Name_____

Date_____Pd____

UNIT II: Worksheet 2

1. A hockey puck with mass 0.160 kg is at rest at the origin (x=0) on the horizontal, frictionless surface of the rink. At time t=0 a player applies a force of 0.250 N to the puck, parallel to the x-axis; he continues to apply this force until t = 2.00 s.
   a. What are the position and speed of the puck at 2.00s?

   b. If the same force is again applied at t = 5.00 s, what are the position and speed of the puck at t=7.00s?

2. A physics student playing with an air hockey table (a frictionless surface) finds that if she gives the puck a velocity of 3.80 m/s along the length (1.75 m) of the table at one end, by the time it has reached the other end the puck has drifted 2.50 cm to the right but still has a velocity component along the length of 3.80 m/s. She correctly concludes that the table is not level and correctly calculates its inclination from the above information. What is the angle of inclination?

3. A 25.0 kg box of textbooks rests on a loading ramp that makes an angle a with the horizontal. The coefficient of kinetic friction is 0.25 and the coefficient of static friction is 0.35.
   a. As the angle a is increased, find the minimum angle at which the box starts to slip.

   b. At this angle, find the acceleration once the box has begun to move.

   c. At this angle, how fast will the box be moving after it has slid 5.0 m along the loading ramp?

4. A block with mass m = 5.00 kg slides down a surface inclined 36.9^0 to the horizontal. The coefficient of kinetic friction is 0.25. A string attached to the block is wrapped around a flywheel on a fixed axis at O. The flywheel has mass 25.0 kg and moment of inertia 0.500 kgm^2 with respect to the axis of rotation. The string pulls without slipping at a perpendicular distance of 0.200 m from that axis.
   a. What is the acceleration of the block down the plane?

   b. What is the tension in the string?

5. You are standing on a bathroom scale in an elevator in a tall building. Your mass is 72 kg. The elevator starts from rest and travels upward with a speed that varies with time according to $v(t) = (3.0\ m/s^2)t + (0.20\, m/s^3)t^2$. When t = 4.0 s, what is the reading on the bathroom scale?

6. A wheel starts from rest and rotates with constant angular acceleration about a fixed axis. Prove that the power at any given time is proportional to the square of the net torque about the axis.