Introduction to science learning & Smartivity- 10 minutes

Introduce yourself. Tell the children your name, your field of study, and a list of superlatives they must use when addressing you, such as _____

Who is a smart kid?
Gather answers from students and then tell them **the definition of a smart kid.**

What is smartivity?

What is science?
Science refers to a system of acquiring knowledge. This system uses observation and experimentation to describe and explain natural phenomena.

What is technology?
Technology is the application of science, or scientific knowledge for everyday use… or what we call practical purposes.

What is engineering?
Engineering is the branch of science and technology that deals with the design, building, and use of engines, machines, and structures…

What is mathematics?
Mathematics is not just about numbers and addition and subtraction and multiplication and division… Math and science go hand in hand. Math is a subject that helps us think about and experiment with science, technology and engineering concepts, before we actually build something.

What is STEM?
STEM is a shortform of Science, Technology, Engineering and Math… all the modern advances that we as humans have made is a result of these four subjects. These four subjects not only help us discover and invent new things, but also help us look at life in a different way - help us question why and why not… show us a way to find new solutions.

What is a Scientist?

"A scientist is a person who asks questions and tries different ways to answer them."

Then I show a PowerPoint I made, **What is a Scientist?**

Science in Life- 5 minutes

Science has invaded every branch of modern life. It is the noise of machines, cars, mills and factories, etc. which awakens us every-day in the morning. The food we eat, the clothes we wear, the books and papers we read, the recreations we enjoy, the games we play – all have something or other to do with the application of science.

Every person feels the effects of science in every sphere of life. It is not merely the electric light or the electric fan, the radio or the cinema that displays the power of science in our daily life, but everything we do or is done to us is in some way or another connected with science.

The things that we use in our daily life are mostly due to science. Our forefathers put on clothes woven by hand. Our clothes are made in large factories where scientific methods are used. We get so much paper to write on only because the piper mills can turn out huge quantities of it. Cloth and paper we had even before science came on the scene but no one could then think of the huge quantities in which they are produced now.

Science has conquered time and distance. We can travel from one place to another with a quickness which our forefathers could not have dreamt of. In the morning, we get news of events that happened yesterday in all parts of the world. Why should we talk of yesterday? With the help of the radio, we can listen to an American speaking. It would seem that he is before us and we are part of his audience. If we want to send a message to a person in America, we can send an email and he will get it in a few hours. If we want to speak to our friends far from us, there is the telephone that will connect us.

Effect of science of human life: It is, indeed, true that science has added tremendously to the comforts and conveniences of mankind. Unless one is an ascetic, one has no reason to reject the things science offers. By conquering time and distance science has brought mankind together and so far made life richer. By inventing medicines it has made our day-to-day existence relatively free from disease, and has, indeed, added to our length of life.

Examples of use of Science in everyday life: This fan and light works from the application of electricity. Electricity is one of the wonders of modern science. The bus which has an engine works with petroleum. The train is driven by the power of coal. This is possible only because of the application of science. My doctor gives certain injections and the patient soon well enough to come here. Medical science is another achievement of modern science, the marvel of medicine.

From the above, it is clear that science is playing an important part in our everyday life.

Scientists Stay Safe

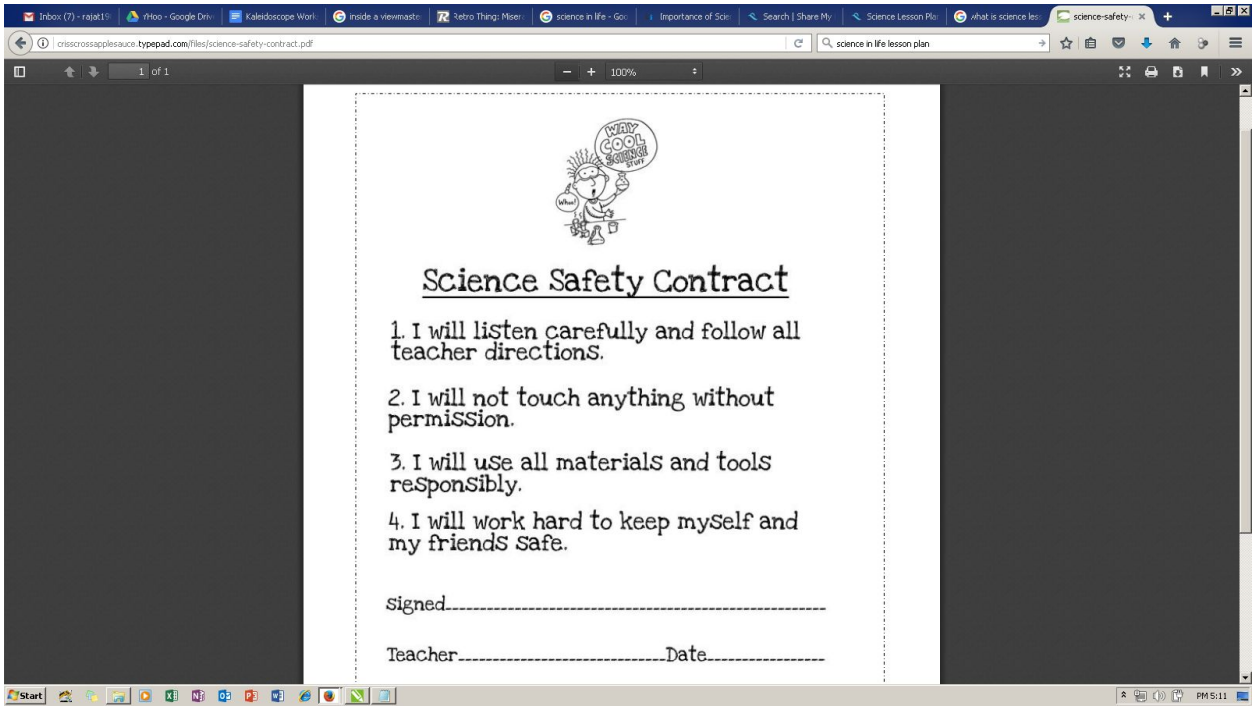
Today we take some time to go over all of the safety expectations in the Science Safety Contract. I start by asking the kids "Why is it important for scientists stay safe? What kinds of things do scientists do to stay safe?"

We watch the PowerPoint What is a Scientist? again. I ask the kids to look for things that these scientists are doing to stay safe. (The chemist is wearing gloves and goggles; The geologist is wearing a hard hat; etc.)

Then I ask the kids about specific slides, for example-- "Do you think the volcanologist plays around with the hot lava? Do you think the chemist tastes the chemicals? Why not?"

We take a few minutes to discuss all the horrible catastrophes that could befall these scientists if they are not safe (the kids are very imaginative that way!) Then I tell the kids that, although we will not be near any volanoes or tornados, it is still very important that ***we*** stay safe while doing science!

I hand out the Science Safety contracts. We go over each expectation--one by one. We talk about why that expectation is important and what could happen if we didn't follow them. When we are done, we sign them and glue them in our notebooks!



Guide students to the scientific concept they will be learning through the activity which is

Reading Instruction Manual and identifying parts

(10 minutes)

Constructing the BALLOON CAR - 90 minutes

Newton's Laws of Motion

Introduction Video: https://www.youtube.com/watch?v=Qr9ge4XGUYs

Say: At the top of your page, write down 5 motions you did during that song!"

What is Motion?

Teachers, define motion to students using the definition that motion is the act of an object changing position. Once students understand the general concept of motion, use the science activity below to express a general idea of Newton's Laws of Motion.

Motion Science Activity

Follow the instructions below to complete this lesson plan on Newton's Laws of Motion.

1. Place the carpenter's level on a flat surface so that the bubble in the center indicates that the level is in fact level.
2. Place the marble in the center of the level.
3. Ask students to observe that the marble is not moving. Question students as to why the marble doesn't move.
4. Students should come up with various responses that indicate they are aware that some type of force needs to be applied for the marble to move even if they do not know the term "force".
5. Briefly explain the term of velocity to students. Once students understand what velocity, ask them what the velocity of the marble is. Let students discuss the possibilities, then explain to them that the velocity of the marble is 0.
6. Further explain that changes in velocity is produced by a force. The only force being applied to the marble in its current state is the force of gravity.
7. Explain to students that force has the potential to cause motion, but may not always result in motion.
8. Tilt the level so that the marble rolls down the level.
9. Question students about what changed so that the marble rolled. You did not directly touch the marble, so what force was applied to cause this motion? Are objects

naturally in motion due to gravity and stopped by the lack of change in velocity or are they naturally still and only move when force is applied?

What is a force?
A force is anything that can change the motion of an object, like a push or a pull. You use force when you push a letter on the computer keyboard or when you kick a ball. Forces are everywhere. Gravity acts as a constant force on your body, keeping you secure on planet Earth so you don't float away.
To describe a force we use the direction and strength. For example when you push your balloon car you are exerting force in a specific direction. That is the direction the balloon car will travel. Also, the harder you push the balloon car the stronger the force you place on it and the farther it will go.

Laws of Motion A scientist named Isaac Newton came up with three Laws of Motion to describe how things move scientifically. He also described how gravity works, which is an important force that affects everything.

First Law of Motion

The first law says that any object in motion will continue to move in the same direction and speed unless forces act on it. That means if you kick a ball it will fly forever unless some sort of forces act on it! As strange as this may sound, it's true. When you kick a ball, forces start to act on it immediately. These include resistance or friction from the air and gravity. Gravity pulls the ball down to the ground and the air resistance slows it down.

Video: https://www.youtube.com/watch?v=mn34mnnDnKU

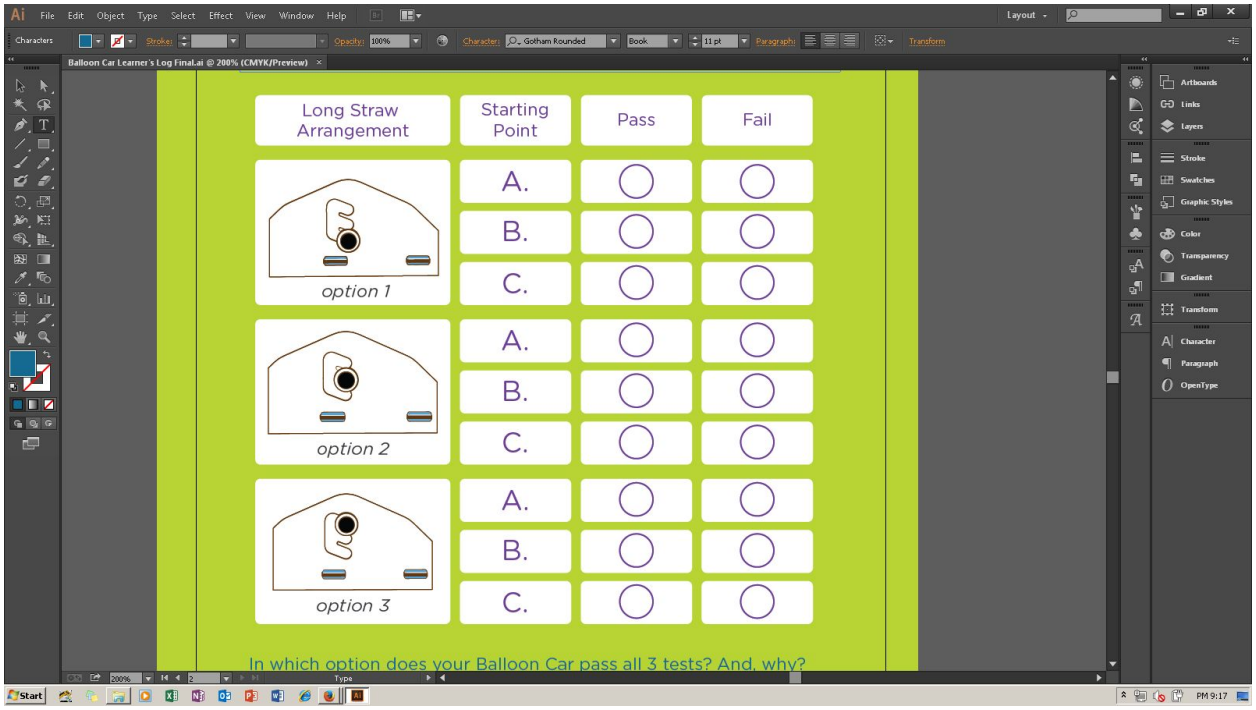
Second Law of Motion

The second law states that the greater the mass of an object, the more force it will take to accelerate the object. There is even an equation that says Force = mass x acceleration or F=ma. This also means that the harder you kick a ball the farther it will go. This seams kind of obvious to us, but having an equation to figure out the math and science is very helpful to scientists.

How fast an object covers a particular distance is the speed of that object. When you keep your Car on the tracks, speed of your Car is Zero. Air flows out of the Wind Pipe and your Car moves. As more air flows out of the Wind Pipe, your car’s speed increases. This increase in speed from Zero is called ‘Acceleration’.

ACTIVITY

Select Option 1 for the Long Straw Arrangement in Mountain Track. Launch your Balloon Car from the Starting Point ‘A’. If the car crosses over to the other side of Mountain, fill the circle below ‘Pass’ column and to the right of Option 1 and Starting Point ‘A’ black or fill the circle below ‘Fail’ column black. Similarly select other Starting Points and other Options, and fill appropriate circles in the table below.



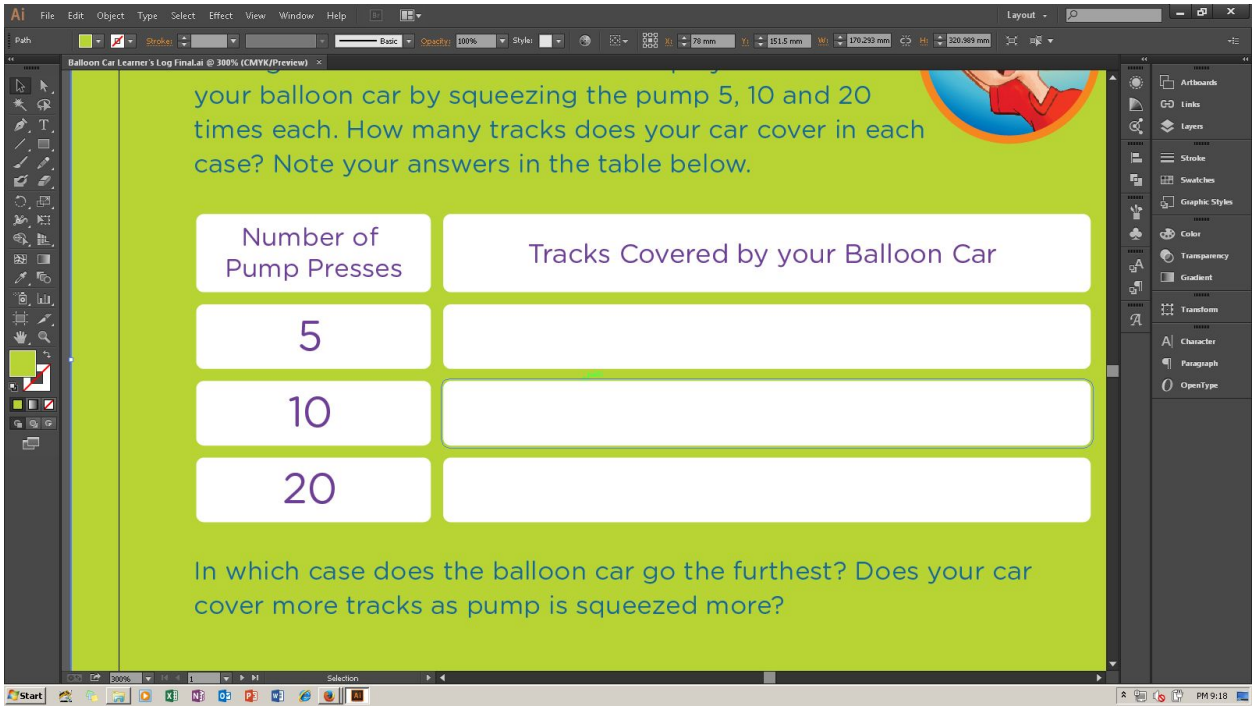
Third Law of Motion

The third law states that for every action, there is an equal and opposite reaction. This means that there are always two forces that are the same. In the example where you kicked the ball there is the force of your foot on the ball, but there is also the same amount of force that the ball puts on your foot. This force is in the exact opposite direction.

How does your balloon car move forward? As air forces itself out through the Wind Pipe, the car gets pushed forward. The car continues this forward motion until the balloon deflates completely. Thus, an action of deflating a balloon creates a reaction of moving the car attached to it. The more forcefully air is pushed out, the faster your car will move.

ACTIVITY

Arrange the tracks as shown in Gameplay. Fill air into your balloon car by squeezing the pump 5, 10 and 20 times each. How many tracks does your car cover in each case? Note your answers in the table below.



QUIZ - 10 minutes

1) A _____ is anything that can change the state of motion of an object.
Mass
Force
Weight
Velocity
Temperature

2) What scientist came up with the Three Laws of Motion?
Thomas Edison
Alexander Graham Bell
Isaac Newton

Bill Gates
Leonardo da Vinci

3) Which of the following is an example of a force in physics?
Gravity
Kicking a ball
Pushing a key on a keyboard
All of the above
None of the Above

4) Which of the following is the First Law of Motion?
The greater the mass of an object, the more force it will take to accelerate the object
Any object in motion will continue to move in the same direction and speed unless forces act on it
For every action, there is an equal and opposite reaction

5) Which of the following is the Second Law of Motion?
The greater the mass of an object, the more force it will take to accelerate the object
Any object in motion will continue to move in the same direction and speed unless forces act on it
For every action, there is an equal and opposite reaction

6) Which of the following is the Third Law of Motion?
The greater the mass of an object, the more force it will take to accelerate the object
Any object in motion will continue to move in the same direction and speed unless forces act on it
For every action, there is an equal and opposite reaction

7) Which law of motion says that the harder you kick a ball, the farther it will go?
First Law of Motion
Second Law of Motion
Third Law of Motion

8) Which law of motion says that when you kick a ball, there is an equal force on your foot as there is on the ball?
First Law of Motion
Second Law of Motion
Third Law of Motion

9) Which law of motion says that a kicked ball would fly forever if it wasn't for forces like air friction and gravity?
First Law of Motion
Second Law of Motion

Third Law of Motion

10) What is the unit of measurement used in physics for force?
Liters Kilograms Meters Kelvins Newtons

Colouring a project - 20 minutes