1. A ball of mass 2.6 Kg, starting from rest and falls a vertical distance h = 55 cm before striking a vertical coiled spring, which it compresses an amount Y = 15 Cm.
   a. Determine the spring stiffness constant of the spring. Assume the spring has negligible mass and ignore air resistance.
   b. Determine all distances from the point where the ball first tauches the uncompressed spring (y=0 at this point)
   c.

(a)   (b)   (c)
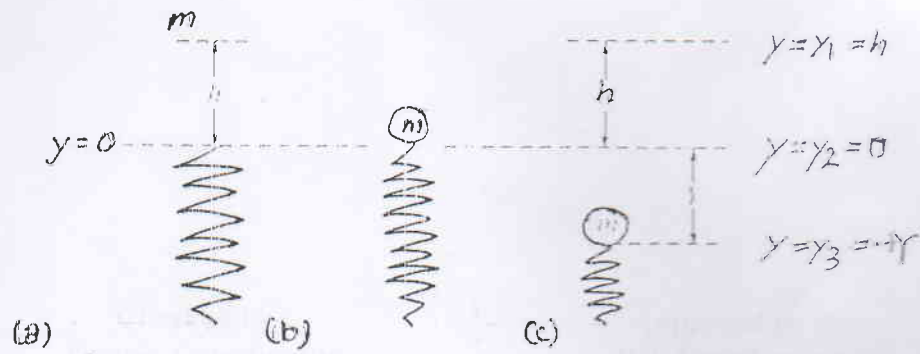
2. A 10,000 Kg railroad car, A, traveling at a speed 24 m/s strikes an identical car, B, at rest. If the cars lock together as a result of the collision, what is their common speed just afterward?

3. **Many of the features we admire in the architecture of the past were introduced not simply for decorative effect, but for technical reasons. One example is the development of methods to span a space, from the simple beam to arches and domes. Please explain what 's kind the tecnical reasons?**

4. You had insert a straw of lengt L into a tall glass of water. You place your finger over the top of straw, capturing some air above the water but preventing any additional air from getting in or out and you lift the straw from the water. You find that the straw retains most of the water.

   a. Does the air in the space between your finger and the top of water have a pressure P that is greater than, equal to, or less than the atmospheric pressure P_A outside the straw?

   b. Explain yours answer!