Name:_____ Posting Code: _____ _____ _____

Physics 4A **FINAL EXAM** **Spring 1993**

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.

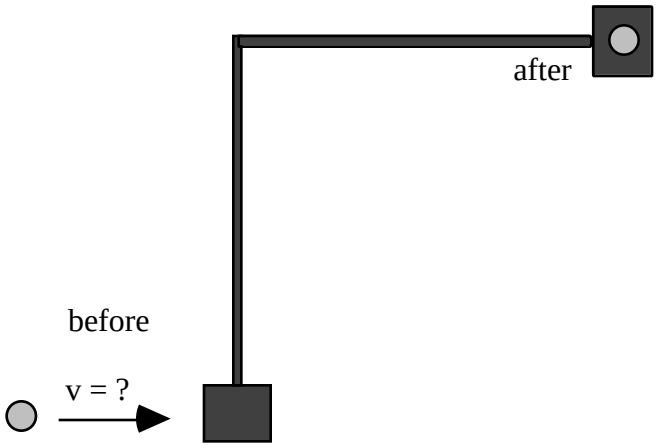
1. A golfer drives a ball 250m with a club that launches the ball at a 17˚ angle. Find the initial speed and time of flight for the ball.

2. A hockey puck slides across the ice at a constant speed until it slams into the wall behind the goal. State Newton's Laws of Motion (you don't have to quote them exactly) and describe how the motion of the hockey puck illustrates each law.

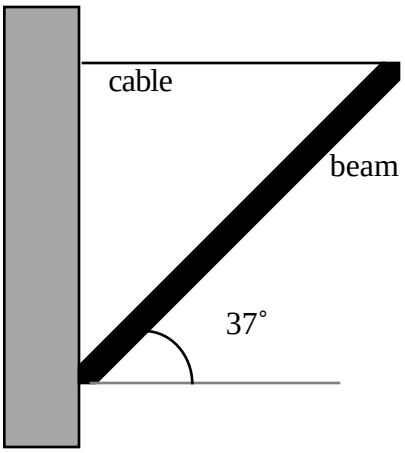
3. A 5.00kg puck traveling at 3.00m/s makes a collision with a 10.0kg puck initially at rest. The 5.00kg puck heads of at a 60˚ angle to its initial direction and the 10.0kg puck heads off at 10˚. (a)Find the speeds of the two pucks after the collision. (b)Is the collision elastic ?

4. A dart gun fires a 80.0±.2g dart by compressing a spring 4.0±.2cm. The dart leaves the gun with a speed of 6.00±.06m/s. Find (a)the spring constant of the spring in the gun and (b)the uncertainty in this spring constant.

5. A ball of mass 50g traveling collides and sticks to a 250g catching device that consists of a 35.0cm long thin rod with a cup at one end and a hinge at the other. Find the speed of the ball before the collision if the ball and catching device rotate upward so that they come to rest when they are horizontal.

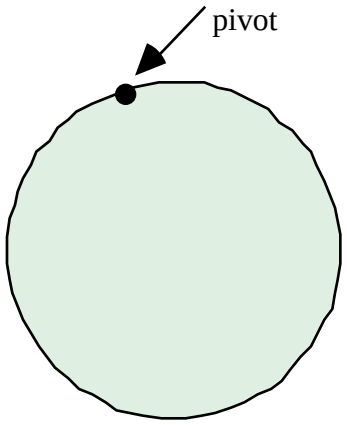


6. A 5.00kg beam 2.00m long is hinged at one end and held at a 37˚ angle above the horizontal by a horizontal cable. Find the tension in the cable and the horizontal and vertical components of the force that the hinge exerts on the beam.



7. If the cable in the previous problem snaps find the speed of the tip of the beam as it slams into the wall.

8. A disk of radius 15.0cm is hung from a pivot point at its edge. Find the period of small oscillations about the equilibrium.



9. Using only data from the last page, find the acceleration due to gravity for an object on the surface of the moon.

10. An 11.0cm diameter water rocket is half filled with water. The air inside is pumped up to 5atm. Find the velocity of the water out the 2.00cm diameter hole in the bottom.