

9.2 Conservation of Momentum

video:

Newton's 3rd Law: Every force comes in pairs. The 2 forces are equal in strength + opposite direction

$F_{Done} = -F_{Cond}$ (Pg. 236)

Bab. C: $P_{cf} - P_{ci} = F_{Done} \Delta t$
 " " D: $P_{of} - P_{oi} = F_{Cond} \Delta t$

$P_{cf} - P_{ci} = -(P_{of} - P_{oi})$

$P_{cf} + P_{of} = P_{ci} + P_{oi}$

$m_c \cdot v_{cf} + m_o \cdot v_{of}$

$(m_c + m_o) v_f = \frac{m_c \cdot v_{ci} + m_o \cdot v_{oi}}{m_c + m_o}$

Apr 17-9:50 AM

Momentum in a Closed, Isolated System

Under what conditions is the momentum of the system conserved?

- 1) No Gain or Loss of Mass
- 2) No forces acting on the system by objects outside of it.

Apr 17-9:54 AM

No system on Earth can be said to be absolutely isolated, because there will always be some interactions between a system and its surroundings.

Often, these interactions are small enough to be ignored when solving physics problems.

Systems can contain any number of objects, and the objects can stick together or come apart in a collision. Under these conditions, the law of conservation of momentum states that the momentum of any closed, isolated system does not change.

This law will enable you to make a connection between conditions, before and after an interaction, without knowing any of the details of the interaction.

Apr 17-9:57 AM

A 1875-kg car going 23 m/s rear-ends a 1025-kg compact car going 17 m/s on ice in the same direction. The two cars stick together. How fast do the two cars move together immediately after the collision?

$m_1 = 1875 \text{ kg}$ $m_2 = 1025 \text{ kg}$
 $v_{1i} = 23 \text{ m/s}$ $v_{2i} = 17 \text{ m/s}$ $v_f = ?$
 $P_i = P_f$
 $(m_1 \cdot v_{1i} + m_2 \cdot v_{2i}) = (m_1 + m_2) v_f$
 $(1875 \cdot 23 + 1025 \cdot 17) = v_f$
 $\frac{(1875 + 1025) \cdot v_f}{2900} \approx 20.88 \text{ m/s}$

Apr 17-9:59 AM

A 1875-kg car going 23 m/s strikes a 1025-kg compact car going 17 m/s on ice in the opposite direction. The two cars stick together. How fast do the two cars move together immediately after the collision?

Apr 17-10:01 AM

Assignment:

① pg. 238 13 - 18 all

② Vocab Quiz
9 terms
12 Total = Newton's 3 Laws
of Motion

Apr 17-10:03 AM

Apr 17-12:59 PM