

STEMMING DAISIES

The intent of this booklet is to provide Daisies and young Girl Scouts with an opportunity to interactively explore STEM.

Introduction And Why STEM Is Important For Daisies:

Cooking, fashion design, and gardening. What do these activities have in common? At the core, all of them have elements of STEM that make them engaging. STEM stands for Science, Technology, Engineering, and Math, and it is everywhere. From the chemistry involved in baking a cake, to the math required to measure out a dress design, to even knowing how plants grow in order to cultivate a beautiful garden, STEM presents itself in many ways. However, it can often be intimidating, bringing to mind pictures of computer scientists hunched in front of a computer screen writing incomprehensible code. This view of STEM can keep young people away from it or discourage them from trying it. Girls especially are affected by this mentality, as evident by the statistic that less than 25% of people in STEM careers are girls. Intimidation surrounding STEM can also turn teachers away from presenting it, and we found this to be true within the Girl Scout community. We conducted some research and found that many troop leaders were highly interested in exposing their troops to STEM and that some young girls had shown interest in the subject. However, the leaders expressed concerns that they felt reluctant or unqualified to teach it. This inspired us to partner with Girl Scouts to try to break down those barriers and provide an avenue for troop leaders to confidently introduce STEM to young Girl Scouts, primarily Daisies. We also wanted to expose Girl Scouts to STEM at a young age, in hope that the early exposure might spark a passion that can be pursued later in life.

Thus this booklet was born.

Purpose Of The Booklet:

This booklet is intended for troop leaders to follow to create an interactive STEM experience for young Girl Scouts, mainly Daisies and Brownies. Our hope is that the format will be accessible, inviting, and understandable to troop leaders, while being fun, exciting, and empowering to Girl Scouts.

How To Start Your Adventure:

The booklet is structured in a sequential story format. The interactive STEM experience is embodied in a story about a Girl Scout who embarks on an adventure but gets lost and must find her way back. The interactive portion comes in through three activities that the Girl Scouts complete using STEM concepts and their creativity. They are placed in the story at certain points and discussion/guiding questions are provided to help the troop leaders make sure the girls see how they are using STEM to find solutions.

Instructions:

In this book, you will be able to follow the story of Kalea (Kuh-Leah), while crafting STEM-related items of your own. As you progress through the story, you will find three different scenarios along with activities.. Each activity will have its own specific set of instructions for you to follow. Start your adventure by reading the story and pausing at each activity.

Activity 1 - Time: 15min - Parachute

Supplies

- 1 plastic bag w/o handles or coffee filter or paper towel
- 4 2ft pieces of yarn, or dental floss
- Some type of weight: 1 wooden person or plastic figurine, or a washer
- A pair of scissors
- 1 roll of tape
- 1 step stool or chair to be the cliff for dropping the parachute
- A photo example of a parachute if needed

What Is A Parachute?

A parachute is a device used to slow down an object that is falling towards the ground. Without a parachute the gravity (a force that attracts a body toward the center of the earth) is more than air resistance. But as the parachute opens, the air resistance increases. Now there is more air resistance than gravity.

Instructions

1. Take out plastic bag or coffee filter, or cut out a circle shape from paper towel.
2. Cut six pieces of equal length string and tape them at equal distances around the edge of the shape.
3. Tape the other ends of the string to a weight.
4. Drop parachute from above ground to watch it descend.

Discussion points

1. Demonstrate how quickly the weight, plastic figure or washer falls to ground without a parachute. Then compare to the slower flight with the parachute.
2. Ask students what they think would make the parachute drop faster or slower (bigger or smaller canopy)? What other materials do they think would work well for making a parachute?
3. Let them know how they used math (measurement) and science (gravity and air resistance).
4. You can use digital cameras to take pictures of parachutes, or video them flying to demonstrate another use of technology.
5. Lead a discussion to compare results and draw conclusions.



Activity 2 - Time: 10min - Bridge

Supplies

- A bag of packing peanuts
- 12 wood skewers per bridge
- Pictures of different bridge designs
- Small weight (3 lbs) or any items to place on bridge to demonstrate load (one light and one heavy)
- 2 stacks of books to create canyon for the bridge to suspend from book to book.

What is a bridge?

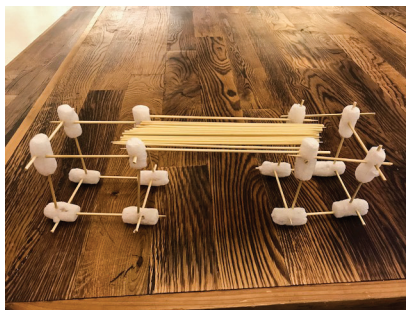
A bridge is a structure carrying a road or path across a river, ravine, or other obstacle. It is designed to carry a load. Bridges come in many different sizes and materials. They might be as simple as a fallen log across a creek, or the Golden Gate Bridge crossing the San Francisco Bay.

Instructions

1. Distribute supplies for each student or group
2. Show them pictures of bridges and how they work
3. Set up two stacks of books at least 1 foot apart and challenge students to come up with design to span across books.
4. Place small weighted objects on bridge to see how the structure withstands weight

Discussion points

1. Discuss if bridge was able to support and light or heavy load.
2. Ask students what they think types of support would be needed to hold a car?
3. Careers for bridge builders could be structural engineers, civil engineers and transportation engineers
4. You can use digital cameras to take pictures of parachutes, or video them flying to demonstrate another use of technology.
5. Lead a discussion to compare results and draw conclusions.



Activity 3 - Time: 20min - Balloon Car

Supplies

- 1 balloon per car and 1 straw
- 2 bamboo skewers for axles
- 1 piece of foam core or lightweight styrofoam or cardboard material 3" x 10"
- Lightweight play foam purchased or made from googling recipe. This will keep wheels secure and axle
- 1 roll of tape
- 4 small wooden craft spools for wheels, plastic bottle caps or foam discs
- Decorating materials

What is a balloon car?

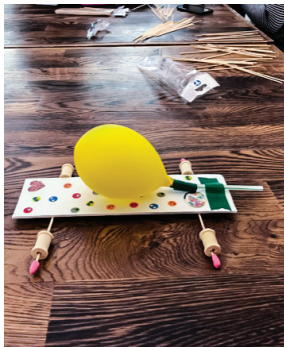
A balloon car is a craft car powered by the air from a balloon exiting through a straw.

Instructions

1. Start with your piece of foam or cardboard
2. Tape two skewers horizontally across body of cardboard with 2 inches in between each skewer.
3. Add spool on all four outer edges of skewers to make wheels. Use small pinch of on end of skewer to keep wheel from falling off.
4. Cut straw in half and insert tip into balloon. Tape straw to cardboard/foam where straw meets balloon.
5. Decorate car to Daisy liking.
6. Blow into straw and inflate balloon, set vehicle down on ground and release.

Discussion points

1. Talk about how far vehicle travels. What would make it go faster?
2. Explain how momentum keeps car moving even after air is out of balloon, but it will eventually slow down due to the friction on the floor.
3. Newton's Law of motion that for every action, there is the opposite reaction. Blow into balloon one direction, the air releases and pushed the car the other way.
4. What different supplies could you use to make other vehicles move without power?
5. Lead a discussion to compare results and draw conclusions.



Kalea's **STEM** Adventure

(Part 1): Once upon a time there was a Girl Scout named Kalea. She was a Daisy just like you, and she loved to work on her petals and learn things in school, especially science and math. One day she went to a big Girl Scout camp with all of her friends. She was having an awesome time when suddenly she spotted something sparkly in the distance. Curious to know what it was, she started walking towards it. As she got closer, she realized it was the magical purple unicorn Swift! Legend had it that when a very brave Girl Scout rode the unicorn she would find a wonderful adventure, so Kalea mounted Swift and took off. She rode for a while past beautiful waterfalls and wooded forests of spruce trees until she and Swift came to the edge of a granite cliff. Kalea stopped and got off to admire the view, but when she turned around, Swift was gone! What should she do? She didn't know the way back so she decided to keep going using her knowledge and skills she'd learned from being a Girl Scout. But how should she get down the cliff? Suddenly she had an idea! She realized that she could build a parachute using her jacket and float down the cliff wall to the steady ground below.

Questions To Ask After Activity:

- What letter of STEM did you use to solve this problem?
- How did you use that letter to help you?

Fun Fact: Did you know? The first woman to jump out of an airplane using a parachute was Georgia Broadwick, nicknamed "Tiny" because she was so small.



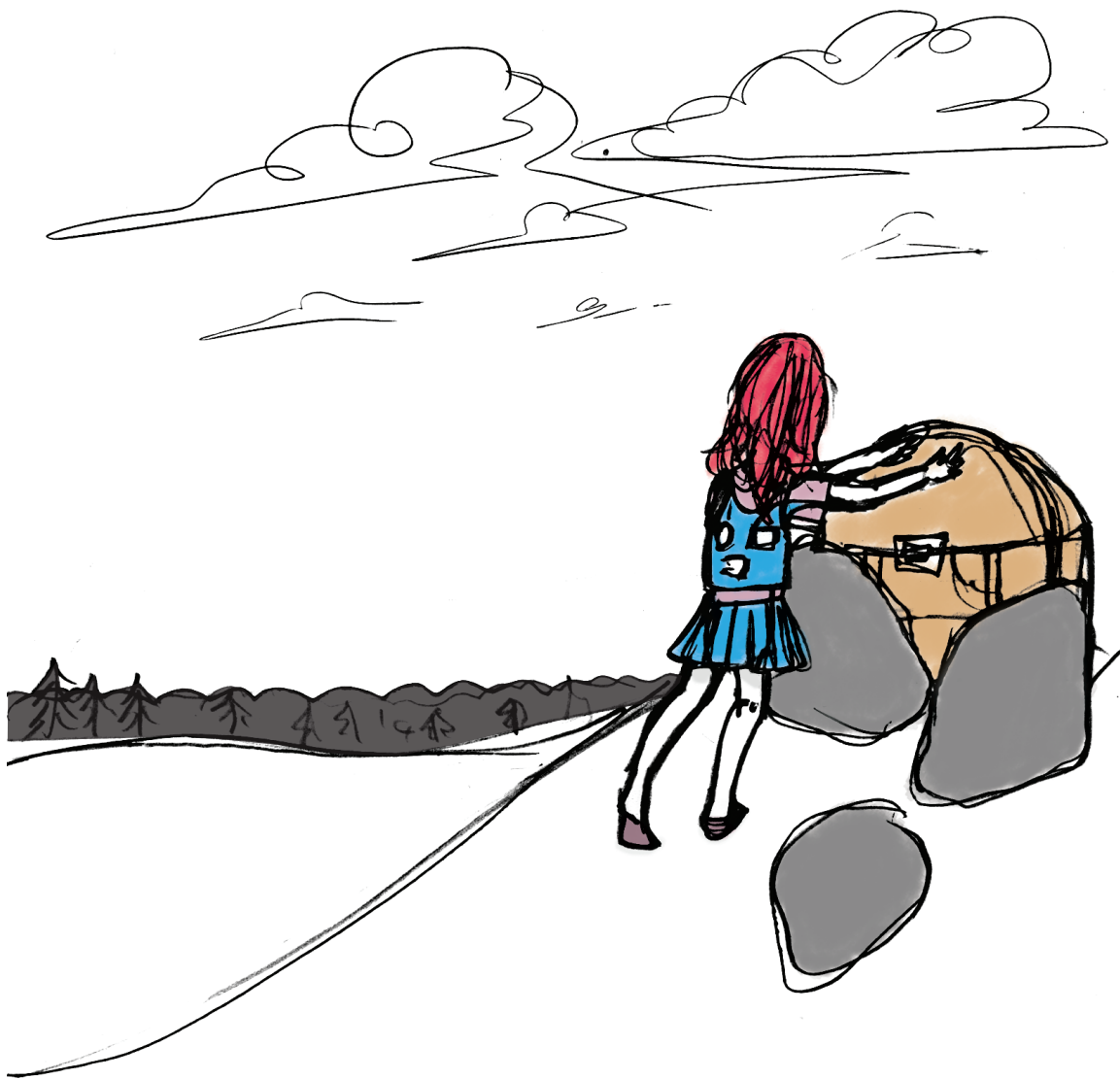


(Part 2): Kalea's idea worked! She safely got down the cliff using her parachute and continued her adventure. After walking for a long time over the hills and through the fields she came to a giant canyon. This time, though, she couldn't parachute down because there were Thin Mint Monsters at the bottom! She had to get across somehow. After doing a bit of hard thinking, Kalea brilliantly discovered that she could build a bridge to get across!

Questions To Ask After Activity:

- What letter of STEM did you use to solve this problem?
- How did you use that letter to help you?

Fun Fact: Did you know? A woman named Emily Roebling supervised the building of the Brooklyn Bridge after her husband fell ill, and her name is on the plaque dedicating the bridge to recognize her vital contributions.



(Part 3): Now that she had crossed the canyon and avoided the Thin Mint Monsters, Kalea was beginning to get tired. She wanted to go back to camp and see her friends but didn't know how to get there. As she was walking, she tripped over something and fell. She got up to see what it was. It was a pile of rocks, but under them there was something shiny! She quickly uncovered it and discovered it was a treasure chest with pieces and parts in it. She dumped them out and found some wheels, some straws, a balloon, and a small piece of cardboard. What could she build? She thought for a bit and decided to build a super-fast go-cart to race back to camp.

Questions To Ask After Activity:

- What letter of STEM did you use to solve this problem?
- How did you use that letter to help you?

Fun Fact: Did you know? Mary Anderson invented automatic windshield wipers for cars in 1903, but they were originally seen as too distracting. However, they became standard on most cars by 1916.

End Of Story: Soon Kalea found her way back to camp. When she arrived she told all of her friends about her magical adventure with Swift the unicorn and the unfortunate obstacles she faced. She shared lessons of how she used her mind, resources and engineering to allow her to return safely.

Ask to make sure they understand the concepts (How did you use science, how did you make technology, how did you engineer this, how did you use math to build this correctly, etc.)

What was your favorite activity?



What's one thing that you learned?



**Would you want to do activities like the ones we did today with your friends?
Which ones and why? What are other ideas for STEM activities to do with your friends?**

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How do you think you could use STEM in your life?

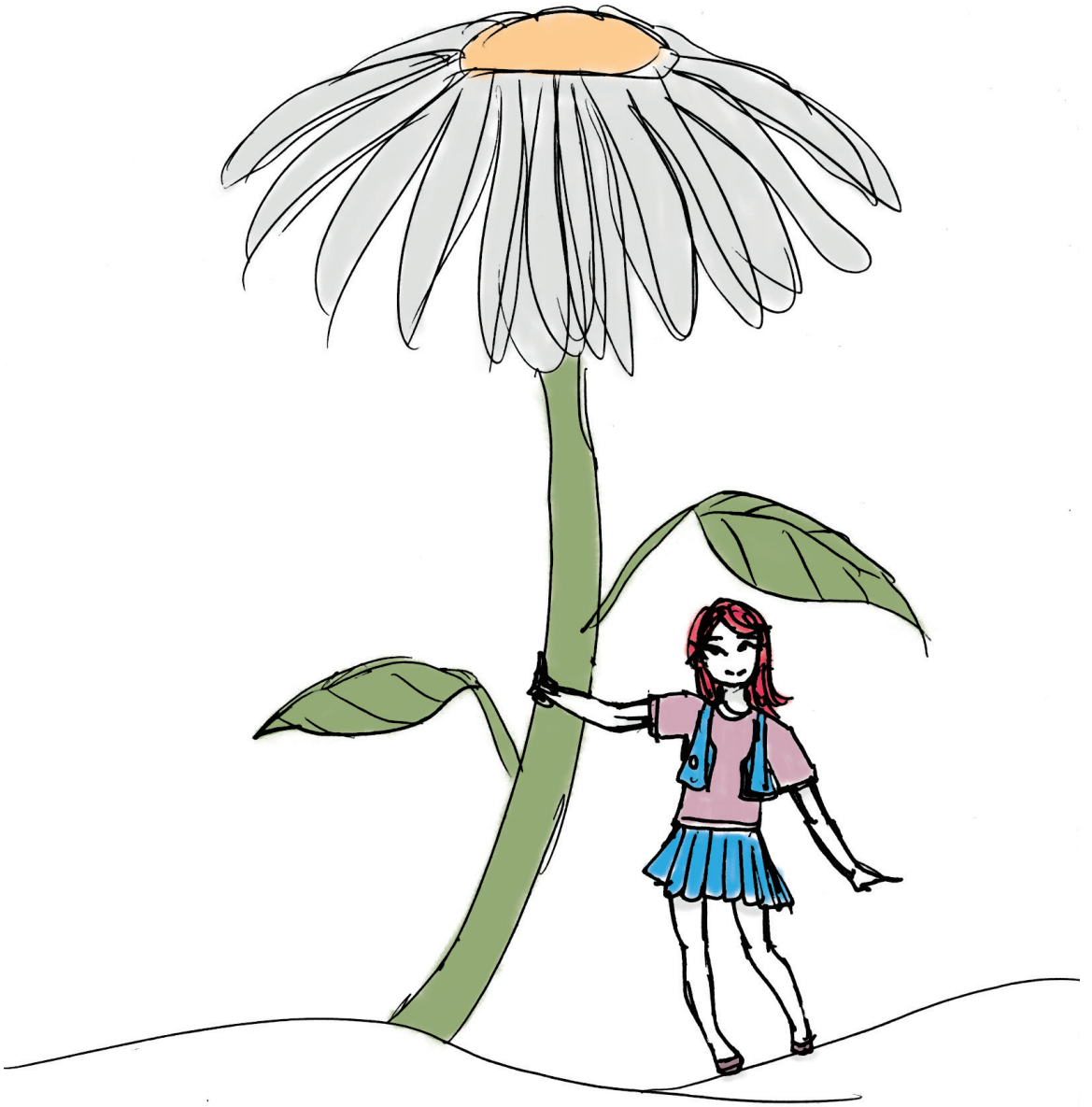
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More STEM Project Ideas/Additional Resources:

STEM careers: <https://www.onetonline.org/find/stem/?t=0>

STEM activities: <https://thestemlaboratory.com/>

STEM journeys: <http://www.girlscouts.org/en/our-program/our-program/stem.html>



ONE  STONE

PROJECT  GOOD