Think Like a Citizen Scientist Journey: Jump Into the Scientific Method

Purpose: Explore how scientists solve problems as you create a test to learn more about your environment. Then, find out how you can help real scientists with their research!

Set-Up: Scientists study nature and conduct research to better understand how it works. They use what they learn to create solutions that help people, animals, and the environment. To learn new things and do research, scientists use a process called the scientific method.

Citizen science is when a scientist asks regular citizens to help with their research. It's a way for everyday people to help scientists advance research.

Activity:

To get started, gather a few sheets of blank paper, a pencil, and some markers or colored pencils. You'll also need a set of "field tools" to help you to take field notes about your environment. You might want to include tools you have around the house, like a ruler, magnifying glass, camera, and thermometer.

Part 1: Make observations about your environment.

Observation is watching and noticing something using all of your senses, especially sight. Observations are a type of data. Data simply means information. It can be notes, drawings, photos, recordings or videos of what you see and hear.

Start by taking a minute to make some observations about your environment (the world around you!).

If you can, go outside, but it's alright if you're indoors—there are still plenty of things to observe! Walk around and explore your surroundings. With your pencil and paper, collect data by writing or drawing what you observe. Make sure to add lots of detail to your data, like information about size, quantity, or color. If you have questions about what you're observing, write them down, too!

Part 2: Form scientific questions and hypotheses.

As scientists collect data, they ask scientific questions about their observations. Once scientists have a scientific question, they make an educated guess, or form a hypothesis, about what they think the answer is. The hypothesis can be tested to see what parts (if any) can be confirmed.

Once you have some observations, choose your 3 most interesting and form 2 scientific questions for each. If you're wondering if your question is scientific, ask yourself: Is this testable? How could I find an answer? What experiment or test could I conduct?

Then, choose one question that: 1) you're interested in trying to answer through more observation, and 2) you could collect data and measurements about.

Finally, look back are your scientific question: what's your hypothesis? Use what you already know or can reason to answer your scientific question.

Part 3: Test your hypothesis.

A hypothesis isn't ever 100% right or wrong. If an experiment confirms a hypothesis, it just means that the scientist has more data about the subject, its environment, and how it interacts with the world.

So, once you have a hypothesis, design a way to test it and see what you can confirm! Create your research plan by deciding: 1) what field tools you'll use and 2) what method or steps you'll use to run the test. Make sure that you'll be able to run your experiment. If needed, scale it down to something you can easily do with some simple observation!

Add "field tools" that help you learn more about you subject. For example, you might have tools to help you show what your subject looks like, how big it is, what it sounds like, or how many you see. Or, you might need to identify parts of nature and want to include field guide research as part of your plan.

Once you have a plan, test your hypothesis by observing your subject once more. This time, focus on taking field notes only on your subject. Use your set of "field tools" to add details about what your subject looks like, how big it is, what it sounds like, or how many you see. For example, you might use a ruler to measure the distance between two objects or a camera instead of sketching.

Part 4: Analyze your results.

When scientists come back from the field, they review their notes to make sure they're detailed and think their data means. Thinking about and understanding data is called data analysis. Scientists might compare what they saw with other data, find a way to present it (like a graph, chart, etc.), or look at their data and decide they need to collect more!

So, look at your data and analyze what you think it means: do your results support your original hypothesis? Compare your results against your original hypothesis to form a conclusion.

Depending on your test, you may not be able to form a conclusion that answers your original question, and that's okay! You're still using the scientific method to learn something about your world, just like scientists.

When this happens to scientists, they might run their experiment again, collect data over a longer period of time, or change their entire research plan! It helps them to confirm that their results make logical sense.

Optional Part 5: Participate in a citizen science project.

Now you know about the scientific method, but what can you do next? Become a citizen scientist!

To help you get started, Girl Scouts of the USA has partnered with SciStarter to offer Girl Scout and volunteers a special portal to find and track citizen science projects.

SciStarter has almost 3,000 citizen science projects to choose from—and the dashboards include several citizen science projects that are well suited for Girl Scouts. There are projects that can be done in any season!

You can participate in Globe Observer from NASA and collect data about clouds, identify plants in your background with iNaturalist, or play an online game called StallCatchers to help with Alzheimer's research. Whatever part of nature you're interested in, there's a citizen project for you!

Check out the "How to Use SciStarter Guide" for more information on citizen science projects and SciStarter.

And that's it! You've completed part of the Senior Think Like a Citizen Scientist Journey! If you had fun doing this, you might want to participate in a citizen science project or Take Action with the rest of the Think Like a Citizen Scientist Journey.