

Chapters/ Sections will be Covered

Book: Fundamentals of Physics by David Halliday, Jearl Walker, and Robert Resnick

Chapter Title: Center of Mass and Linear Momentum

Sections: Collisions

Sample Quiz Question

What does it mean by the X_{com} of the system?

- a) Mass
- b) Weight
- c) Central mass
- d) Position

An engineer is conducting car collision research. What is the name of the collision event?

- a) Elastic collision
- b) Impulse
- c) Slow collision
- d) Constant acceleration

Sample Quiz Question

What is the best option for elastic collision?

- a) Only momentum is conserved
- b) Kinetic energy remains the same
- c) Works for stationary system and rigid body
- d) Both kinetic energy and momentum are conserved

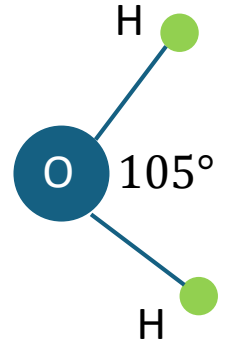
When an inelastic collision happens, what happens to its energy?

- a) Individual kinetic energy of particles is different
- b) Energy does not dissipate since momentum is conserved
- c) Energy dissipates through different forms of energies
- d) Energy remains the same inside the particles of the rigid body

Class Activity: Math Problem #1

Consider a water molecule that has two hydrogen are connected to one oxygen. Find the center of mass of this molecule.

Oxygen-Hydrogen bond length $d = 9.57 \times 10^{-11} \text{ m}$, $m_H = 1.0 \text{ u}$, and $m_O = 16.0 \text{ u}$



Class Activity: Math Problem #2

A Kung Fu expert shatters a concrete block by hand strike.

If the expert's hand mass is 0.70 kg , to be moving 5.0 m/s as it strikes the block, and to stop 6.0 mm beyond the point of contact.

- (a) What impulse does the block exert on the expert's hand?
- (b) What is the approximate collision time and the average force the block exerts on the expert's hand?

Class Activity: Math Problem #3

A prototype magnetic train is approaching two other magnetic trains positioned on the track. When train 1 hits train 2, train 2 then collides with train 3. Following this second collision, train 2 comes to a stop, while train 3 begins moving with a final velocity of $v_{3f} = 5 \text{ m/s}$. ($v_{1i} = 10 \text{ m/s}$, $m_3 = 6 \text{ kg}$)

What are the masses of trains 1 and 2?

What is the final velocity of train 1?

Probable Final Questions: Lecture 14

How do objects behave differently after elastic and inelastic collisions?