



PLTW Flight and Space Virtual Learning

**8th Grade/Newton's 3rd  
Law, Playing with Marbles**

April 16, 2020



8th Grade/Flight and Space  
Lesson: April 16, 2020

**Objective/Learning Target:**  
**Students will learn about how Newton's 3rd Law helps explain the lift force on an airplane.**

# Warm-Ups:

Draw a picture in your [Cornell Notes](#) or notebook paper to represent each one of Newton's Laws.

Newton's laws of motion in physics	
<b>LAW #1</b>	A body at rest will remain at rest, and a body in motion will remain in motion unless it is acted upon by an external force.
<b>LAW #2</b>	The force acting on an object is equal to the mass of that object times its acceleration, $F = ma$ .
<b>LAW #3</b>	For every action, there is an equal and opposite reaction.

# Lesson Introduction/Background Information:

Newton is best known for three very important principles of physics called classical mechanics. These principles describe how things move and are referred to today by his name - Newton's Laws of Motion. There are three of them, Newton's First, Second and Third Law of Motion. Today's experiment will demonstrate *Newton's Third Law of Motion*: for every action there is an equal and opposite reaction. SIMPLY: If you push an object, that object pushes back in the opposite direction equally hard.

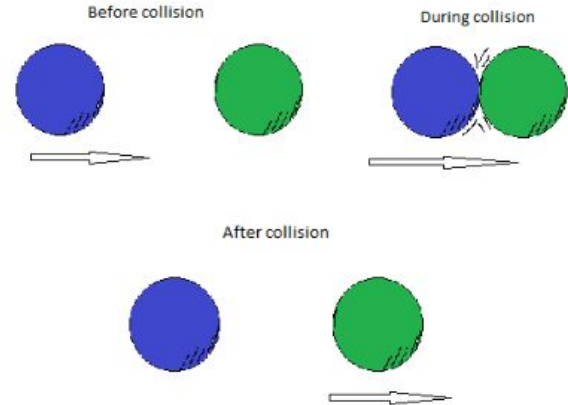
NASA teaches Newton's 3rd Law [here](#)

Learn all 3 of Newton's Laws [here](#)

# Practice:

An easy activity that shows the law of physics at work is to play with marbles. Choose two marbles, or other small round objects that you have available, and set one marble at the end of a flat surface. Push the second marble into the first marble (at the end of the surface). Observe what happens when the two marbles collide—notice the reaction to the collision. Write about the transfer of energy from one marble to the next. Also discuss that, like the marble, any object hit with another would react to the action.

Here is a video of Newton's 3rd Law in action with [Marbles](#).



## Practice:

Use the Quizlet vocabulary link to review what we have learned about airfoils, lift, Bernoulli Principle, and Newton's 3 Laws of Motion.

[Vocabulary review](#)

## Self-Assessment:

Can you think of any other ways to demonstrate Newton's 3rd Law? Write your plan down, or draw a picture to demonstrate.

## Extend Your Learning/Continued Practice:

Newton's 3rd Law demonstrating backward force to move forward by teacher [here](#)

Newton's 3rd law with balloon car [here](#)