



**Unit 1**  
**Newton's 2<sup>nd</sup> Law and Momentum of Colliding Forces**  
**High School**  
**Physics**

**Unit Length and Description:**

**9 Instructional Weeks**

Students will analyze data to support the claim that Newton's 2<sup>nd</sup> Law of Motion describes the mathematical relationship among the net on a macroscopic object, its mass, and acceleration. Students will also use mathematical representations to support the claim that the total momentum of a system of objects is conserved when there is not net force on the system. Students will then apply science and engineering ideas to design, evaluate, and a device that minimizes the force on a macroscopic object during a collision.

**Science Standards:**

- HS-PS2-1** Analyze data to support the claim that Newton's second law of motion describes the mathematical relationship among the net force on a macroscopic object, its mass, and its acceleration.
- HS-PS2-2** Use mathematical representations to support the claim that the total momentum of a system of objects is conserved when there is no net force on the system.
- HS-PS2-3** Apply scientific and engineering ideas to design, evaluate, and refine a device that minimizes the force on a macroscopic object during a collision.

**Enduring Understandings-  
Unit Anchor Phenomenon:**

Faster NHL Skater Challenge: Each year skaters challenge to see who can skate the fastest time around the ring. In 2018, that time was 13.454 sec. The record was set in 2016 with a time of 13.172 sec.

**Essential Questions-  
Reflective Summaries:**

- How is data used to support claims that Newton's second law of motion describes the mathematical relationship among the net force on a macroscopic object, its mass, and its acceleration?
- Use mathematical representations to support claims the total momentum of a system of objects is conserved when there is no net force on the system.
- How can you apply scientific and engineering ideas to design, evaluate, and refine a device that minimizes the force on a macroscopic object during a collision?