Collisions
Flipped Lesson
by Ms. Logan

Conservation of Momentum

- Principle that states that the total momentum of an isolated system stays constant.
  - Total momentum before a collision equals total momentum after a collision

p = 30 kg·m/s p = 20 kg·m/s p = 20 kg·m/s p = 30 kg·m/s

Total = 50 kg·m/s Total = 50 kg·m/s

Conservation of Momentum Equation

- $$p_{o\,(total)} = p_{\,(total)}$$

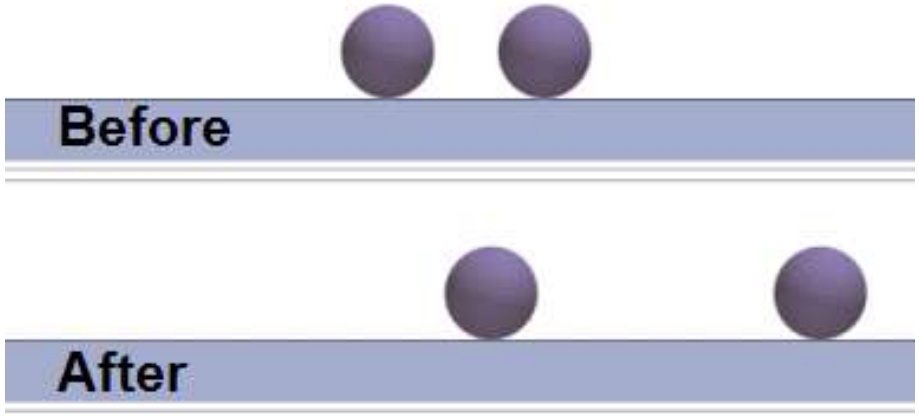
Unit: $\frac{kg \cdot m}{s}$

* Remember that velocities are vectors

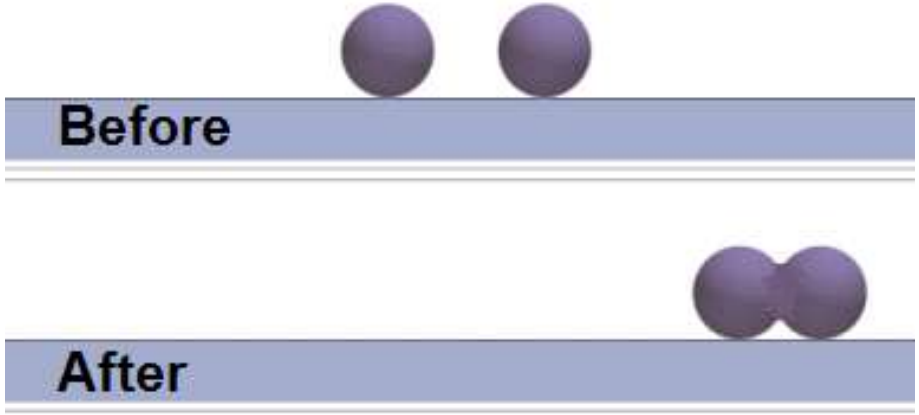
- $p_{o\,(total)}$ → sum of initial momenta of all objects
- $p_{\,(total)}$ → sum of final momenta of all objects

Types of Collisions

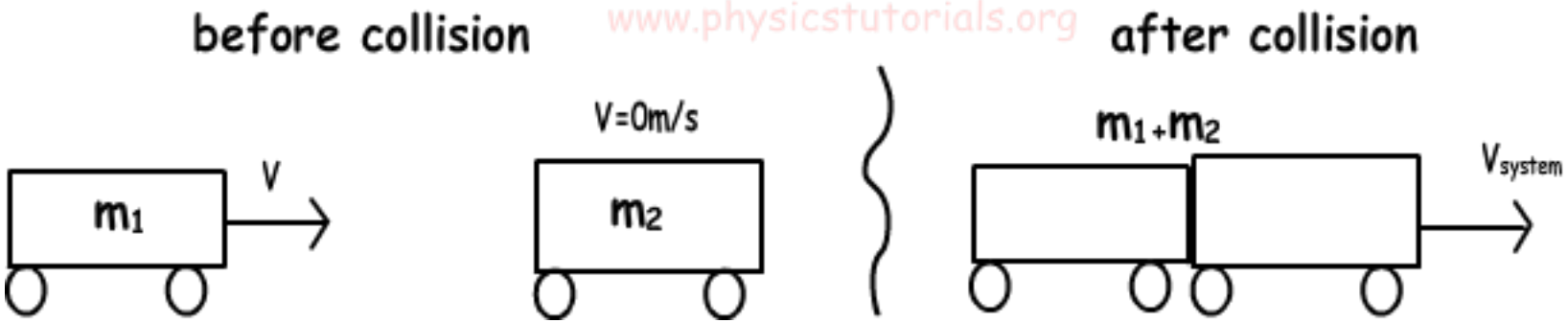
Elastic



Inelastic



Inelastic Collision



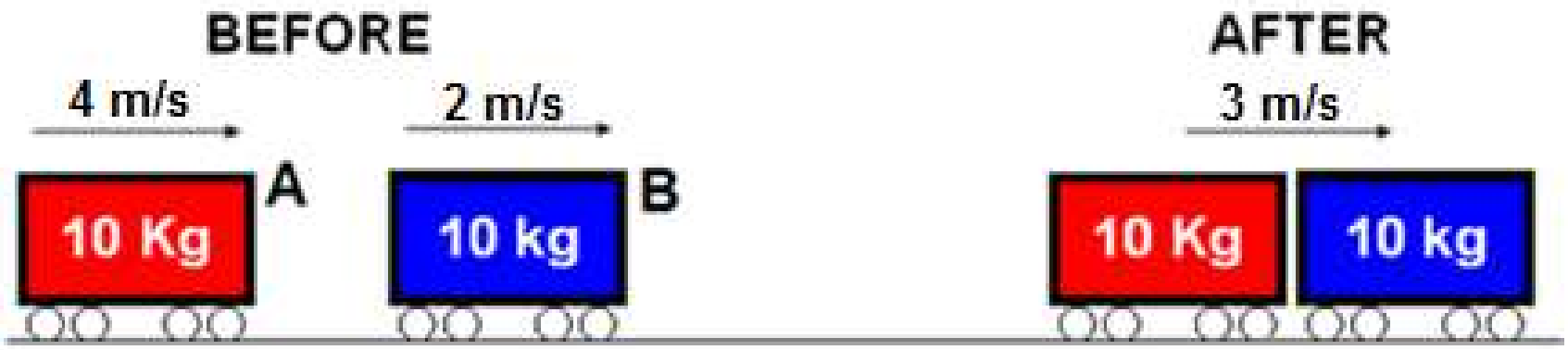
Elastic Collision

Figure 1

Types of Collisions

Type	Kinetic Energy Conserved	Momentum Conserved	Stick Together
Elastic	✓	✓	
Inelastic		✓	✓

Inelastic Problem



p = 40 kg·m/s p = 20 kg·m/s

Inelastic Problem

A 1950 kg police car going 12.5 m/s rear-ends a 1500 kg sedan moving at 3.0 m/s. After the collision the two cars move together as one unit. What is their final velocity?

Elastic Problem

After a hold up, Caleb flees in his 1575 kg getaway car at 20 m/s. He crashes into a 45 kg highway barrel which is at rest. If Caleb's car moves at 18.9 m/s after the collision, how fast does the barrel move after being hit?