LEGACY: NATURALIST

Sky

"The sky is the soul of all scenery. It makes the earth lovely at sunrise and splendid at sunset. In the one it breathes over the earth crystal-like ether, in the other a liquid gold."

—Thomas Cole, American artist

The sky is a masterpiece. Every day it graces us with living art, whether through a glorious sunset, shifting cloud formations, or the stunning display of night stars. No wonder we take every opportunity to spend time outdoors. Our world is a stage and the sky performs with beauty, wonder, and mystery.

Steps

1. Watch the skies
2. Investigate the science of the skies
3. Explore the connection between people and flight
4. Help clear sky pollution
5. Create sky art

Purpose

When I've earned this badge, I'll understand the sky—from science to stars to stories.

"Look at your feet. You are standing in the sky. When we think of the sky, we tend to look up, but the sky actually begins at the earth."

—Diane Ackerman,
Poet, essayist, naturalist

More to Explore

Track some heavenly bodies. Take a series of photographs or digital images of the moon's movement, a planet, an asteroid, a meteor, or a comet. Label each, including the date and time it was taken. Show all positions on a star chart or map.

Every step has three choices. Do ONE choice to complete each step. Inspired? Do more!

STEP 1 Watch the skies

If you really want to see the night sky, use a telescope (perhaps there's one at a local college or planetarium). But first, learn the parts of a telescope and how to use one. If possible, use a tracking telescope, or look through telescopes with different magnifications.

CHOICES — DO ONE:

☐ **Focus on the night sky.** Identify 10 constellations and 8 noticeable stars, 5 of which are magnitude 1 or brighter. Learn how to find the North Star from the Big Dipper, and then how to use the North Star to find north.

FOR MORE FUN: Explain how the North Star has been used for navigation throughout history.

OR

☐ **Host a star party.** Organize a stargazing event for Girl Scout friends and family or for younger girls at camp. Bring a star chart and a flashlight (green or white works best, and the more focused the beam, the better). Trace some constellations for your guests. Find bright patterns, such as the Big Dipper, then move on to other constellations. Can you find a planet? How about an artificial earth satellite? Perhaps invite an astronomer to give insight.

FOR MORE FUN: Share the Greek mythology or Native American stories that go with each constellation.

OR

☐ **Investigate the colors of the sky.** Take five photographs of the sky in different colors, and describe the science behind the colors you see. For instance, why is the sky blue? What makes up a rainbow? Why does the sun appear yellow from Earth and white from space? What makes the sunset red?

In astronomy, **MAGNITUDE** means the degree of brightness of a celestial body. Greek astronomer Hipparchus created the magnitude system around 120 B.C. to rate the brightness of stars and other sources of light. Magnitude runs on a scale of 1 to 4, 1 being the strongest.

STEP 2 Investigate the science of the skies

Now that you've spent some time enjoying the sky, get to know it on a more scientific level. Find out the basics about the sky, its atmosphere, planets, and weather.

CHOICES — DO ONE:

☐ **Label a "Map of the Sky."** Chart the layers in the Earth's atmosphere, the mixture of gases and other materials that surround us. Start with Earth's lowest layer. What are the properties of each layer? What do they provide us? Which layers reflect radio waves, allowing radio signals to be sent around the Earth?

OR

☐ **Visit a planetarium or astronomical observatory.** Take a guided tour of the sky. Find out more of the astronomy behind planets, stars, and the solar system. (For instance, if you watched constellations in step 1, here you could ask an expert about the formation of stars, super novas, and black holes.)

FOR MORE FUN: Find out when there is a meteor shower visible in your area and watch one.

OR

☐ **Weather watch.** For one day, track the weather and record the highest and lowest temperatures on Earth. Note extreme weather conditions, hurricanes, and twisters. Compare what you tracked to the forecast from the day before. Try to speak with a meteorologist about how weather is predicted and how often forecasts are accurate.

FOR MORE FUN: Investigate temperatures on the moon. What are the averages for day and night? How does it compare to Earth?

More to Explore

Chart the air. Air has weight. Its pressure and density rapidly decrease as you climb higher in the atmosphere. Draw a chart to show how air pressure and density measurements change from sea level to 30,000 feet above, which is referred to as the jet stream. At what point is the air's content unsuitable for human survival?

Maria Mitchell

In 1847, Maria Mitchell became the first female American astronomer to discover a new comet, now known as "Miss Mitchell's Comet." She won a gold medal prize from the king of Denmark for her discovery. Maria also taught astronomy to young women at Vassar College.

Page from the Past

Pass tests in knowledge of air currents, weather lore. Must have made an aeroplane to fly 25 yards (or have certificate for driving an aeroplane), and some knowledge of engines.

—complete requirements for the Flyer badge (one of the first Girl Scout badges), 1913

STEP 3 Explore the connection between people and flight

Our dream of flying dates back as far as humans exist. Prehistoric cave drawings depict winged men. In the 1500s, artist Leonardo da Vinci drew an ornithopter, an aircraft with wings designed to flap like a bird's. Aviation pioneers contributed ideas that led to airplane flight and rocket launches.

CHOICES — DO ONE:

- ☐ **Explore air traffic control. Interview an air traffic controller or take a tour of an air traffic facility.** You might also listen online to air traffic controllers transmitting live. Find out how they direct planes, what controlled and uncontrolled airspace means, and the type of radar they use.

  FOR MORE FUN: Try an activity from the 1963 Senior "Project: Aviation Tours and Meets." Watch the arrival and departure of various aircraft. Identify as many as possible. Or draw the layout of runways and locate maintenance and repair facilities, the air traffic control tower, and passenger and cargo terminals.

OR

- ☐ **Build a model plane, rocket, or space exploration vehicle.** Get a kit or use whatever you have around. Explain the scientific principles that governed your design. (Girl Scouts earning their Aerospace badge in 1980 had to make a glider "fly straight, stall, loop, bank right, and bank left.")

  FOR MORE FUN: Make it a competition. Invite Girl Scout friends or family members to construct a model and have a launch or exhibit.

OR

- ☐ **Track a current space mission.** Research NASA online to check the launch schedule for an upcoming mission and follow the mission for a week. What's the purpose of the mission? How is the information recorded and sent back to Earth? Check the mission's website for updates. Compile a log based on information you collect and your personal insights.

  FOR MORE FUN: If the mission is scheduled to orbit over your area, see if you can find it in the night sky.

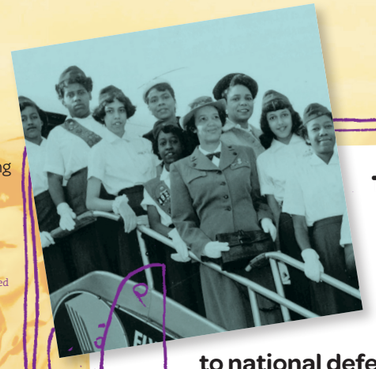
More to Explore

Discover satellites. During the U.S. Civil War, balloonists gathered military intelligence. The first aerial photograph was taken onboard a plane piloted by Wilbur Wright in 1908. This quest to "see from above" led to the birth of satellites. Find out how a satellite works—its parts, how it's launched, how it orbits. How many satellites are there? Who regulates the orbit? What happens if satellites collide?

WING SCOUTS

Aviation is all around us. We want to know about jobs for women in aviation; we want to talk the same language as our air-minded brothers and friends; we want to know what is happening when we are in a plane as a passenger or looking at one overhead. We want, at least some of us, to become good pilots someday. These are the wishes of Senior Girl Scouts; these are the reasons for Wing Scouting.

—Wing Scout Manual, 1945



Wing Scouts from Washington, D.C., visiting New York City, circa 1950.

Girl Scouts of the USA-National Historic Preservation Center. Used by Permission.

The Wing Scouts program—designed for older Girl Scouts interested in aviation—was introduced in 1941. After the bombing of Pearl Harbor that year, people became more aware of the importance of aviation to national defense. The Girl Scouts worked with the National Aeronautic Association to develop a program based on three things: making girls more air-minded and aware of the importance of air supremacy for the United States; preparing girls for careers in aviation; and preparing them for community service related to aviation. The program was open to all Senior Girl Scouts who completed the Red Cross first aid course and took one flight-related course, such as meteorology. Wing Scouts studied aviation principles, built model planes used by the army and navy for training, and learned how to use aviation instruments.

Background photo: Senior Girl Scouts of Wichita, KS, on tour of Beech aircraft, 1952.

Girl Scouts of the USA-National Historic Preservation Center. Used by Permission.

Learning to fly and earning a pilot's license is a final goal for many air-educated Wing Scouts. Flight training will necessarily be a cooperative effort between you, your family, the flight school you select, the Federal Aviation Agency, and your bank account.

—from "Project: Learn to Fly," *Senior Girl Scout Handbook,* 1963

Space Trash

Millions of pieces of space debris are orbiting the Earth. Our robust space exploration has meant leaving rocket stages and dead satellites in our heavily trafficked orbit. And these are things we wouldn't want dropping on our heads! So the U.S. Air Force launched a surveillance satellite to monitor the thousands of active satellites and 20,000 pieces of debris in our orbit. The satellite orbits 390 miles above Earth and transmits back information.

STEP 4 Help clear sky pollution

Take a look at the pollution in our skies and on other planets and find out what you can do.

CHOICES — DO ONE:

- [ ] **Explore air pollution.** Most pollution is caused by fossil fuels: burning coal, oil and gasoline from power plants, furnaces, and cars. Interview an ecologist or environmentalist to find out what preventative measures really work. Do tall smokestacks on industrial plants keep pollutants away from humans? What is ground-level ozone? What do aerosols do to the ozone layer? Once your research is done, share your recommendations for the five best ways people can reduce air pollution.

OR

- [ ] **Explore light pollution.** Find out if your community or state has laws regulating industrial lighting. Then, look into the causes and effects of light pollution. You might consider the composition of the sun, its relationship to other stars, and its effect on Earth. Or explore sunspots and describe the effects they have on solar radiation, or the way pollution affects astronomy. When your research is done, share your recommendations for the five most effective things people can do to help with light pollution.

OR

- [ ] **Chart climate change.** Visit NASA's website to track a satellite that gives a global view of developments on our planet. Chart how Earth's climate system changes from week to week. Track climate change for eight weeks and document what you find. Monitor key indicators: sea level, carbon dioxide concentration, global surface temperature, arctic sea ice, and land ice. Share what you find.

More to Explore

Pretend you're a Girl Scout in 1980. Try this activity from their Eco-Action badge: Every day for two weeks, record the air quality in your community. Can you smell the air? Taste it? See for a long distance? Record the temperature, time of day, and amount of wind. Coat a heavy piece of paper with petroleum jelly. Put it outside on a level spot. Observe it for specks of air pollution that fall onto it.

STEP 5 Create sky art

Now that you've taken an expansive tour of the sky, use your inspiration to explore and create your own sky art.

CHOICES — DO ONE:

- [ ] **Make sky art.** This might be a scale mobile of planets, a sky or constellation mural or map, or a series of photographs showing the changing sky throughout the day. Create something that will celebrate the wonders of the sky and share it in a presentation, exhibit, or tour.

  FOR MORE FUN: Explore art that celebrates the sky. Go to a museum or search art books for works such as Wassily Kandinsky's *Sky Blue*, Vincent van Gogh's *Man Sowing at Sunset*, and Nikolay Roerich's *Celestial Battle*. Or compare Chinese art, in which the sky was often hazy or misty, to the visible atmosphere in Italy's Renaissance paintings.

OR

- [ ] **Share sky stories from ancient to modern cultures.** Remember Chicken Little, the chicken who believed the sky was falling? In the original fable, the chicken was a hare. An Australian tale tells about a morning star named Barnumbirr who was so bright, people asked her to come out so they could see better. But she was afraid of drowning and refused to go with them. So they tied a string around her, which is why she cannot rise high and sticks close to the horizon. The Anishinabe culture of central North America passed on stories of Grandmother Moon, who dwells in the heavens near her daughter, Mother Earth, and Grandfather Sun, who brings the morning light to his children. Collect five more tales of the sky and share them.

OR

- [ ] **Write your own story of the northern and southern lights.** Perhaps the most mythologized event in the sky is the appearance of the northern and southern lights, ghostly waves of red, blue, and green. Cultures that witnessed the lights came up with many interpretations: The Fox Indian tribes of Wisconsin feared the lights were slain enemies. Scandinavian fishermen saw them as a sign of rich catches. Some Chinese believed a fire-breathing dragon caused them. Find photos of these amazing lights, then write your own story about their significance. Make it a bedtime or campfire story to share with younger girls.

  FOR MORE FUN: In some areas of the country, it's possible to see the northern lights in the winter. If you can, try and see them yourself for inspiration.

Careers to Explore

- Astronaut
- Meteorologist
- Air traffic controller
- Astronomer
- Aerospace engineer
- Computer scientist
- Animator
- Planetary geologist
- Software engineer
- Vulcanologist (studies volcanoes on the moon, Earth, and other planets)
- Renewable energy scientist
- Systems analyst
- Technical writer
- Astrophysicist
- Science journalist
- Forensic meteorologist
- Atmospheric scientist
- Skydiver
- Aerial photographer
- Cosmic dust detective

Add the Badge to Your Journeys

Leadership Journeys invite you to take some time away from your routines and get clear about what matters to you. Why not turn step 1 into a weekend campout or retreat for you and your Girl Scout sisters. Watch the sky and share stories about how you hope to reach for the sky, too!

Now that I've earned this badge, I can give service by:

- Starting an astronomy or weather-watching club
- Sharing my knowledge of air pollution to be an advocate for change
- Showing younger Girl Scouts how to use a telescope to see the wonders of the night sky

I'm inspired to:

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