Physics Honors: Conservation of Momentum

Some Vocabulary:

System: Objects of interest that can interact with each other and the outside world

Closed System: A system that does not gain or lose mass

Isolated System: A closed system that has zero net external force

Force and Impulse

Imagine two balls are rolling toward each other.

When they make contact, what does Newton's 3rd Law tell us about the force acting on each ball?

What does this force tell us about the impulse?

Law of Conservation of Momentum

The impulse for the objects in the collision stays the sam

$$\Delta p_b = -\Delta p_s$$

$$p_{bf} - p_{bi} = -p_{sf} - -p_{si}$$

Equation

total momentum before = total momentum after

$$m_{\mathrm{A}} v_{\mathrm{A}} + m_{\mathrm{B}} v_{\mathrm{B}} = m_{\mathrm{A}} v'_{\mathrm{A}} + m_{\mathrm{B}} v'_{\mathrm{B}}$$

Conservation of Momentum Practice

1. A 1874 kg car going 23 m/s rear ends a 1025 kg car going 17 m/s going the in the same direction as the first car. After the collision, the first car goes 21 m/s. What is the speed of the second car after the collision?

Law of Conservation of Momentum Practice

A 0.105 kg hockey puck is moving at 24 m/s. It is caught and held by a goalie at rest who weighs 100 kg. With what speed does the goalie slide on the ice after catching the puck?

2D conservation of Momentum