“The first step towards getting somewhere is to decide you’re not going to stay where you are.” — John Pierpont “J.P.” Morgan
STEM sessions started with all the excitement and enthusiasm which unleashed the learning of the students into the world of curiosity, creativity, critical thinking and collaboration. Students were all geared up to begin STEM lessons and dive into fun filled activities planned throughout the month of September. All these problem-solving activities were truly a kick back start to the commencement of their journey as aspiring scientist, engineer, architect, doctors, artist and most important livelong independent learners.

Grade One

Activity: Floor Hockey

In this activity, students constructed a model of hockey player and used gear mechanism to demonstrate its arm movement. They used the arm movement to make their hockey puck land on any two subtraction number problems and solved it to compare their results. They simultaneously completed the worksheet as they were performing the activity.
Activity: Sound of Music

In this activity, students designed and constructed a device, which helped them to communicate from one corner of the room to another. They tested their device to understand how sound is produced and travels through different objects/materials.
Activity: Silent Zone

In this activity, students designed and constructed a soundproof device for the given noisemaker. They tested their model by analyzing the decibel readings generated using sparkvue software. They redefined their model to obtain the best solution.

Some group of students also constructed an amplifier/mega phone demonstrating loud sound. They tested their model by analyzing the decibel readings generated using sparkvue software. They redefined their model to obtain the best solution.

Later they compared both the devices and analyzed how sound can be reduced or amplified using various solutions.
Activity: Bridge the Gap

In this activity, students pretended to be architect and civil engineers who were given the task of designing and building a long bridge as per the given dimensions. They also made the bridge strong enough to support the weight of heavy objects.

Later they analyzed the length, weight and quality of given materials to support evidence to their findings.
Activity: Summer Holidays

Students started the session by recollecting their cherished moments of their summer holidays and demonstrated those memories through build up story on the given base plate. Later they were introduced to story visualizer software which was used by the students creatively to capture those moments in form of a comic strip.
Activity: Bend It Like Beckham

In this activity, students pretended to be material engineers for the day who were given a task of analyzing properties of various materials and understand how materials can be stretched, bent, twisted and squashed to build structures in different form. They applied their understanding to construct various 2D shapes using straws and pipe cleaners and using the same they built a strong/stable bridge. They tested their bridge for strength and stability by keeping definite amount of load on the bridge. The model which was able to withstand the test and stay stable for longer time was declared as winner.
Activity: Manufactured Naturally

In this activity, students pretended to be architects and civil engineers working on the task of constructing three different houses, one made from ice cream sticks, one made from clay and the last one made from LEGO bricks. Later the houses were put through three different tests (wind, water and weight). The house which was able to withstand each test successfully was given certain points. The students added up all their points to find the ultimate winner.
Activity: Paint the Town Black

In this activity, students were handed over the silhouette of certain buildings, which was used as a guide to recreate similar structure using LEGO blocks. They tested for accuracy by casting its shadow using the light from the projector and understand how shadows are formed. The activity was an excellent insight to the students to develop their understanding about light and shadows.
Activity: Spy Robot

Robots have been mesmerizing people with their ability to perform various tasks using latest technology. This activity got all the students excited to learn more about motion sensor and demonstrate the application of motion sensor through programming.
**Activity: What’s My Temperature?**

Thermoregulation is a process that allows your body to maintain its core internal temperature. All thermoregulation mechanisms are designed to return your body to homeostasis.

In this activity, students were introduced to making of journals using PASCO temperature sensor and its software. They used the sensor to observe the temperature at different body location to understand how different body locations have different temperature allowing it to maintain its homeostasis. Later they used the same data to generate a bar graph for observation and analysis.
Activity: What’s the Matter?

Life around us is filled with atoms and molecules. They are a mystery to all of us. In the third week of September students took an initiative to explore and understand more about molecules and how temperature affects motion of molecules in various situations.

Students visualized concepts like evaporation, condensation and diffusion through various hands-on experiments. This lesson was related to various real-life aspects which they regularly see happen around them, but they never knew the answers as to “why” it happens. Various experiments kept at different stations helped the students to find answers which was definitely a “WOW” factor for all of them.
Activity: How clean is that water?

Many people in this world do not have access to running water in their taps or even clean water perhaps due various reasons.

This activity was an awareness to the students about this global crisis and how students can contribute in making clean water accessible to less fortunate people living in various parts of the world.

They were asked to pretend like environmental engineers who are studying contamination of water in a village and how they can design an effective filtration system which will allow the people to filter the water and use it for various purposes including drinking.

Students tried various solutions by changing the placement of resources in the given chamber till they were successful in obtaining clean water. Some group of students were not able to design a system which could filter all the given impurities but due to the beauty of STEM sessions they collaborated with other group members who were successful in obtaining clean water and identified the reason for their failure. Later they used their findings to redefine their filtration system and also calculate the cost of their filtered water by applying the concept of division.
Activity: Down the Hill

In this activity, students were given a task of constructing a car demonstrating gear mechanism. They tested their model to measure the distance travelled within a given timeframe. The model covering maximum distance within given timeframe was declared as winner.
Activity: Scratch Coordinate

In this activity, students were introduced to Scratch based programming wherein they created a sprite and programmed it to navigate along the coordinate axis. Students created an animation using the software by firstly designing a sprite and later programming the sprite to create a square on the screen. They also demonstrated the time taken by the sprite to move from one quadrant to another using various commands.
Activity: Ready, Steady LEGO

Students designed and constructed a model of balloon powered car and investigated to understand how air can be used to push the car front or back. They inflated the balloon in various sizes and recorded the distance travelled by the car in different situations. They tested the car for various solutions like size of the propeller, number of balloons, weight of the car and tires. They redefined their model with different solutions until they were able to obtain the best result.
Activity: All Mixed Up

In this activity, students tested solubility of various substances in water through hands-on experiment. They prepared different solutions with given materials and tested pH of those solutions using PASCO pH sensors to understand how different solutions have different pH level. They recorded the collected information for observation and analysis.
Activity: EV3 Theremin

In this activity, students constructed a musical instrument known as Theremin. They used the ultrasonic sensor to detect the distance from itself and their hand placed in front of it to produce a tone.
Activity: Shadow tower

In this activity, students designed and constructed a tower of different heights using Lego community starter kit. They then used a flashlight to shine a light on the tower and cast a shadow on the wall. The students observed the different sizes of the shadows at different times of the day by using the flashlight as a sun.
Activity: Simple Machines Park

In this activity, students pretended to be architects and civil engineers who were given the task of designing and building a park using the Lego base plates and the 'Simple and powered machines' kit. They divided the base plate into three sections and made a play area in one of the sections. The play area comprised of playground equipment that are examples of simple machines. Eg: Slide (inclined plane), See Saw (first class lever), Merry go round (wheel and axle).

They assessed their model’s strengths by putting them through different tests and finally chose the one they thought was apt. They then presented their park models to the rest of the class.
Activity: Powered by the sun

In this activity, students were asked to design and build a solar powered car. They designed the cars without any instructions and proceeded to attach a motor to the wheels which they connected to a Lego solar panel and used it as the roof of the car.

The students were then taken outdoors so that they can see the car moving in the presence of sunlight and slowing down and coming to a stop when it enters a shaded area.
Activity: Tug of war

Students started the session by discussing what they know about tug of war. Later they made a powered car using the Lego Simple and powered machines kit. They used different combinations of wheels to maximize friction and grip. A string was tied between two cars and the center line was drawn on the floor.

The students put their powered cars to the test and we had tug of war between the different cars.
Activity: The Lego convoy

In this activity, students made a car convoy using the Lego mindstorms EV3 kit. They applied their understanding of the ultrasonic sensors and programming to program their cars to follow the car right in front of them and maintain a specific distance. They tested their cars and made sure it’s going in a straight line while following the car ahead.
Activity: Digestive system

In this activity, students studied the different parts of the human digestive system and its functions. A sheet was given to them, which had the outline of the human digestive system, and they were asked to label the different parts.

Later, everyone was asked to use HUE Animation and create a stop-motion video of food entering the digestive system and undergoing different steps in the various parts of the system. They used the human digestive system sheet and pieces of clay to do this.
Activity: Change the state

In this activity, students were quizzed about the different states of matter and about their knowledge of the molecules in the different states of matter. They were shown videos and simulations of the way the molecules behave in different states of matter.

The students used Scratch to recreate an animation of the molecular movements in these different states of matter.

The activity was an excellent insight to the students to strengthen their idea about molecular movements, programming and animation.
Activity: Windmill flag hoist

In this activity, students were quizzed on the use of windmills. They used the Lego simple and powered machines set to construct a windmill with a lever behind it so that it would work with the wind, as well as by spinning it manually.

They were also asked to draw a flag consisting of a design that represents their team. This flag was attached to a pulley, which was attached to the windmill’s shaft so that when the windmill turbines spin, the flag is hoisted up. Different gear combinations were tried to observe the different speeds at which the flags would come up.
Activity: Make your own thermos

We all use different containers to store hot or cold liquids. The objective of this lesson was to understand what factors help the containers maintain the temperatures of their contents.

The students used the PASCO temperature sensors to observe the temperatures of the liquids inside their containers. Different teams, then wrapped their containers in different combinations of one, two and three layers of foil. They observed the temperature change at different points of time.

A comparative table was drawn to compare and finalize which design was best at keeping their drinks’ temperatures constant.
Activity: Fix the tunnel

Robots help us do various tasks. They help access areas that are not physically accessible by human beings. This activity was an example of such a situation, hence the name. They were given examples of different scenarios where calamities occurred and understood the gravity of the hazards to human life.

The students were given a task to design and program a robot that would drive into a pipeline and sense the cracks inside it. They came up with great, innovative ideas and creative designs. A color sensor was attached to the robot facing downwards to detect the cracks based on the reflective light intensity.
Activity: Life with limbs

In this activity, students were challenged to make different kinds of robot using the Lego Mindstorms EV3. A robot with limbs.

The challenge was not to use any wheels to move the robot. They were to use their own imagination and creativity to come up with a way to move their robots forward with the least amount of slip.

They constructed and programmed their robot to travel a distance of at least 50cm. The robot that was successful in moving the given distance with the least amount of slip was the winner.
Activity: Cook from the sun

In this activity, students used the PITSCO solar oven kit. They made a solar oven and used it to heat up a marshmallow. The students then observed how the heat changed the volume and the shape of the marshmallow.

Activity: Heart valves

Students designed and constructed a model of the left side of the human heart using the PITSCO package designing kit. This lesson was focused on the left atrium, the left ventricle and the valve between them, the mitral valve.

The students had to measure, cut out and design a box, then separate it into two sections separated by a valve (mitral valve). This valve had to be designed such that blood would only be pumped one way and not return. The students used different materials to pretend as blood.