

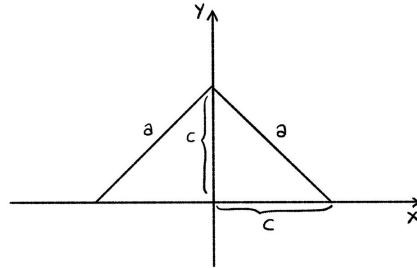
PHY 250: Homework 1

Fall 2020

Death-line: September 22nd

Exercise 1

Where is the center of mass of an isosceles right triangle of uniform areal density?

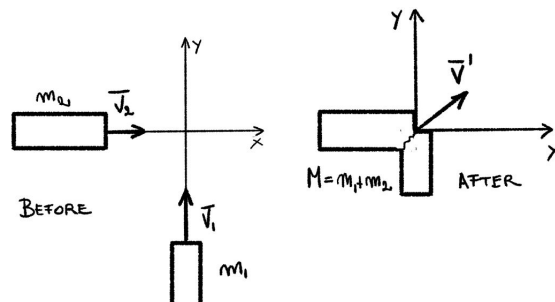


Exercise 2

Consider a system of two particles of equal masses m . The external forces acting on each particle are $\vec{F}_1 = 0$ and $\vec{F}_2 = F_0 \hat{i}$, respectively. Calculate the position, velocity and acceleration of the center of mass assuming that the particles are initially at rest.

Exercise 3

A car of mass m_1 traveling north with a velocity \vec{v}_1 collides with a truck traveling east with a velocity \vec{v}_2 . After the collision, the two vehicles move away from the impact point as one. Find the velocity of the wreckage just after the impact.



Exercise 4

A cannon at sea level fires a shell of mass M at an elevation angle θ and muzzle velocity v_i . At the highest point, the shell explodes into two fragments (masses $m_A + m_B = M$), with an additional energy E , traveling in the horizontal direction. Find the distance separating the two fragments when they reach the sea level.

