

## 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- 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 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 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

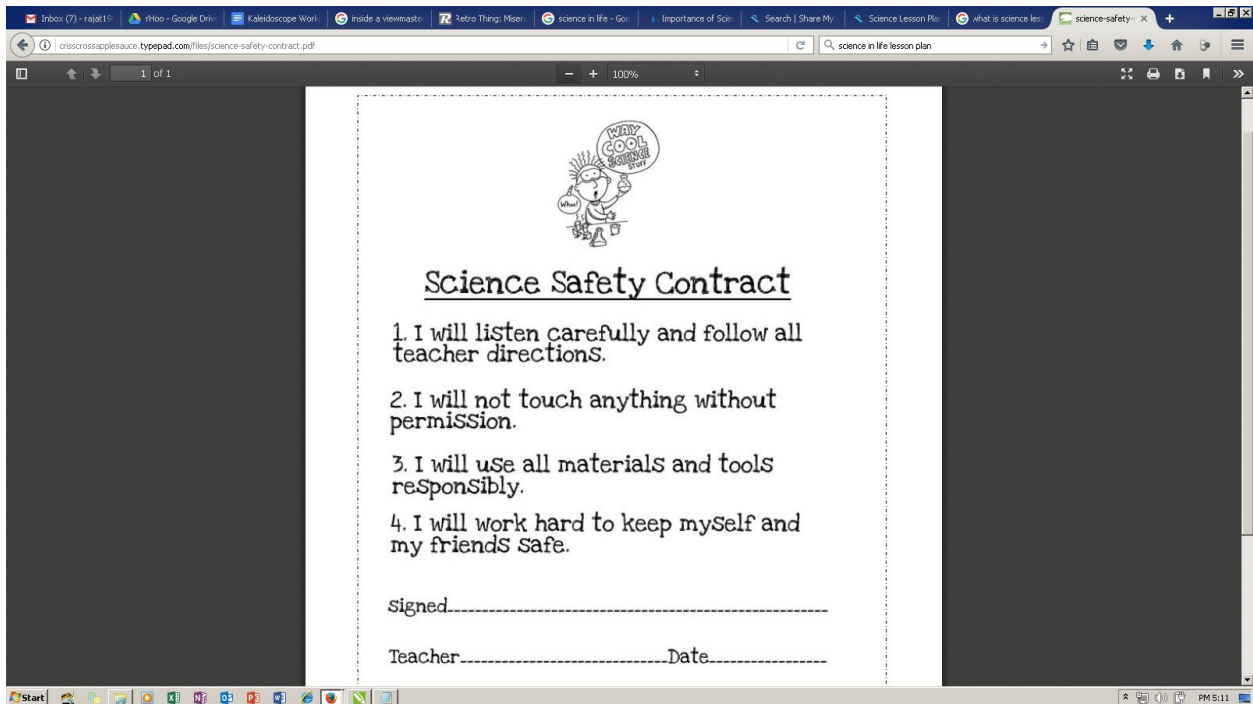
Today we take some time to go over all of the safety expectations in the [Science Safety Contract](#). I start by asking the kids "Why is it important for scientists stay safe? What kinds of things do scientists do to stay safe?"

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 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!



## 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=9qJORYbhUIM>

Today's lesson is all about PULLEYS and speed

Reading Instruction Manual and identifying parts

(5 minutes)

Constructing the TRANSPORTER - 125 minutes

PLAYTIME - 10 minutes

WEIGHT - 5 minutes

<https://www.youtube.com/watch?v=Q3P1CU6tlho>

Weight indicates how heavy a person or an object is. In your transporter, when you release the basket, marbles in it force the basket to go down. The greater the number of marbles, more is the force exerted on basket. Hence, the basket comes down faster!

ACTIVITY -

Drop 5 marbles in the basket and then release it. What happens?

Drop 15 marbles in the basket and then release it. What happens?

Because the weight of basket has increased it pulls the kart with more force and gives it more speed.

## PULLEYS - 5 minutes

A pulley comprises of a wheel on a fixed axle (the straw), with a groove along its edge to guide a rope or a thread. Pulley is in the form of a wheel because a wheel does not have any edges. If there are edges then the string will not slip freely over the pulley and much more weight will be required to move the basket down and kart forward. Because of the grooved edge in a pulley the string that slips over it does not lose contact with the pulley during motion.

### ACTIVITY

Right now, your thread passes through 4 pulleys fixed to F-Pillars. Remove thread from the 2 lower pulleys, and let the system run only on top 2 pulleys. What happens? Does the kart move faster? Why?

### ACTIVITY

Try an alternate gameplay. Instead of only one marble, load your kart with 2 marbles. Release the Kart. Open 2 consecutive gates. Fill the basket so that both marbles fall down through separate gates. Now try to unload both marbles through one gate. Similarly develop your own gameplays and challenge your friends and family members.

## SPEED- 5 minutes

How fast an object covers a particular distance is the speed of that object. In your transporter as you increase the weight in basket, basket comes down faster. As a result your kart is pulled at a greater speed. If your kart is too fast, it will jump over the open gates without unloading the marble. On the other hand, if your kart is too slow, it will not be able to reach the open gate.

### ACTIVITY

From different types of threads. Replace the thread of your Transporter with these threads and observe what happens. Out of the collected threads, with which thread does the kart move the fastest?

## ACTIVITY

Did you notice that in your transporter distance moved by the kart is twice the distance moved by the basket? How does it happen? Could the answer lie in the pulley arrangement? Can you think of a pulley arra

ngement in which the distance the kart moves is three times the distance moved by basket?

## Colouring a project - 20 minutes

## Pop Quiz - 10 minutes

1. A pulley guides a rope or a thread with a structure comprising of a \_\_\_\_\_ on a fixed axle and a \_\_\_\_\_ along its edge. (a)
  - a) wheel, groove
  - b) groove , wheel
  - c) Fulcrum, wheel
  - d) Wheel, fulcrum
2. Why is pulley in form of wheels? (b)
  - a) Because wheel has 4 edges
  - b) Because wheel has no edges
  - c) Because wheel has 2 edges
3. Grooved edge helps to not lose \_\_\_\_\_ with the string when pulley is in \_\_\_\_\_. (contact, motion)
4. A pulley is a \_\_\_\_\_ machine. (a)
  - a) Simple
  - b) Complex
5. We would require \_\_\_\_\_ weight to move the basket down if the wheel has edges? (c)
  - a) Less
  - b) Same
  - c) More
  - d) Zero
6. Speed determined by how fast an object covers a particular \_\_\_\_\_. (b)
  - a) Time
  - b) Distance

- c) Area
- d) Movement

Speed is a measurement of how fast an object moves relative to a reference point. It does not have a direction and is considered a magnitude or scalar quantity.

7. Speed is a measurement of how fast an object moves relative to a \_\_\_\_\_ point. (d)
- a) Opposite
  - b) Reference
  - c) Central
  - d) All of the above.
8. A pulley \_\_\_\_\_ effort to pull an object. (a)
- a) Reduces
  - b) Increases
  - c) Doesn't change
  - d) It depends.
9. A fixed axle is also called \_\_\_\_\_. (c)
- a) Glass
  - b) Groove
  - c) Straw
  - d) Gear
10. Speed doesn't have a \_\_\_\_\_. (c)
- a) Unit
  - b) Medium
  - c) Direction
  - d) All of the above.
11. If your kart is too \_\_\_\_\_, it will \_\_\_\_\_ the open gates without unloading the marble. (b)
- a) slow, derail from
  - b) fast, jump over
  - c) full, stop at