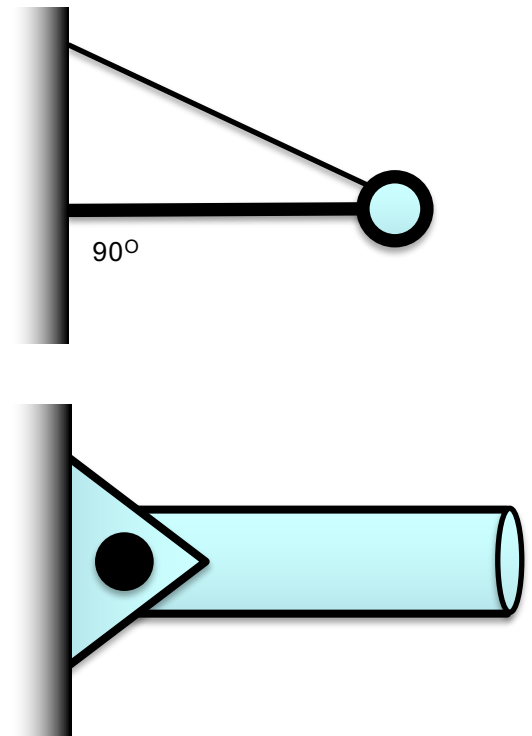


- 1) A 100 kg sphere is hung in front of a store (as an advertisement for ball bearings) using a massless horizontal bar and a massless cable as shown at right. The linkage between the bar and wall is a freely rotating hinge (shown below) so that without the cable, the ball would swing downward with no friction. **BUT**, the cable keeps it hanging there. *Don't use trig please. (not on original exam)*



- a) Is the tension in the cable more, less, or equal to the force of gravity on the ball? How do you know? **Because forces can be found in discussions of momentum and work (energy), in order to justify dynamics, you really need to identify forces and acceleration (=0 in this statics case).**

Some things to remember are that

- 1) you should have a diagram showing the forces adding to the sum of the forces that is separate from the Free Body Diagram.
  - 2) When you show the forces, make sure they are pointing very true in direction. This will make the solution more true to the drawing.
  - 3) It is very difficult to get credit for dynamics problems if you don't follow something close to the protocol. In particular many people didn't write that the sum of the forces in the x direction = 0, or the sum of the forces in the y direction = zero. Many people didn't put in a force diagram. Many people use words like "counter act".. what does that mean? I think it means that these forces add to zero. This is how it should be expressed.
- b) Is the force on the bar a compressional or tension force, or is there no force on the bar? How do you know?
- c) Estimate the tension on the cable. **~ 2000N**
- d) Estimate the force the bar puts on the hinge at the store front (include direction). **If you took the hinge away, the bar would slide to the left, so the hinge must be putting a force to the right on the bar. ~1700N**

I think it is important to not use trig yet, as we should first develop an intuitive sense of components. Yes, we I will allow trig on the next midterm and you can even use a calculator, although I think it'd be better if you didn't.