

PARENT LETTER FOR DYNAMIC ENGINEERING AND ROBOTICS

SCIENCE, ROBOTICS, TECHNOLOGY AND ENGINEERING

Dear Parents,

We look forward to a great semester with your child! We are excited to share so many hands-on, fun-filled activities with our students!

Please remember that we alternate approximately 3 weeks of Science with 3 weeks of Technology.

SCIENCE OVERVIEW

DOMES AND BRIDGES

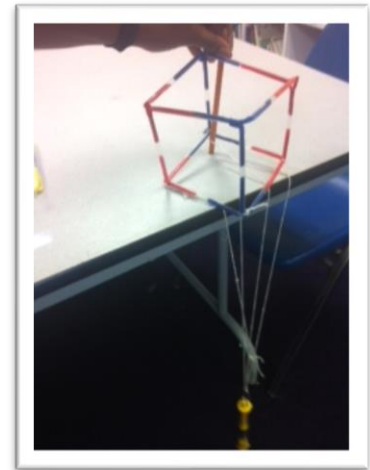
PART 1 PRINCIPLE- STRUCTURES



- By the end of Part 1 your child should walk out with a new understanding of concepts people in ancient Rome used to build bridges! Students will go from challenge to challenge as they progressively construct a sturdy paper bridge. This bridge will need to have columns, stretch at least 2 feet, and have an arch. Though it may seem simple, this paper bridge will start your child's understanding of stable structures.
- Our class will then move on to learning about suspension bridges. They will divide into groups and make a small suspension bridge. At the end, each team will compete to see which of their bridges can hold the most weight!
- **Discovery Questions**
 - *What is a suspension build, and how is it made?*
 - *What makes the structure more stable?*

PART 2 PRINCIPLE-TRUSSES

- They will be building their very own trusses out of toothpicks and gumdrops. In building these trusses they will understand just how strong the 'triangle shape' is. This shape is used in a lot of major bridges.
- They will then need to build a gumdrop bridge that uses trusses, spans at least 2 feet, and uses the concept of suspension (learned yesterday).
- What they build they take home today!
- **Discovery Questions**
 - *What shapes are most stable?*
 - *What is the "weakest link" of a structure?*



PART 3 PRINCIPLES- ARCHES AND DOMES

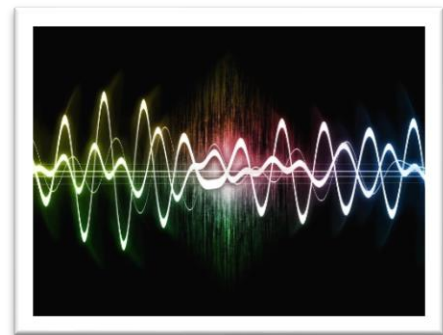
- Your children will be introduced to Geodesic Domes! We promise- it is as cool as it sounds! They will each take home a dome!
- Your children will then have an Egg Bungee Drop! Given several protective materials and pantyhose, your children will be creating a bungee that will contain an egg. This egg and bungee will then be dropped from a height of at least 6 ft. Your child's objective- To make a bungee device that will enable the egg not to touch the ground!
- **Discovery Questions**
 - What is a geodesic dome?
 - Why are arches and domes so stable?



SOUNDS LIKE FUN!

We will start with a **thunder tube** that will light up their eyes as they see how sound can be amplified.

We will explore how sound works and how our ears pick up on the sound with an exciting array of experiments. We have to use sonar to find to location of our Dr. Lipid's underwater lab. But first we must understand how sound can work to accomplish this mission.



Next we will explore *how we hear* with our model eardrum and special sound games.

Back to our sound amplification with some very exciting and funny experiments such as *a talking cup* and *screaming balloon*.

Just how does sound travel? We will explore with a sound symphony, sonar search and eavesdropping activities.

We will finish our Sounds Like Fun! Portion with an understanding of *frequency and resonance* with our strange band of Singing Bottles, Singing Tubes and Palm Pipes.

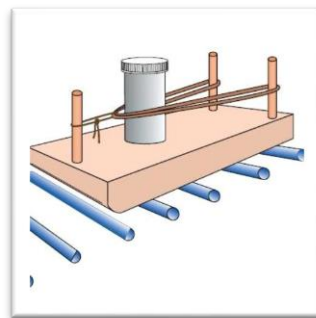
Whoever know sound could be so much fun!

NEWTON MANIA

Ok, the laws may sound boring, but the proof of the laws are not! We have amazing beads that defy gravity and Newton's Car. But the favorites are our Potato Launcher and Water Balloon Helmet Designs!

Three Laws of Motion, which changed science forever, are as follows:

1. Every object in a state of uniform motion tends to remain in that state of motion unless an external force is applied to it. (Law of Inertia)
2. Acceleration is produced when a force acts on a mass. The greater the mass (of the object being accelerated) the greater the amount of force needed (to accelerate the object).
3. For every action there is an equal and opposite reaction.



- **Newton's Car**- Students will put The Third Law of Motion into motion by proving that "For every action there is an equal and opposite reaction." This activity will also help students to understand how mass affects the acceleration of moving object (Newton's Second Law).
- **Water Balloon Helmet Design**- After learning about what affects an object's acceleration students will be given several experiments that they will use to test what affects an objects deceleration when an impact occurs. They will have to make a 'helmet' for a water balloon that will prevent the water balloon from breaking when dropped from at least 8 feet.
- **Potato Launcher** will prove the second and third laws as we propel potato pieces using the force of compressed air!

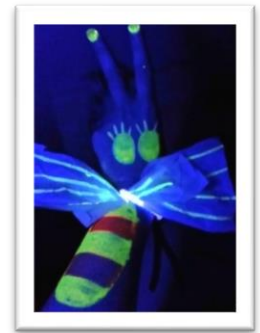
VORTEX GENERATOR



Then, just to prove that waves can travel through the air even though we cannot see them, we will make a **vortex** that can knock cups down from across the room. Your child will make a smaller version to take home.

FLUORESCENCE

Learn about hitch hiking germs, ghost eggs and invisible inks all under the power of Fluorescence! Watch eggs grow to unbelievable size and glow. Let your child understand why you always are saying “wash your hands!” Learn about how fluorescence works!



TECHNOLOGY AND ROBOTICS OVERVIEW

STOP MOTION VIDEO:



Stop Motion

Students will create their own stop motion film. Students will need to use their Sequential Reasoning capabilities and thought processes to create their video. First, students need to lay out a plan that starts with a story-line followed by the storyboard. As students begin to set up their stage they will have to check and test all equipment for glitches! Pictures of each movement will be taken of the characters. In stop motion filming, every step must be taken in the correct order, one small movement at a time, just as a robot is programmed to move from point A to point B. These pictures are download to an app that will speed the flow of vision, creating the look of fluid movement. This helps students to gain an understanding of the concepts introduced in coding! Using logic and creativity results in all around great fun!

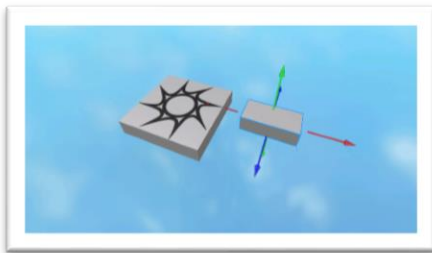
CODING:



sentence.

Imagine That! kids will learn LUA, a Coding Language using CodeCombat! Students will use this platform to learn the science behind computer programming. We choose an Avatar to win armor and gems while writing LUA code and play the game in real time. Writing Basic Syntax first, students move to higher levels using Loops, Algorithms and Conditionals battling their way to victory with each correct coding

Gaming



New! Let's create our own game using Roblox Studio! While your child has been busy playing everybody else's games on Roblox, they could have been making their own! Well, we'll fix that! Students will create and play their game as they learn all about directionals, anchors and how to make a game that others will be challenged by. Each week we will progress until all students test each other's game out. This is too much fun!!

Robotics



Our students will have the opportunity to build several different activities while learning how machines, programming and coding works. Most of these builds will be attempted during the class time. How many activities completed depends on the abilities of the students. We hope to complete all builds offered in each class.



Robotics: The Express bot will be built with Lego[®] **MINDSTORMS[®] NXT's!** All robots built will use the express bot as a base. All Challenges attempted will be FLL based. With the first version of the express bot students are challenged using move blocks. How will they be able to maneuver around the room? The basics of NXT's are worked on in the first class session.

With additions to the build we will make a remote-controlled Forklift and then will play a game of Tag Bot. The base bot gets our students started programming with the basics. The Forklift adds touch sensors to move and control the lifting action of the bot. Our challenge will be to navigate to an object, lift it and return it to the starting point.



The Tag bot adds touch sensors to the bumper and an ultrasonic sensor to detect the other bots to tag with the motor-controlled tag arm. The challenge will be to sense and putting other robots out of commission.

MACHINES



As time Allows:

Machines: With Lego ® Simple and Powered Mechanisms our students will become scientists and engineers while understanding mechanical and structural principles in machines used in everyday life.
