Grade 6 Science
Week of January 25 – January 29

Newton's First Law

Inertia Egg Drop

So, just to recap quickly:

Newton's First Law of Motion = The Law of Inertia

Inertia = An object at rest **will stay at rest** and an object in motion **will stay in motion,** unless **an unbalanced force acts upon it.**

Knowing this, you're going to make a **prediction** before watching the following science demonstration. In the demonstration, you're going to see what is called an 'inertia egg drop'. It uses a glass of water, a pie pan, an empty toilet paper roll, and an egg, and is set up like this:

After setting up the demonstration like so, the demonstrator will then smack the pan from one side. Use your Learning Guide to answer the following questions:

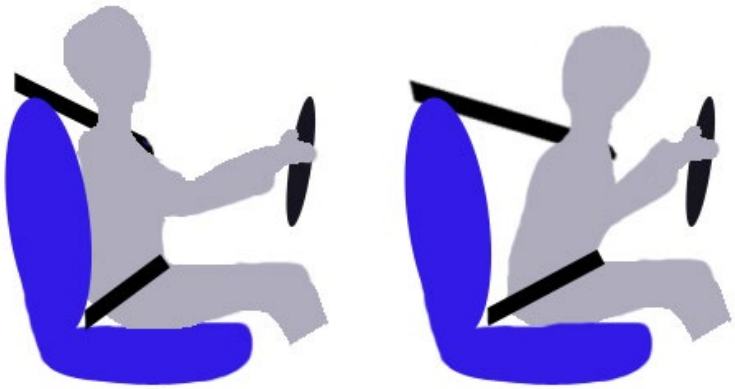
- If the demonstrator smacks the pie pan from the right side, which direction will it go? What force acts upon the pan to make it move?
- Which way will the egg go? What force acts upon the egg to make it move?

Once you have **finished making your predictions in your Learning Guide,** watch the video below.

Egg Drop Inertia Challenge: https://youtu.be/6gzCeXDhUAA

Inertia and Seatbelts

Newton's Laws of Inertia: https://youtu.be/8zsE3mpZ6Hw



What happens to you when the car comes to a screeching halt? The car stops but your body doesn't - in fact if it wasn't for the seatbelt you might continue to move forward. You'll continue to move forward until you encounter a force that will stop you (such as the seatbelt, or the windshield if you're not wearing your seatbelt!).

This result was observed by the scientist Isaac Newton in the 1600s. His thinking was that something that is moving will KEEP moving until a force acts upon it. He extended this thinking by saying that something that is NOT moving will continue to stay still until a force acts upon it. This is called **inertia** (in - er - sha) and is called Newton's first law of motion.

Tablecloth Trick

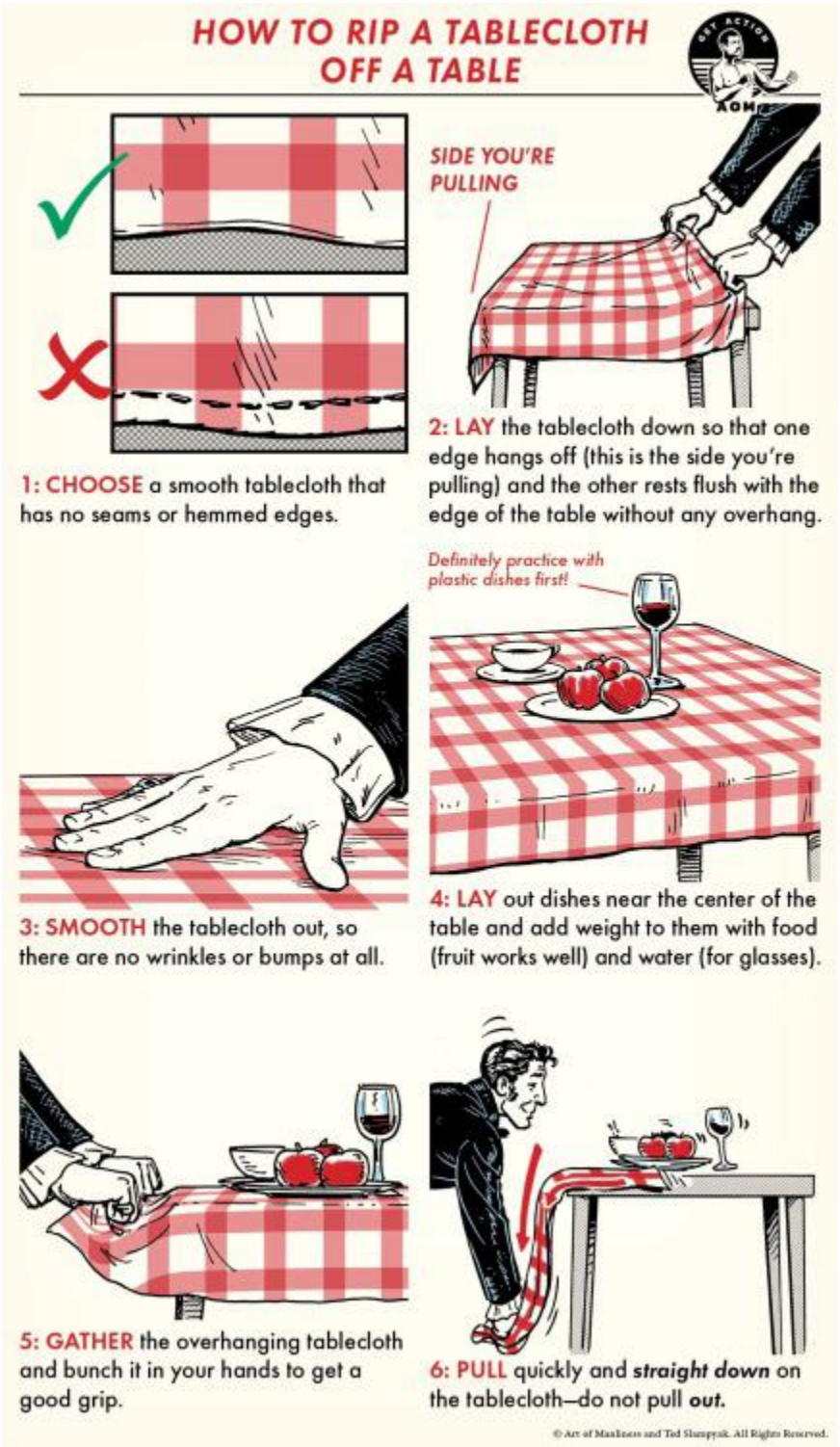
Have you ever seen someone in a movie who whips off a table cloth, without disturbing anything that's sitting on the table? Did you know this is actually a perfect display of **inertia**? It's true!

As you know, "...an object at rest will stay at rest unless acted on by an unbalanced force" - that's how this trick works! When you pull the tablecloth off the table, you are applying a **pull force** to the tablecloth, but nothing else. So, if you apply enough force to the tablecloth, nothing but the tablecloth should move.

Check out this video to see it in action! Make sure you follow along in your Learning Guide.

Tablecloth Trick: https://youtu.be/PcGIUZzWoVc

If you want to try this at home, make sure you ask an adult for help finding all the materials - you need to make sure you don't have anything on the table that is breakable because it might take a few tries until you become a master! Follow the instructions below:

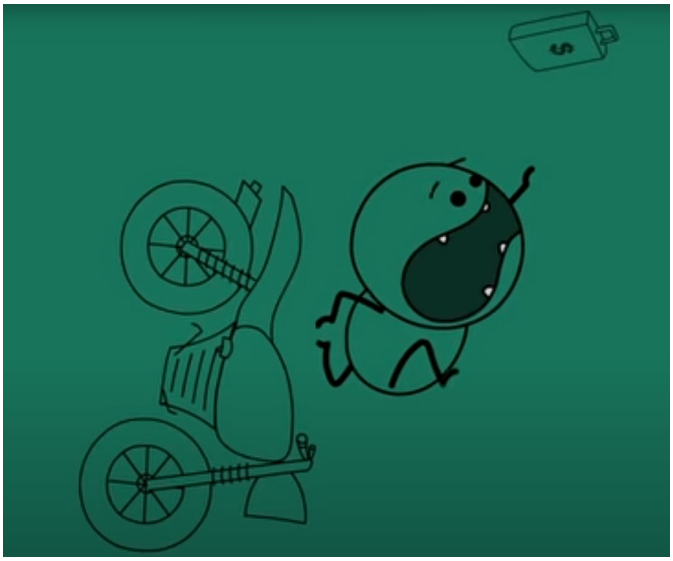


Travelling

Why Do You Fall Backwards When a Bus Starts Suddenly?: https://youtu.be/jpi6HjSYKcY

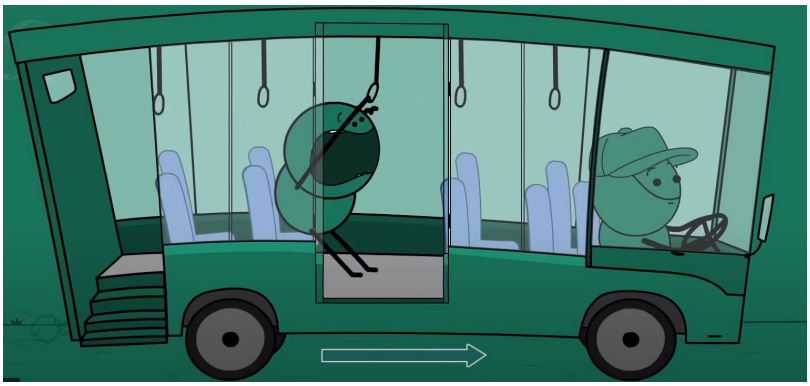
Inertia and Riding a Motorcycle

Have you ever heard that riding a motorcycle can be dangerous? Well, it's true, for a few reasons, one of which involves Newton's First Law of Motion. If you were riding a motorcycle and were to get into an accident, there would be a force applied to your motorcycle (another car, a meridian, etc.) BUT, there would be no force being applied to you, sending you flying forward, without your motorcycle.



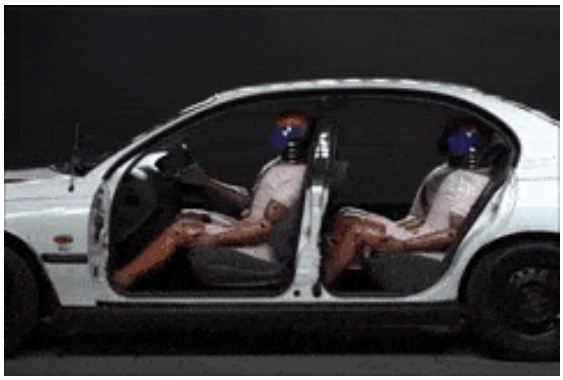
Inertia and Riding the Bus

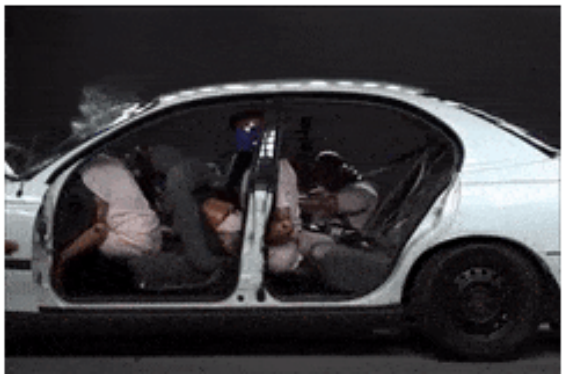
If you've ever taken the city bus or train, you'll know that when you're standing, it's important to hold on to something, because once the bus stops, your body actually continues to move forward! This is because of inertia. When the breaks are applied to the bus, it's a force that is acting on the bus to make it stop, but there isn't any force being applied to you!



Why Seatbelts are Important

What happens to you when the car comes to a screeching halt? The car stops but your body doesn't - in fact, if it wasn't for the seatbelt you might continue to move forward (depending on the speed of the car). This is one of the reasons motorcycles are so dangerous because there are seatbelts on motorcycles. Without a seatbelt, you'll continue to move forward until you encounter a force that will stop you (such as the seatbelt, or the windshield if you're not wearing your seatbelt!).





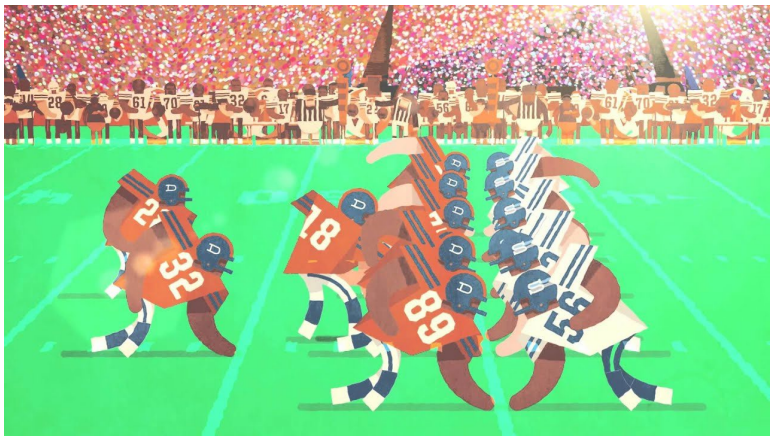
Helium Balloon in Truck

Now that you know Newton's First Law, this might initially seem surprising, but remember that air is heavier than helium and will push helium out of the way.

Helium Balloon in Car: https://youtu.be/XXpURFYgR2E

Inertia and Football

In a game of football, let's list all the ways we can see inertia at play:



- A football game begins with a kick-off, where one team punts the ball down the field to the other team. The ball **is at rest** on the field, until a player punts the ball.

(an object at rest stays at rest until an unbalanced force acts upon it)

- Once the ball is punted, it is put into motion. The ball will **stay in motion** until outside forces slow it down. Forces like: Gravity pulling it to the ground, friction from air resistance, a player catching it, or friction between the football and the grass if it hits the ground.

(an object in motion stays at in motion until an unbalanced force acts upon it)

- When a player catches the ball, they will begin to run towards the end zone. Once they are in motion, they will have to be stopped by an external force that is stronger than their force (unbalanced force).

(an object in motion stays in motion until an unbalanced force acts upon it)

- A defensive line may hold their ground (stay at rest) trying to protect their quarterback. They will not move until players from the other team forcibly tackle them to reach the quarterback.

(an object at rest stays at rest until an unbalanced force acts upon it)

Watch the following video to see these statements in action. Make sure you follow along in your Learning Guide!

Science of NFL: https://youtu.be/08BFCZJDn9w

1. Inertia Egg Drop

Predictions

1) If the demonstrator smacks the pie pan from the right side, which direction will it go?

2) What force acts upon the pan to make it move?

3) Which way will the egg go?

4) What force acts upon the egg to make it move?

After watching the video

1) Were your predictions correct?

2) Why did the egg not go in the same direction as the pie pan?

2. What would happen if you were taking the city bus, standing up, and not holding on to anything when the bus comes to a stop?

3. Why are seatbelts so important?

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

Video: Newtons 1st Law of Motion – The Science of NFL Football

a. Fill in the blanks: On the football field you can think of inertia as being a _____ who is already in _____, doesn't want to change the fact that it's already in motion.

b. True or False: A body on earth would have the same mass as that body on the moon but it would weigh less on the moon, because gravity is less on the moon.

i. True

ii. False