

Final Exam: May 13th, Wednesday

Time : 8:30-11 am (arrive by 8:15 am)

Room: Cullimore Lecture Hall 3.

"Impulse" and "Momentum"

Last class...

System of particles

Conservation of Momentum

Elastic vs. Inelastic Collisions

Today...

Collision in 2D

Center of mass

Collisions in Two Dimensions

If net external force is zero, net momentum is conserved.

$$\rightarrow \vec{P}_{net,i} = \vec{P}_{net,f}, \text{ where } \vec{P}_{net} = m_1\vec{v}_1 + m_2\vec{v}_2 + \dots$$

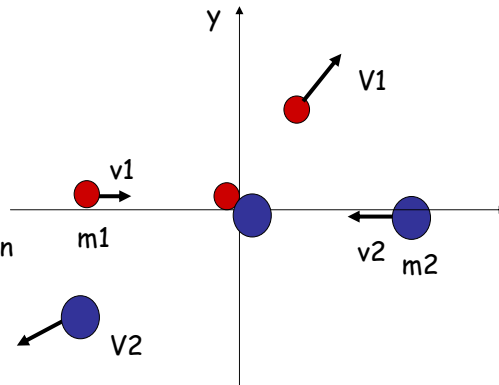
Or

$$P_{net,i,x} = P_{net,f,x}$$

$$P_{net,i,y} = P_{net,f,y}$$

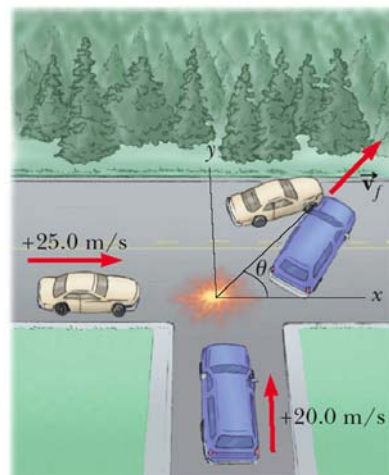
If net kinetic energy is conserved \rightarrow Elastic collision
 not conserved \rightarrow Inelastic collision

If moving together after collision
 \rightarrow Perfectly Inelastic collision



Example 2: Collision at an intersection

A 1500 kg car traveling east with a speed of 25 m/s collides at an intersection with a 2500 kg van traveling north at a speed of 20 m/s. Find the direction and magnitude of the velocity of the wreckage after the collision, assuming the vehicles stick together after the collision.



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More example on collision & momentum

Example : Ballistic Pendulum

The bullet is fired into a large block of wood suspended from light wires. The bullet is stopped by the block, and the entire system swings up to a height h . Assume that the mass of the bullet, m_1 , is 5.0 g, the mass of the pendulum, m_2 , is 1.0 kg, and h is 5.0 cm. Find the initial speed of the bullet, v_{1i} .

