

“We want to explore. We’re curious people.”

—Eileen Collins, NASA Space Shuttle commander and Air Force pilot



Space Science Explorer

Space scientists are people who study outer space—what’s in the sky. In this badge, you can be a space scientist as you look at the sky and talk about what you see!

Steps

1. Explore the Sun
2. Observe the Moon
3. Meet the stars

Purpose

When I’ve earned this badge, I will have explored and observed the Sun, Moon, and stars.



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

STEP

1 Explore the Sun

The Day and Night Dance

Imagine that your head is the Earth and you live on your nose! Start by putting a smiley face sticker on your nose. Ask an adult to set up a lamp without a shade in a dark room—and pretend the lamp is the Sun. (The light bulb may get hot, so don't touch it.)

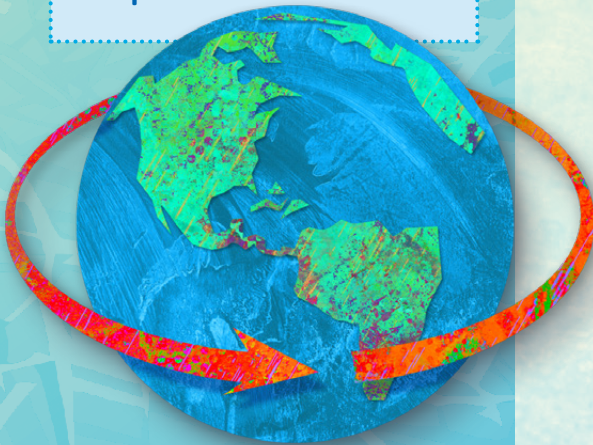
Now turn around slowly to make it daytime and then nighttime on your nose! That's what the Earth does all the time. Like you are doing, it spins!

Have you ever heard the words “sunrise” and “sunset”? That's how we describe the Sun coming up in the morning (sunrise) and going down at night (sunset). But did you know that the Earth—the planet where we live—is actually spinning like a top in space? That's why the Sun seems to move across the sky. On the part of the Earth facing the Sun, it's day. On the part facing away, it's night. Wow!

CHOICES—DO ONE:

- Make a day sky book.** Go outside and look at the sky three times during the same day. You could do it after breakfast, after lunch, and near dinnertime. Do not look directly at the Sun though! Just like a scientist, make a prediction (guess) for what the sky will look like each time you go outside. Then, see if your guesses were correct. Scientists check their guesses (predictions) all the time—that's how they learn. Draw pictures of what you see at the different times of day. Does the sky look different each time you go outside? How? Did the colors or clouds change? Talk about the sky with your family or friends.

For More FUN: To find out how long it will be until sunset, hold out your hand with your elbow straight, like you're saying “stop!” Tuck in your thumb and press your fingers together. Now turn your hand sideways, like your fingers are in a stack on their sides. With your hand in position, face the sun, never looking directly at it. If you can fit your four fingers under the Sun, you have about an hour until the sun starts to set. If you can

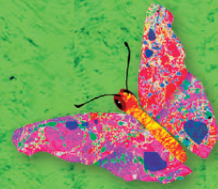


only fit two fingers under the Sun, the Sun will start to set in about 30 minutes.

OR

Make a shadow poster. On a sunny day, go outside and stand 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. Use tape or rocks to keep the paper in place, then have a friend trace your shadow or place small rocks around its edges. You're going to come back to your poster in a bit. When you do, you'll want to stand in the same place. So, be sure to mark your feet—this way you'll remember where you were standing. Do you think the shadow will look different later in the day? What will it look like? Make a prediction (guess). Later in the same day (wait at least an hour), stand in the same place and have your friend make new marks around your shadow. Talk about what you see! Was your guess (prediction) right? Scientists check their guesses (predictions) all the time—that's how they learn.

TIP: If you don't have paper large enough to trace your shadow on, that's ok! Use a small toy, like a doll or a truck, and trace that shadow instead.





For More FUN:

Make a Pinhole Projector

Scientists know that it's dangerous to look at the Sun, because it can damage their eyes. They use special tools to study the Sun safely. You can do this, too, with a tool called a pinhole projector. With an adult, follow these instructions to make your projector. Then head outside and try it out! After you try it, talk about what you saw.

You will need:

- A sunny day
- Two sheets of stiff white paper
- A pin

- 1** Have an adult use a pin to make a hole in the center of one piece of paper.
- 2** Go outside (with your adult). Put your back to the Sun and hold the paper out so the Sun shines on it. Just make sure you don't look at the Sun through the hole or any other way.
- 3** Use the other piece of paper to "catch" the image of the Sun that will come through the hole. Move the paper back and forth and see how it changes the image. What you see on the paper is an image of the Sun!



This is a safe way to see the Sun without hurting your eyes—using tools just like scientists do.

"Make a Pinhole Projector" activity is courtesy of Stanford Solar Center.

STEP 2 Observe the Moon

Have you ever noticed the Moon in the daytime sky? Sometimes it's there! It just doesn't seem very bright compared to the blue sky or clouds. When it's up at night it's hard to miss, and some nights it's brighter than others. Take a closer look at the Moon and see how it seems to change shape over time.

CHOICES—DO ONE:

- Make a Moon sky book.** This book is for recording what you see. Go outside with an adult three times and look at the Moon. You can either do it three different times during one day or night, or three days or nights in a row at the same time. Before going outside, make a prediction (guess) for what you think the Moon will look like. Then, go outside and draw what you see. Were your predictions correct? In the box on this page, you can see how the Moon appears to us at different times each month. Which Moon phases do your pictures look the most like? Share your pictures and Moon shapes with your family or friends.

For More FUN: Keep adding to your Moon book! Have an adult help you write down your thoughts about the Moon, and write the dates under your Moon pictures.



Moon Phases

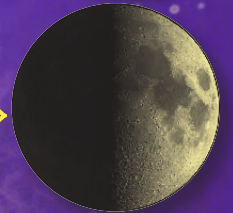
New Moon



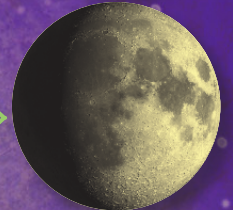
Waxing Crescent



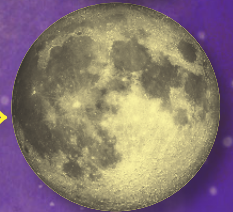
First Quarter



Waxing Gibbous



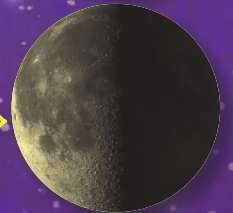
Full



Waning Gibbous



Third Quarter



Waning Crescent



For More FUN:

Meet the Man (or Woman!) in the Moon. For as long as people have been looking at the sky, they have been making up stories about the large spots they see on the Moon. Some people think the shapes look like a person's face, some see a full body, and others see animals like frogs or rabbits. Look at pictures of a full Moon or go outside and look at a full Moon at night. What do you see? Do you see any of your flower friends? Why do you think it looks this way? Make up a story about what you see or draw a picture of it, and share it with your family or friends.



OR

- **Take a closer look.** Space scientists use different kinds of tools to help them see the Moon better. You can use binoculars to look at the Moon like scientists do! When the Moon is up in the sky, ask an adult to take you outside and use binoculars to look at the Moon. Does the Moon look different when you look at it through binoculars? How?

The light areas are mountains and the dark areas are flat, covered in fine volcanic rock.



What do you think the light and dark areas of the Moon are?

Real-Life Space Scientists



Mae Jemison

was born in Decatur, Alabama. On her first day of kindergarten, Mae's teacher asked what she wanted to be when she grew up. "A scientist," she said. She became a doctor and worked in Africa for many years. Then Mae decided that she wanted to become an astronaut. She was accepted into NASA's astronaut program. (NASA stands for National Aeronautics and Space Administration.) In 1992, Mae became the first African American woman to travel in space—on the Space Shuttle Endeavour. "I felt like I belonged right there in space," she said.



Huy Tran

grew up in a small village in a country called Vietnam. In 1969, when she was six years old, astronauts first landed on the Moon. There were very few televisions where she lived and a large crowd gathered to watch the event on a tiny black-and-white TV on someone's front porch. Huy was too small to see the TV from the back of the crowd—so she climbed a mango tree to get a better view. "I watched the people in the control room celebrate and wished that I could be one of them," she says. Many years later, her family moved to the United States—and she went to work for NASA as a materials engineer, testing tiles that would be used on the Space Shuttle. Her childhood dream came true!

STEP 3 Meet the stars



Now that you've observed the Sun (our closest star) and the Moon, it's time to see more stars! All of the other stars are much farther away than the Sun and the Moon. That's why they look like tiny points of light.

CHOICES—DO ONE:

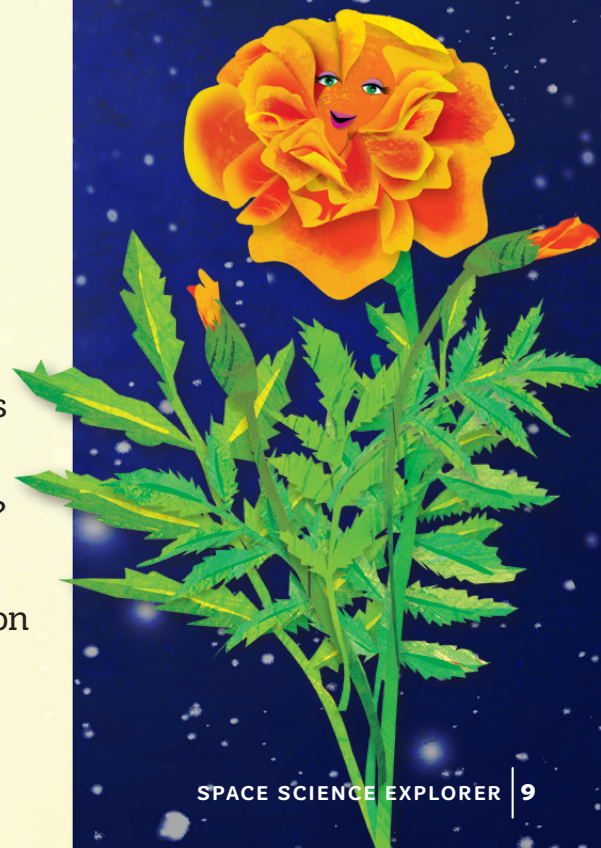
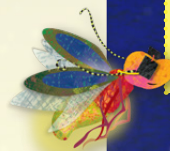
Make a pretend telescope. A telescope is a tool that scientists can use to study the stars by making distant things seem brighter and bigger. Make a pretend telescope by decorating a toilet paper tube or rolled-up piece of construction paper. (You can even paint stars on it!) Then take your "telescope" outside on a clear night, with an adult, and look through it at the stars as you use your creativity to pretend you're a NASA scientist.

OR

Make a star pattern. For as long as people have been looking at the sky, they've found patterns and shapes in the stars. These patterns are called constellations. People from all cultures made up stories about these constellations and would use them as a map to tell directions. Make a star pattern of your own—in the shape of you! Lie down on a piece of paper and have a friend draw stars on the paper at a few different points around your body. Don't have big paper? Try using a smaller part of you, like your hand. Can you tell it's you? What else does it look like? The stars give a general outline of the original shape and we use our imagination to fill in the outline—just like a constellation!

For More FUN:

On a clear night see how many stars you can count in one minute!



Can You Find These Stars?

Cassiopeia

North Star

Big Dipper

The Big Dipper is easiest to spot. Once you find it, draw an imaginary line from its bowl to the North Star (Little Dipper), then continue the line to find Cassiopeia.

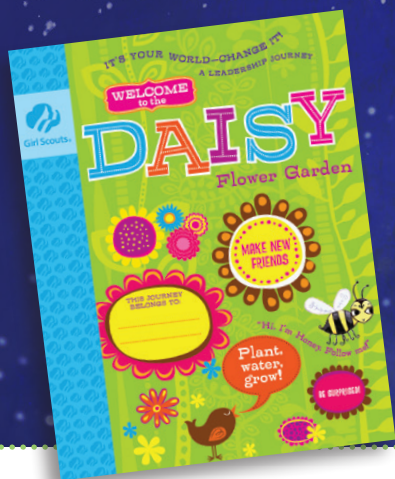
Orion

The constellation (or star pattern) called Orion can be one of the easiest to find because it has bright stars. The constellation has two stars at the top, three in the middle, and two at the bottom. What do you think the shape looks like?



For More FUN: Use a spray bottle or brush to splatter white paint on dark paper. Then connect the dots. Just be sure the paint is washable!





Going on a Journey?

Do some badge work along the way.

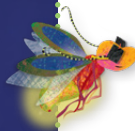
Daisies plant a mini-garden and watch it grow in *Welcome to the Daisy Flower Garden*. As you watch your garden grow, think about what you saw in this badge as you explored the power of the Sun. Can you use what you learned to help your garden grow big and strong?

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

- Sharing with my family how the Earth rotates making it daytime and nighttime
- Teaching others how to make predictions like a good scientist
- Showing my friends how to see things with their eyes and space science tools, like binoculars, in a new way



I'm inspired to:



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