National Park Service
U.S. Department of the Interior

JUNIOR RANGER
ECLIPSE EXPLORER

October 14, 2023 Annular Eclipse & April 8, 2024 Total Eclipse

Become an Eclipse Explorer

Hello Junior Rangers! Welcome to the Junior Ranger Eclipse Explorer activity book. Inside we will learn about what an eclipse is and how experiencing this natural event first-hand can make your visit to a national park or public land extra special.

Here are two special guests to help you along your way. This is Junior Ranger CaLisa and Bill Nye from The Planetary Society. They know a lot about solar eclipses and other cool things happening in space!

In this book you will **EXPLORE** the Sun and Moon in the sky above you and observe how they interact with the Earth you're standing on. **LEARN** about the 2023 North American Annular Solar Eclipse and the 2024 Total Solar Eclipse. **PROTECT** your eyes from the Sun while still being able to enjoy the wonder of an eclipse.

To earn your Junior Ranger Eclipse Explorer badge, complete the activities in your age group.

When you have completed the activities, return your book to a park ranger. Be prepared to tell them three things you have learned about eclipses and how to safely view them.

1. _____

2. _____

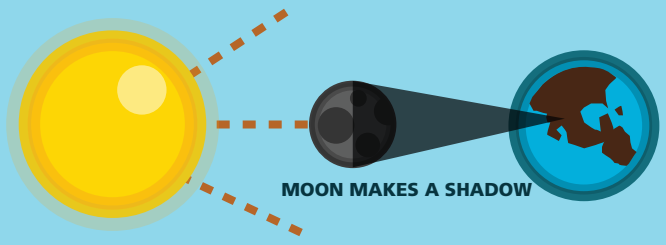
3. _____

What is a Total Solar Eclipse?

A solar eclipse happens when the Moon passes directly between the Sun and the Earth. The Moon will then make a shadow on Earth. If you happen to be inside of that shadow, then you will be able to see a solar eclipse!

Total Solar Eclipse
We see this when the Moon is just the right distance from Earth and perfectly aligned to hide the entire Sun from view.

SOLAR ECLIPSE



Annular Solar Eclipse

As the Moon orbits Earth, sometimes it's closer and sometimes it's farther away. If there is a solar eclipse when the Moon is farther from Earth, an annular eclipse happens and we see what looks like a ring of fire in the sky! The word "annular" comes from the Latin word for "ring."

Partial Eclipse

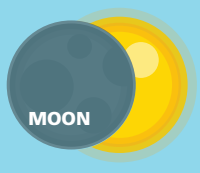
Sometimes objects in space line up, but not quite perfectly. Partial solar eclipses will look like someone took a bite out of the Sun! For the 2023 Annular Eclipse and the 2024 Total Eclipse, most of North America will see a partial eclipse.

Here are views of different solar eclipses.
Draw lines to match the words below to the different types of eclipses.

PARTIAL **TOTAL SOLAR** **ANNULAR**

SUN COVERED COMPLETELY BY MOON

SUN RING VISIBLE BEHIND MOON



SUN PARTIALLY COVERED BY MOON

Bill's Questions

1. A solar eclipse happens when the_____ blocks the light of the_____.

2. The ring of fire can be seen during an_____.

Protect Your Eyes

Looking at the Sun without special **eclipse safety glasses** can seriously damage your eyes. During an eclipse, people often forget this and look right at the Sun. Remember, regular sunglasses, tinted car windows, cameras, candy wrappers, 3-D movie glasses, and glass bottles are NOT safe to use when looking at the Sun.

Don't use anything to look at the Sun other than eclipse safety glasses.

You can find a pair of eclipse safety glasses in this booklet.

Now that we're safe and sound, let's test out your eclipse safety glasses! Put them on and find the Sun in the sky. Does it look bigger or smaller than you expected?

More safety information

Syzygy (*siz-uh-jee*)

Eclipses come with a lot of fun new words! Try to match these eclipse words to their definitions below.

Totality **Corona** **Syzygy**

_____ This is a funny word that is used when any three objects line up in space. You can always remember it because it has three Y's lined up inside of it.

_____ The moment when the Sun is completely and totally hidden by the Moon.

_____ A bright, halo-shaped light around the edge of the Sun that can be seen during a solar eclipse.

The images to the left show a timeline of a total solar eclipse in action. At first, very little of the Sun is covered, then the Moon slowly moves in. Eventually the entire Sun is blocked and for a few minutes we can see the bright halo shape around the edge of the Sun called the corona. The Moon then continues to move, revealing the Sun once again.

Sssssyzygy!

Ancient Cultures and Eclipses

Many ancient cultures have observed and recorded eclipses. Ancient cultures tried to understand why the Sun vanished from the sky, so they came up with various reasons and stories for what caused a solar eclipse. Many of the stories involved figures eating or stealing the Sun. Others interpreted the event as a sign of angry or quarreling gods.

The image below is from Chaco Culture National Historical Park in New Mexico. It's a very old drawing carved into a rock wall that scientists call a petroglyph. It was made by the ancestral Puebloan peoples in that area. Many people believe this ancient artwork represents a total solar eclipse that happened over 900 years ago!

What do you think?
Does it look like an eclipse to you?

Draw your own eclipse petroglyph in this area.

Photo by Tyler Nordgren.

Ancient people around the world have been observing and recording eclipses for years. How are you recording your observations?

Tell Your Own Story

Some ancient cultures wrote stories to explain what they saw in the sky during the eclipse. The Nation of Pomo is a group of indigenous tribes in Northern California. Some of their ancestors told a story of a Bear walking along the Milky Way. As Bear was walking she had to stop because the Sun was blocking her path. To get by, Bear took a great, big bite out of the Sun!

Write your own eclipse story. How would you describe your eclipse experience to someone who has never experienced an eclipse?

2023 and 2024

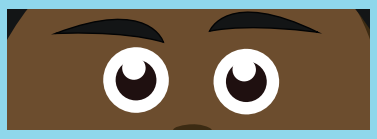
Solar Eclipse Paths

THE PLANETARY SOCIETY

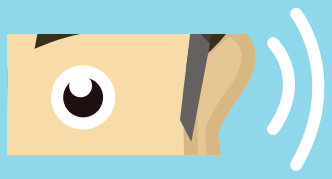
LOOK • LISTEN • FEEL

Since the daylight is completely blocked, a lot of strange things happen during a total solar eclipse. The sudden change in the amount of sunlight can have some bizarre effects on nature and on you.

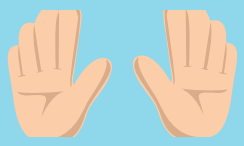
Think about what kinds of changes you might notice with your senses.



LOOK
Since the light changes, the colors of the land will change, too. And in the sky you may see stars shining in the middle of the day! Why do you think this happens?

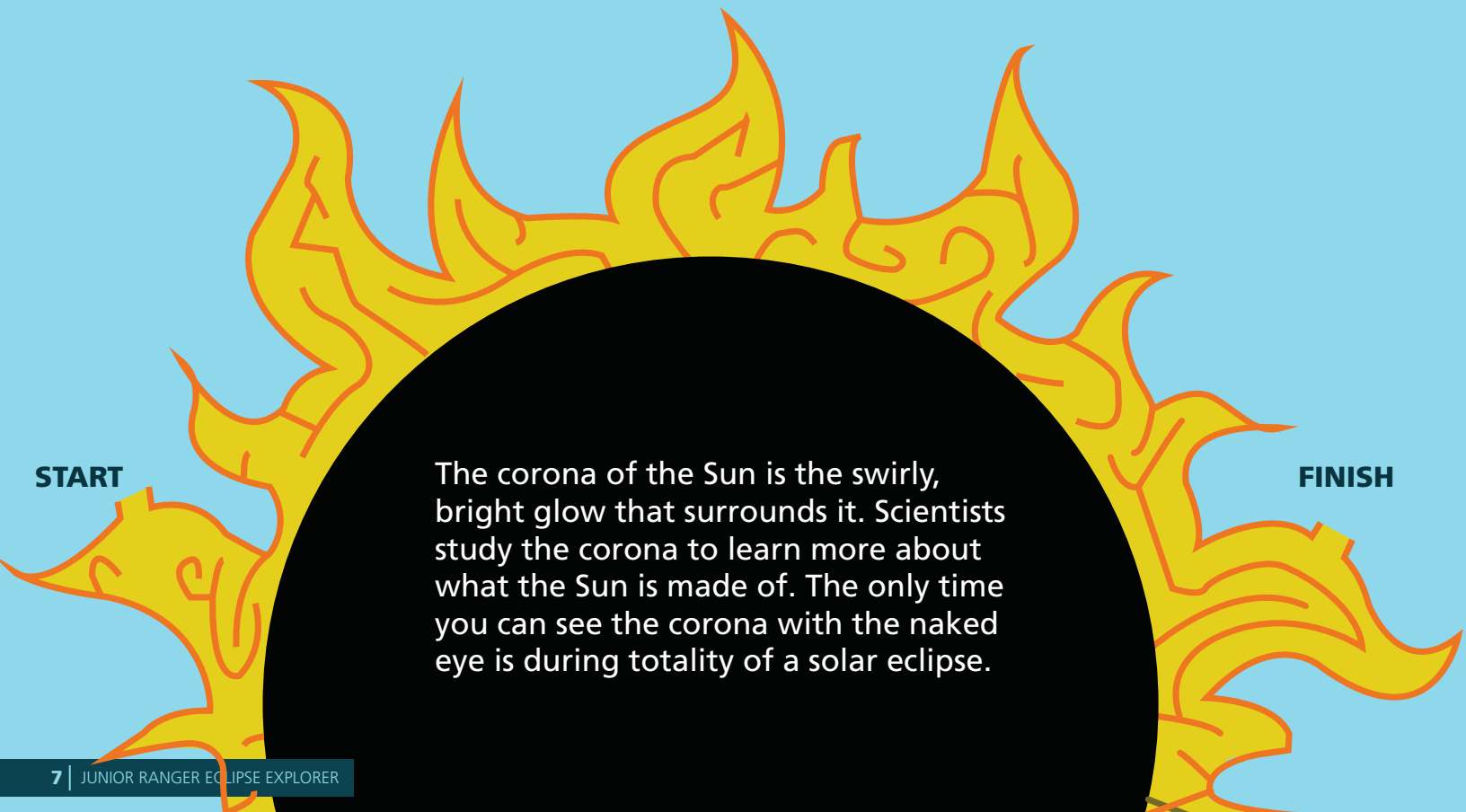


LISTEN
During totality, birds will stop singing and frogs start croaking. After all, they think it's night time! Can you think of any other animals that might make noises because of an eclipse?



FEEL
The temperature might change. Do you think it will be warmer or colder?

Make Your Way through the Solar Corona Maze



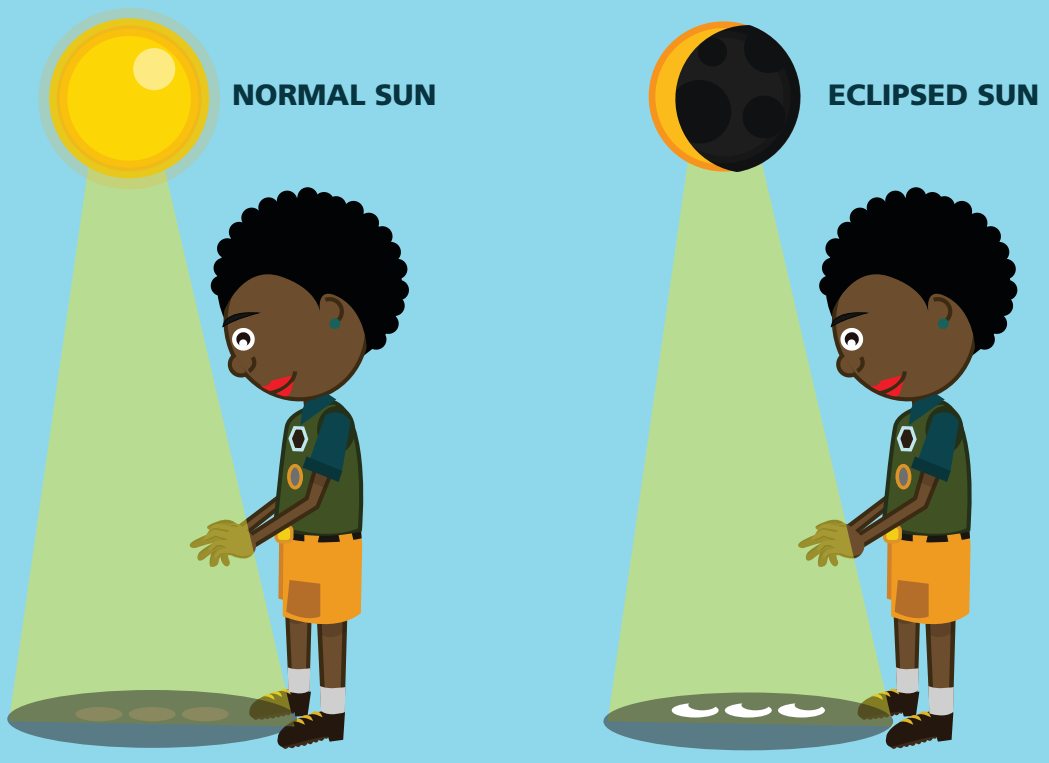
Shadows and Light

If it is a sunny day, go outside! Open your fingers wide and place one hand across the other like this:

Photo by Bruce Betts

There should be little window spaces between some of your fingers where sunlight can pass through. Now hold your hands out to make a shadow on the ground. Those little windows are only letting a small amount of light through.

Move your hands up and down a bit and move your fingers in closer together until you see little, round shapes of light on the ground.



ROUND SHAPES IN THE SHADOW **ECLIPSE SHAPES IN THE SHADOW**

The finger windows you made are also called pinholes. The lights on the ground appear round because the Sun itself is round! The round shape you are seeing is a projection of the Sun on the ground. During a partial eclipse, you can try this cool trick and the shapes will look just like the shape of the eclipse. Pretty neat!

Stamp Out the Sun

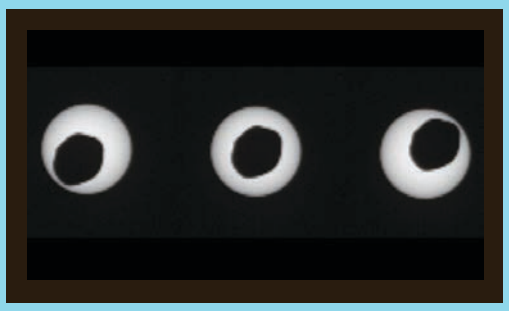
Find the cancellation stamp in the visitor center of your park and use it to eclipse the Sun here. The stamp should fit right inside the center of the Sun.

If you are not near a visitor center, color the Sun with your pencil, crayon, or marker to make a partial, annular, or total eclipse.

As long as it has a special filter.

Did You Know?

You can view a solar eclipse with your eclipse safety glasses, but you can also look through a telescope as long as it has a special solar filter. This can give you an up-close view of the solar corona!



An eclipse on Mars? That's right! NASA's Curiosity Rover on Mars took these photos of a moon eclipsing the Sun. This moon is called Phobos and it is smaller than our moon.

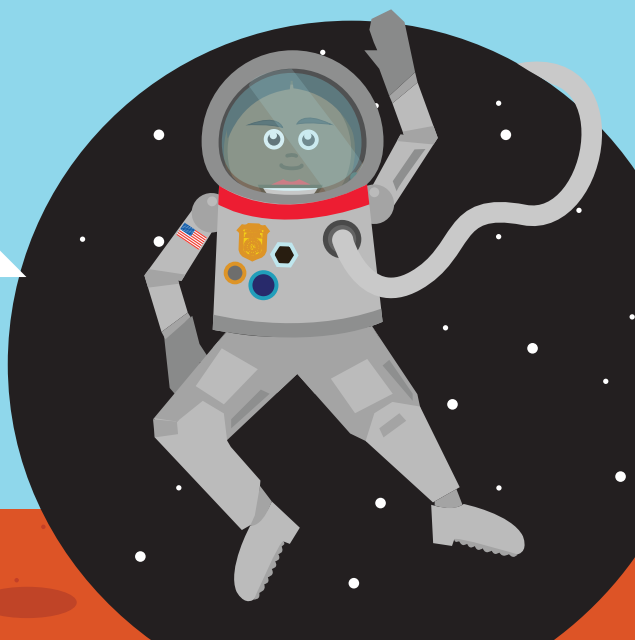
What kind of an eclipse is this? _____

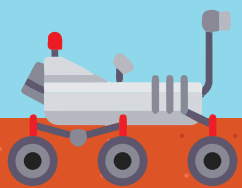
Can you name another planet besides Earth and Mars that can have an eclipse? (Hint: All planets in our solar system except Mercury and Venus have moons.)

_____

Did You Know?

Earth is in space and you are on Earth, so you are in space too. A solar eclipse is the alignment of the Sun, Moon, and You!





THE PLANETARY SOCIETY

Find Your Place in Space

JUNIOR RANGER ECLIPSE EXPLORER

10/14/23
Annular Eclipse

4/8/24
Total Solar Eclipse

EXPLORE • LEARN • PROTECT

NPS

ECLIPSE EXPLORER PLEDGE

I _____,
promise to only view solar eclipses with the proper eye protection, to show others how to view an eclipse safely, and to teach others what I have learned about different kinds of eclipses.

I also will continue to explore my national parks and the wonders of space by looking up to the skies, both day and night.

Congratulations!
You are now officially a Junior Ranger Eclipse Explorer.

Park Ranger Signature _____

Date _____

There's more to see at night!

A total solar eclipse during the day means there will be no Moon in the sky later that night. Without the bright Moon in our night sky, there will be a wonderful opportunity to see the stars. If you are in a national park with dark skies, you will even see the Milky Way!

The National Park Service and The Planetary Society agree that stargazing is a perfect way to get inspired about the wonders of our cosmos.

Visit go.nps.gov/nightexplorer to learn more about the Junior Ranger Night Explorer program.

Learn more about eclipses at
planetary.org/eclipse
nps.gov/subjects/naturalphenomena
#NPSEclipse, #ParkSkies, #eclipse

This activity book was made as a partnership between the U.S. National Park Service and The Planetary Society, a non-profit dedicated to empowering the world's citizens to advance space science and exploration.

Content by Merc Boyan, CaLisa Lee, & Tyler Nordgren
Supervised by the WASO Office of Interpretation, Education, and Volunteers.

This book belongs to _____

National Park Service
U.S. Department of the Interior

THE PLANETARY SOCIETY
Find Your Place in Space