

**At-Home STEM Activities for
Elementary and Middle School
students**



Greetings Code Red NRG & FTC Families!

We know how hard it is to keep kids busy and interested in learning at this time, so we have compiled some activities that can inspire kids to explore STEM and learn more about what they love! In this PDF, you will find crafts, lego building ideas, movie ideas, websites and apps that promote learning as well as a list of simple STEM ideas to create your own activities.

We hope you find it useful, and we look forward to holding our NRG Summer Camp and Fall Season when we are through all of this.

-Code Red Mentors and Students

For students who have the ELEGOO Arduino robot we use for NRG:

The company that makes the robot cars that we use in NRG offers other robot kits as well as accessory kits to their robots. On their website, you can see the [products they offer](#). On their [download page](#) are instructional files as well as programs you can download onto your child's robot. If you get an accessory kit, there are downloadable files for those kits as well. Select the type of robot you have (for NRG, we use the Smart Robot Car Kit Version 3.0) to access the files compatible with your robot. Several of Elegoo's products are available to purchase on Amazon as well.

Fireworks in a Jar - Science

Materials needed:

- Big Mason Jar
- Oil
- Water
- Food Coloring

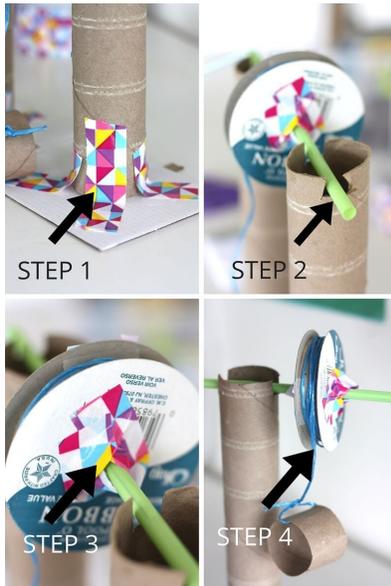


1. Fill your jar 3/4 of the way full with warm water.
2. In a separate bowl, mix 3-4 tablespoons of oil and several drops of different colors of food coloring (I used 4 drops of each color: red, yellow, blue, and green).
3. Use a fork to gently mix the oil and food coloring together.
4. Gently pour the oil mixture into the jar.
5. Watch what happens—the food coloring will slowly sink out of the oil and into the water. When this happens, it will expand and begin to mix with the other colors.

The Science Behind It:

Food coloring dissolves in water but not in oil. Because the oil is less dense than the water, it will float at the top. The colored droplets will begin to sink because they are heavier than the oil. Once they sink into the water, they will begin dissolving into the water (which looks like a tiny explosion).

Make a Crank Winch- Engineering



Materials:

- Cardboard Tubes
- Spool (Can be optional)
- String
- Tape and scissors
- Object to attach to string

STEP 1

Tape 2 cardboard tubes to a solid surface. Use your straw as a reference tool for how far apart they should be placed from each other.

STEP 2

Make 2 cuts at the top of each cardboard tube just big enough of the straw or pencil to rest and be able to spin.

STEP 3

Put your spool on the straw or pencil. Now if you don't have a spool, you can simply secure your rope to the straw or pencil with a piece of tape. You still have a hand crank winch! If you do use a spool make sure to secure it with tape to the straw or pencil. What if you don't secure it? The spool just spins around the straw and there is no ending up of string! We learned this concept with our rubber band car too! If you are using a straw, you can even thread another straw into it and use the bendy part to make a handle!

STEP 4

Secure your rope or string to spool with a piece of tape {or to straw directly if you don't have a spool} and tie your basket or object to the bottom of the string
Go ahead and test out your hand crank winch simple machine.

Make a stop-Motion video- Technology

Materials:

- Two pieces of foam core (also called foam board)
- Collection of objects to animate, toys like dinosaurs, cars and animals work great
- Smart phone, touchpad, or iPad. We used an iPad mini.
- Tripod or stand to hold your device steady
- Stop Motion Animation App. Free stop motion animation website:
 - Stop Motion Studio: <https://www.cateater.com/> (also available for ipad, iphone and Android phone)
- Not an iOS user? Use the Stop Motion Studio app from google play.

Set up a backdrop. This could be a wall or piece of foam core. Gather toys to include in your animation. Set up your touchpad or smart phone on a stand or tripod, across from the foam core. Start the Stop Motion Animation App and make your movie!

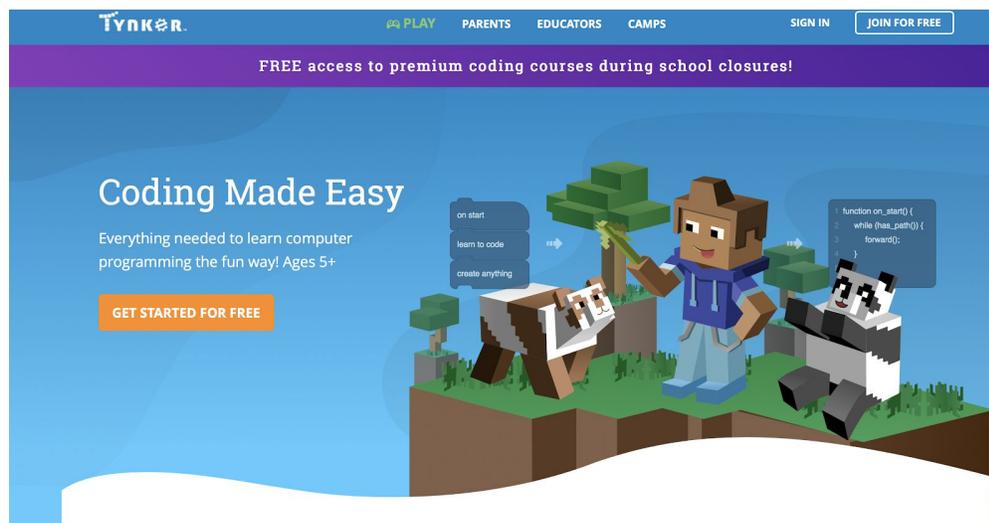


Learn to code! - Technology & Math

Interested in learning to program?

Experiment with the website <https://www.tynker.com>. Tynker introduces kids to the world of programming by providing tutorials, microsoft mods, games, and puzzles. The advantage of Tynker is that it uses familiar programming languages like Java and Python for its activities. It is an excellent introduction to programming for kids that will have future application.

To get started: Join for free. You can have a parent, teacher, and/or student account. Parents, if you sign up as a teacher, you can create lessons/projects for your “students”.



Tynker: Empowering Kids To Create
—with just the Internet and a computer

Activities with Legos- Engineering

Most legos today are sold as kits with instructions for building specific items, but consider using them to create something from scratch. The thought processes involved in designing an original lego creation are similar to the engineering process. As a follow-up, consider having your children describe their design process as they create (how they came up with the final product, how they had to plan out the steps needed to make it, learning from what didn't work, etc.)

- Create a rollercoaster
- Build a rocket for NASA
- Build the toughest pickup truck in the world
- You're stranded on an island, build a boat to get off!
- Build a hotel with a room for all your family and friends.
- Build a hospital
- Build a robot to save the world
- Build a house ONLY out of yellow legos
- Build a treehouse
- Build two fast cars and race them
- Build a safe that nobody can crack
- Build a set for the newest star wars movie
- Build a castle for cinderella
- Design and build your dream bedroom
- Make a thanksgiving dinner out of legos for your lego people
- Build the tallest tower you can
- Build the longest bridge you can
- Design a flag for an imaginary country
- Make a LEGO maze for a toy car



Other STEM activities that can be done with what you have on hand:

- Learn to identify trees by their leaves.
 - Take a walk around the yard, neighborhood, or nearby park and identify the trees that are part of your day-to-day lives.
 - You can take pictures of the leaves, or collect leaves and put them in a scrapbook or digital photo book
- Read a book with a STEM theme
 - The National Science Teaching Association assembles a [list of recommended books](#) each year for K-12 students.
 - Here is the list of STEM [books recommended by NSTA for 2020](#):
- Make the alphabet from sticks or other natural items
- Make your name out of recycled materials
- Make a sculpture or item from old puzzle pieces
- Test objects in your house to see if they float or sink
- Write instructions to make a sandwich & let family members follow it exactly
- Build a paper airplane launcher
- Build a fort using blankets, chairs, and cushions
- Draw a robot with sidewalk chalk. Label the parts and what they do.
- Make something useful out of duct tape
- Invent something to solve a problem in your home
- Learn how to solve a rubik's cube
- Write your own book, include drawings and a fancy cover
 - [My storybook](#) is a website that lets you create a children's picture book for free. If you want to print it, then you would purchase a copy.
- Make ice cubes from various liquids and see how long it takes them to freeze
- Invent your own musical instrument
- Create a secret code then write a note with instructions for a task using that secret code
- Draw your own comic book. Some free quality online comic strip makers:
 - [Storyboard That](#)--provides a variety of backgrounds and customizable characters you can use to create a comic strip
 - [Pixton](#)--Easy to use with lots of backgrounds, characters, and customizable features
- Put different amounts of water in glass containers and tap lightly to make music
- Put dirty pennies in vinegar
- Put flowers in water that contains food color
- Build the tallest tower with one peice of paper and tape
- Learn to cook a new recipe
- Build a miniature version of your house with cardboard, paper and tape

- Make a mini-golf course
- Read a book and make a “book trailer”
- Make a board game

STEM Movies with enhancement activity ideas:

Big Hero 6

Idea for project: Make your own fighting robot

Question: If you had your own ‘Nerd Lab’ what would be in it? What would you create?

Cloudy with a Chance of Meatballs:

Idea for project: Make your own blueprints for a food weather machine

Question: if you had the ability to control the weather in the world, what weather would you choose & why?

The Iron Giant

Idea for project: Make, design, draw your own robot

Question: What would you do if you had a giant robot? How would you use it?

Wall-E

Idea for project: Design and build a ship for long term space travel

Question: How would you design a ship for long term space travel> what problems could happen?

October sky

Idea for project: make your own rocket with an empty bottle, and baking soda and vinegar

Question: How does a rocket fly? Why are rockets shaped like that?

Meet the Robinsons

Idea for project: Invent your own way to make a peanut butter and jelly sandwich

Question: What is the purpose of inventing? Why do people invent?

Robots

Idea for a project: Find something that doesn't work anymore and figure out a new purpose for it.

Question: What should we do with old robots that don't work anymore? Should we recycle them or find a way to repurpose and reuse them?