

# Summer STEM Challenge



Spend time this summer exploring STEM! In this challenge, you could make your own robots, study your neighborhood's ecosystem, or make yummy scientific treats! To complete this challenge, you must get Bingo, meaning you complete four challenges in a row. They could be up and down or diagonal, choose the topics you are most interested in exploring!

When you complete the Summer STEM Challenge, you can purchase the fun patch from the GSOC Shop!

## Female Leaders in STEM

Celebrate Female Leaders in Science! Learn more about these incredible trailblazers and learn how they made the world a better place.

*Choose one of the options below:*

- ◇ Discover someone in your community that is helping make the world a better place through STEM and interview them. If you can't interview them, do research to learn more about them. Then share what you've learned with others.
- ◇ Research someone in history who has been a trailblazer in their STEM field. Share about the discoveries they made with others through an art project, by drawing a picture, or making a collage!
- ◇ Get hands on with history! Find a trailblazer that did something you think was really amazing, then recreate it at home. For example, Dr. Mae Jemison was the first black woman in space. To celebrate her accomplishments, build your own bottle rocket and launch it!

## Your Neighborhood Ecosystem

Your neighborhood is full of science! Discover the unique ecosystem in your area. An ecosystem is made up of living organisms (like animals, plants, and bugs) interacting in an area with all of the non-living organisms (like water, dirt, and the sun).

*Choose one of the options below:*

- ◇ Take a walk to find the STEM in your neighborhood. See if you can find some different animals, insects, or plants and uncover the adaptations that make them special. After you have learned about them, draw what you saw! For example, a Phasmatodea, commonly known as a stick bug, has adapted to look like its environment. This is to help protect it from predators, the things that want to eat it!

- ◇ Visit a local nature center, park, or garden! Many different organizations support our local Orange County environment by conservation and educating the community.
  - ◆ Some fun places to visit with FREE admission include, Fullerton Arboretum, Thomas F. Riley Wilderness Park Butterfly Garden in Coto de Caza, Newport Bay Conservancy, Mason Regional Park in Irvine, Shipley Nature Center in Huntington Beach, Oak Canyon Nature Center in Anaheim or Carbon Canyon Regional Park in Brea!
- ◇ Create a checklist of all of the living or non-living things you think may be in your neighborhood ecosystem (maybe a crow, or a worm, or rocks!). Once you complete your list, give it to a friend or family member and see if they can find all of the items on the list!

## The Science of Cookies

Learn the science behind one of a Girl Scout's favorite things, cookies! Who knew science and cookies connected?!



*Choose one of the options below:*

- ◇ Explore how STEM can be found in baking. Try experiments with ingredients and amounts to see how they affect our end product. This is called the cookie test! Pick a simple recipe and pick something you want to experiment with. Make half the recipe normally, and half with something different. Maybe you want to try different sugar ratios, no baking powder, or add more flour! Try something new!
- ◇ Take on the engineering challenge of building with cookies! You can either make a gingerbread house or use cookies as your building blocks! When finding a good gingerbread house recipe, make sure its best for building rather than eating. Don't forget to decorate your cookie house!
- ◇ Boxes, boxes, and more boxes! Now that cookie season is over, what do you do with all the boxes? Use Girl Scout cookie boxes to build something new! Maybe it can be a car! Or a journal! Or a tower! Use your imagination and creativity.

## Media Arts & Technology

There are so many creative jobs within Media Arts and Technology including animation, filmmaking, photography, audio engineering, graphic design and more! Let's take a deeper dive into some of these careers and try some media arts on our own!

*Choose one of the options below:*

- ◇ Be a filmmaker and design your own commercial for Girl Scouts! Write a script, cast your crew, and film a video. Figure out how you want to spread the word about Girl Scouts in your video, just like your favorite commercials on TV! Bonus if you have an adult share it on Instagram and tag @girlscoutsoc!

- ◇ Become an Animator! Animators use storyboards to design and plan their animated features. Use your own [storyboard](#) to design and plan a few scenes of your very own animated movie. If you want to bring your story to life, you can use online applications such as Animation Kit, Toontastic, or Animoto.
- ◇ Get a taste of Digital Photography! Pick your photo subject (maybe a friend, or a pet, or something outdoors!) and snap some pictures. Get creative with angles, poses, and more! You can even edit these photos after you take them.  
(Juniors! Did you know there is a Digital Photographer badge?)

## Create & Innovate

Get your creative juices flowing and try something new! You can become an inventor, or a chef!

*Choose one of the options below:*

- ◇ Become an inventor and design your own brand-new invention! Maybe this invention helps people or makes people laugh! Do some research if you need some inspiration. Draw out a design of your invention – make sure to add notes so we know what your invention does. Share your new invention with a friend! Bonus, make a prototype of your invention!
- ◇ Research some of the most creative and innovative inventions of all time! Pick your favorite and design a creative way to share what you have learned with others. Create a multimedia presentation, a collage, a written article, or even a video!
- ◇ Design your own food! Try combining different flavor combinations to come up with a new type of food. Spaghetti Hotdogs? PB&J Smoothie? The sky's the limit! Think of something new and out of the box. Create a recipe for your new creation and share it with others so they can enjoy it with you!



## Coding for Fun

Who knew coding could be this FUN! Coding is the instructions used to communicate with computers. Learn about coding basics with these creative activities.

*Choose one of the options below:*

- ◇ Design your own coding jewelry by making a binary code bracelet! Binary code is the language used to communicate with computers by using patterns of 0s and 1s ([check out this document for the Binary Code!](#)). Pick two colors of beads and match the letter patterns to spell out your initials or name! You could try making one for a friend and put “bff”! Let your creativity and coding skills shine!

- ◇ Coding Dance Party! Check out Hour of Code on Code.org. and try the activity called Dance Party! You will get to program your very own dance routine using your favorite songs and silly characters. Dance on!
- ◇ Create a coding obstacle course! When coding, it is important for programmers to use very clear language to communicate to the computers. Create an obstacle course for a friend. Have your friend keep their eyes closed and direct them across the obstacle course using only your voice! For an added challenge, write out all of the steps and read them, just as you would when you write code on a computer!

## Botany: Plant Science

Botany is a branch of biology where scientists study plants! Scientists who work in the field of botany are called botanist. Get your hands dirty and become a botanist!

*Choose one of the options below:*

- ◇ How do plants drink water without having a mouth? Though osmosis of course! Osmosis is the way a plant absorbs water. To test this out, try a celery osmosis experiment. Take cups of water filled with food coloring and place a stalk of celery, bottom of the stalk first, into the water. What do you think will happen? Make a hypothesis! Then wait and watch your celery drink it up!
  - ◇ Create your very own at-home greenhouse! Greenhouses are glass buildings used to grow plants. Greenhouses stay warm inside, even during the winter. Using a baggie, you can create a small greenhouse. Add dry beans into a plastic baggie with a damp paper towel (not soaking wet, just damp). Some dry beans that work include lima, kidney, pinto, navy, or black beans. Tape your plastic baggie to a window that gets lots of sun. Keep an eye on it for a few days, and watch what happens!
  - ◇ Learn about new plants! Go to a garden and find a new plant you haven't seen before. Take photos of it, or draw it, and learn more about it! You can ask a local gardener or search for the plant online. What new facts can you learn about this local plant?



Check out these GSOC Juniors exploring the ecosystems in their local beach communities!

## Creative Chemistry

Chemistry is a branch of science that can get wild! People who study chemistry are called chemists. Chemists study the substances that make up matter – everything that takes up space in the universe! They also study the changes that take place when substances are combined. These changes are called chemical reactions! Learn about what chemical reactions you can do at home.

*Choose one of the options below:*

- ◇ Can you clean a penny? Fill up one cup with water and one cup with ketchup! (Trust me on this one! It sounds silly!). Observe how the pennies look before putting them in the cups. Then, place the pennies in the cups, completely submerged! Let them sit for 5 minutes. Make a hypothesis of what you think will happen, then observe. What happened?
- ◇ Solid, liquid, gas, and Oobleck?? What category do you think Oobleck fits in? Scientists say it may not fit in any category! To make Oobleck you need cornstarch and water. Try it for yourself! [Click here for the experiment!](#)
- ◇ Here is your challenge... blow up a balloon without blowing into the balloon. Tricky huh? Not with chemistry! First, add baking soda to a balloon. Then, take a plastic water bottle and add an inch or two of vinegar. Next, carefully attach the balloon to the top of the water bottle without letting any baking soda fall in to the bottle. Once it's secured, lift up the balloon so the baking soda falls into the vinegar. Watch what happens!



## Space Science

Get ready for liftoff! With these activities you will learn more about space! Learn some out-of-this-world facts about the moon and our stars.

*Choose one of the options below:*

- ◇ Did you know the moon sometimes looks like an Oreo? Well maybe not, but we can use Oreos to model the moon!. Use a spoon to help move the frosting around on the Oreo to make it look like each phase of the moon cycle. [You can use the worksheet linked here!](#) Don't forget to taste the Oreo moons after!
- ◇ Go stargazing! See if you can locate any stars visible from your city! Check out this sky map to learn what stars may be visible in your area. [www.skyandtelescope.org/interactive-sky-chart](http://www.skyandtelescope.org/interactive-sky-chart).
- ◇ Create a constellation! Look up some of the most famous constellations, and pick your favorite. Then, make your own constellation using things you find around your home. I recommend using food so you can eat it after! :)



## Animal Science

Animal Science is learning the science, arts, and practical methods of caring for, improving, and managing livestock and companion animals. Do you have a companion animal (pet) at home? Learn more about animals in our neighborhoods or in your home!

*Choose one of the options below:*



- ◇ Tweet Tweet! Time to feed the birds! Design and create bird feeder. Use your creativity to come up with a unique bird feeder design. Can you use old bottles? Maybe popsicle sticks? Once your bird feeder is done, add some seed and find a place to share it in your neighborhood.
- ◇ Let's play! Design a new toy for a pet. If a pet could have any toy, what would you design for them? Maybe a new chew toy for a dog? A new ball for a hamster? Tank toys for a fish?
- ◇ Did you know that some animals have jobs? Some animals play very important roles in our communities. Do research on animals that have jobs and share your newfound information with your family and friends.

Bonus: Visit local animals! There are fun, FREE, places to meet animals in Orange County including, the Farm and Food Lab at Great Park in Irvine, Rancho Los Alamitos in Long Beach, and Centennial Farm in Costa Mesa.

## DIY Robotics

Beep Boop! Do you want robots living with you? In these activities, robots will come to life using materials from around your home. All levels, Daisies through Ambassadors, have Robotics badges if you are ready to dive into robotics!

*Choose one of the options below:*

- ◇ Create a robot out of recycled materials. Get creative! Make sure you give your robot a purpose! What would your robot do if it came to life?
- ◇ Design a robot! Create a detailed sketch of a robot prototype you would create to help solve a problem. What problem would this robot solve? What would it look like? Share your robot design with others!
- ◇ Create a bristle robot! You will need a few materials to make this happen including a toothbrush, a vibration motor and a coin cell battery! Check out this link to learn how make your own Bristlebot: <https://www.sciencebuddies.org/stem-activities/toothbrush-bristlebot>



## Math in Nature

Math is everywhere! Did you know you can find math outside? Get outside and find patterns, collect data, or make your own mathematical designs. Like these badges? Daisies, Brownies, and Juniors all have three Math in Nature badges to earn!

*Choose one of the options below:*

- ◇ Go bird watching! Search [www.ebird.org](http://www.ebird.org) to find your city and see what birds have been spotted in your local area. Pick a bird you are interested in collecting data on. Take a journal out with you and tally how many times you can find that bird (Tip: pick a bird that is seen commonly in your community). You can bird watch from anywhere but [www.ocbirds.com](http://www.ocbirds.com) has information on the best bird watching spots.
- ◇ Make a life size sundial! If you have a sunny day, a friend, some rocks, and ribbon, you can make a sundial with people! First, place a rock in the center of an imaginary circle on the ground. Stand by it and cast a shadow. Have your partner extend a piece of ribbon from your foot to the end of your shadow, cut it, and pin it down with another rock. Check the actual time and write it down. Repeat several times throughout the day. Each time, look at the shadow: is it long or short? Wide or narrow? How did it move or change? How does the time of day affect the shadow? Can you use your sundial to tell time without a clock?
- ◇ Find a pattern in nature. What natural patterns can you find in your community? Where do you see patterns in nature? In flowers? In spiderwebs? In rock formations? Draw a picture of what patterns you find!



## Engineering Challenges

Get ready to think like an engineer! Engineers use something called the Engineering Design Process when making their designs. First, they research, imagine, and create a plan. Second, they create a prototype and test their design. Sometimes, if the design does not work the first time, they have to try again! Keep trying these challenges, and don't give up!

*Choose one of the options below:*

- ◇ Create a bridge! Do research on the best bridge designs and make your own using found materials at home. Some ideas include Lego, blocks, dominos, paper towel rolls, anything you can find! Draw a body of water (like a river) for your bridge to go over.
- ◇ Build your own kite! It may take a few tries to get it right but follow the Engineering Design Process and keep trying! Once you have your kite prototype, try flying it!
- ◇ Engineering Challenge! Find a friend or family member to join you in a tower building contest. Pick two items you have in your home and see who can build a taller tower. Those items could be, paper and tape, clothespins and sticks, uncooked noodles and playdoh, cups and popsicle sticks, the combinations are endless!

## Careers in STEM

There are hundreds of jobs in STEM from jobs helping animals, helping people, and helping the world! Learn more about the different STEM Careers available to you! If you want to dive deeper, all levels have a STEM Career Exploration Badge.

*Choose one of the options below:*

- ◇ Create a vision board. What does your future look like? Do you want to graduate? Do you want a STEM career? Design your own vision board with the things you hope to see in your future. You can draw pictures or cut things out from a magazine to create a collage.
- ◇ Do research and learn about careers in STEM. Find a new one or one that you would like to investigate. There are jobs in STEM related to animals, video games, and helping people! Find one you are interested in, learn about it, and share what you have learned.
- ◇ Talk to someone in a career you find interesting or watch a video! If you can find someone in a career you like, ask them about their career. How they got there, what their favorite parts of the job are, and what they recommend you do to get there. Learn more about what steps you can take to get into that career you find interesting!

## Digital Leadership

The internet and social media are fun, but it is important to be safe. We want to empower Girl Scouts to educate others about the importance of online safety. Learn more about what it means to be a digital leader!

*Choose one of the options below:*

- ◇ Make a video! In this video, share how others can be safe online. Do research on how to make safe choices on the internet. One way you can do that is by watching videos like this one: <https://bit.ly/4bFOQAP>. Create your own video, and share it with others so they can be digital leaders too!
- ◇ How can you make a difference in the digital world? Make a collage to help explain your ideas.
- ◇ If you could design an app to help people, what would that app be? Design your own app for a phone or tablet that you think would help people. Draw out the design for your app and make a list of how you think it would help others.



GSOC Girl Scouts know the importance of Digital Leadership!

## Sweet Science

Who knew science could be so sweet... literally! These activities will help with your sweet tooth craving!

*Choose one of the options below:*

- ◇ Did you know a chemical reaction takes place to make at-home ice cream? Beat the heat with this tasty experiment! You will need half & half, vanilla, sugar, ice, salt, and plastic bags. Follow along with this video to make some tasty ice cream! Watch the Video: <https://bit.ly/4b19YVk>. Instructions: <https://bit.ly/3UBkkZU>
- ◇ Grow your own candy! Yes, you heard that right, grow your own rock candy! This experiment takes a few days, so be patient, but the reward of tasty rock candy is worth it! Find the instructions here from Science Buddies: <https://www.sciencebuddies.org/stem-activities/rock-candy>.
- ◇ How is your favorite candy made? Research the science of candy. Candy making is made up of chemical reactions and lots of experimenting! Pick your favorite candy and research how it is made! Share what you learned with your family or friends.

