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 <u>must</u> show your work in a logical fashion <u>starting</u> 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 child runs horizontally of the end of a diving board at a speed of 5.00m/s. The diving board is 1.20m above the water. Find (a)the time that the child is in the air and (b)the horizontal distance the child travels before hitting the water.

v=5.00m/s

1.20m
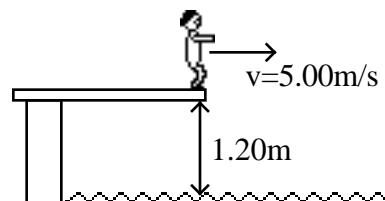
2. A 70.0kg skier heads down a 12.0˚ incline with an acceleration of 1.00m/s^2. Find the coefficient of kinetic friction between the skis and the snow.

12˚
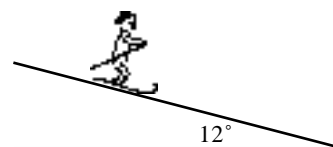
3. The spring in a dart gun is compressed 6.00cm. When the gun is fired vertically, the 30.0g dart rises to a height of 14.0m. Find the spring constant of the spring in the gun.

4. An 85.0kg baseball player jumps vertically upward to catch a 150g baseball traveling horizontally at 60.0m/s. The instant before the catch, the player is moving upward at 0.250m/s. Find the velocity (magnitude and direction) of the player and ball system just after the catch.

5. Find the rotational inertia of a 300g meterstick about the 25.0cm mark.

6. The physics of the collision between a baseball and a bat can be modeled as shown. The bat can be treated as if it is rotating about a fixed pivot at the end and the collision time is so short that no torques have time to act during the collision. Assume the mass of the bat is 1.00kg, its rotational inertia about the pivot is 0.350kg·m^2 and its initial rotation rate is 600rpm. The mass of the ball is 150g and its initial speed is 40.0m/s. Find the speed of the ball after the collision if the final rotation rate of the bat is 300rpm and the ball strike the bat 60.0cm from the pivot while moving perpendicular to the bat at the instant of collision.

v_o

60.0cm

o

pivot
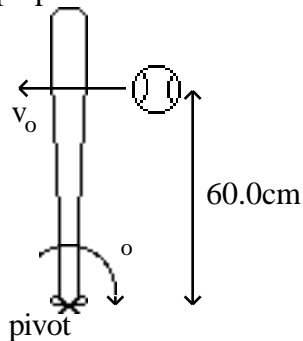
7. A wheel barrow full of gravel is shown. It has a mass of 100kg. Find the minimum force needed to lift the rear legs off the ground and the normal force on the front wheel under these conditions.
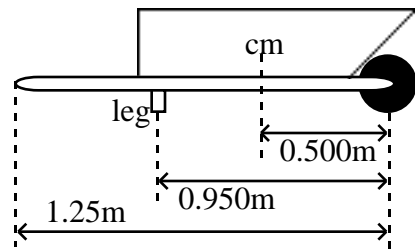
8. The moon of Jupiter called Io has an orbital period of 1.77days and an orbital radius of 4.22×10^8m. Use this information to find the mass of Jupiter.

9. A 1.00kg aluminum cylinder has a radius of 3.00cm and a height of 13.1cm. The cylinder is hung from a spring scale and suspended in water. Find the reading on the scale in kilograms.
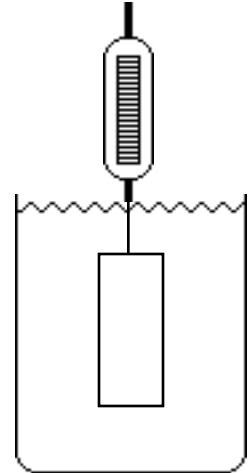
10. Find the period of oscillation of a meterstick held at one end and allowed to swing freely.