Daisy the SmartFlower and Solar Power

Lesson Plan for: Daisy | Brownie | Junior

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 Activity 3 while you wait. Activity 4 is a field trip around your city.

girl scouts of the colonial coast

Activity 1: Explore The Sun

This activity also meets the requirements for:

- *Step 1 of the Girl Scout Daisy Space Science Explorer badge*
- *Step 1 of the Girl Scout Daisy Numbers in Nature badge*
- *Step 2 of the Girl Scout Junior Space Science Investigator badge*
- *Step 4 of the Girl Scout Junior Numbers in Nature badge*

Materials:

- Large white paper and pen/pencil
  OR
- Sidewalk chalk
- Optional: flashlight and a ball

Time allotted:
1 hour 30 minutes
(includes 1 hour wait time)

Background:

When an object blocks the light from the sun, it creates a shadow. Observing shadows is a safe way to observe the sun. **NEVER look directly at the sun.** Have you noticed shadows seem to move throughout the day, even when the object stays in the same place? This is because the Earth, our home planet, rotates like a spinning top! This is why the Sun appears to rise in the east, move across the sky during the day, set in the west, and seems to disappear at night. Try shining a flashlight on a ball and spin it. The flashlight is like the Sun and the ball is like the Earth. Do you notice how one side is in light and the other is in darkness? That's day and night!

As it spins, the Earth also moves around the Sun in what is called an orbit. One full orbit is one year! Did you know you have a different birthday on other planets? Discover how old you would be on other planets by checking out: www.girlscouts.org/SpaceSciencePlanetAges

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 stand on some concrete or asphalt, or in front of a big piece of paper—big enough so that you can see your shadow on it (you may need to tape a few pieces together).
2. Have a friend trace your shadow. Also mark exactly where you are standing.
3. Leave your marked shadow for a bit and come back later (wait at least one hour).
4. Before you come back, make some predictions (smart guesses). Do you think the shadow will look different later in the day? What will it look like?
5. When you come back, stand on the mark where you stood before. Have your friend make new marks around your shadow. Talk about what you see! Was your guess (prediction) right?

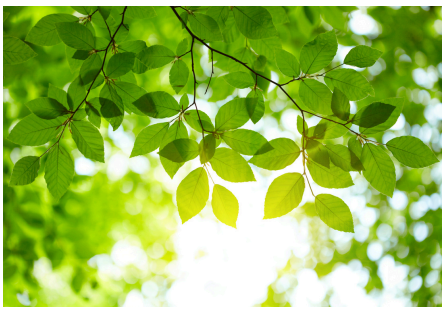
If you are visiting A Place for Girls, you can track Daisy's shadow! **Use caution as our SmartFlower is set up near a parking lot; please watch for moving cars.** Use natural items you can find on the ground (small rocks, leaves, or sticks) to mark where her shadow falls, then come back in at least one hour and see if it moved! 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 (a chemical in the air produced when we breathe out) 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!

Girl Scout Juniors can learn more about energy in the Journey: GET MOVING!

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! What can you think of that uses electricity? Computers, TVs, lights, toys, fans, and so much more all need electricity to function.

Activity 3: SmartFlower vs. Real Flower

This activity also meets the requirements for:

- *Step 2 of the Girl Scout Daisy Numbers in Nature badge*
- *Step 2 of the Girl Scout Brownie Numbers in Nature badge*
- *Step 3 of the Girl Scout Junior Numbers in Nature badge*

Materials:

- A few different kinds of fallen leaves
- A ruler (with inches and centimeters)
- A tape measure
- A calculator
- Outdoor space with at least one tree
- Optional: white paper and crayons

Time allotted:
45 minutes

Background:

Imagine if Daisy the SmartFlower was a real flower! Her “petals” (the solar panels) are each about 8 feet long! Using math, we can figure out how much larger Daisy is than real plants growing around us. Scientists use math to solve all kinds of problems. Before they can do equations with math, scientists often first take measurements. What kind of things can we use to take measurements? Rulers help us to measure length and scales help us to measure weight. Scientists sometimes use special machines that can measure sound, light, speed, and other things as well!

Learn more about making observations and taking measurements with the Math in Nature badges for Daisies, Brownies, and Juniors!

Activity 3: SmartFlower vs. Real Flower

Instructions:

1. Gather leaves or flower petals of different sizes from the ground. Do not pick them off of trees or plants.
2. Lay the leaf on the paper as flat as you can and trace around it.
3. Make a guess: how long do you think your leaf is in inches? Can you guess how many centimeters?
4. Measure the leaf with a ruler. How close was your guess?
5. Repeat with a few more leaves or flower petals. Optional: make leaf rubbings with your paper and crayons!
6. Pick out the largest leaf or petal. Using its length in inches, have an adult help you with the following math (you can use a calculator for help):
    a. Daisy's petals are 8 feet long. There are 12 inches in a foot. Multiply 8 by 12 to find out how many inches long Daisy's petals are. (Answer: 96 inches!)
    b. Divide 96 by the length of your leaf. For example, if your leaf is 3 inches long, you would do 96 divided by 3.
    c. The answer to this math problem is how many times larger Daisy's petals are than your leaf! In our example, Daisy's petals are 32 times larger than the leaf!
7. You can find out how old a tree was by looking at the number of rings in its trunk. But if the tree is still alive, you can estimate its age by measuring its circumference (the distance around it) in inches. Find a tree that you can safely walk around.
8. Wrap the tape measure around the trunk of the tree and measure its circumference in inches.
9. The number of inches in the circumference is about equal to the number of years it has been alive! For example, a tree that is 15 inches around is about 15 years old.
10. If it is safe to do so, try to find the oldest and youngest tree in the area. Remember to be respectful of wildlife by not stepping on living plants off of a marked trail.

Daisy the SmartFlower is not a tree, but how old would she be if she was? If you are visiting A Place for Girls, measure the circumference of the concrete base. (Please do not climb onto the base or step on any plants.)

Activity 4: Energy Sources Field Trip

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

Conclusion: Conserving Energy, Conserving Plants, Conserving the World

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 school. Scientists and people around the world are developing new ways to use fewer of the resources we need so we can conserve more.

Try to learn about where your home or school uses a lot of energy. Can you work with a team (your family, classmates, teachers, etc.) to figure out a way to reduce the amount of energy that you use?

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.

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