

Newton's Second Law

- Isaac Newton was one of the first scientists to study motion in an organized way
- He developed 3 laws of motion:
- Newton's First Law talks about inertia
 - An object at rest tends to stay at rest
 - An object in motion tends to stay in motion
- Newton's Second Law talks about Force
 - He found that the Force (F) of a moving object is equal to its Mass (M) times its Acceleration (A)
 - He wrote this as a formula: $F=MA$
 - So if you increase the Mass of an object, you will increase the force
 - A bowling ball (more mass) dropped on your foot will hurt more (more Force) than a tennis ball (less mass) dropped on your foot (less Force)
 - Also if you increase the Acceleration of the object, you will increase the force
 - Major League pitchers can throw a ball 90mi/hr
 - Little League pitchers usually throw about 30mi/hr
 - The increased acceleration of the ball in the major league means the ball hits the catcher's mitt with much more Force than the Little League pitcher's throw

Controlling Force

- Reducing the Force of an object is very important
 - Car's airbags, cell phone cases, Styrofoam packaging, Football pads and parachutes are some common items that reduce the Force of motion by reducing the acceleration

- Remember the formula for Acceleration: $A = \frac{V_f - V_i}{T}$

- If we take 2 objects that have the same motion: $A = \frac{20\text{m/s} - 0\text{m/s}}{T}$ $A = \frac{20\text{m/s} - 0\text{m/s}}{T}$

- But increase the time of the motion: $A = \frac{20\text{m/s} - 0\text{m/s}}{1\text{s}}$ $A = \frac{20\text{m/s} - 0\text{m/s}}{10\text{s}}$

- We reduce the Acceleration: $A = 20\text{m/s}^2$ $A = 2\text{m/s}^2$

- If $F=MA$ and the mass of the 2 objects is the same: $F = 10\text{Kg} \times 20\text{m/s}^2$ $F = 10\text{Kg} \times 2\text{m/s}^2$

- By reducing A, we reduce the total Force: $F = 200\text{N}$ $F = 20\text{N}$