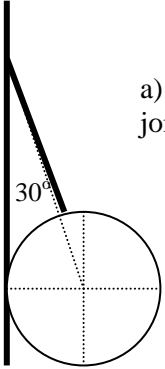


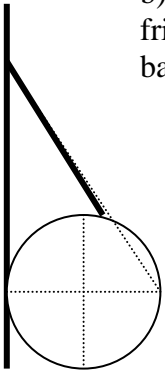
Workshop module 10 - Physics 113, Fall 2013
Statics, fluids

1. Consider a uniform ball of radius 0.2 m and mass 0.75 kg held against a frictionless wall by a massless string as shown in the diagram below. The string makes an angle of 30 degrees with the wall.

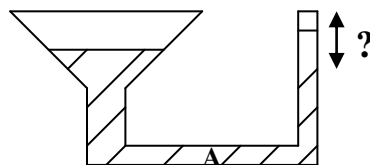


- a) Find the tension in the string and the normal force of the wall against the ball assuming the line joining the wall to the ball extends through the center of the ball (drawn imperfectly below).

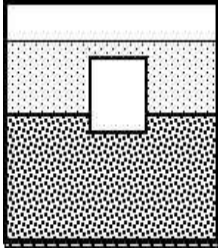
- b) Is it possible for the configuration below to be in static equilibrium if the wall is frictionless? In this configuration the line joining the wall to the ball passes through the ball as shown. Why or why not?



2. You can probably stand flatfooted on the floor, then rise up and balance on your tiptoes. Why can't you do it if your toes are touching the wall of the room? (Try it!)
3. A rubber hose is attached to a funnel, and the free end is bent around to point upward. Water is poured in the funnel until it is partially filled. The fluid reaches static equilibrium. Is the pressure greater toward the left or the right of point A? How does the level of the water in the funnel compare to that in the hose? Why?



4. A cubical block of wood floats at an oil-water interface in a large tank. The block is 9.0 cm on a side and has its lower surface 1.5 cm below the interface. The density of the oil is 750 kg/m^3 . What are the forces on the block? Draw a free body diagram for the block. What is the mass of the block?



5. A tornado passes by your house. When the first windows break, does the glass blow inside the house or outside the house. Why?
6. A pipe enters a house in the basement carrying water with a speed of 0.9 m/s at a pressure of 170 kPa . The pipe has an inside diameter of 2.5 cm as it enters the house. What is the speed and pressure of the water coming out of a faucet on the second floor of the house, assuming the pipe has tapered to an inside diameter of 1.2 cm and that the faucet is 8 m above the point the pipe enters the house?