Name:_____

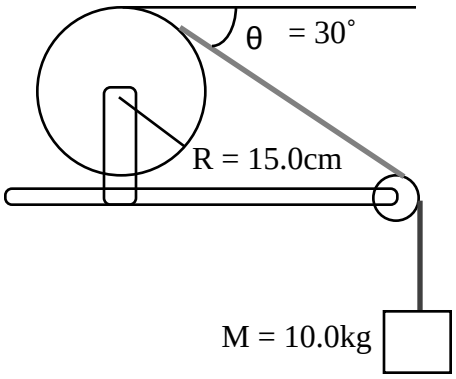
Physics 4A THIRD EXAM Chapters 1 - 12 Fall 1992

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 150g bat (the animal) flying northward at 0.800m/s gulps down a 20g moth heading east at 3.50m/s. Find the speed and direction of the bat and its full belly just after this snack.

2. A solid sphere of mass 1.00kg and radius 10.0cm rolls along at a speed of 5.00m/s when it reaches the base of a hill. Find the maximum height to which it will rise.

3. The cable of a 15.0cm radius winch heads downward at an angle of 30˚ below horizontal. It runs over a pulley and supports a 10.0kg mass, Find the torque that the cable exerts on the wench.



4. A potter's wheel with a moment of inertia of 0.100 kg·m^2 is spinning at 3.00rev/s when the potter drops a cylindrical hunk of clay on to it at the center. The hunk of clay has a mass of 4.00kg and a diameter of 15.0cm. Find (a)the moment of inertia of the hunk of clay about its central axis and (b)the rotational speed of the wheel and the clay just after it is put on the wheel.

5. A 50.0kg athlete doing a push-up lies horizontally with only her hands and feet touching the ground. Her center of mass is 60% of the way from her toes to her head and her hands are 85% of the way. Find the force that she must exert on the ground to do the push-up.