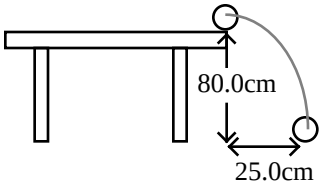
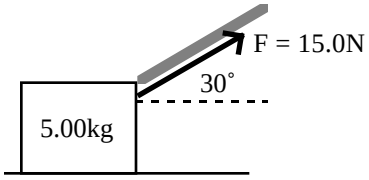
Name:_____ Posting Code _____ _____ _____

Solve the following problems in the space provided. Use the back of the page if needed. Each problem is worth 10 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.

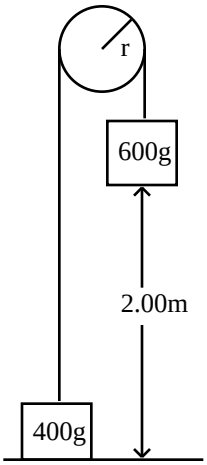
1. A marble rolls off the edge of an 80.0cm high table and strikes the ground 25.0cm horizontally from the edge of the table. Find (a)the time that the marble is in the air and (b)the speed of the marble as it left the table.



2. A 5.00kg block is pulled along a horizontal floor with an acceleration of 2.00m/s^2 by a cord that exerts a force of 15.0N at a 30.0˚ angle as shown. Find the coefficient of kinetic friction between the block and the table.

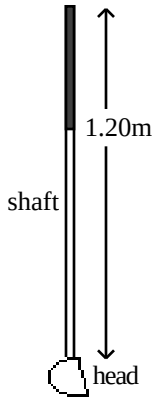


3. An Atwood's Machine is made from a 600g mass, a 400g mass and a 200g pulley of radius 4.00cm. The 600g mass is released from rest and falls 2.00m. Find the angular speed of the pulley when the 600g mass reaches the ground.



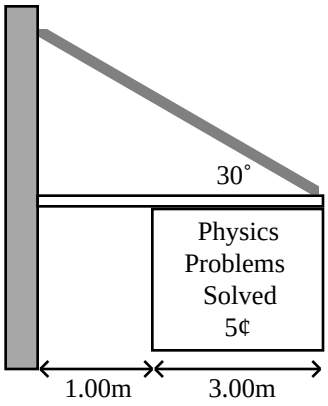
4. An 800kg car collides head-on with a stationary 1200kg truck. Experts estimate that the speed of the combined wreckage just after impact is 40±5km/h. Find (a)the experts estimate of the speed of the car before collision and (b)the experts estimate of the uncertainty in this speed.

5. A golf club designer wants the rotational inertia about the handle end of the shaft to be 1.15kg·m^2. She assumes the shaft can be treated as a stick 1.20m long with a mass of 300g and the head can be treated as a point mass. Estimate the required mass of the head of the club.



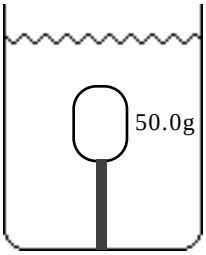
6. A 100g golf ball is struck by the club described in problem 5. The velocity of the club head is 40.0m/s just before the collision and 32.0m/s just after. Find (a)the angular momentum of the golf club about the end of the shaft just before the collision, (b)the angular momentum of the golf club about the end of the shaft just after the collision and (c)the velocity of the ball assuming that the torques exerted on the handle during the short time of the collision are small.

7. A 20.0kg sign 3.00m wide hangs from a horizontal rod that is supported by a cable that makes a 30.0˚ angle with the rod. Find (a)the tension in the cable and (b)the horizontal and vertical components of the force that the wall exerts on the rod. Ignore the mass of the rod.



8. The International Space Station that is just starting to be built will orbit at an altitude of 350km. Find the period of orbit for the space station.

9. A 50.0g cork is held underwater by a string as shown at the right. Cork has a density of 560kg/m^3 and water has a density of 1000kg/m^3. Find the tension in the string.



10. The golf club designer wants to test the club she has designed and built. She holds it at the end of the shaft and lets it swing. Find (a)the center of mass of the club and (b)the predicted period of oscillation.