

## STEAM Activities for Programs

Looking for activities you can implement in your afterschool program today? Say goodbye to googling or searching on Pinterest. Use the following activities to support youth in building an engineering mindset.

- [First Woman Camp Experience](#): Hands-on activities that accompany NASA's "First Woman" graphic novel series.
- [James Webb Space Telescope STEM Toolkit](#): Virtual and classroom resources related to the James Webb Space Telescope.
- [Sun STEM Toolkit](#): Virtual and classroom resources related to the sun.
- [Sustainable Aviation STEM Toolkit](#): Virtual and classroom resources related to aviation.
- [NASA Coloring Pages](#): Color and learn about some faraway worlds with these coloring pages.
- [NASA for Students Grades K-4](#): Fun activities centered around all things NASA. Games, puzzles, color, and more
- [Space Place Art Challenge](#): Space Place monthly art missions. Draw, color, or paint the subject of the month.
- [Climate Kids](#): Learn about weather and climate through games, activities, and videos.
- [Build to Launch with LEGO Education and Artemis I](#): An interactive digital learning adventure that explores the Artemis I mission to the Moon.
- [Clean Room - Europa Clipper](#): Watch this live YouTube stream as NASA's Europa Clipper, is built and tested.
- [Learn the Phases of the Moon](#): Assemble a printable Moon Phases Calendar and Calculator.

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- [Night Sky Network](#): Astronomy clubs bring the wonder of the universe to the public.
- [NASA Space Voyagers Game](#): A strategy card game where students explore the solar system.
- [Mars Scavenger Hunt!](#): Students participate in a Martian mission by completing the Mars scavenger hunt.
- [Build a Pizza Box Solar Oven](#) - Use easily found materials to create an oven where students can cook s'mores. The activity answers the question "What has engineering got to do with me?" in a way that is fun.
- [Hands-On Math: Fraction Math Trees](#) - This fun hands-on, kinesthetic, and visual approach to learning about fractions produces "math art".
- [Welcome to Space Math @ NASA](#) - A collection of math videos, books, and activities that are sorted by grade level, science topic, NASA missions, and engineering topics. All activities are based on NASA Mission and projects.
- [STEM Lessons from Space: Mathematics](#) - A collection of math and engineering activities, videos, and resources with a focus on the International Space Station.
- [The Institute of Electrical and Electronics Engineers](#) - A collection of fun and easy activities for ages 4-18 that cover a broad spectrum of activities—everything from designing devices to address climate change to coding.
- [Can Plants Stop Soil Erosion?](#) Soil erosion can cost the world billions of dollars every year by washing pollutants into our streams and rivers and by causing the loss of farmland. What can you do about this problem?
- [Build a Jumping Robot](#) Can you build a robot that hops like a frog? In this engineering project, you will learn how to build a simple robot that uses the energy stored in a stretched rubber band to jump. You will use the engineering design process to try to make your robot jump higher and farther. How far can you make it jump?

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- [Gravity: It's What Keeps Us Together](#) This set of ten easy to understand activities use math to understand gravity on Earth and in space. The activities are kid-centered (for example, what would I weigh on Mars) and use math in an integrated format.
- [3D Printing by Hand](#): Students will explore how 3D printers' work. Then, working in pairs, they will use the same methods used by 3D printers to create a 3D model of an object. This comes with a video for educators and a complete lesson plan.
- [Experiment with Parachutes](#): In this aerodynamics science project, kids test whether the size of the parachute is important for slowing down the speed of the fall. They make a series of parachutes from small to large and test how quickly they fall from the same height.
- [Marble Run Kit & Caboodle Activity](#): Don't be misled by the word "kit" in the title! This activity plan uses easy to find materials to make a marble run (think marble roller coaster!). The "kit" is a complete lesson plan and video.
- [12 Great Ideas for Engineers Week](#): These quick, easy to implement, and fun activities highlight design process and engineering principles. Materials are easy to find at the grocery store or in the afterschool setting.
- [Mathematics & Probability Science Activity](#): Asked to get an estimate for the famed mathematical constant, Pi, you might do what the ancient Greeks did: Divide the circumference of a circle by its diameter. Or you can estimate Pi by a less conventional method: the random tossing of toothpicks!
- [Cutting Pi: Mathematics & Measurement Science Activity](#): **Cutting** string diameters from a string circumference is a physical (kinesthetic) way to divide the circumference of a circle by its diameter. No matter what circle you use, you'll be able to cut three complete diameters and have a small piece of string left over.
- [Build a Bird Nest](#): In this project kids try to build their own bird nest using only natural materials that you can find outside. Birds are engineers too!

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- [Explore Biodiversity Using a Homemade Bug Vacuum!](#): Kids use engineering skills to support the role of a wildlife biologist. Kids create a bubble vacuum to collect and examine the biodiversity of bugs and other small invertebrates.
- [M&M Survival Challenge](#): Test how mimicry works by using M&M and Skittles candies as the prey. Learn about animal survival in a fun context.
- [How Does a Wind Meter Work?](#) In this experiment, find out how you can make your own instrument to measure the speed and power of the wind.
- [Turn Milk into Plastic](#): In this activity students will make their own casein plastic out of hot milk and vinegar.
- [Devising an Algorithm for Solving Rubik's Cube](#): This activity shows youth three sets of move sequences that accomplish specific rearrangements of the cube. Is there a way to solve the cube using *only* these three move sequences?
- [Can Humans Recognize ChatGPT's AI-Generated Text?](#) In this science project, you will conduct an experiment to see if volunteers can correctly identify whether different passages of text were written by a human or AI.
- [Landing Humans on the Moon](#): Take a look back at the legacy of our first small steps on the Moon and look forward to the next giant leap with the following playlist for program providers, facilitators, and families.
- [Lunar Roving Vehicle Activity](#): In this activity, students compare lunar rovers to family cars, and then design and build a rover model that may be used to explore the moon. Special considerations for the vehicle include the type of terrain the rover will traverse.
- [Rocket Races](#): In this fun activity students construct balloon-powered racing cars using a foam tray and drinking straws. They test the cars along a measured track on the floor. After measuring trials, they report on their racer design and how it performed.
- [Can Humans Recognize AI-Generated Images?](#): Artificial intelligence (AI) generated images have exploded in popularity, bringing plenty of controversy along with them. In this science project youth investigate whether people can tell the difference between real pictures and pictures generated by AI.

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- [Statistical Science](#): In this activity kids learn about probability to determine the frequency of different colored M&M's in a package of M&M candies. M&Ms normally come in six different colors: red, green, yellow, blue, orange, and brown.
- [Cyberchase Biancas-Body-Math](#): In this activity, learners use math to explore how parts of the body are proportional. Learners make a measuring device out of string and then use it to measure the length of their forearms, the circumference of their fist, the circumference of their forehead, and the distance from their head to their toes.
- [Cool It!](#): In this fun hands-on activity, learners use simple materials to investigate evaporation. How can the evaporation of water on a hot day be used to cool an object?
- [Reverse Engineering: Ball Bounce Experiment](#): In this activity, learners investigate the properties of different types of balls. Learners conduct experiments on four different balls to see which can bounce the highest and which continues bouncing for the longest period of time. Use this activity to talk about how each ball's properties are appropriate for their respective sport. This activity also coincides well with math graphing practice.
- [Small Moon Big Sun](#): In this activity, learners explore how distance can affect the way we perceive the size of an object. It also introduces learners to solar eclipses as well as the Sun and Moon's sizes and distances from Earth.
- [Straining out the Dirt](#): Learners take on the role of environmental engineers as they design water filters. Learners see how polluted water can become clearer when passed through their filter.
- [Ancient Observatories: Chichén Itzá](#): This is a lesson plan for an activity in which learners, playing the role of archeologists, use math concepts about number bases to decipher the Dresden Codex, an ancient Mayan document.
- [Apple Science: Comparing Apples and Onions](#): Students will explore heredity concepts by comparing observable traits of apples and onions, collecting data on the traits of different apple varieties, and learning about apple production. Additional activities include hands-on methods for testing apple ripeness.

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- [Leaf Me Alone](#): In this activity, learners explore the structure of plant leaves. Use this activity to investigate the structure of plants and discuss photosynthesis/respiration.
- [How To Make Seed Bombs –](#) Help youth connect to their impact on the environment start a new tradition to celebrate Earth Day and learn how to make seed bombs or seed balls. This website also features other STEM activities for kids in environmental education.
- [Do-It-Yourself DNA](#): In this activity, you will make your own DNA extraction kit from household chemicals and use it to extract DNA from strawberries.
- [Investigate Alien Genetics](#): Students model how traits are passed on from parents to their offspring by creating baby aliens based on the alien parents' traits. Students will also learn the difference between dominant and recessive traits.
- [Extracting Onion DNA](#): In this project, you'll learn how to isolate DNA from onion cells, separating it from other cellular components in a manner that still preserves its structure and sequence. In the end, you'll have enough DNA to see with the unaided eye, and you'll be able to spool it to demonstrate its strand-like structure.
- [Intro to Climate Change](#): This engaging video and hands-on activity show how adding carbon dioxide to water changes its properties. Perfect for middle school science learners, the activity includes clear instructions, background info, discussion questions, and everything needed for a fun and educational experience!
- [The Toothpaste Test](#): Try this fun eggsperiment to see what certain food do to our teeth and how we can protect them.
- [Cereal Graph Crunch](#): Collect data on different types of cereal, create bar graphs to represent their data, and analyze the results.
- [Fizzy Fruit Eruption](#): Learn about acid-base reactions using household items!
- [Shake it up Sundae](#): Science + Ice Cream = The prefect experiment. This hands-on way to learn about heat transfer and a sweet treat!
- [Petal Potion](#): The secret science to changing color. Learn how to change the color of white carnations using food coloring.

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- Piñata Physics: Learn about the concepts of force, motion, and energy through smashing a Pinata.
- Pinecone Picnic: Support local wildlife. This activity involves using simple materials to create feeders that attract and nourish birds.
- DIY Constellation Viewer: Create a constellation viewer using a toilet paper roll and black construction paper to project star patterns onto a wall or ceiling. This activity teaches about constellations and how stars form patterns in the night sky.
- Reduce, Reuse, & Recycle: Decorate an empty container and plant seeds inside to create a thoughtful Mother's Day gift. This activity emphasizes plant growth and the importance of upcycling.
- Tree Scavenger Hunt: Engage in a scavenger hunt to find various items related to trees, enhancing observation skills and appreciation for nature. This activity encourages outdoor exploration and learning about trees.
- American Flag Analysis: Observe and record the number of American flags seen during a walk, then graph the data to practice data collection and analysis. This activity improves organizational skills and understanding of data display methods.
- Fizzy Art: Create colorful artwork by combining baking soda and vinegar, observing the chemical reaction that produces carbon dioxide gas. This activity promotes scientific curiosity and artistic expression.
- DIY Yo-Yo: Make a yo-yo using bottle caps, a pencil or straw, and string to explore principles of physics such as energy, motion, and friction. This activity combines creativity with learning about physical concepts.

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- Let's Make Ice Cream: Prepare homemade ice cream using a simple mixture of cream, sugar, and vanilla, learning about states of matter and freezing point depression. This activity combines chemistry with a delicious treat.
- Elephant Toothpaste: Conduct a chemical reaction using hydrogen peroxide, yeast, and dish soap to create a foamy eruption, demonstrating decomposition chemistry. This activity teaches about catalysts and different states of matter.
- Egg Shell Escape: Watch a regular egg turn into a bouncy, shell-less wonder with vinegar and science magic.
- Red, White & Zoom: Celebrate the 4th of July with this high-flying STEM activity! Kids will explore Newton's Third Law of Motion by building balloon-powered rockets. Using simple materials, they'll learn how thrust works and experiment with design to see how far their rockets can fly.
- Sweet Science Rainbow: Create a rainbow using sugar, water, and food coloring! This fun, hands-on activity teaches kids about **density** by layering sugar water solutions of different concentrations to form a colorful display—mixing science with creativity.
- The Invisible Tug-of-War: Explore the power of magnetism as you make a paperclip “float” in midair, defying gravity. This activity shows how magnetic force can counteract gravitational pull.
- Orange You Gonna Sink? Discover the science of buoyancy by testing whether an orange floats better with or without its peel. The peel's air pockets act like a life jacket, helping the orange stay afloat.
- Colorful Salt Crystals: Combine art and science by using salt, glue, and watercolor to create vibrant, spreading designs. Capillary action allows the salt to absorb and move the color in fascinating patterns.

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- **The Balloon Wing Boogie:** Use static electricity to make butterfly wings flutter without touching them. Rubbing a balloon on your head charges it, attracting the lightweight tissue wings through invisible electric forces.
- **Cloudburst in a Cup:** Simulate rainfall by dropping colored water onto a shaving cream “cloud” and watching it fall through. This experiment models how clouds release rain when they become too heavy with water droplets.
- **Edible Architecture:** Explore engineering and geometry by designing and building edible structures using graham crackers, marshmallows, pretzels, and icing. This hands-on activity encourages creativity, problem-solving, and measurement skills—and ends with a tasty treat!
- **DNA Candy:** Build a colorful, edible model of DNA using licorice, marshmallows, and toothpicks to explore base pairing and the double helix structure. This hands-on activity reinforces concepts in genetics, symmetry, and molecular biology through creative model building.
- **Build a Helper Bot:** Create a fun robot that helps people! You’ll draw, build, or pretend your robot solves a real problem—like cleaning up trash or helping someone learn. This activity lets you be creative, think like an engineer, and learn how technology can make the world better.
- **Haunted House Circuit Design:** Build a spooky mini house that lights up! Use simple circuits, measure your design, and decorate it with your own creepy-cool ideas.
- **Candy Cane Catapult:** Design, build, and test a mini catapult using candy canes and simple materials in this festive challenge. Students explore physics, engineering, and creativity while launching marshmallows and recording their results.

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- **Cotton Ball Launcher:** Design and build a mini launcher using cardboard tubes and rubber bands to explore elastic potential energy and how it transforms into kinetic energy. Test your design by measuring how far your cotton ball can fly!
- **Sweet and Salty Tower:** Use marshmallows and pretzel sticks to engineer the tallest and most stable tower possible. Learn why strong shapes like triangles and squares help structures stand tall without collapsing.
- **Parachute Fall Design:** Create and test parachutes using different materials and shapes to see which design falls the slowest. Discover how gravity and air resistance work together during a drop.
- **Hurricane Challenge:** Build a stormproof structure and test it against wind and water to see if it survives. This activity teaches structural engineering, stability, and problem-solving under real-world conditions.
- **SCI- FI World:** Imagine and create your own futuristic world filled with advanced technology, space travel, and innovative designs. This activity combines science, engineering, art, and math to bring your sci-fi ideas to life through drawings or models.
- **Boat Afloat:** Design and build a boat using aluminum foil, then test how many coins it can hold before sinking. This activity explores buoyancy, density, and the engineering design process.
- **Coin Roller Coaster:** Create a roller coaster out of paper and tape that sends a coin racing from top to bottom. Learn about gravity, angles, and motion while improving your design through testing.
- **Static Race Challenge:** Use static electricity to move an aluminum can across a finish line using only a balloon. Discover how electric charges create forces that make objects move without touching.
- **Exploding Snowman:** Build a snowman and trigger a fizzy chemical reaction that makes it explode. A fun way to learn about reactions and the power of everyday science.