Campamento S.T.E.M

Objetivos de aprendizaje: Participar en desafíos de diseño e ingeniería pensando como un emprendedor.

Exploración 1 – Lectura de la máquina Rube Goldberg

Lectura– Elegir un texto para leer de forma independiente o con un miembro de la familia durante al menos 20 minutos por día.

Matemáticas - Eligir una actividad matemática de su nivel de grado "Guía familiar para el aprendizaje" en su paquete.

Diario / escritura de observación – Día 1 -Diario de tus pensamientos y artículos que va a utilizar para tu máquina. Día 2 – describir tu construcción y frustraciones. Días 3-5 – detallar tus intentos, los cambios que se hicieron en la máquina y reflexionar sobre lo que salió bien.

Actividad – Construir una máquina Rube Goldberg (Esta actividad puede tardar de 3 a 5 días). Leer una de las dos páginas de dirección. A continuación, utilizar la lista de actividades sugeridas para encontrar artículos alrededor de tu casa para usar. Comenzar a construyendo la máquina. Ajustar y refinar según sea necesario hasta que tengas éxito. Hacer un video de tu máquina exitosa.

Extensión - modificar tu máquina para hacerla más grande o más compleja.

Exploración 2- Catapulta

Lectura- Elegir un texto para leer de forma independiente o con un miembro de la familia durante al menos 20 minutos al día.

Matemáticas - Elegir una actividad matemática de su nivel de grado "Guía familiar para el aprendizaje" en su paquete.

Diario / escritura de observación – Día 1: hacer una predicción. ¿Tus predicciones eran correctas? ¿Por qué algunos objetos fueron más lejos que otros? Día 2: Describir cómo cambió tu catapulta o una competencia que tuvo usándola.

Actividad – Hacer y probar una catapulta usando palitos de paleta (1 - 2 días de actividad). Leer una de las dos páginas de dirección. Reunir los suministros y construir la catapulta. Con la página de predicción, buscar los elementos con los que desea iniciar. Hacer predicciones sobre la distancia a la que viajará cada elemento. Lanzar sus objetos y medir la distancia de cada uno.

Extensión- Hacer diferentes variaciones de lanzadores o competir con un amigo para ver qué objetos vuelan más lejos.

Exploración 3 – Coche propulsado por aire

Lectura- Elegir un texto para leer de forma independiente o con un miembro de la familia durante al menos 20 minutos al día.

Matemáticas - Elegir una actividad matemática de su nivel de grado "Guía familiar para el aprendizaje" en su paquete.

Diario / escritura de observación –Explicar el poder que hace que tu auto funcione. Describir los cambios que realizó en su automóvil y las carreras que realizó. Reflexionar sobre el proceso de construcción: ¿fue difícil o fácil? ¿Por qué?

Actividad – Hacer y correr un automóvil propulsado por aire (actividad de 1 a 2 días). Leer una de las dos páginas de dirección. Reunir sus suministros y construir su automóvil. Probar hasta dónde puede viajar su automóvil. Ajustar la cantidad de aire en tu globo, cambia la construcción de tu rueda y agregue peso para que tu automóvil lo transporte.

Extensión - Organizar una competencia con amigos o familiares para ver qué automóvil viaja más lejos.

Exploración 4 - Desafíos

Lectura- Elegir un texto para leer de forma independiente o con un miembro de la familia durante al menos 20 minutos al día.

Matemáticas - Elegir una actividad matemática de acuerda a tu nivel de grado "Guía familiar para el aprendizaje" en tu paquete.

Diario / escritura de observación – Usar las páginas de datos y resultados de la revista STEM incluidas para documentar cada una de las cinco actividades.

Actividad – Semana de desafíos STEM (5 días de desafíos independientes). Leer la página Cómo comenzar. Elegir la actividad con la que te gustaría comenzar. Reunir los suministros necesarios. Comenzar tu desafío y grabar el proceso utilizando las páginas del diario incluidas

Exploración 5 – Gelatina Elástica

Lectura- Elegir un texto para leer de forma independiente o con un miembro de la familia durante al menos 20 minutos al día.

Matemáticas - Elegir una actividad matemática de acuerdo a tu nivel de grado "Guía familiar para el aprendizaje" en su paquete.

Diario / escritura de observación – Describir cómo se ve, se siente, huele y cómo se estira la gelatina elástica. Dibujar y escribir sobre esta experiencia.

Actividad – Ciencia de la gelatina elástica (actividad de 1 a 2 días).

Extensión - Hacer gelatina con 2 o más recetas. Comparar y contrastar la diferencia entre las gelatinas.

Posibles materiales para STEM

Palillos de dientes Papel de aluminio Palitos de helado Limpiadores de pipas
Cinta artesanal Pajitas Ligas Hilo / cuerda
Globos Clips de papel Tubos de papel Malvaviscos / chicles
Reciclables Vasos de plástico Cartón / papel de construcción
* Muchos artículos se pueden encontrar en la casa *

Exploration 1: Rube Goldberg Directions

BRAINY ZANY CONTRAPTIONS WITH STEM!

WENDY GOLDFEIN SEPTEMBER 14, 2014 STEM

Brainy Zany Contraptions

As children we loved a game by Ideal toy company called The Mousetrap Game. Based on Rube Goldberg's creative ideas of complicated systems for solving a simple problem, the game actually was a captivating engineering exercise that utilized simple machines and creative problem solving.

Over 50 years later, the game is still available and still intrigues students as they try to solve the challenges. Simple machines, engineering, and inspiration from Rube Goldberg provide a wonderful combination for STEM problem solving challenges. Critical thinking, perseverance and application of physical science concepts are just some of the skills that can be developed in this game and other STEM contraption activities.

Over the years we have also loved the Rube Goldberg inspired contraptions that have been included in movies from *Back to the Future* 's opening scene and its complicated way of feeding the dog, to the *Home Alone* devices to foil the robbers and the *Honey, I Shrunk the Kid*'s gadgets and mechanisms. Even Buzz Light Year in *Toy Story* used a Rube Goldberg sequence to show he could fly. Amusing to watch and filled with suspense, one can't help being mesmerized while waiting for the next thing to happen and being delighted when it really works.

Creating contraptions inspired by Rube Goldberg is all about physical science and simple machines. Although humorous, they actually follow a logical sequence that takes into account force, motion, gravity and inertia. The cartoons he drew, available on-line, are a great way to introduce a simple machines unit. Another mesmerizing opener for a unit is the YouTube video created by Ok Go for their song "This Too Shall Pass":

Resources useful for making Rube Goldberg Machines

Ramps
Toy train tracks
Gutters
PVC pipes
Trays
Fan
Marble runs

Recyclables
Cardboard Rolls
Plastic water bottles
Cardboard
Cans
Plastic tubing

Things that Roll
Marbles
Balls: tennis, baseball
Toy cars
Dominoes
Skateboard
Roller skate

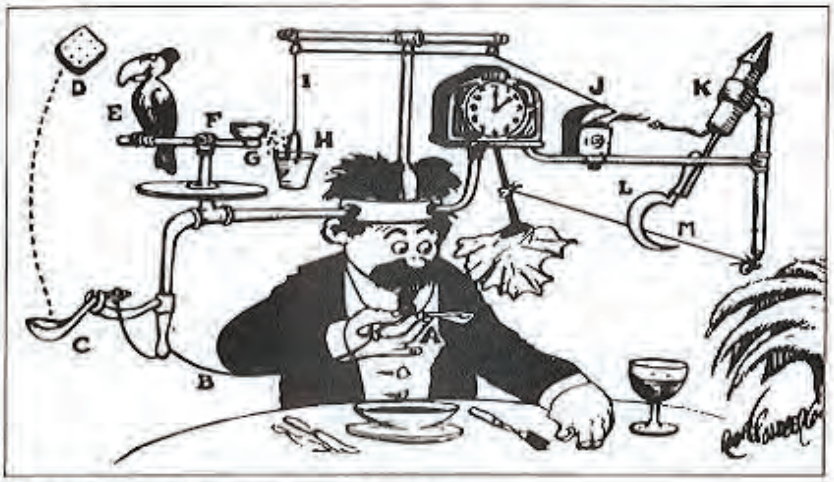
Additional Items
Chopsticks
Bowl
Sand
Tape
String
Pins
Ruler
Balloons
Hammer
Wooden blocks
Cereal boxes
Books

Things that move
Mousetrap
Dominoes
Toaster

Rube Goldberg's Machines

Rube Goldberg was an American cartoonist in the early 1900s. He became famous making cartoons like the one below. In them a simple or silly task is accomplished in an extremely complicated and humorous way. His machine for a self-operating napkin uses a parrot, alarm clock and fireworks!

Self-Operating Napkin



Rube Goldberg's Self-Operating Napkin from 1915

Using the six simple machines (pulley, lever, wedge, screw, inclined plane and wheel & axle) can you make your own **Rube Goldberg machine?** Think of an everyday task you would like to accomplish, and make a machine for it using all six of the simple machines.

Exploration 2: Catapult directions

POPSICLE STICK CATAPULT FOR KIDS STEM ACTIVITY

July 19, 2018 by littlebins

POPSICLE STICK CATAPULT SUPPLIES:

- 10 Jumbo Popsicle Sticks
- Rubber Bands
- Firing Power (marshmallows, pompoms, pencil top erasers)
- Plastic Spoon (optional
- Bottle Cap
- Sticky Dots

HOW TO MAKE A CATAPULT WITH POPSICLE STICKS

STEP 1: Make predictions. Which object will fly the farthest? Why do you think one will fly farther than the other?

STEP 2: Hand out supplies to each individual or in small groups, and build a Popsicle stick catapult following the instructions below.

Read more about the science behind the catapult and simple ways to create a catapult science experiment below!

STEP 3: Test and measure how far each item goes when flung from the catapult. Record results.

This is a simple and quick Popsicle stick catapult using just two supplies. The best part is that you can also grab the supplies at the dollar store!

Adult supervision and assistance is highly recommended when using scissors. You will want to use a pair of scissors to make two v notches on either side of two jumbo craft or Popsicle sticks (in the same place on both sticks). Use the below photo as a guide for where to make your notches. Once you have made your notches in two of the sticks, set them aside!

Take the remaining 8 craft sticks and stack them one on top of the other. Wind a rubber band tightly around each end of the stack.

Go ahead and push on of the notched sticks through the stack under the top stick of the stack. Make sure to watch the video again to see this done.

At this point flip your partially made popsicle stick catapult over so that the stick you just pushed in is on the bottom of the stack.

Lay the second notched stick on top of the stack and secure the two popsicle sticks together with a rubber band as shown below. The V notches that you cut help to keep the rubber band in place. Create more leverage with your catapult by pushing the stack of popsicle sticks towards the notched ends connected by the rubber band. Read about the science behind this below!

In your journal:

- Make a list/drawing of each of the items you will launch. Make a prediction by answering these questions:
- Which object will fly the farthest?
- Why do you think one will fly farther than the other?

Exploration 3: Make a Jet Propelled Car

1. Here's what you need to make your 4-wheel balloon car!

Jet

- Balloon
- Flexible straw
- Rubber band or tape

Body (select one)

- Water bottle
- Toilet-paper tube
- Juice box
- Disposable cup (paper or plastic)
- Fast-food or deli "clamshell" container
- Ice cream container (pint or quart)
- Milk carton (individual size)
  Cardboard sheet
  Orange-juice can

Axles (select one)

- Straws
- Barbeque skewers
- Chopsticks

Wheels (Select one)

- Bottle caps
- Lifesavers
- CD's
- Cardboard circles

Connector for attaching wheels to an axle (select one)

- Dry sponge
- Foam
- Clay
- Marshmallow (cut in half)

2. Make the jet

Put the long end of a flexible straw into a balloon.

3. Attach the straw and balloon so that no air can escape, using a rubber band or tape.

4. Insert two axles

- Poke two holes in the bottle's sides, on the part of the bottle that will be the bottom of the car. Make holes directly across from each other so the axle goes straight across.
- Slide a straw through the two holes. Adjust so the axle goes straight across.
- Repeat for the second axle.
- Slide a barbeque skewer through each straw.

5. Make the wheels

- Wedge a square of sponge (or foam or marshmallow) into a bottle cap to make a wheel.

6. Make four of these wheels

7. Add wheels

- To make it easy to push a skewer into a sponge, use the skewer's point to poke holes in the sponges.
- Center the holes so the wheels will spin evenly and not wobble up and down.
- Push the wheels onto the ends of the skewers.

8. Insert the jet

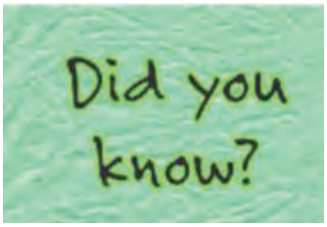
- Poke a hole in the top and back of the bottle.
- Push the jet into place so that the straw's balloon end pokes out the top and the open end pokes out the back.
- Make sure the straw at the back is as parallel to the floor or tabletop as possible. If it points up, down, or to the side, your car won't move as fast or far as if the jet points straight back.

9. Power the jet

- Blow up the balloon by blowing through the straw.
- Put your finger over the end of the straw to stop air from escaping.
- Put the car on a smooth surface. Then let go. ZOOM!!

10. Did you know?

Your balloon car uses jet power to move. The stored air in the balloon pushes through the straw, creating **thrust**-the force that pushes the car forward. So when air from the balloon moves in one direction, it pushes the car in the opposite direction.



Exploration 4: 5 STEM challenges

Use your journal to answer the questions from each step of the "STEM Steps to Success" page. Record your results for any of the challenges you choose.

STEM CHALLENGES

Marshmallow and Toothpick Tower

How high can you go!
Using 100 marshmallows build the tallest tower possible!

Supplies: Mini Marshmallows, toothpicks, and measuring tape

Tips: Have kids count out 100 marshmallows. Draw out a plan to get started.

Egg Drop Challenge

Protect a raw egg from harm! Using a variety of materials or supplies on hand, design, build, and test a contraption that will protect an egg from breaking when dropped from a specific height.

Supplies: Raw Eggs, recycle bin items, and any other simple supplies on hand like bubble wrap, tissue paper, or straws.

Tips: Start by choosing a specific height to drop the egg from and use the same height each time. To reduce mess, incorporate zip top bags into the design process.

Catapult Design Challenge

How far can you launch something with a homemade popsicle stick catapult. Which items fly the farthest? Plan, design, and build a working catapult.

Supplies: Popsicle sticks, rubber bands, bottle cap, glue or sticky dots, spoons, tubes, items to launch.

Hint: Use our easy popsicle stick catapult design or let the kids get creative with LEGO, pencils, spoons and cardboard tubes!

LITTLE BINS ≈ LITTLE HANDS

STEM CHALLENGES

Build An Unsinkable Boat

Build a boat that floats and can't be sunk! Using recycled items and supplies from around the house or classroom, build boats that will float in a tub of water. Take it a step further and build a boat that will hold a specific object such as a soup can!

Supplies: Tub with water, supplies to build boats, items to test flotation

Tips: Make sure to choose an item to test flotation that you have enough or that all weigh the same and are the same size! Think rolls of pennies, soup cans, large wooden blocks, small wooden cubes, etc.

Hint: You can also challenge kids to build tin foil boats with only a 12" square of aluminum foil!

Build A Paper Bridge

Span that gap with a bridge building challenge! Set up two stacks of books and challenge the kids to build a bridge that spans the gap out of paper! Test the bridge with the weight of pennies!

Supplies: Computer paper (dig out the recycling bin), tape, pennies, and two stacks of books the same height..

Tips: Create a gap using two stacks of books that the bridge will need to span. Test the strength of the paper bridges by adding pennies to it. You can also compare other bridge building materials such as tin foil, wax paper, construction paper, or card stock!

LITTLE BINS ≈ LITTLE HANDS

Exploration 5: Slime Science

SLIME SCIENCE FOR KIDS!

April 18, 2019 by littlebins

HOW TO MAKE SLIME BUBBLING FIZZY VOLCANO SLIME

YOUWILL NEED:

- 1/2 cup Elmer's Washable White School Glue
- 1 tbs Saline Solution
- 2 tbs Baking Soda
- 1/4 cup White Vinegar
- Food Coloring (yellow and red)
- Small Container (for mixing slime volcano)
- Small Cup (for mixing vinegar and saline)
- Cookie or Craft Tray

STEP 1: Start by combining the glue and baking soda in your chosen container. You will notice that as you stir the baking soda into the glue it thickens! This is really the point of adding baking soda to saline solution slime recipes.

SLIME TIP: Experiment with different amounts of baking soda!

STEP 2: For our lava colored fizzing slime volcano we used red and yellow food coloring, but we didn't make orange straight away. Add 5 yellow drops to the glue and baking soda mixture and stir.

Then add 1-2 drops of red food coloring but DO NOT stir! This will give way to a fun color burst as you mix. You can make this slime volcano any color you want!

Step 3: In another small container, mix the vinegar and the saline solution.

SLIME TIP: You can also play around with the amount of vinegar you use for another way to set up a slime experiment!

Step 4: Pour vinegar/saline mixture into the glue mixture and start stirring!

You will notice the mixture begin to bubble and eventually erupt everywhere! This is the reason for the tray!

Step 5: Continue to stir until the eruption is complete. You will notice that it gets harder and harder to stir because you are mixing your slime as well! Once you have stirred as much as possible, reach in and pull out your slime! It will be a bit messy at first but this slime is wonderful! All you need to do is knead it a bit.

SLIME TIp: add a few drops of saline to your hands before you reach in for the slime!

It should not be sticky on the hands either! But if after kneading your slime it still feels sticky, you can add a drop or two of saline to it and continue to knead. Don't add too much or you will end up with a rubbery slime!