

Name: \_\_\_\_\_

Date: \_\_\_\_\_

## 6.3 Momentum Conservation



$$\vec{p} = m\vec{v}$$

Just as forces are equal and opposite (according to Newton's third law), changes in momentum are also equal and opposite. This is because when objects exert forces on each other, their motion is affected.

The law of momentum conservation states that if interacting objects in a system are not acted on by outside forces, the total amount of momentum in the system cannot change.

The formula below can be used to find the new velocities of objects if both keep moving after the collision.

total momentum of a system before = total momentum of a system after

$$m_1 v_{1(\text{initial})} + m_2 v_{2(\text{initial})} = m_1 v_{3(\text{final})} + m_2 v_{4(\text{final})}$$

(initial velocities)                      (final velocities)

If two objects are initially at rest, the total momentum of the system is zero.

the momentum of a system before a collision = 0

The law of conservation of momentum states that, in a closed system, the total momentum of a system remains constant or does not change.

$$m_1 \vec{v}_{i(1)} + m_2 \vec{v}_{i(2)} = m_1 \vec{v}_{f(1)} + m_2 \vec{v}_{f(2)}$$

initial velocities before collision                      final velocities after collision

initial momentum = final momentum