Juniors Toolkit

About Girls Get STEM: Unleash Your Inner Scientist

Girl Scouts of the USA has unleashed a new partnership with Discovery Education to spark girls' interest in STEM and help them unleash their G.I.R.L. (Go-getter, Innovator, Risk-taker, Leader)™ potential. Girls Get STEM: Unleash Your Inner Scientist provides educators and Girl Scouts troop leaders with standards-aligned curriculum that aims to address gender equity in STEM education across the country through a series of girl-led, girl-tested, and girl-approved resources for students in grades 2–5.

Quick Facts

- Program Name: Girls Get STEM: Unleash Your Inner Scientist
- URL: https://www.girlsleadstem.com/educator-resources
- Audience: Girl Scouts in grades 2–5

About the Girls Get STEM Activities

The Girls Get STEM activities below were created to bridge national science and engineering standards into the Think Like a Citizen Scientist Journey. This can support you as a troop leader in recruiting girls and establishing relationships with educators. In additional to our national standards, non-cognitive skills are factors that predict success in school beyond content knowledge and academic skills. In education, we refer to some of the most popular learning strategies in today's workforce as the "4Cs" for 21st Century Learning. They include critical thinking, communication, collaboration, and creativity. Each of the activities created in this partnership highlight and help develop these important skills.

The table below provides an overview of each Girls Get STEM activity, how to include this activity in your current Think Like a Citizen Scientist Journey, and identifies the 21st Century Learning Skill featured.

Data Collection Activity: Critical Thinking

Timing: Approximately 30 minutes, but tailor this activity to fit your troop's needs!

Focus Area: Critical thinking involves the skills we use to make our own decisions and form our own independent thoughts. In order to think critically, we need to gather and assess the information available to us. It's important to continually sharpen our critical thinking skills, and this activity does just that!

Activity Overview: Throughout the Think Like a Citizen Scientist Journey, the troop will learn about and practice data collection. To prepare for collecting data for a citizen science project, the girls will first participate in a quick hands-on activity in which they learn to differentiate between qualitative and quantitative data. Girls will then work together to brainstorm the qualitative and/or quantitative data that needs to be collected for their citizen science project

Materials:

- **Data Cards,** one copy of each
- **Conclusion Name Tag,** one copy for you to wear
- Tape or a safety pin (to attach the **Conclusion Name Tag** to your shirt)
- **Data Sentence Strips,** one copy
- **Data Brainstorming,** enough for about one-third of the troop
- Poster board/chart paper and a marker
- **Prepare Ahead:** Cut out the **Data Cards**, the **Conclusion Name Tag**, and the **Data Sentence Strips.**

Where can this activity fit in?

- Citizen Science Project: This activity can be used to complement any citizen science project the girls take on throughout the Think Like Citizen Scientist Journey. In particular, it can be used prior to the troop conducting their project in Think Like a Citizen Scientist Pt. 3.
- Take Action Project: For those troops who have decided to complete a second citizen science project as part of their Take Action project, this activity can be integrated into Activity 3 of Think Like a Citizen Science Pt 5.
- Other times of data collection: The activity can also be used to support any kind of activity that includes data collection!

Steps:

Juniors will learn to differentiate between qualitative and quantitative data. They'll work together to brainstorm the qualitative and/or quantitative data to collect for their citizen science project.

Part 1: Explore

Though your troop has likely already discussed what it means to make observations and collect data, begin with a review.

SAY:

- As part of the Think Like a Citizen Scientist Journey, you'll complete at least one citizen science project as a troop.
- No matter what project you choose, you'll be collecting data to send to a scientist for analysis.
- What does it mean to collect data?

Encourage girls to share their ideas with a partner, and then discuss as a troop. Arrive at an answer that when someone collects data, they record information that they measure or observe. This information is then used to help them better understand a problem!

Hold up the two Data Cards and read the definition of each type of data:

SAY:

- Data you measure and data you observe are two different types of data.
- Quantitative Data is data that is measured with numbers.
- Qualitative Data is data that is observed using your senses (sight, touch, smell, sound or taste).

Put the **Data Cards** on the board or on a wall where girls can continue to refer to them. Alternatively, you may want to rewrite the definitions on the board or chart paper so they're easier for girls to see.

Put on your Conclusion Name Tag and then explain the rules of the game.

SAY:

- Next, we're going to play a game to categorize data into qualitative data and quantitative data.
- Half of you will become "Quantitative Data Collectors" and the other half will become "Qualitative Data Collectors."

- I'll represent the conclusion—which is the answer scientists hope to find when they conduct a science experiment.
- For the game, I'll read aloud a piece of data. If it matches the type of data you collect, you'll take one step towards me.
- The first Data Collector to reach the Conclusion (me) wins!

Have all of the girls should stand on one side of the room, as you stand on the other side. Depending on the size of your meeting space, decide in advance if girls can take giant steps or if they must keep their steps to a certain size.

Once you have separated the girls into Qualitative and Quantitative Data Collectors, get started!

Randomly draw the Data Sentence Strips and call out data examples.

- **If you read an example of qualitative data,** all Qualitative Data Collectors should take a step toward you (the Conclusion).
- **If you read an example of quantitative data,** all Quantitate Data Collectors should take a step toward the Conclusion.

Continue to read Data Sentence Strips and have girls move forward until the first Data Collector reached the Conclusion (you). Girls may refer to the **Data Cards** to help them if they are unsure.

If the game finishes quickly and you still have many sentence strips left to use, the girls can switch roles and play again.

Part 2: Debrief

Bring the girls back together and prompt the troop to consider the lesson behind the game.

SAY:

- If given the choice in this game, would it be better to be collect qualitative data, quantitative data or both? Why?

Help the girls to understand that this game is representative of science experiments.

AFTER THE DISCUSSION, SAY:

- It's usually best to collect both types of data in order to see the bigger picture. If you use just one type of data, it can be hard to really understand what is happening.
- For instance, if you were studying a river in winter time, you may observe that the ice is 6 inches thick, but you may not observe that you could see a fish swimming underneath!
- Each type of data tells you something that the other does not. When you use both types of data to see the bigger picture, you can usually develop a stronger answer or reach the conclusion more quickly.

Part 3: Apply

Divide the girls into groups of three or four, and distribute a **Data Brainstorming** handout to each group.

Together, review the goal/purpose of your troop's citizen science project, and then challenge each group to brainstorm qualitative and quantitative data that they could collect for this project.

Note to Volunteers: While some projects may logically need more of one kind of data than the other, reinforce the idea that strong data collection involves both types of data!

Once groups have had time to create their lists, bring the troop back together. Encourage each group to share their ideas, and use the chart paper or poster board to create a final list of the quantitative and qualitative data that you'll work together to collect for the citizen science project.

Data Cards

Quantitative Data
is measured with numbers.

Qualitative Data
is observed using your senses (sight, touch, smell, sound or taste).

Conclusion Name Tag

Directions: Cut out the square below and tape or pin it to the front of your shirt before playing the Data Collection Game.

CONCLUSION

Data Sentence Strips

Directions: Cut out each of the sentence strips for use in the data collection activity. Starred sentences represent qualitative data, and sentences with no star are examples of quantitative data.

The Sun is a bright orange color.*

It is 86 degrees outside today.

The river is roaring much more loudly today than it was yesterday.*

The river is an inch higher today that it was yesterday.

The pavement is so hot, it will burn your feet.*

The pavement will burn your feet if you stand barefoot on it for more than 5 seconds!

The mud is thick and sticky.*

My foot sinks more than 2 feet down when I step in the mud.

The leaf looks smooth, but it feels very bumpy.*

Critical Thinking

I need a magnifying glass to see the bumps on the leaf because they are less than 1 millimeter high.

The air doesn't smell clean; it smells like car exhaust.*

The Air Quality Index is at 205, which means the pollution in the air may cause health problems.

The moss on one tree stump makes it look much older than the other tree stump.*

One tree stump has 32 rings, and the other tree stump only has 4 rings.

The bird moved slowly from branch to branch.*

It took 5 minutes for the bird to walk across the 47-inch branch.

The forest was silent after the rain.*

In a period of one hour, only 4 sounds were heard after the rain.

The cookie tasted rich, chocolatey and sweet.*

The cookie contained 23 chocolate chips!

Critical Thinking

Data Brainstorming Handout

What quantitative data will our Take Action Project need to collect? *Remember:* This kind of data is measured with numbers!	**What qualitative data will our Take Action Project need to collect?** *Remember:* This kind of data is observed using your senses!