

Daisy the SmartFlower and Solar Power



Lesson Plan for: Cadette | Senior | Ambassador

Background Information for Leaders and Caregivers:

If you or your Girl Scout(s) have never visited the Girl Scouts of the Colonial Coast (GSCCC) headquarters, called A Place for Girls, it's time to plan a trip! Located between the office building and parking lot is an incredible machine called a SmartFlower.

"SmartFlower is the world's only solar solution to use an all-in-one, sculptural design and intelligent solution to produce clean, sustainable energy for your home, car, or business." – SmartFlower website

A SmartFlower collects energy from the sun through solar panels on its "petals." As the sun moves across the sky during the day, the SmartFlower will turn to follow it- just like a real sunflower. Because of this feature, it can obtain up to 40% more energy than a stationary panel. At night or during strong winds, the SmartFlower will close.

GSCCC's SmartFlower was installed in summer of 2023. We nicknamed it "Daisy" after the nickname of the founder of Girl Scouts, Juliette Gordon Low. While she doesn't offset all of our energy use, Daisy helps reduce our need for non-renewable resources and is an excellent teaching tool.

Below are four activities you can do with your Girl Scout(s) to learn more about Daisy the SmartFlower, resources, energy, the sun, and making observations. Activities 1 and 2 both require waiting time; it may be best to start both activities around the same time and continue to Activities 3-5 while you wait. Activity 4 is a field trip around your city.

Activity 1: Explore The Sun

*This activity also meets the requirements for Step 2 of the
Cadette Space Science Explorer!*

Materials:

- Blue construction paper
- Plastic film (plastic wrap or a plastic sheet protector will work)
- Sunscreen (with at least SPF 30 and no metal oxides)
- Optional: other types of sunscreen

Time allotted:

30 minutes + 3 hour wait time



Background:

The Sun is the star at the center of our solar system. All the planets, meteors, asteroids, and more orbit around the Sun. According to NASA, the Sun is the major source of energy for everything here on Earth. It would take 44 MILLION large electric power plants to equal the energy coming from the Sun. Earth, due to factors like our distance from the Sun and our atmosphere, is in balance with the Sun's energy; we are neither frigid nor blazing and life is supported- although it's a delicate balance.

Plants have used the Sun's energy for millions of years but only recently have humans been able to harness the energy to turn into electricity through solar panels (you'll learn more about energy in the next activities). But the light and heat energy from the Sun can also be damaging. Let's observe the power of the Sun with a simple experiment.

Learn more about the Sun, Moon, stars, planets, and more with the Space Science badges for all levels!

Instructions:

1. On a sunny day go outside and place your construction paper somewhere in full sun. Place the plastic sheet on top. Weigh it down with small rocks if needed.
2. Squirt a small amount of sunscreen onto your hands and spread a thin layer over your fingers and palms.
3. Press your hands firmly onto the plastic, making handprints. You can also try drawing with the sunscreen.
4. Leave the paper and plastic sheet in the sun for 3-4 hours. Before you come back, make some predictions. What do you think the paper will look like?
5. When you come back, take off the plastic sheet. What does the paper look like now? Why do you think the sun made that change happen? What does this teach us about our skin and wearing sunscreen?
6. Optional: Try the same experiment with other types of sunscreen and record the differences.

If you are visiting A Place for Girls, you can observe Daisy's movement as she absorbs energy from the sun! **Use caution as our SmartFlower is set up near a parking lot; please watch for moving cars.** Use natural items you can find on the ground (small rocks, leaves, or sticks) to mark where her shadow falls, then come back in at least one hour and see if it moved. The shadow will move due to the rotation of the earth, but can you tell if Daisy's solar panels (her "petals") moved to follow the sun as well?

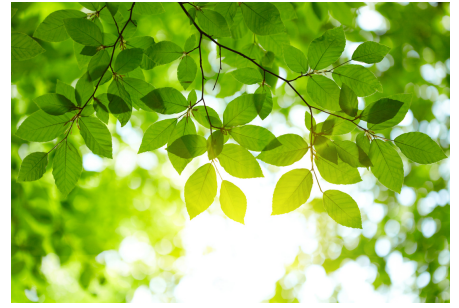
Activity 2: Get Solar Energized!

Materials:

- Fresh green leaf (the larger the better)
- Bowl large enough to fit the leaf (clear glass is best)
- Water
- Small rock
- Optional: magnifying glass

Time allotted:

At least 1 hour 30 minutes
(includes 1+ hour wait time)



Background:

What is energy? It's the power we get from something else. Humans and other animals get our energy to move and grow from food, which may be plants or meat. Plants get their energy from the sun! Chlorophyll, which is what makes plants green, absorbs light energy. Then, a process called photosynthesis uses that energy to turn carbon dioxide and water into food (specifically, a kind of sugar called glucose) for the plant! The plant also then releases oxygen.

You can see photosynthesis happening with a simple experiment!

Instructions:

1. Fill the bowl with water.
2. Carefully remove a green leaf from a plant that is safe to touch. (Normally, we want to leave growing leaves on plants and only pick up leaves from the ground. Leave the rest of the leaves for the plant to use!)
3. Place the leaf into the bowl and put the small rock on top of it so that it is fully under the water. Place the bowl in a sunny location.
4. Wait at least 1 hour- maybe take a snack break to refresh your own energy!
5. Come back and observe the leaf. What do you notice? You should see small bubbles around the leaf and the bowl. That is the oxygen produced by the leaf after it absorbed energy from the sun!

Daisy the SmartFlower also uses energy from the sun! The large, shiny, black “petals” absorb light energy just like the green leaves of a plant. Can you find where the energy absorbed is moved into the office building? If you look carefully, you will see a tube that leaves the “stem” and travels under the road between Daisy and the building. The tube then travels up the building and over the roof. If you can go to the other side, you’ll see where it enters the building.

Instead of producing sugar and oxygen, Daisy produces electricity for the building!

Activity 3: Think Like a Solar Scientist

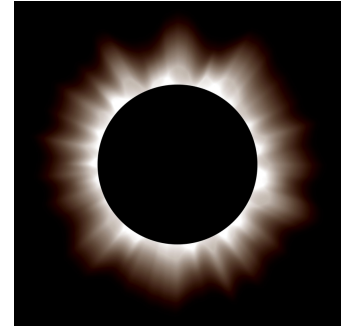
This activity also meets the requirements for Step 2 of Think Like a Citizen Science Journey for all levels!

Materials:

- Computer, laptop, or tablet
- Any materials required by chosen citizen science projects

Time allotted:

Varies based on projects.
It may be best to complete over multiple days.



Background:

Scientists are always learning new things about the Sun, outer space, and the environment here on Earth. They ask questions, make hypotheses, make observations, collect data, analyze results, and make conclusions- the scientific method! Recently, scientists have realized that non-scientist members of their communities can also help to collect data. Those people are called citizen scientists, and you're going to be one, too!

Girl Scouts has partnered with SciStarter to bring citizen science projects right to you! If you choose to work on a SciStarter project, you will need to make an account:

<https://scistarter.com/girlscouts/volunteer/login>

Instructions:

Option 1: SciStarter

1. Visit the SciStarter website and choose [a project about the sun for your age group](#).
2. Choose [another project](#) in the categories of Astronomy & Science, Climate & Weather, or Ecology & Environment for your age group.
3. Finally, choose a third project in any category that interests you!
4. Complete all projects based on the guidelines for each.
5. Discuss with your troop, friends, or family what you learned from each project. What do you think scientists will be able to discover with the data you helped to collect?

Option 2: NASA

1. Visit the NASA Citizen Scientist page for the Sun and eclipses: <https://science.nasa.gov/eclipses/citizen-science/>
2. Choose any three projects to complete.
3. Complete all projects based on the guidelines for each.
4. Discuss with your troop, friends, or family what you learned from each project. What do you think scientists will be able to discover with the data you helped to collect?

Activity 4: Energy Sources

Field Trip

This activity also meets requirements for STEM Career Exploration badges for all levels!

Materials:

- None!
- Optional: Computer to watch video

Time allotted:

Varies



Background:

There are two main types of resources that give us energy for electricity here on Earth: non-renewable and renewable. Non-renewable means once that resource is used, it's gone forever. Renewable resources can be used over and over again. Do you know any types of renewable and non-renewable resources? What type of resource do you think the Sun is?

Non-renewable resources include fossil fuels and minerals. Fossil fuels are fuels like oil, coal, and natural gas. They were formed inside the Earth long ago from the remains of ancient plants and animals- just like fossils are also the remains of ancient life! Because it takes millions of years to create fossil fuels, the ones we have inside the earth now are considered non-renewable. Unfortunately, many fossil fuels also pollute the air because they must be burned to be used. Minerals, which also come from inside the Earth, include things like gold, iron, and copper. Minerals are formed in many different ways but also can take millions of years and mining for minerals can be damaging to the environment. Luckily, many minerals can be recycled!

Renewable resources include the sun, wind, water, geothermal (heat from the Earth), and living things such as plants and animals. These things can be used over and over again or can be grown again. Generally, they are more environmentally friendly and some things (like paper made from trees) can be recycled!

Conserving energy is the best way to use less resources of any type!

Activity 4: Energy Sources

Field Trip

Instructions:

1. Before going on your field trip, discuss with your troop, family, or friends what you can do to conserve energy. Examples include:
 - a. Turning off lights and other electronics when not in use
 - b. Recycling (which reuses materials and saves energy from producing new materials!)
 - c. Walk or bicycle to school or around your neighborhood (if you can do so safely)
2. Go on a tour of your city and see how many resources you can find! Are there any windmills, dams with hydroelectric power, or coal power plants? Do you see any buildings with solar panels? Even something as simple as a gas station is a source of non-renewable energy for our cars.
3. Learn about one of the most energy efficient buildings in the Colonial Coast Council, the Brock Environmental Center in Virginia Beach:
<https://www.cbf.org/about-cbf/locations/virginia/facilities/brock-environmental-center/welcome-to-one-of-the-worlds.html>
4. After learning about sources of energy in your community, reach out to one of the sources and ask if you can email with or talk to an employee (for example, a solar panel or power plant engineer). Ask them what they do day-to-day in their job, what education or training set them up for success, and any other questions you want to know.

Activity 5: Take Action in Your Community

All Girl Scout Journeys require a Take Action project. This Take Action activity may help to meet those requirements!

Materials:

- Computer, laptop, or tablet
- Optional: Pen and paper for letter writing
- Optional: Paper and coloring materials for poster making

Time allotted: Varies



Background:

Conservation is the idea that we can prevent the wasteful use of a resource. Using resources is not always wasteful and we need to use them for many things every day! We need electricity to power our lights, ovens, and air conditioning at home. We need oil or electricity to power our cars and buses so we can go to work and school. Scientists and people around the world are developing new ways to use fewer of the resources we need so we can conserve more. Any time we conserve a part of nature, such as land, minerals, plants, and animals, we keep it around longer for more people to enjoy! Daisy the SmartFlower is just one small way that Girl Scouts of the Colonial Coast is conserving resources at A Place for Girls.

Instructions:

1. Learn about where your home or school uses a lot of energy. Work with a team (your family, classmates, teachers, etc.) to make a plan to reduce the amount of energy that you use. Optional: make a poster to display in your school or a community center that teaches others what they can do to conserve energy.
2. Learn about where your community gets its energy (you should have done this in Activity 4). Is it primarily renewable or nonrenewable sources? Are any new sources being constructed?
3. Look up your local, state and national legislators.
 - a. Virginia residents can do so here: <https://whosmy.virginiageneralassembly.gov/>
 - b. North Carolina residents can do so here: <https://www.ncleg.gov/findyourlegislators>
4. Write a letter or an email to one or more of your legislators. Using what you've learned, encourage them to support renewable energy sources and ways to reduce energy usage.