Cadette Space Science Researcher

Pillar: STEAM
Outcomes: Develops a strong sense of self

Cadettes will earn their badge by understanding more about the amazing properties of light and how we use it to make discoveries about the universe and space science.

1. **Explore "Visible" Light**
    a. What more can you see? When you study space science, you are studying light from stars and other objects in space, including our sun. Because visible light reaches our eyes by bouncing off objects, we see green trees, red cars, and planets of different colors. The light from our star – the sun – appears to be one color. Is it possible it's made of all the colors we see? Let's find out.
    b. Construct a spinner. Discover the dynamic qualities of light by creating a spinner called a Newton Disc. Instructions here: https://www.wikihow.com/Make-a-Newton-Disc

2. **Explore "Invisible" Light**
    a. Each kind of light has a unique wavelength, but human eyes can only perceive a tiny slice of the full spectrum -- the very narrow range from red to violet. Microwaves, radio waves, x-rays and more are hiding, invisible, just beyond our perception. https://ed.ted.com/lessons/light-waves-visible-and-invisible-lucianne-walkowicz

3. **See the Stars in a New Way**
    a. You don't have to have a fancy telescope to look deeply into the Night Sky! Check out Stellarium online! Stellarium is an open-source planetarium you can access right from your computer! It shows a realistic sky in 3D, just like what you see with the naked eye, binoculars or a telescope. You can download the app here https://stellarium.org/ or visit online at https://stellarium-web.org

    b. Explore on your own or try doing the Stellarium Scavenger Hunt:
        a. What stars can we see from Kansas City right now?
        b. What planets can we see from Kansas City right now?
        c. Using the menu at the bottom of your screen search the sky:
            1. Click the constellations button; what constellations are in our night sky?
            2. Try the Atmosphere button; what would the night sky look like without it?
            3. Click on the deep space object button; double-clicking on an object will help you zoom in.
        d. Find the Orion Nebula
        e. Find the Pleiades
        f. Find the Beehive Cluster
        g. What is another name for M31? What does it look like?

4. **Expand your Vision**
    a. Explore the sky BEYOND our solar system by helping real scientists!
    b. Check out - Galaxy Zoo! To understand how galaxies formed we need your help to classify them according to their shapes. If you're quick, you may even be the first person to see the galaxies you're asked to classify. Look at telescope images of distant galaxies. Explore the sky. What will you find?
    c. Galaxy Zoo is an online database where you can help real NASA scientists classify galaxies! Don't worry you don't have to be a rocket scientist to do this. These images are taken from over 7 different MASSIVE telescopes and there are 100s of thousands of images that need to be classified. Because there are so many galaxies and photos, they need help from the general public and to help go through them.

d. https://www.zooniverse.org/projects/zookeeper/galaxy-zoo - start here. You can create an account or participate anonymously.
e. In Galaxy Zoo, we ask a series of questions about the shape of a galaxy, to learn about the astrophysical processes in the galaxy's evolution.
f. You can answer these questions without any specialist knowledge. Many of the galaxies are distant, so the answer may not always be obvious - just take your best guess.
g. Sometimes there are multiple galaxies in the image. Always classify the central galaxy in the system. (If you think another galaxy is interacting with the central galaxy, you'll have a chance to say so.)
h. Need to see some examples before you dive right in? Check out this forum - https://www.zooniverse.org/projects/zookeeper/galaxy-zoo/talk

5. **Conserve the Night Sky**
   a) Make a Plan! Go online and see what are some ways you can conserve the Dark Sky in your Area: https://www.darksky.org/5-things-you-can-do-to-protect-the-night-sky/

Online additional resources:

- Build a spectroscope for extra fun: https://www.livescience.com/41548-spectroscopy-science-fair-project.html
- https://www.nasa.gov/specials/nasaathome/index.html
- https://www.nasa.gov/nasa-at-home-for-kids-and-families
- https://spaceplace.nasa.gov/
- Meet a scientist: Annie Jump Cannon
- Our wonderful community partner, The Arvin Gottlieb Planetarium, has live and recorded Facebook videos studying the sky, constellations, planets, and more https://www.facebook.com/watch/KCplanetarium/; check them out!

When you're finished: Congratulations, you have earned your badge! You can purchase by emailing shopdept@gsksmo.org or at https://www.girlscoutshop.com/cadette-space-science-researcher-badge

No shipping charges apply at this time.
