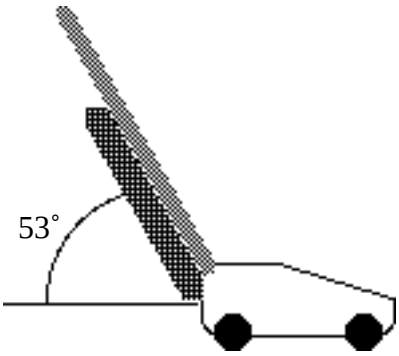
Name:_____

Physics 4A SECOND EXAM Chapters 1 - 8 Spring 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 3.00kg vacccuum cleaner is pushed along the ground with an acceleration of 1.00m/s^2 by exerting a force of 10.0N along the handle. The handle makes a 53˚ angle with the horizontal. Find the frictional force and the normal force on the vaccuum.



2. An electron (m = 9.11 x 10^{-31}kg) orbits the proton (m = 1.67 x 10^{-27}kg) in a hydrogen atom at a radius of 0.52 x 10^{-10}m with a speed of 2.2 x 10^6m/s. Find the magnitude of the electric force of attraction between them.

3. Charles "Gabby" Street was a catcher for the Washington Senators from 1909 to 1911. He reputedly caught a 145g baseball dropped from the top of the Washington Monument which is 152m tall. Modern wind tunnel measurements suggest that the maximum speed of a dropped baseball should be about 42.7m/s. Find (a)the work done by gravity on the falling ball, (b)the net work done on the ball during its fall and (c)the work done by air resistance during the fall.

4. Use energy methods to find the speed that the baseball in problem 3 would have struck the ground if there were no air resistance.

5. 1.00kg gismos are manufactured by a machine that releases them 2.00m above the ground. A ramp with a spring at the bottom needs to be designed to stop the gismos without breaking them, as shown below. The design calls for a light spring that brings the gismos to rest in a distance of 25.0cm. Find the spring constant of the spring required.