

Linear Momentum
Physics 161

A 0.500-kg sphere moving with a velocity $(2.00\hat{\mathbf{i}} - 3.00\hat{\mathbf{j}} + 1.00\hat{\mathbf{k}})\text{m/s}$ strikes another sphere of mass 1.50 kg moving with a velocity of $(-1.00\hat{\mathbf{i}} + 2.00\hat{\mathbf{j}} - 3.00\hat{\mathbf{k}})\text{m/s}$.

(a) If the velocity of the 0.500-kg sphere after the collision is $(-1.00\hat{\mathbf{i}} + 3.00\hat{\mathbf{j}} - 8.00\hat{\mathbf{k}})\text{m/s}$, find the final velocity of the 1.50-kg sphere and identify the kind of collision (elastic, inelastic, or perfectly inelastic).

(b) If the velocity of the 0.500-kg sphere after the collision is $(-0.250\hat{\mathbf{i}} + 0.750\hat{\mathbf{j}} - 2.00\hat{\mathbf{k}})\text{m/s}$, find the final velocity of the 1.50-kg sphere and identify the kind of collision.

(c) **What If?** If the velocity of the 0.500-kg sphere after the collision is $(-1.00\hat{\mathbf{i}} + 3.00\hat{\mathbf{j}} + a\hat{\mathbf{k}})\text{m/s}$, find the value of a and the velocity of the 1.50-kg sphere after an elastic collision.