girl scouts river valleys

SENIOR SKY BADGE

Badge Purpose: When you've earned this badge, you'll understand the sky—from science to stars to stories.

Activity	Materials Needed
In a Galaxy Far, Far Away... • Head outside to observe the night sky.	☐ Binoculars ☐ Red flashlight (or regular flashlight covered with red cellophane) ☐ Two sheets of paper ☐ Scissors ☐ Stapler
The Sky's the Limit • Visit an observatory, astronomy club, or planetarium to learn more about the sky.	☐ Phone or computer with internet access
Ground Control to Major Tom • Learn about Mission Control and test out your communication skills in a role-playing game.	☐ Legos ☐ Cup or similar container ☐ Paper ☐ Pen
Searching for the Dark • Research light pollution, then create art to educate others about light pollution and what they can do to reduce it.	☐ Phone or computer with internet access ☐ Various art supplies

Activity #1: In a Galaxy Far, Far Away...

Badge Connection: Step 1 – Watch the skies
Materials Needed: Binoculars; red flashlight (or regular flashlight covered with red cellophane); two sheets of paper; scissors; stapler
Prep Needed:

- Assemble and familiarize yourself with the planisphere before you go stargazing.

1. You don't need much to start stargazing, and just like many things in life, the more often you stargaze, the easier it'll be to recognize constellations and become familiar with the movement of the sky.
2. Before you set out on your sky-watching adventure, collect a few items:
    - **Binoculars** (or a telescope if you have one!). The moon and some stars are visible to the naked eye, but you'll get a better and more detailed view of the celestial bodies with binoculars.
    - **Red flashlight** (or, regular flashlight covered with red cellophane). Humans are diurnal creatures (active during the daytime), so our eyes are more adapted to seeing in well-lit conditions. Astronomers use red flashlights to read star atlases so that they don't risk blasting their eyes with

light. (It takes 15 – 30 minutes for the human eye to adjust to darkness. Using a red light doesn't interfere with vision as much as white light.)
    - **Planisphere** (aka star chart, star atlas). The origins of the planisphere are ancient, and its creation was based on the belief that the Earth was the center of the universe. Though this belief has been proved false, the planisphere is still used today to tell us which celestial objects can be seen in the sky at every hour of the day for every day of the year.
3. Create your planisphere and learn how to use it:
    - Print out the star wheel disk and star wheel sleeve; these should be printed out on standard letter-sized paper.
    - Cut out the star wheel (trim away the gray corners) and cut out the sleeve (make sure to keep the white rectangle at the bottom of the sleeve, but cut out the white oval in the middle of the sleeve).
    - To assemble the star wheel, fold the white rectangle at the bottom of the outer sleeve so it's underneath the front. Then, staple the sides together at the two white lines on the bottom of the sleeve near the words "horizon." Then, slip in the circular sky map so it shows through the oval in the middle of the sleeve.
4. To use the planisphere:
    - Pick the date and hour you want to watch the skies, and set the Star Wheel so that date (on the rim of the circular disk) matches the time indicated along the edge of the outer sleeve. Use the white hours during standard time and the orange hours when it's daylight saving time (in the summer).
    - The white oval in the middle of the planisphere shows the whole sky, and the curved edge of the oval represents the horizon you're facing. One you're outside, hold the planisphere out in front of you and look at the yellow "Facing" labels around the oval. Turn the whole wheel so that the yellow label for the direction you're facing is on the bottom, with the lettering right-side up. Remember that the sun sets in the west.
    - Now the stars above the map's horizon should match the real stars in the sky. The star patterns will be much larger in the sky than they look on the map. The farther from the edge of the oval the stars appear, the higher up they'll be in the real sky. Stars in the center of the oval will appear directly overhead.
5. See if you know someone who's interested in astronomy to go stargazing with you. For the best view, pick a place that's away from city lights, and go on a relatively clear and dark night (not the night of a full moon, or the days leading up to one).
6. Currently, 88 constellations have been identified. Some of these constellations can be seen year-round (like Ursa Major and Cassiopeia), while others can only be seen in specific seasons (like Canis Major and Gemini in the winter). Before you set out, familiarize yourself with the ones that can be seen year-round, and then check which ones will be in the sky this season.
7. Tip: When you're learning how to spot constellations, work first on finding familiar patterns (like triangles, curves, and straight lines of stars).

Activity #2: The Sky's the Limit

Badge Connection: Step 2 – Investigate the science of the skies
Materials Needed: Phone or computer with internet access

1. Now that you've gotten a feel for the skies, locate an observatory (make sure it's open to the public), planetarium, or astronomy club close to you to learn more fascinating aspects of the sky.
2. For example, deep sky objects—the general name for objects beyond our solar system, like galaxies, nebulae, and star clusters—can be difficult to locate or spot. Something that looks like a blurry patch might actually be a globular cluster! You'll be able to see more with a telescope, especially with a capable guide to point out what you're looking at and what you should be looking for.
    - go-astronomy.com/astro-club-search.htm
    - go-astronomy.com/observatories.htm
    - go-astronomy.com/planetariums.htm

Activity #3: Ground Control to Major Tom

Badge Connection: Step 3 – Explore the connection between people and flight
Materials Needed: Legos; cup or similar container; paper; pen

1. When an astronaut goes into space, they have a team of support people behind them. Mission Control is probably the most well-known section of their support team.
2. During Apollo 13, Mission Control was critical in helping three astronauts return safely to Earth after an oxygen tank exploded in the Apollo spacecraft. Mission Control had to quickly problem solve to figure out a way to get the men back to Earth despite the spacecraft's limited power, loss of cabin heat, and need for carbon dioxide removal. Communication and trust was paramount; as Gene Kranz, the flight director during Apollo 13 said, "The missions run on trust. When you turn seven-and-a-half million pounds of thrust loose on a Saturn that contains three men, trust is the thing that allows you to make a split-second decision and very rapidly seek out every option that may exist."
3. Get a taste of what it would be like to work in Mission Control.
    - For this activity, you'll need a partner. One partner will be playing the role of Space Station (the person in the spacecraft) and the other partner will be Mission Control.
    - The partner playing Mission Control will use 20 – 30 Legos to create simple object or structure. Then, write down step-by-step instructions for creating the object, and then take a picture of the finished creation. Break down the object and put the Legos into a cup (remember to only put in the Legos that you used to create the object) and hand the cup to Space Station.
    - The partners should then sit next to each other with a barrier separating them so they can't see each other's work or actions
    - Mission Control should then relay the instructions to build the object to Space Station.
    - After Space Station has finished building the structure, take a picture of the creation. Then compare with Mission Control's original creation to see if they're the same.

Activity #4: Searching for the Dark

Badge Connection: Step 4 – Help clear sky pollution and Step 5 – Create sky art
Materials Needed: Phone or computer with internet access; various art supplies

1. When you set out on your first activity observing the night sky, was it hard to find a spot that was relatively dark? It used to be that relative darkness at night was the norm—but now it's the inverse. Many people, especially those living in cities and suburban areas, are affected by light pollution.
2. First, research light pollution. What causes it, and what are the side effects of light pollution?
3. Artists are using art to create awareness of light pollution. Get some inspiration from their work, then create a piece of activism art of your own. Why should people care about light pollution, and what are some ways they can help reduce it?
    - bit.ly/howpollutionhidesthenightsky
    - bit.ly/endlightpollution
    - bit.ly/darkenedskiesandcities
    - bit.ly/artofnight

Star Wheel

(*source: skyandtelescope.com*)