North Jersey Section
American Chemical Society

Is your New Year's Resolution to get out and volunteer more?

We are extending an invitation
to the NJACS members to join us in hosting

STEM Exploration 2020

at Liberty Science Center, Jersey City, New Jersey
on Saturday, February 15th, 2020
11 a.m. – 3 p.m.

The NJACS STEM Exploration committee will run the following four activities:

Film Canister Rockets
Making a Battery
Balloon Powered Car
Marble Runs

At least two volunteers are needed for each activity

To help, please register at

https://docs.google.com/forms/d/1bciUD7BC_FbsEb5x93ti5CmWm1DUCOEudhxvDKeRNqY/viewform?edit_requested=true

or

Email: mitachaki@gmail.com

Film Cannister Rockets

Task

- Launch a paper rocket into the air using the power of chemistry and of course Newton's Third Law.
- Design a paper rocket that uses a film cannister filled with your proprietary mixture of fuel (baking soda and citric acid solution) to launch the highest rocket.

Supplies Required

Assembly:

- Scissors
- Tape

Body:

- Film Cannister
- Cardstock
- Paper

Fuel:

- Baking soda, Citric Acid solution
- Measuring spoon, Calibrated pipette

Protection:

- Goggles, absorbent floor mats and plastic containers (lunch trays?)

Use the following websites for ideas and resources:

https://www.scientificamerican.com/article/bring-science-home-homemade-rockets/

https://www.lpi.usra.edu/education/explore/beyondEarth/activities/rocketLaunch.shtml

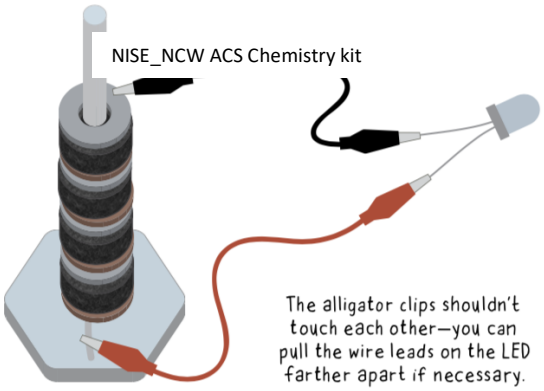
https://www.imaginationstationtoledo.org/educator/activities/rockets

https://www.teachengineering.org/activities/view/cub_rockets_lesson04_activity3

http://cdn.teachersource.com/downloads/lesson_pdf/CAN-300.pdf

https://www.fizzicseducation.com.au/150-science-experiments/force-movement-experiments/film-canister-rockets/

Making a Battery:



Goal*: generate enough electricity to power an LED, buzzer, or a motor.*

Batteries use the motion of electrons (current) in a chemical reaction to do electrical work (run your circuit).

Chemical reactions where electrons are transferred are called oxidation-reduction reactions; redox for short.

Here you will use 2 metals with different activities separated by a wet sponge containing electrolytes (ions) to pass the electrons between the 2 metals. Each metal sandwich is a unit cell. Find out what happens when you make a stack of unit cells (car batteries are actually 6 unit cells). All supplies will be provided.

Supplies Required:

- Nickel and zinc washers (maybe other metals too)
- Pennies
- Sand paper
- Washer shaped sponges
- Electrolyte solution (vinegar, salt water, acid water; *citrus fruit or potato pieces could be used but it's messy*)
- Playdoh
- Bowls to hold electrolyte solution and to soak sponges
- Stands to assemble battery cells
- Alligator clips
- *Extra wire*
- *Wire cutter/stripper*
- Buzzers, LEDs, motors
- Voltmeters
- Tongs
- Goggles and gloves for safety

Models to examine:

- AA or AAA batteries: fresh, spent, cut open. Also enlarged diagram showing the anode, cathode, and the electrolyte as well as the reaction.
- Computer circuit board

Use the following websites for ideas and resources:

https://www.nisenet.org/chemistry-kit build-a-battery

https://www.exploratorium.edu/snacks/penny-battery one version of the penny battery

https://www.wired.com/2012/09/could-a-penny-battery-power-a-house/ -calculations

Balloon Powered Car

Task:

- Use your physics and engineering skills as well as your imagination to ***Repurpose*** an assortment of ***Recyclables*** into a ***Balloon Powered Car***.
- Design, test and redesign your car.
- Then compete against other contestants to race to the finish.
- Toy with Newton's Third Law of Motion to build one of the following:
    - The fastest car
    - One that goes the longest distance
    - One that follows the straightest path
    - Simply the most elegant design

Supplies Required:

- **Assembly Tools:**
    - Assortment of tape, hot glue guns and glue sticks, scissors, drill, rubber bands, balloons, x-acto knife, rulers, paperclips, rubber bands
- **Axles:**
    - Skewers, pens, straws, etc.
- **Wheels:**
    - Round objects for wheels – CD's bottle caps, spools, cup lids, cetc.
- **Body:**
    - Plastic bottles, Styrofoam trays. Cardboard, toilet paper/paper towel tubes, tongue depressors, paper plates, disposable cups

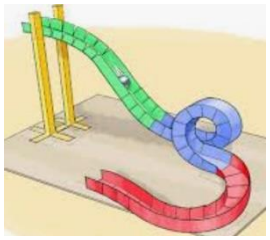
Use the following websites for ideas and resources:

https://www.scientificamerican.com/article/build-a-balloon-powered-car/

https://www.stevespanglerscience.com/lab/experiments/balloon-powered-race-car/

https://extension.purdue.edu/4h/Documents/Volunteer%20Resources/Science%20Made%20Easy/Balloon%20Powered%20Cars.pdf

Marble Runs



Task:

- Design and construct a freestanding marble run that shows segments with acceleration, deceleration and centripetal force.
- Each group will receive the same set of supplies and at the end of 20 minutes, you will compete against other groups to determine who's track keeps the marble rolling longer than any other team.

Supplies Required:

- **Assembly Tools:**
  - Assortment of tape, scissors, ruler
- **Body:**
  - Cardstock paper, toilet paper/paper towel tubes, paper plates
- **Support Platform:**
  - Foam core or cardboard
- Stopwatch, marble

Use the following websites for ideas and resources:

https://www.scientificamerican.com/article/paper-roller-coasters/

https://schoolwires.henry.k12.ga.us/cms/lib08/GA01000549/Centricity/Domain/5472/building%20the%20PAPER%20ROLLER%20COASTERS.pdf

https://www.discovere.org/sites/default/files/Marble%20Run_082716.pdf

https://volumeone.org/news/2017/01/26/16802_family_team_steam_challenge_marble_run

https://www.hawaiipublicschools.org/DOE%20Forms/STEM/hs_PS_paper_roller_coaster.pdf

http://www.mrwaynesclass.com/ProjectCoaster/

https://www.ldsd.org/cms/lib/PA09000083/Centricity/Domain/318/1_Paper%20Marble%20Roller%20Coaster.pdf