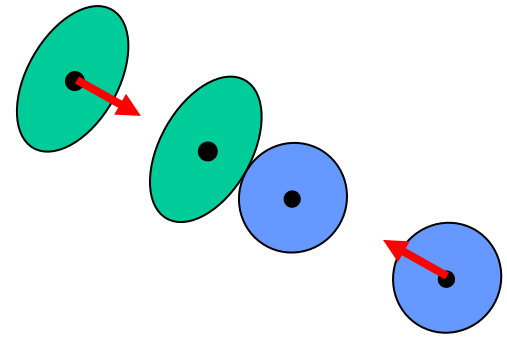
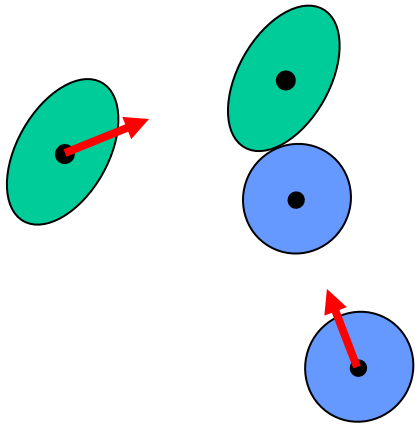
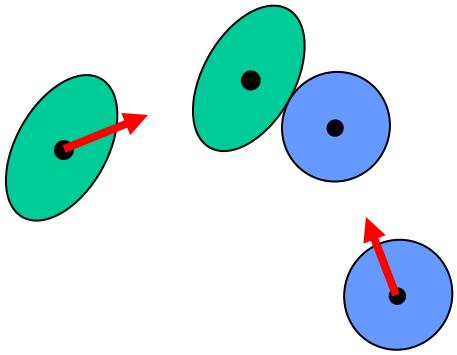
Learning Exercise 10b:
Analysis of Impact of Masses

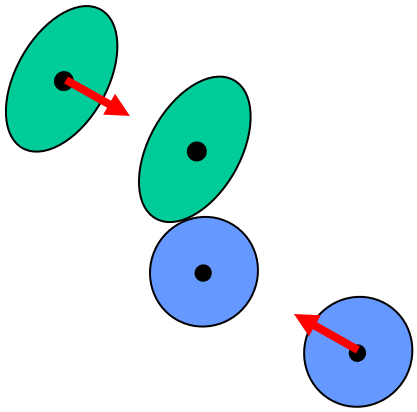
Objective: **To be able to apply the impulse-momentum method to analyze the motion of two masses impacting each other**

1. Locate the contact point, draw the TP and LOI, then categorize each case with respect to direct, oblique, central, and eccentric conditions.

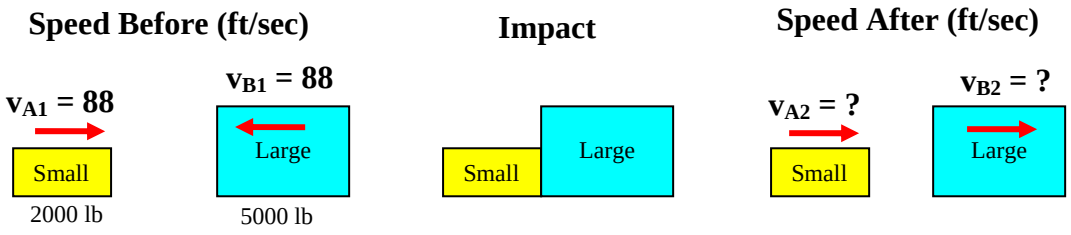








2. Given the speeds before impact, use the coefficient of restitution equation and conservation of linear momentum to verify the speeds after impact for the value of e = 0.5. Using this and the other results, compute the corresponding changes in kinetic energy for each case below.



e	Velocities + to right (ft/sec) v_2 of Small	v_2 of Large	% Δ v compared to 88 ft/sec Small	Large
1.0	-163.4	12.6	285	114
0.5	-100.6	-12.7	214	86
0.0	- 37.7	-37.7	142	57

Kinetic Energy Before Impact: (ft-lb)	e	Kinetic Energy After Impact Small	Large	Σ	% Δ system Kinetic Energy
Small = 240,497	1.0				
Large = 601,242	0.5				
Σ = 841,739	0.0				

EXAMPLE 10.1(Figure 10.11) Direct central impact between a large and small vehicle with different designs for energy dissipation.

3. Mass B has the same mass as A. The coefficient of restitution is 0.8. The side rollers are frictionless. Find the magnitude and angle of velocity of A and the vertical speed of B just after impact if (a) mass B is fixed to the earth, and (b) if mass B is supported by soft springs..