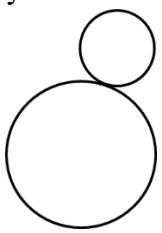
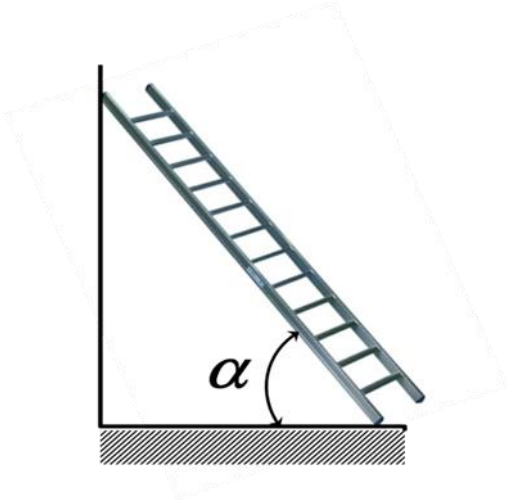
Homework 7

Equilibrium. Center of gravity.

1. When a car comes to stop it inclines forward. Explain why.
2. Two balls of radii ***R*** and ***r*** made of the same metal are welded together as it is shown below. Find the position of the center of gravity of this construction.



3. The ladder is staying against the wall. Find the minimum angle α between the ladder and the floor, at which the ladder does not fall down. The friction coefficient between lower legs of the ladder and the floor is ***k***. The center of mass of the ladder is in its geometrical center. There is no friction between the vertical wall and the ladder.



I believe that the hardest part of this problem is to mark all the forces applied to the ladder. Please remember that the friction force is directed along the plane of the floor and its magnitude is equal to the product of the friction coefficient and magnitude of the normal force. Normal forces are directed perpendicular to the surfaces of the wall and floor.

As long as the ladder does not move, the sum of all the forces along any direction is equal to zero. The sum of all torques applied to the ladder is zero as well. As you remember from the last class, we can calculate the torques with respect to any point.

Good luck!