16. The implication in the problem regarding $\vec{v}_0$ is that the olive and the nut start at rest. Although we could proceed by analyzing the forces on each object, we prefer to approach this using Eq. 9-14. The total force on the nut-olive system is $\vec{F}_{\mathbf{o}} + \vec{F}_{\mathbf{n}} = -\hat{\imath} + \hat{\jmath}$ with the unit newton understood. Thus, Eq. 9-14 becomes

$$-\hat{\imath} + \hat{\jmath} = M\vec{a}_{\text{com}}$$

where $M = 2.0$ kg. Thus, $\vec{a}_{\text{com}} = -\frac{1}{2}\hat{\imath} + \frac{1}{2}\hat{\jmath}$ in SI units. Each component is constant, so we apply the equations discussed in Chapters 2 and 4.

$$\Delta\vec{r}_{\text{com}} = \frac{1}{2}\vec{a}_{\text{com}}\,t^2 = -4.0\,\hat{\imath} + 4.0\,\hat{\jmath}$$

(in meters) when $t = 4.0$ s. It is perhaps instructive to work through this problem the *long way* (separate analysis for the olive and the nut and then application of Eq. 9-5) since it helps to point out the computational advantage of Eq. 9-14.