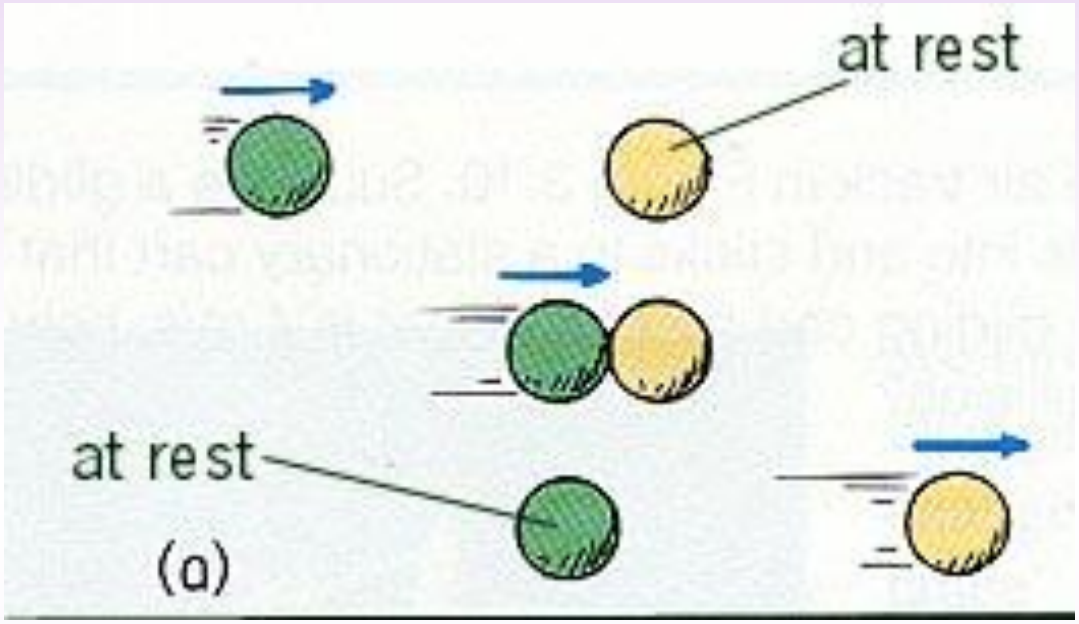
Collisions

- In collisions momentum is **conserved** because all of the forces acting are **internal** forces.
- **Remember:** According to the Law of Conservation of Momentum, an **outside** force is required to change the momentum of a system.
- Net momentum before collision = **Net momentum after collision**

Elastic collisions



$p_1 = 5$ $p_2 = 0$

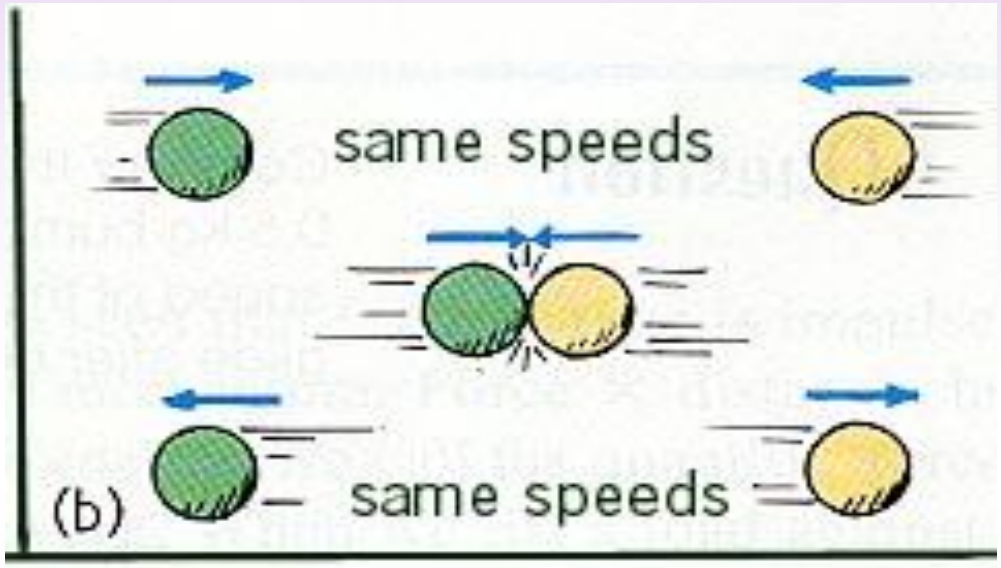
$p_1 = 0$ $p_2 = 5$

$p_{before} = 5 + 0 = 5$

$p_{after} = 0 + 5 = 5$

$p_{before} = p_{after}$

Elastic Collisions



$p_1 = 5$ $p_2 = -5$

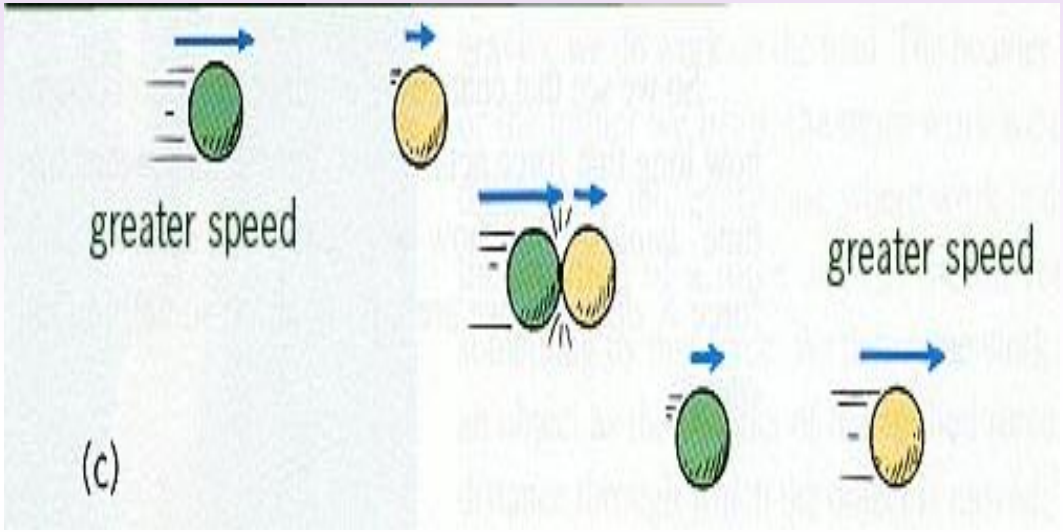
$p_1 = -5$ $p_2 = 5$

$p_{before} = 5 + -5 = 0$

$p_{after} = -5 + 5 = 0$

$p_{before} = p_{after}$

Elastic Collisions



$p_1 = 5$ $p_2 = 1$

$p_1 = 1$ $p_2 = 5$

$p_{before} = 5 + 1 = 6$

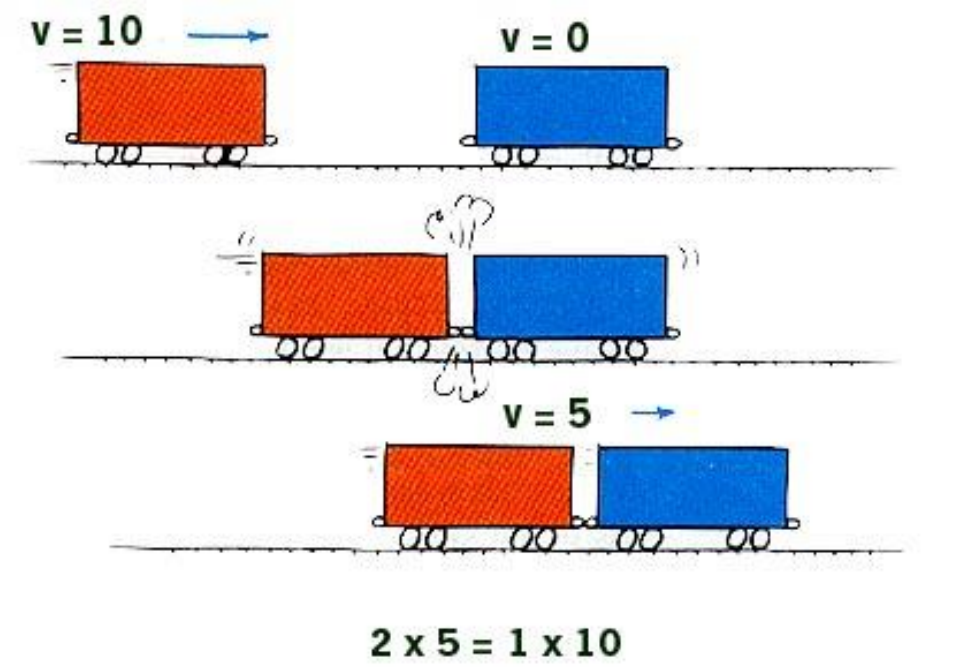
$p_{after} = 1 + 5 = 6$

$p_{before} = p_{after}$

Elastic Collisions

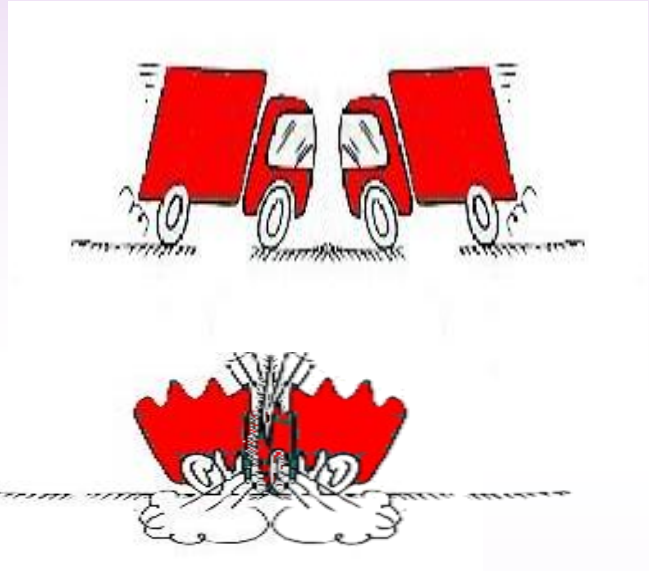
- Each of these examples demonstrates a collision where the objects bounced off each other without any damage.
- These are **Elastic collisions** - when colliding objects rebound perfectly without heat or damage
- More common in the “real world” are **Inelastic collisions** - when colliding objects rebound with heat or damage occurring

Elastic Collisions



In a perfectly inelastic collision, both objects **stick together.**

Elastic Collisions



If both of these objects have the **same initial momentum**, they stop dead in their tracks.

What would happen if the truck on the right had more initial momentum?

Collisions

The **Law of Conservation of Momentum** applies to both types of collisions.