bat exerts on the ball assuming that it is in contact with the ball for 1.20ms.



3. A 1.00kg mass hangs from a string that is wrapped around a 3.00kg cylinder with a 5.00cm radius. After the mass is released it falls as the string unwinds and the cylinder spins. After the mass has dropped 2.00m, find its velocity.



4. Four solid objects are shown below in cross section. They all have the same mass, equal heights, and equal widths (They will necessarily have different thickness). (a)Rank them from the highest rotational inertia to the lowest rotational inertia about the axis shown and (b)explain why you put the cube in the place that you chose. If your explanation only involves equations from the last page you will not get full credit.



5. A 5.00kg beam 2.00m long is hinged at one end and held at a 37˚ angle above the horizontal by a horizontal cable. Find the tension in the cable and the horizontal and vertical components of the force that the hinge exerts on the beam.