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 short form 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- 10 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

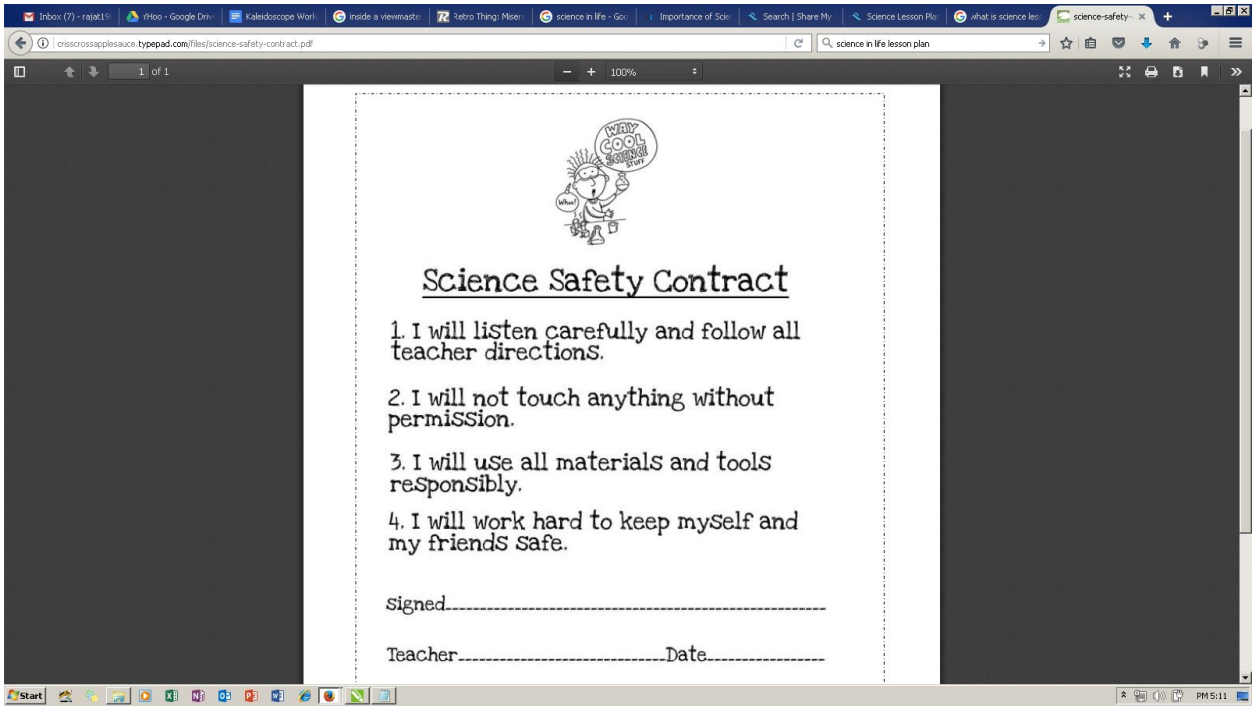
Today we take some time to go over all of the safety expectations in the Science Safety Contract. I start by asking the kids "Why is it important for scientists stay safe? What kinds of things do scientists do to stay safe?"

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!



CONCEPTS EXPLAINED - 10 Minutes

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

Video: https://www.youtube.com/watch?v=AGjxfx8sy6s

Today's lesson is all about music, sound and vibrations. You will make a music machine today that will product music just like you saw in the video. But in this machine you dont have to hit anything yourself. Your machine will do it for you.

Reading Instruction Manual and identifying parts

(10 minutes)

Constructing the Music Machine - 125 minutes

PLAYTIME - 10 minutes

Sounds and Vibrations - 5 minutes

Your music machine is a member of the percussion family of musical instruments. The common characteristic of percussion instruments is that they are struck or shaken to make a sound; in this case the sound is produced when metal bars are struck by the tongs. The pitch of each bar is determined by the length of the bar. Longer bars have a lower pitch which means that longer bars will produce a flat sound when struck. Shorter bars have a higher pitch which means that shorter bars will produce a shrill sound when struck.

ACTIVITY -

Sound Plates of your Music Machine produce sounds because the plates vibrate. What will happen if you press your fingers over the ends of Sound Plates, when the tune plays? What you hear now are flat sounds, and what you were hearing earlier were Shrill sounds.

ACTIVITY

Place your Music Machine on different surfaces, that is, Wooden Table/ Concrete Floor/ Your bed/ A metal plate from the kitchen. Play tunes from the Music Sheet on these surfaces. Do you notice any difference?

RATCHET MECHANISM - 5 minutes

A ratchet mechanism is based on a wheel that has teeth cut out of it and a pawl that follows as the wheel turns. In your Music Machine, the Beak Plate is Pawl and the Wavy Gear is Ratchet. When the handle is rotated in clockwise direction, the Beak Plate which is attached to Big Gear rotates. Beak Plate is stuck between the teeth of Wavy Gear. Hence, Beak Plate forces the Wavy Gear to rotate. As Wavy Gear rotates, the Drum of your Music Machine rotates.
When the handle is rotated in an anti-clockwise direction, the Beak Plate (attached to Big Gear) slides over the Wavy Gear. As a result, neither the Wavy Gear nor the Drum of your Music Machine rotates.
Hence, the Drum of your Music Machine can rotate only in one direction; all because of the Ratchet Mechanism. Magical, isn't it !

ACTIVITY
Split in groups of 2. One person will hold the beak plate of ratchet mechanism so that it does not touch the wavy gear and the other person will rotate the handle. What happens?

Gears - 5 minutes

Gears are toothed Wheels that are used to transfer motion from one part of a machine to another. For gears to work perfectly, their teeth must match with one another; too loose or too tight, and the teeth get stuck. In your Music Machine, when big gear completes one rotation, small gear has completed 8 rotations. Therefore the drum of your music machine rotates 8 times slower than the handle. Hence even if you rotate the handle too fast you will be able to understand the tune that plays.

ACTIVITY

Count the number of teeth on Big Gear and count number of teeth on Small Gear.
Divide teeth of Big Gear by teeth of Small Gear.
Now count the number of times that your handle must be rotated so that the drum completes 1 rotation.
Are both the numbers same? Why?

Colouring a project - 20 minutes

Pop Quiz - 10 minutes

1) What family does the music machine belong to? (d)
   a) Brass family
   b) Strings family
   c) Woodwind family
   d) Percussion Family

2) What determines the pitch of each bar? (a)
   a) The length of the bars
   b) The width of the bars
   c) The number of bars

3) What type of bars have the lower pitch? (a)
   a) Longer bars
   b) Shorter bars
   c) Wider bars
   d) Narrower bars

4) Which bars produce a flat sound when struck? (a)
   a) Longer bars
   b) Shorter bars
   c) Wider bars
   d) Narrower bars

5) In the music machine, what is the beak plate called? (a)
   a) Pawl
   b) Ratchet
   c) Drum
   d) Gears

6) In the the music machine, what is the Wavy Gear called? (b)
   a) Pawl
   b) Ratchet
   c) Drum
   d) Gears

7) Does the Beak Plate rotate when the handle is rotated in clockwise direction? (a)
   a) Yes
   b) No
   c) May be

8) How many directions can the drum of the music machine be rotated in? (a)

a) One
b) Two
c) None

9) _____ are toothed Wheels that are used to transfer motion from one part of the machine to another. (a)

a) Gears
b) Ratchet
c) Pawl

10) How slower does the music machine rotate than the handle? (a)

a) 8 times
b) 4 times
c) 12 times