

Grade 6 Science
Week of January 18 – January 22

Newton's First Law

You now know a bit about who **Sir Isaac Newton** was and some of the contributions he made to our world. In the next few books, you are going to learn about **Newton's 3 Laws of Motion** more in-depth. But did you know that there were brilliant minds that came before Newton's time?

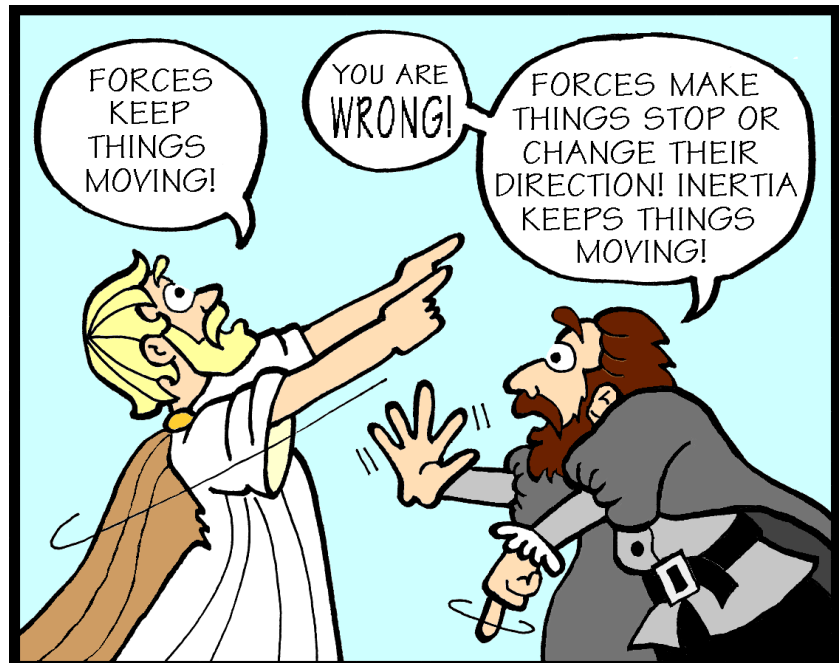
"If I have seen farther than others, it is by standing on the shoulders of giants"

-Isaac Newton



Isaac Newton solidified the 3 Laws of Motion and filled in the gaps from the theories of great thinkers who came before him. For example, **Aristotle** is one of the most respected great thinkers of the world. For centuries (hundreds of years) his thoughts and theories dominated science. But his theories had holes. For example, **Aristotle thought that forces kept things moving.**

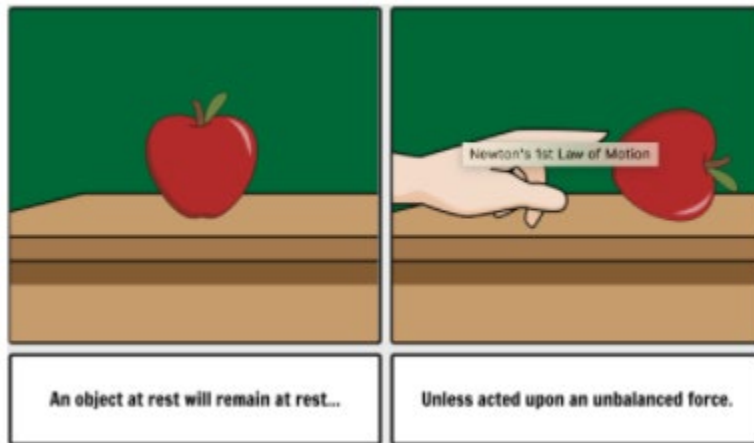
However, in time, more great thinkers like **Nicholas Copernicus** and **Galileo Galilei** helped progress these theories, until finally, Sir Isaac Newton came along and filled the theories holes all together. Sir Isaac Newton was able to for the 3 Laws of Motion because of the great thinkers who came before him.



Now, let's take a closer look at Newton's First Law of Motion. This law is often called the Law of Inertia. This law states that:

An object at rest will stay a rest until an unbalanced force acts upon it. An object in motion will stay in motion until an unbalanced force acts upon it. Another way of saying this is that **objects will just keep doing what they're doing** (resting or moving) **until something happens to change what they're doing.**

An apple will just sit there until you apply a force:



A ball rolling along will eventually stop due to friction from the ground. You can stop it even faster if you apply a force in the other direction (eg. stop it with your foot.)



Watch the following video to understand Newton's 1st Law of motion a bit better. Make sure you follow along in your learning guide! https://youtu.be/n_A24gBS5dE

Inertia

Objects are lazy.....this may adequately sum up one of the most important laws of motion.



<https://youtu.be/OHw80HXSuAQ>

So if you're sitting watching television, it's inertia that prevents you from getting up and cleaning your room!

One force that will act on most objects that are moving is friction. If there is no friction (maybe in outer space), will objects keep moving?

Some objects have more INERTIA than others. This means that they have a stronger tendency to keep their original motion.

Look at the this photo of a traditional Japanese Sumo Wrestler below. What is the main reason why he is so difficult to move? In other words, why does he have so much INERTIA?



If you guessed mass, then you were right!

MASS is the reason why some objects have more **INERTIA** than others. The more massive an object is, the more it wants to keep its original motion.

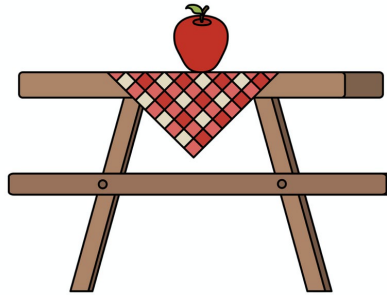
Law of Inertia

Sometimes, you might hear people calling Newton's First Law, the Law of Inertia. Guess what? They mean the same thing!

Newton's First Law = The Law of Inertia

So what is inertia? Inertia is the resistance of an object to change its motion. This means, an object at rest will stay at rest and an object in motion will stay in motion unless another force acts upon it. Here are some examples of inertia in action:

- When you swirl your hot chocolate with a spoon, it will continue to swirl in circles even after you stop stirring
- When you pedal your bicycle, then stop pedaling, your bicycle still continues to move forward
- An apple sitting on a table will not move on its own, it will stay put until a force forces it to move



Inertia can be found all around us! But did you know that **some objects have more inertia than others**? This means that they are more likely to keep their original motion.

Why do some objects have more inertia though? **Mass!** Mass is the reason why some objects have more inertia than others. The **more mass** an object has, the **more it wants to keep its original motion**.

Let's say you had a ping pong ball, and a bowling ball.

- Which would be harder to push down a hill (change the motion)?
- Which would go farther (stay in motion longer?)

The bowling ball! And it's all because...

More Mass = More Inertia



So, if an object in motion will stay in motion, then how come if we kick a soccer ball, it will eventually come to a stop?

In the last book, you learned about **different forces**, such as Gravity and Friction. No matter what, there are **always** forces acting on an object here on earth - even if an object is at rest! **Forces can send an object at rest into motion**, and they **can also make objects in motion rest**. It all depends on **what force is acting on the object**.



Newton's First Law of Motion

1. Name 3 great minds who came before Isaac Newton, and influenced his development of the 3 Laws of Motion:

2. How was Aristotle's theory of motion different from Newtons?

Newton's First Law:

3. Watch the following video to answer the following questions.

Video: Newtons 1st Law of Motion – Inertia

a. Because of Inertia, objects in motion will keep moving at the same _____ and in the same _____, unless some force _____ their motion.

b. **True or False:** Velocity is the speed and direction of an object.

i. True

ii. False

c. **True or False:** Heavier objects have more inertia

i. True

ii. False

Newton's First Law =

4. Inertia is:

5. More Mass =

6. What forces made the object at rest (the soccer ball) go **into motion**?



7. What force(s) will make the object in motion (the soccer ball) **rest**?