

WORKSHOP MODULE for ROCKET ACTIVITY

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 paper 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 on 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

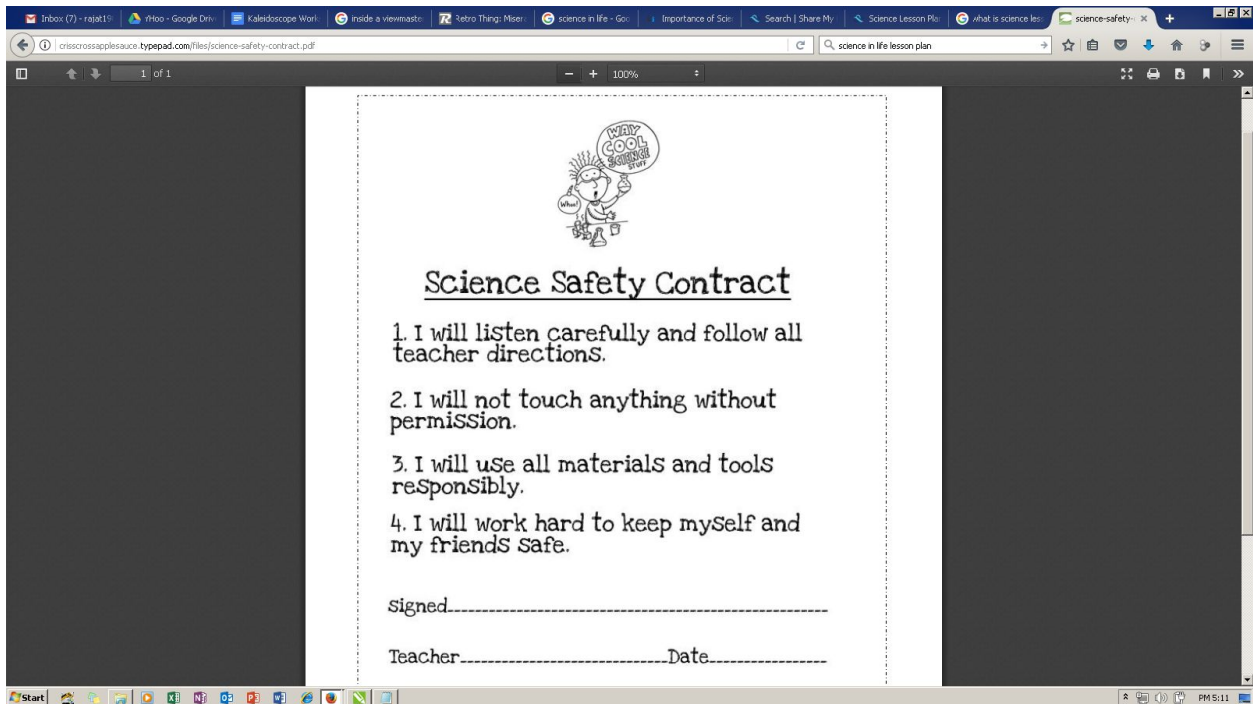
Today we take some time to go over all of the safety expectations in the [Science Safety Contract](#). I start by asking the kids "Why is it important for scientists stay safe? What kinds of things do scientists do to stay safe?"

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 volcanoes 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 LAUNCHER & ROCKET - 70 minutes

GRAVITY - 15 minutes

Say:

We have an exciting science class today. We are going to start by following astronauts into space and landing on the moon. I would like everyone to slide in front of the Smart Board. I am going to show you a [video](#) of the first astronauts to land on the moon. I want you to watch what happens as they start walking around on the moon. Their steps will look a little different than if they were just walking around our classroom.

Why were the astronauts bouncing? Why don't we bounce when we walk around the room?

Come to explaining gravity.

Force of gravity on Moon is much weaker. That is why astronauts can jump high on the Moon. They can jump far and high, but they will not float off the surface because the Moon's gravity still pulls them back down. On Earth, we cannot jump as high because our planet's force of gravity is much stronger.

Gravity - Simply speaking, "Gravity makes things fall." Gravity is a force that attracts things {objects, masses, particles, light}. Most of the time we think about gravity as the reason we are walking on the ground rather than floating in the air. We are attracted to the Earth. Gravity is why objects fall to the ground.

Have the children jump up. Ask: *Why did you fall back to the ground? Why didn't you stay in the air?* Because gravity pulled you back down.

Review with children that mass is the amount of matter in an object. Since all things have matter, all things have mass. But, some things have greater masses than others. Brainstorm different items with various masses and compare them. Which has more mass, an elephant or a mouse? A book or a pencil? A bowling ball or a basket? Guide children to understand that things with larger masses are not necessarily larger in physical size. For example, a balloon might be bigger than a baseball in diameter, but a baseball has a greater mass. Explain that objects with greater mass have a stronger force of gravity.

Heavy objects are more difficult to move while light objects are easier to move. Every object tries to remain still, unless you move it. This property is called inertia. Heavier the object, more will be its inertia and more difficult it is to move that object.

To Do:

Remove top 5 boosters of your rocket and now launch it. Does it go more higher than with those 5 boosters. Remove more boosters and observe your rocket. Does it go even higher? Why so? Could the reason lie in the weight of rocket. As the boosters are removed rocket becomes lighter and hence, goes further up.

Throw the rocket up in the air again. Explain to children that the rocket has mass, but Earth's mass is much, much greater. When you throw a rocket, Earth's gravity pulls the rocket down. Without gravity, the rocket would continue flying up and up.

Video: <https://www.youtube.com/watch?v=suQDwZcnJdg>

ELASTICITY - 10 minutes

When you stretch a rubber band and then release it, it immediately returns to its original shape. This happens because rubber bands are elastic. Your rocket uses the power of elasticity to launch into the air. When the rubber bands in your rocket launcher stretch, they try so hard to get back to their original shape that they lift the rocket up and throw it into the air.

To do:

Launch the rocket using different rubber bands. Does it go higher for the smaller bands or the bigger ones?

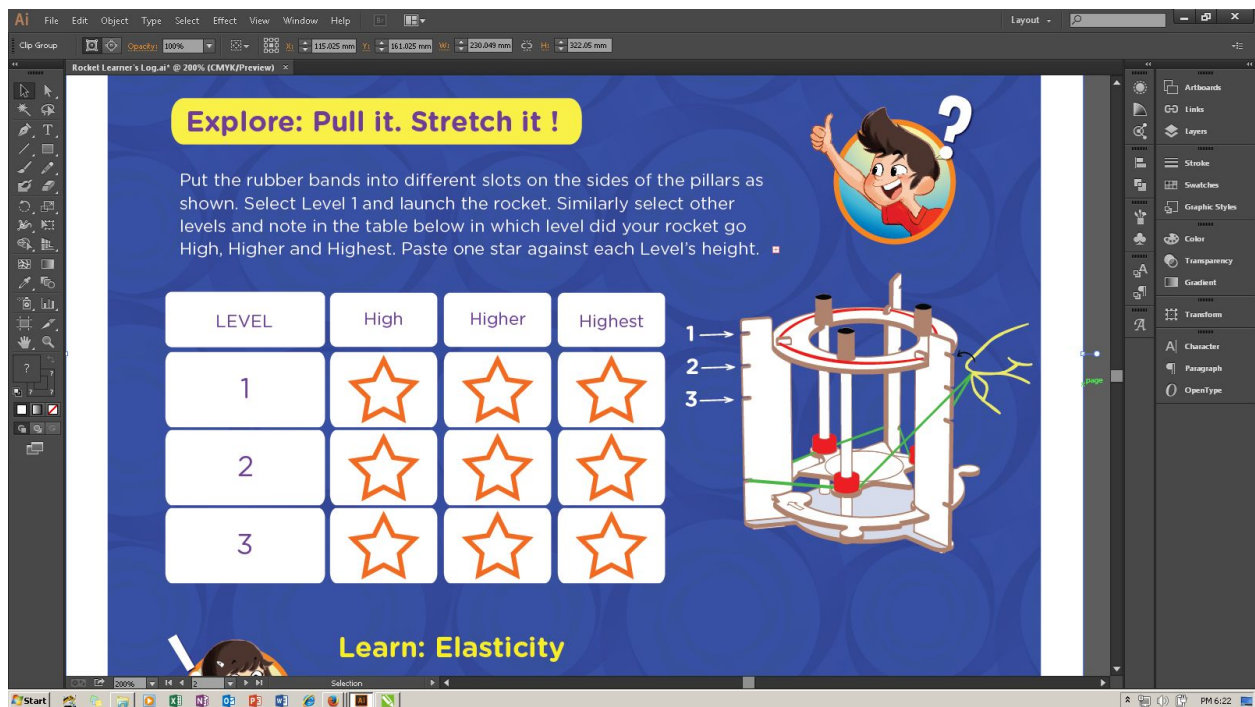
Video: <https://www.youtube.com/watch?v=pWAvmQZjdXk>

STORED ENERGY - 10 minutes

The effort you make to push the Star Plate down, is stored in the Medium Bands in the form of energy. When you rotate the Locking Plate, this energy in the bands is transferred to the Star Plate, which pushes the rocket up into the air. The more effort you make in pushing the Star Plate down, greater is the energy stored and higher will your rocket go. This Stored energy is known as Potential Energy.

Video: <https://www.youtube.com/watch?v=Q0LBegPWzrg>

Video: <https://www.youtube.com/watch?v=qLudHpeQpMg> (Snippets from this video)



ACTION-REACTION - 10 minutes

<https://www.youtube.com/watch?v=OnoNITE-CLc>

- How did the rocket move? (It pushed off the ground)
- Which direction did it in move in? (Upward motion)
- Were there any other things moving? Explain. (the gases/fuels moved in the opposite direction, causing the rocket to push off the ground and up into the air)
- Did the gases/fuels move in the same direction as the rocket? (no it went in the opposite direction.)

Real rockets are too big and heavy to use rubber bands. So how do they work? They use something called Jet Propulsion. 'Jet' is a stream of air and 'Propulsion' means movement. You can notice it in balloons as well. Fill a balloon with air and then release it. Doesn't it fly off? The action of pushing air behind causes the rocket to move forward. Rockets have a special fuel that releases so much air so quickly, that they end up flying high into the sky.

Colouring a project - 20 minutes

Pop Quiz - 10 minutes

1) What is Gravity? (a)

- a) The force that pulls objects to the ground
- b) An object that conducts electricity
- c) Molecules that make up the air we breathe

2) Gravity on Moon is weaker than on Earth? (true)

- a) True
- b) False

3) Everything that has matter has _____. (mass)

- a) Weight
- b) Mass
- c) Velocity
- d) Force

4) What is mass? (Amount of matter in an object)

- a) Amount of matter in an object
- b) Size of the object
- c) None of the above

5) Which has more mass? (elephant)

- a) An Elephant
- b) A Mouse
- c) A Pencil

6) The property where every object that tries to remain still unless it is moved is called _____. (Inertia)

- a) Inertia
- b) Elasticity
- c) Gravity

7) You have 3 round objects of equal mass and equal radius, but different shapes. Which of the following shapes will have the largest moment of inertia? (hollow ring)

- a) A hollow ring
- b) A solid disk

- c) A solid sphere
- d) They are all equal

8) Which of the following things are elastic? (rubber band)

- a) Boomerang
- b) Rubber band
- c) Plastic
- d) None of the above

9) What is elasticity? (a)

- a) When an object is stretched and it moves to original shape
- b) When an object is stretched and it stays in the new shape
- c) When an object is not stretchable

10) What is stored energy called? (potential energy)

- a) Potential energy
- b) Usable energy
- c) Kinetic energy