1 Center of Mass for Two Uncoupled Particles

The center-of-mass motion is determined by the net external force, even when the particles are not interacting. Practice with center-of-mass coordinates.

Consider two particles of equal mass m. The forces on the particles are $\vec{F}_1 = 0$ and $\vec{F}_2 = F_0\hat{x}$ (for this problem, ignore gravitational forces between the two particles). If the particles are initially at rest at the origin, find the position, velocity, and acceleration of the center of mass as functions of time. Solve this problem in two ways,

(a) solve for the motion of each of the particles, separately, then see what happens to the center of mass

(b) solve directly for the center of mass motion

(c) Write a short description comparing the two solutions.