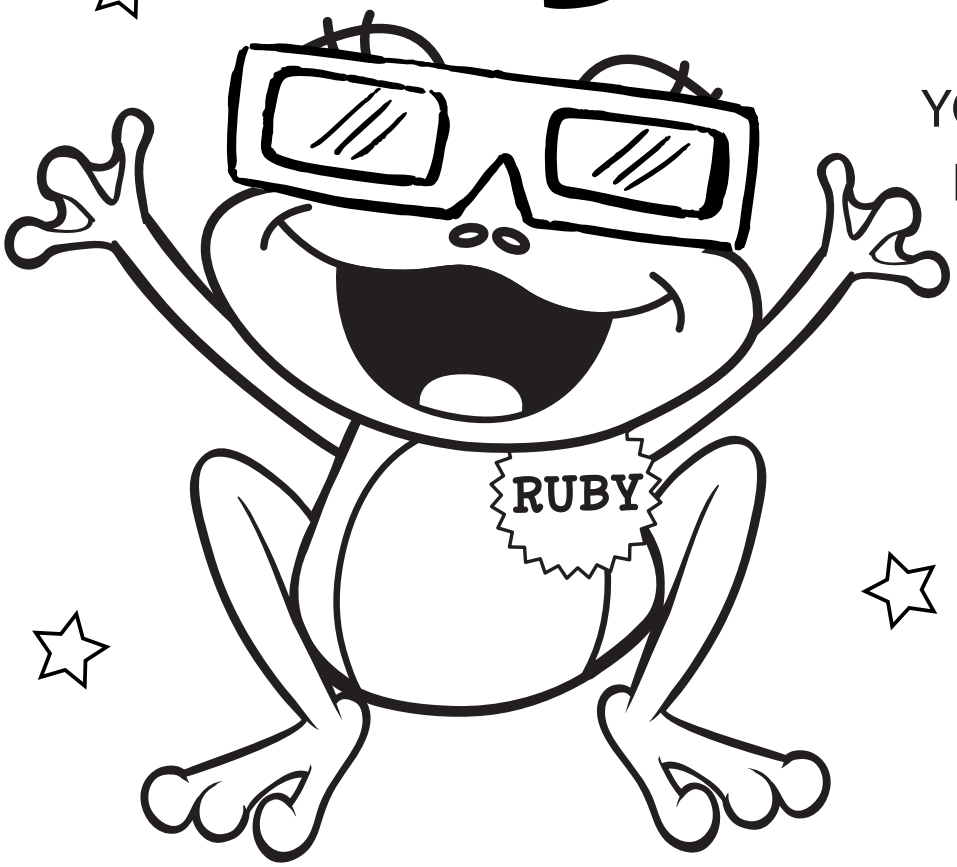
WBGU PBS

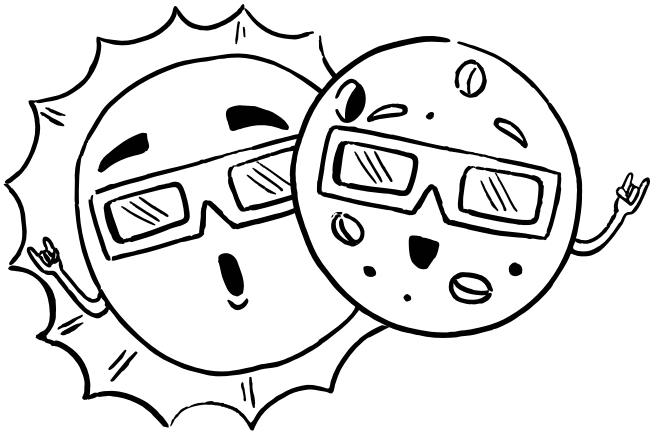
PRESENTS

SUN, MOON & SHADOWS



YOUR ULTIMATE ECLIPSE GUIDE AND ACTIVITY COMPANION

OHIO Learns 360



About this Guide

Soar into the enchanting world of celestial wonders with this information and activity book dedicated to unraveling the mysteries of eclipses. This guide is designed for inquisitive minds of all ages, and may be used for at-home learning, classroom activities, or as a portable companion for stargazing enthusiasts.

Within these pages, discover the magic of eclipses through a blend of information and hands-on activities. Investigate the science behind solar and lunar eclipses while learning and practicing literacy, math and social studies skills. Whether you're captivated by the science behind eclipses or simply eager to engage in hands-on cosmic exploration, this book is your passport to the celestial marvels that grace our skies.

To access an electronic copy of this activity guide, visit wbgu.org/solareclipse or scan or click on the QR code above.

To view all of the eclipse related videos produced by WBGU-PBS and utilize Ohio Learns 360 resources, scan or click on the QR codes in the back of the book.

Acknowledgements

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Thanks to the following individuals and organizations for supporting the development of this guide and activity booklet. Please visit their organization's resource pages for more eclipse information.

BGSU Department of Physics and Astronomy
BOWLING GREEN STATE UNIVERSITY

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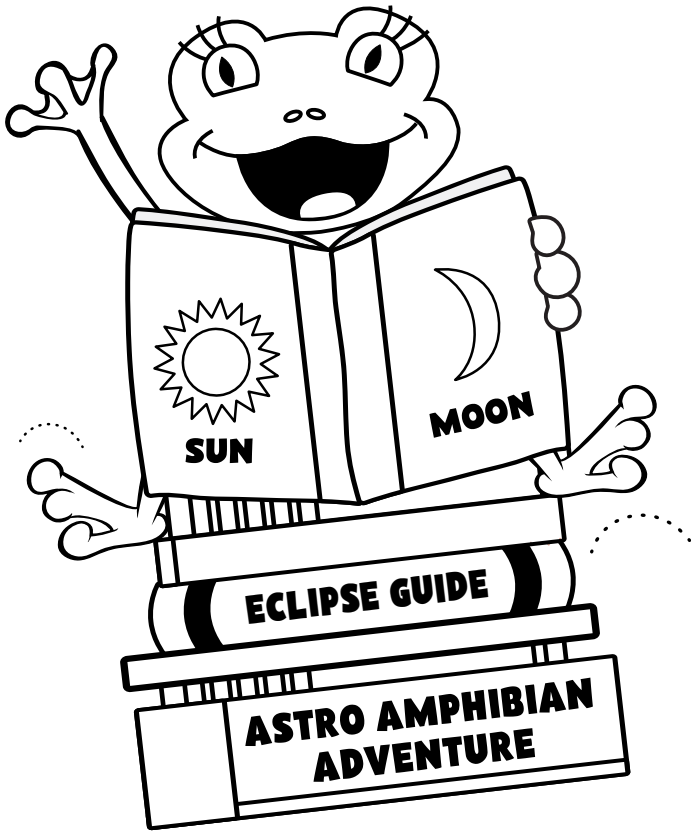
- Dr. Kate Dellenbusch, Lecturer

bgsu.edu/eclipse

Ohio Department of Education and Workforce 2024 Solar Eclipse Resources

Ohio Learns 360



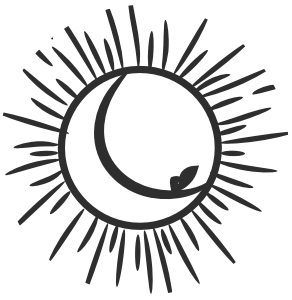


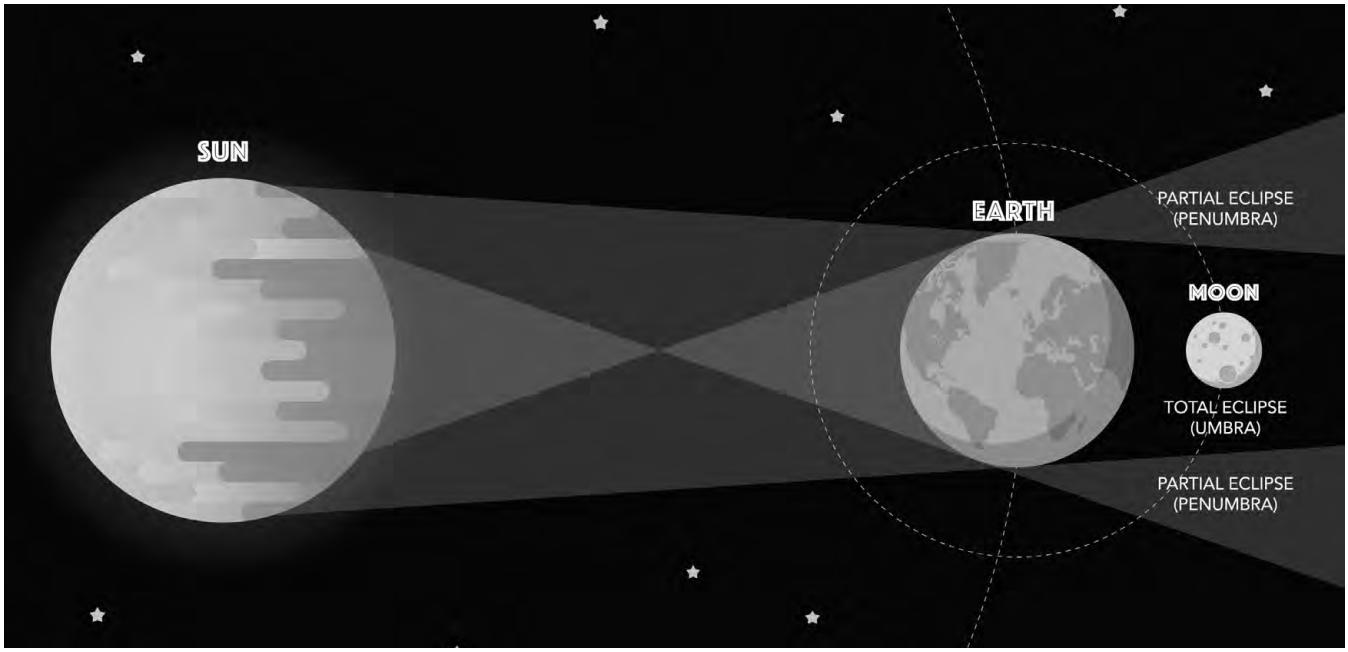
Table of Contents

What is an Eclipse?

An eclipse happens when one object in space, like a planet or moon, passes through the shadow of another object in space.
There are 2 types of eclipses: a **lunar eclipse** and a **solar eclipse**.

Lunar Eclipse

During a **lunar** eclipse, the **full moon** looks darker.



A lunar eclipse is like a special night show that happens when Earth comes between the Sun and the Moon. We usually see a bright **full moon** every month (actually every 29.5 days), but when Earth, the Moon, and Sun line up just right, and the weather is good, you may see a lunar eclipse every year or two. A lunar eclipse will last for about an hour. You don't need special glasses to see this natural wonder in the night sky.

Imagine Earth as a big friend blocking the Sun's light from reaching the Moon. This makes the Moon look different, like it's disappearing in the night sky. Sometimes, during a total lunar eclipse, the Moon even turns a dim red color known as a "Blood Moon." This happens because of the Sun's light scattered in the Earth's atmosphere. The weather forecaster on the news will usually tell you when a lunar eclipse can be seen where you live.

Want to learn more about eclipses? Scan or click on these QR codes to watch short eclipse videos.

What is a Lunar Eclipse?!

How to Explain an Eclipse to a Kindergartner (or a Basic Explanation of an Eclipse)

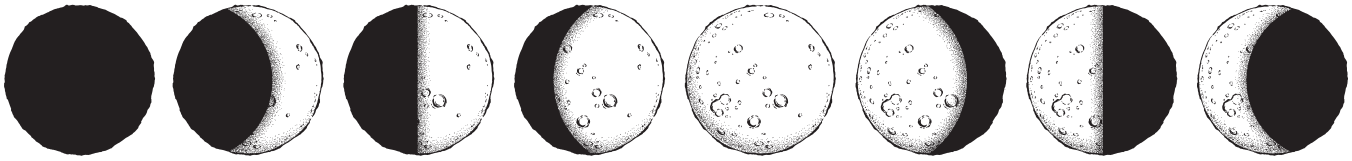
Moon Journal

Did you know that the Moon doesn't actually change shapes? This "change" is really the shadow of Earth as it blocks the Sun's light from reaching the Moon. From Earth, the Moon will appear to have different shapes depending on where it is in Earth's orbit.

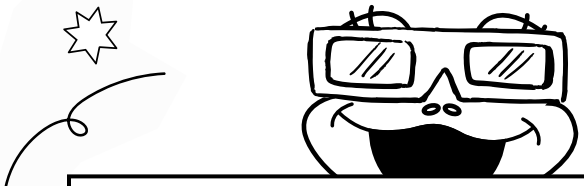
Look at the Moon each night at the same time and draw what you see!

Date observation started: _____ **Time to check Moon each night:** _____

Sunday	Monday	Tuesday	Wednesday	Thursday	Friday	Saturday
Date: ☐	Date: ☐	Date: ☐	Date: ☐	Date: ☐	Date: ☐	Date: ☐
Sunday	Monday	Tuesday	Wednesday	Thursday	Friday	Saturday
Date: ☐	Date: ☐	Date: ☐	Date: ☐	Date: ☐	Date: ☐	Date: ☐



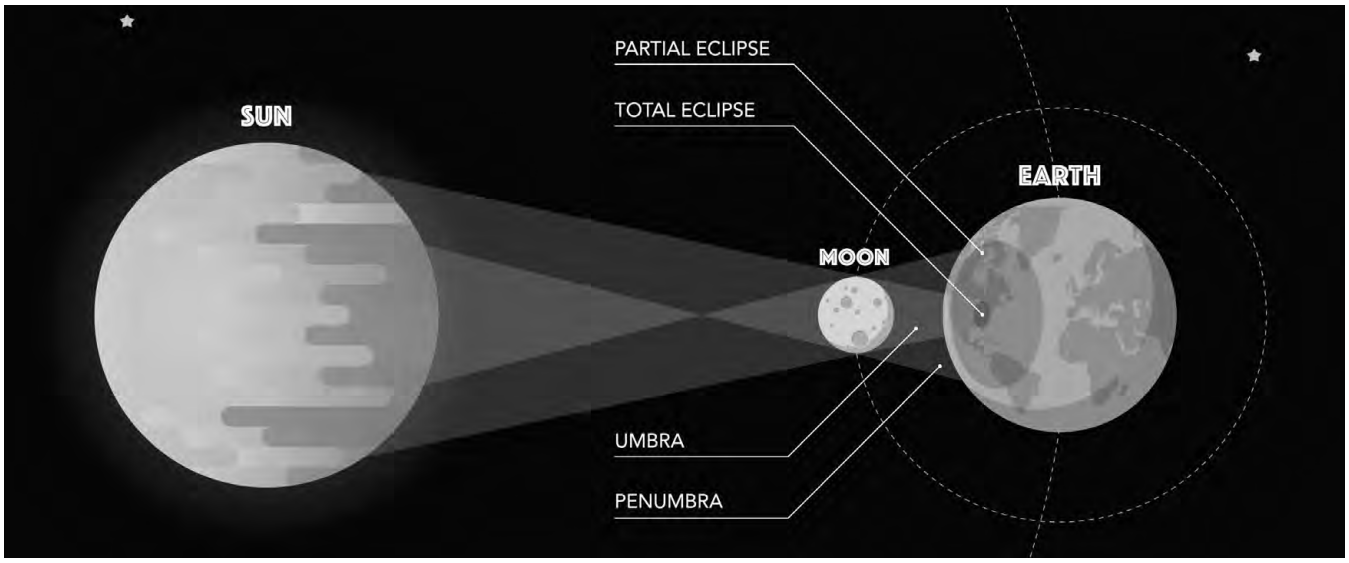
New Moon | Waxing Crescent | First Quarter | Waxing Gibbous | Full Moon | Waning Gibbous | Last Quarter | Waning Crescent



For more games and activites, visit pbs.org/parents

Solar Eclipse

During a **solar** eclipse, the **Sun** looks darker.



A solar eclipse is a special event that happens during the day and at **new moon**. It occurs when the Moon **orbits** between the Sun and Earth. The Moon casts a shadow on a small part of Earth that blocks out the Sun's light from reaching Earth. There are three types of solar eclipses: **Total**, **Partial**, and **Annular**.

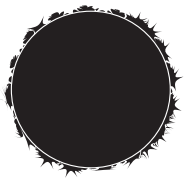
- **Total Solar Eclipse:** Imagine the Moon blocking all of the Sun's light for a short time. It's like a special dark trail moving across Earth. The time when the Moon is blocking all of the Sun's light is called **totality**. It gets so dark that it feels like night for a few minutes. During totality, if the weather is clear, the Sun's atmosphere, called the **corona,** will be visible. Most people agree this sight is the most spectacular part of a total eclipse. Totality is totally amazing! Animals might get a bit confused in the dark too! Totality only lasts a few minutes, but before and after totality, there is a partial eclipse that lasts a few hours. A total eclipse event rarely happens in the same place - on average - every 375 years in your hometown.

- **Partial Solar Eclipse:** This happens when the Moon only partially blocks or covers the Sun, giving the Sun a crescent shape.

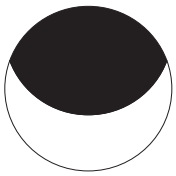
- **Annular Eclipse:** The Moon covers the Sun but doesn't block it completely. There's a cool "**ring of fire**" around the Moon. This is rare, like a total solar eclipse, and you can only see it in certain places.

Types of Solar Eclipses

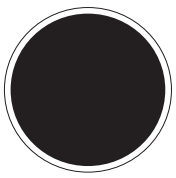
TOTAL ECLIPSE



PARTIAL ECLIPSE



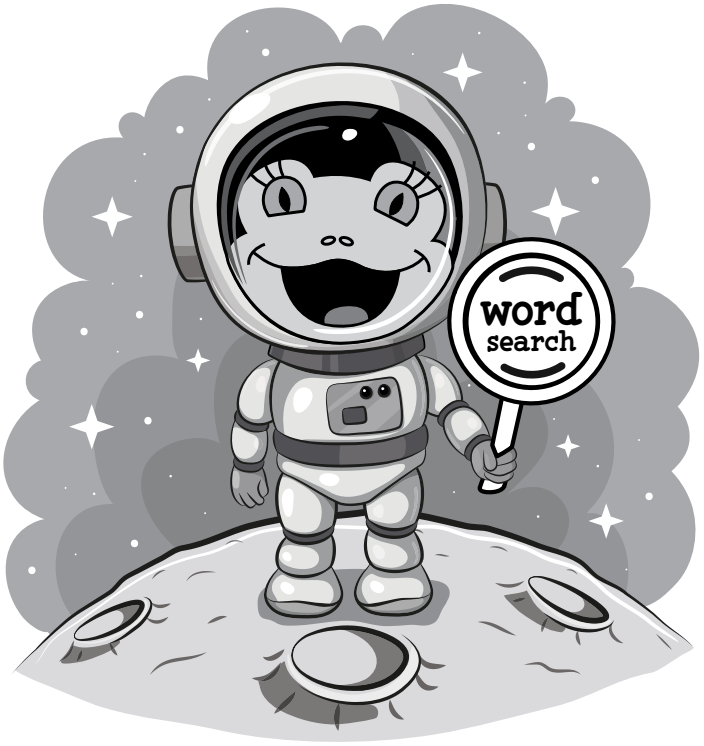
ANNULAR ECLIPSE



Scan or click on these QR codes to watch short eclipse videos.

What is a Solar Eclipse?!

April 8, 2024 The Next Solar Eclipse



COSMIC
WORD QUEST

DIRECTIONS: Help Ruby find the "eclipse" words that are hidden in the puzzle below. The words in this puzzle may be hidden horizontally, vertically, diagonally, forward or backward. Words can share letters as they cross over.

ANNULAR	**ECLIPSE**	**NASA**	**RARE**
DARK	**GLASSES**	**NIGHT**	**SOLAR**
DAY	**LUNAR**	**ORBIT**	**SUN**
EARTH	**MOON**	**PARTIAL**	**TOTAL**

Find these 2 bonus words - RUBY and WBGUPBS

R H D A G E O P T O T A N E R
I T L M I C B K R P I N S A T
S N P B K L R A N U L N O B S
B S U N T O I P B A N U L R P
P O R L R O H U G S S C A L O
U U N B N G S N T K E A R T H
G R I E K R A D P I M E S H E
B T L O A T O S E S S A L G R
W U O N G I D A Y L O N K I T
H M P T S O P R E T R M R N L
A N S I A M A O S C A T W E S
I P L E M L R D L T L E R A R
K D T R U A T S I S O I P C D
M O O N S L I K A O S K P O M
B R N K I R A B N O N R B S N
P A M N I D L O R U B Y E K E

VENN DIAGRAM

Compare a Solar and Lunar Eclipse using these words in the Venn Diagram below.

darker (2)	full	minutes	night
day	glasses	Moon (3)	shadow
Don't	hour	new	Sun
Earth (2)	hours		

LUNAR ECLIPSE

SOLAR ECLIPSE

BOTH

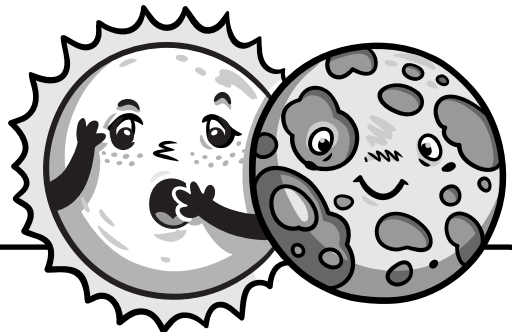
• _____ blocks the Sun's light from the _____. • The _____ is being eclipsed. The Moon looks _____. • _____ need special glasses. • It can only happen during a _____ moon. • It lasts for about an _____. • It happens during the _____.

• Occur when one space object moves into the _____ of another space object.

• The _____ blocks the Sun's light from _____. The Sun looks _____. • The _____ is being eclipsed. • You need special _____. • It can only happen during a _____ moon. • Totality is a few _____, but the whole event lasts for several _____. • Happens during the _____.

COSMIC CANVAS

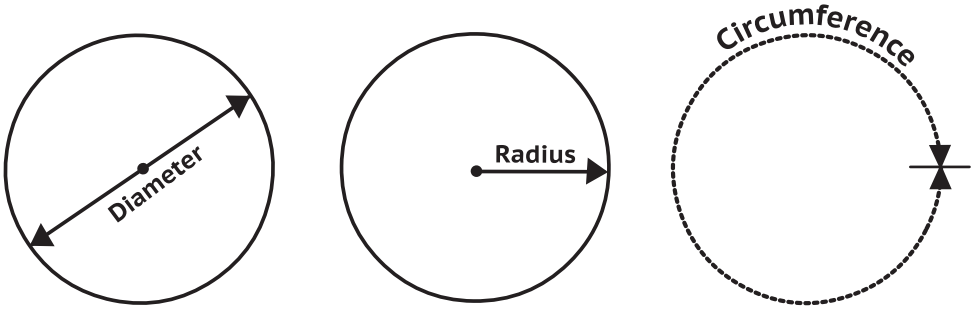
Create a Celestial Spectacle



1. Draw a large circle in the center of the page. This will represent the Sun.
2. Draw a smaller circle partially covering the larger Sun circle.
3. What object do you think the smaller circle represents?_____
4. What event do the two circles together represent? _____
5. Color your drawing. You may want to add lines to the edges of your Sun to show rays of light.

How Does a Solar Eclipse Happen?

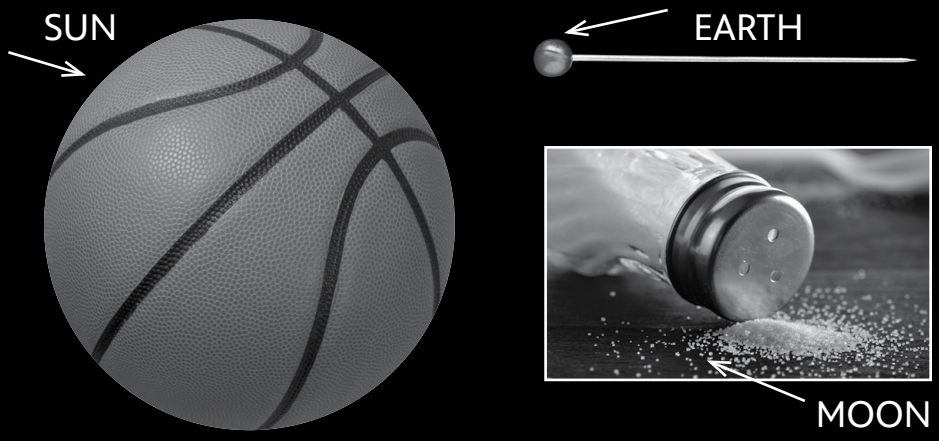
The Sun and the Moon might seem like they're the same size when we look up at the sky, but here's a fun fact. The Sun is actually way, way bigger than the Moon. It's 400 times larger in diameter!



Diameter is a straight line passing from side to side through the center of a circle or sphere. Radius is a straight line from the center to the circumference of a circle or sphere. Circumference is the distance around a circle or sphere.

Let's try to picture it:

If the Sun were as big as a basketball, Earth would be as small as the head of a pin, and the Moon would be as tiny as a single grain of salt.



Now, you might be wondering, how can the tiny Moon cover up the enormous Sun?

Here's the simple answer: The Moon is just the right distance from Earth. Even though the Sun is way bigger, it's also much farther away – like, 400 times more distant than the Moon! So, when we look up from Earth, the Sun and Moon look almost the same size.

It's really a fantastic coincidence! If the Moon were closer, it would block all of the Sun, and we wouldn't get to see the amazing Sun's atmosphere called the corona during an eclipse. If the Moon were farther away, it wouldn't cover the Sun completely.

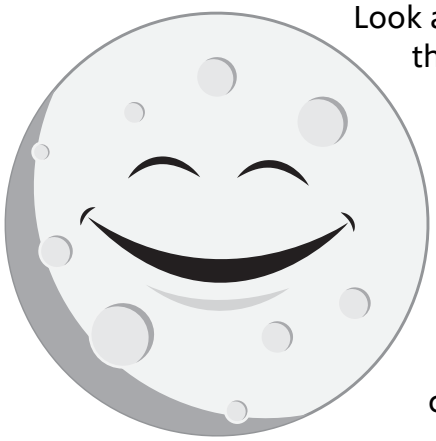
Nature has this amazing way of making things work perfectly for us to enjoy these awesome moments!

Scan or click on the QR code to watch a video about the relative sizes and distance of the Sun and Moon.

Relative Sizes and Distances of the Sun and Moon

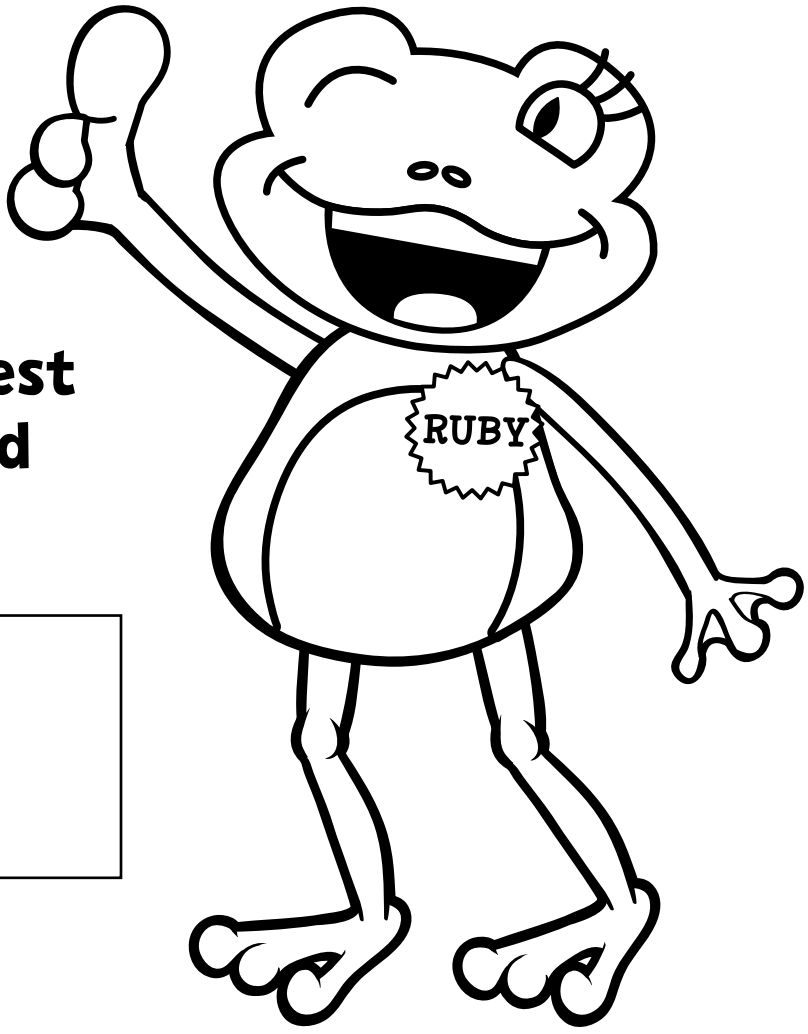
Try It!

Tip the Scales Activity



Look at something in the distance that's bigger than your thumb. Now, stretch out your arm in front of you and hold your thumb up (like a thumbs up sign) and close one eye.

Does your thumb cover the object in the distance? If not, try stepping back farther, and try again until you can make the object disappear. This activity shows how the smaller Moon (like your thumb) can cover up the bigger Sun (like the object in the distance). Experiment with different objects and see how large of an object you can "eclipse" with your thumb.

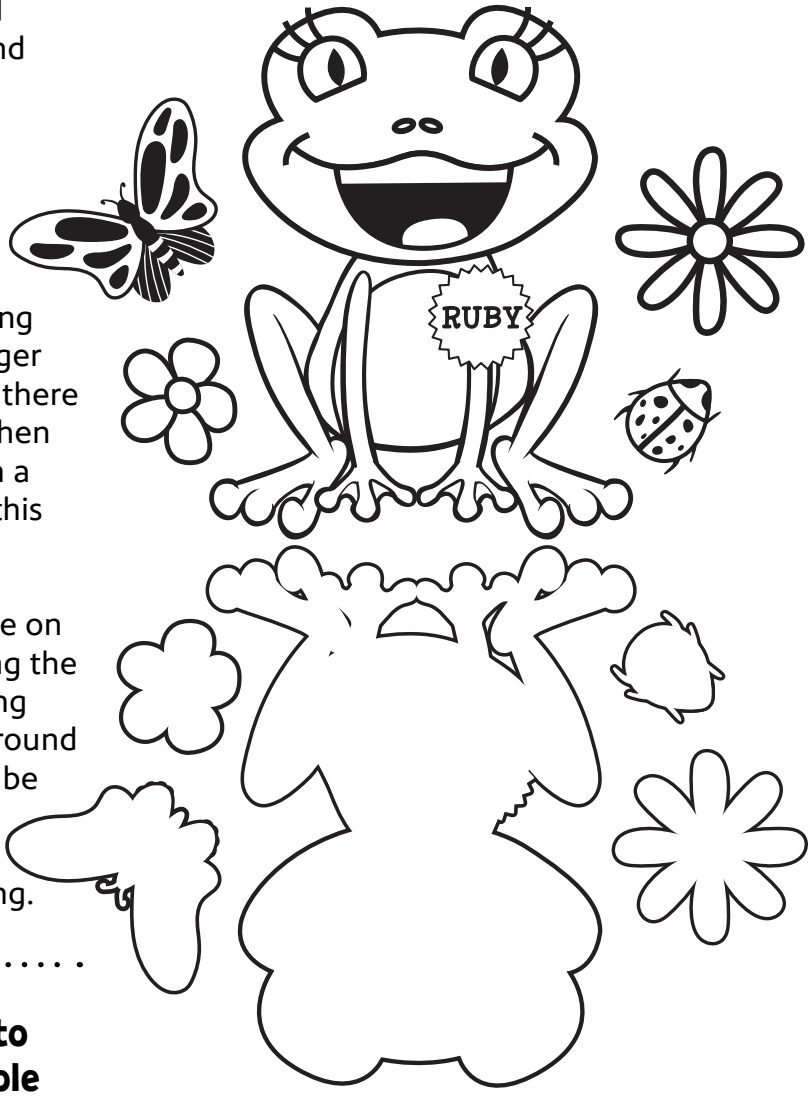


What is the largest object you could "eclipse"?

Spectacular
CELESTIAL SILHOUETTES

When a solar eclipse approaches totality, remember to look down! If you can find some trees with leaves, check the ground during the eclipse. You may spot some bright images of the partially-eclipsed (crescent) sun. This happens when light passes through small gaps between the leaves of a tree, creating “pinholes” that make the normal bright round dapples of sunlight under the tree. During a partial eclipse, the dapples are no longer round sun images, but crescent ones. If there are no trees with leaves, try using a kitchen colander or poke small, smooth holes in a sheet of paper or aluminum foil to see this neat effect.

Here's another cool effect you might see on the ground. As the sky gets darker during the eclipse, there's not as much light creating shadows. This makes shadows on the ground look clearer and sharper. You may even be able to see the hairs on your arms as shadows! It's like a little show on the ground when a solar eclipse is happening.

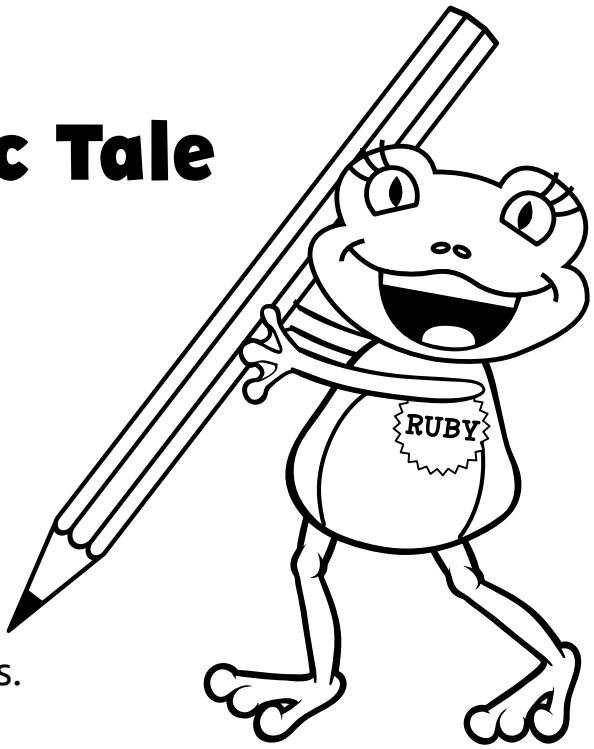


Scan or click on the QR code to watch a video about the pinhole camera effect phenomenon.

Why Solar Eclipses
Create Those
Crescent-Shaped Lights

Color the picture of Ruby with the colors of your choice then color Ruby’s shadow black or gray.

Orbiting Verses - An Eclipse Acrostic Tale



Use the first letter of the words
SOLAR ECLIPSE to write a poem about eclipses.

Here is an example of an acrostic poem using the first letters of the word Moon:

Mysterious in the night so high,
Orbiting, a glowing light in the sky.
Overhead, it quietly gleams,
Nature's lantern with enchanting beams.

S _____

O _____

L _____

A _____

R _____

E _____

C _____

L _____

I _____

P _____

S _____

E _____

Eclipsed Oddities: Peculiar Animal Behavior

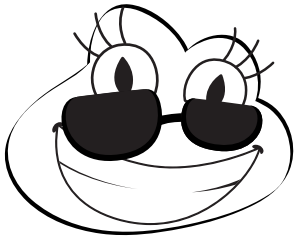
When there's a total solar eclipse, animals may behave strangely. As an eclipse gets closer to total darkness, some domestic animals, including cows and sheep, might go back to their homes. Birds may start flying in odd groups or change the way they sing. Nocturnal animals such as crickets and frogs could become more active, making a lot of noise together.

Right before everything gets super dark during the eclipse, you may hear more buzzing, chirping, and chattering from animals than usual. It's much louder than any other time of the day. But once it gets completely dark during the eclipse, these animals become silent.

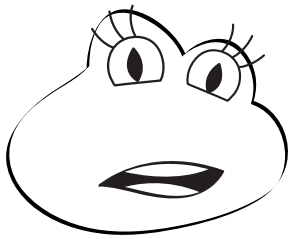
Scientists have studied how animals act during eclipses. They have seen birds stop eating and fly to their homes, hippos walk into the water like it was evening, and a squirrel stay in its hole during the eclipse, maybe thinking it was bedtime.

People have seen insects and spiders do strange things too. Bees have been observed flying back to their hive as darkness approached during an eclipse. Two scout bees went out when the light returned, but the other bees didn't follow. Spiders took down their webs when it turned dark and built new ones when the Sun came back a few minutes later.

Zookeepers watched a group of chimpanzees gather and point toward the Sun and Moon during an eclipse. Another time, a herd of llamas came out of seemingly nowhere and surrounded a group of researchers. Whales and dolphins were observed surfacing and swimming alongside a boat just before everything got dark. Both groups of animals went away right after the eclipse, and were not seen again.

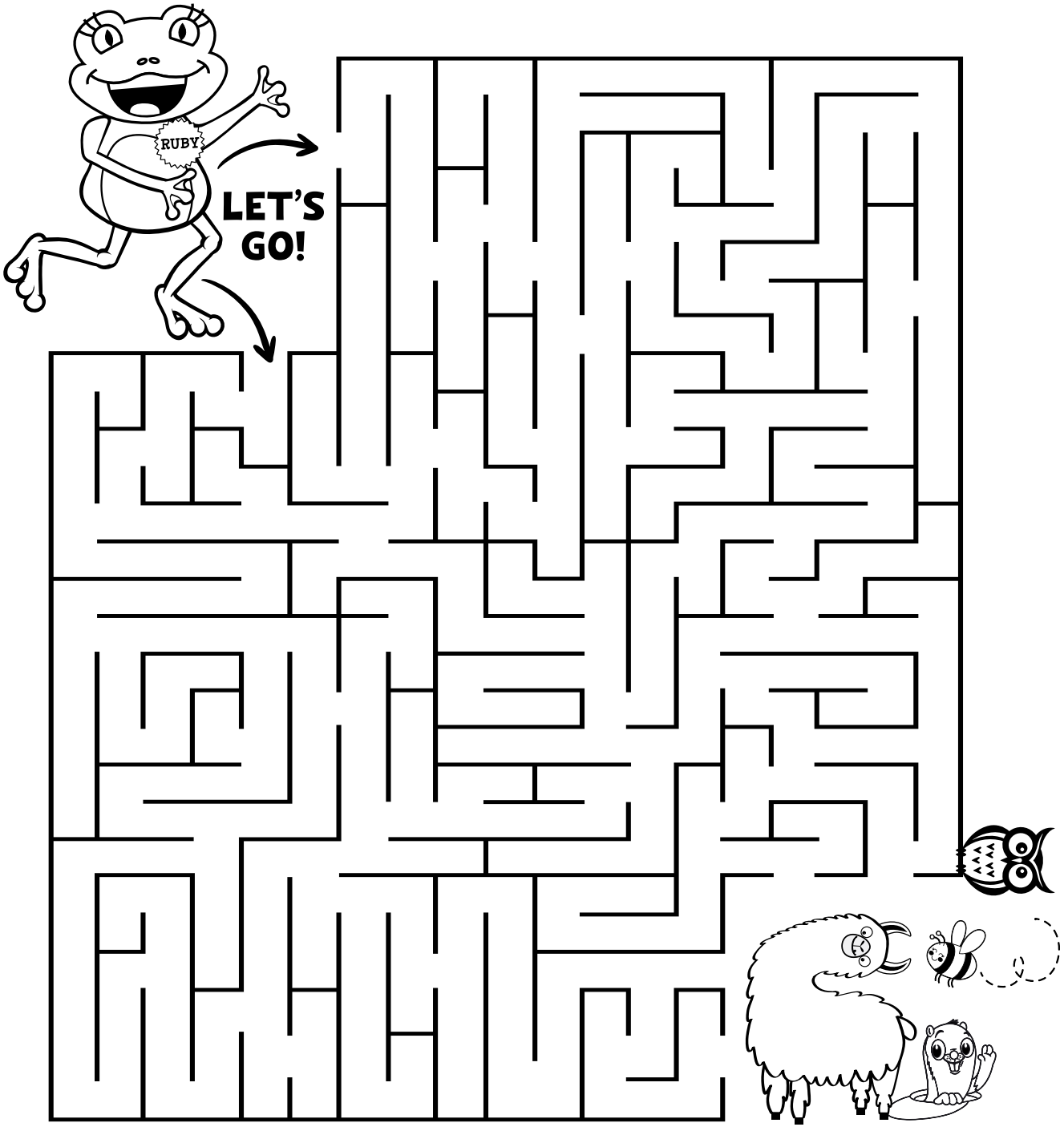


Scan or click the QR Code to watch a video of Astronomer Dr. Douglas Duncan describe the strange behavior of some animals during an eclipse: casa.colorado.edu/~dduncan/?page_id=114



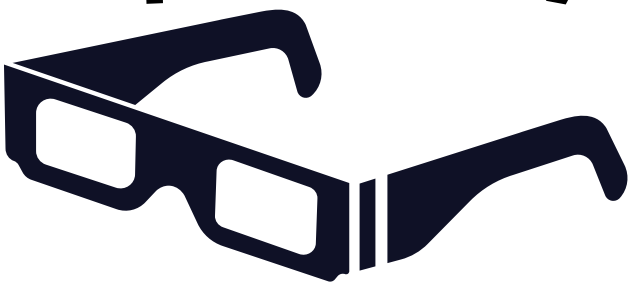
Astro Amphibian Adventure

Help Ruby find her way to her friends to sing their nighttime song before the total solar eclipse.



Parents and caregivers, always supervise children to make sure they use their eclipse glasses safely.

Eclipse Safety



Make sure you read this section with a grown up so you stay safe during an eclipse!

It's super important to keep your eyes safe during a solar eclipse. The only time it's ok to look at the Sun without special glasses is during the few minutes of time when the Moon completely covers the Sun. This short time period when the Moon's disk completely covers the Sun is called totality.

Using regular sunglasses or looking through binoculars, a camera lens, or a telescope without special filters can hurt your eyes badly. Even if you're wearing **eclipse glasses**, NEVER look at the Sun through a camera or telescope – it's dangerous! Also, don't point your phone camera at the partial phases of an eclipse, it is too bright and will damage or ruin your camera, just like it could your eyes. It is ok to take a photo during totality, but you may want to spend that short time looking with your eyes.

To safely watch the eclipse, you need special "eclipse glasses." These glasses are not like regular sunglasses, no matter how dark or fancy they are. Eclipse glasses are much darker and follow safety rules called ISO 12312-2.

Before you use your eclipse glasses, check if they have any rips, scratches, or damage. If they do, don't use them – throw them away. If you don't have eclipse glasses, you can still watch the eclipse without looking directly at the Sun. You can make a **pinhole projector**, which is a cool way to see the Sun's image projected onto a surface. But remember, don't peek at the Sun through the pinhole!

Remember these important points:

- Only use special eclipse glasses to look at the Sun, except during totality.
- Take off your eclipse glasses only during totality to enjoy the full eclipse.
- Put your eclipse glasses back on as soon as you see any part of the Sun after totality.
- Eclipse glasses are not safe for use with cameras, binoculars, or telescopes. Special filters are needed for these devices.
- If you can't find eclipse glasses, use a pinhole projector to watch the eclipse safely.

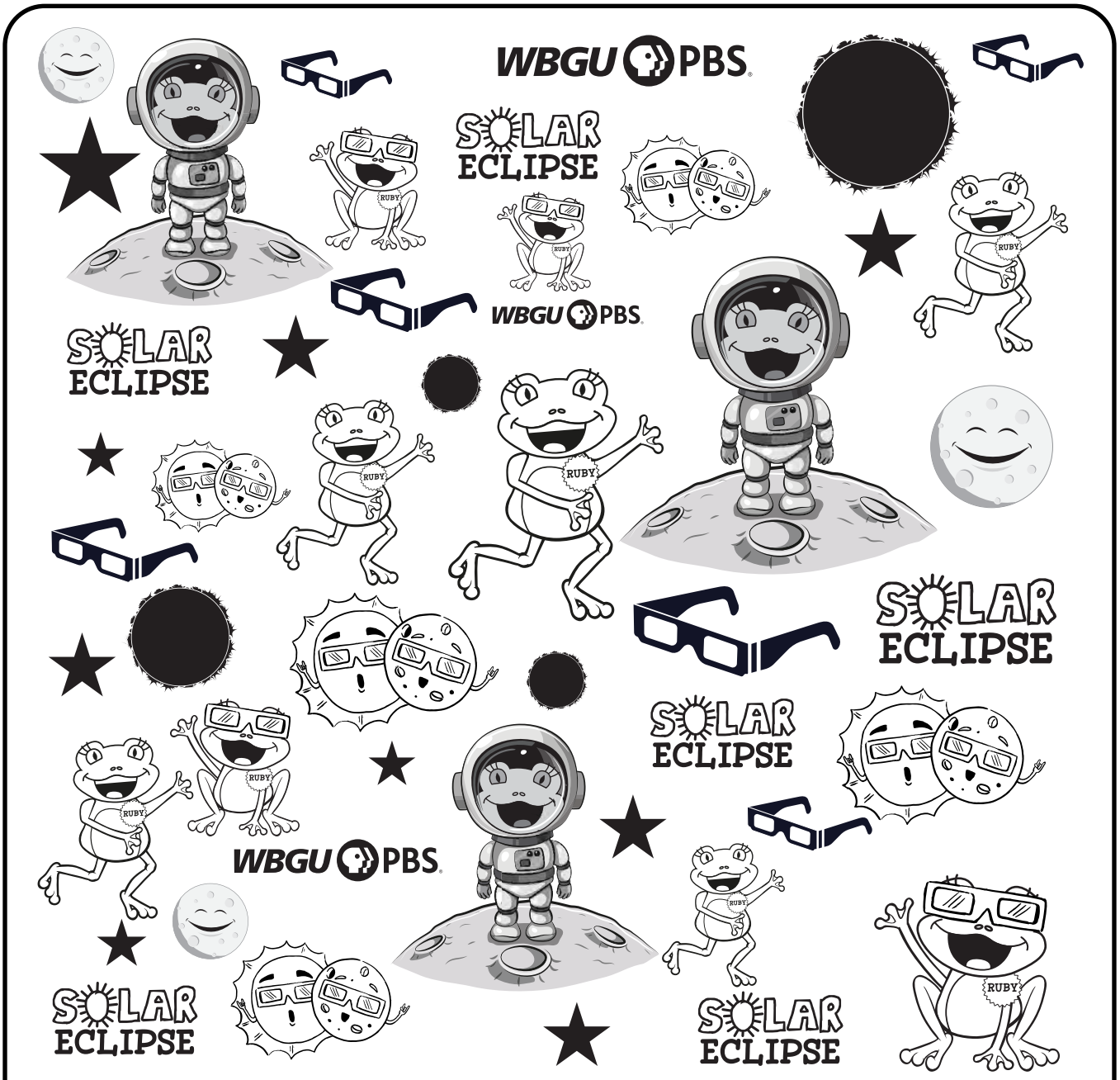
Scan or click the QR codes to learn how to make a pinhole projector and for more information about staying safe during the eclipse. Keep your eyes protected and enjoy the amazing show in the sky!

Pinhole Solar Projection Viewer

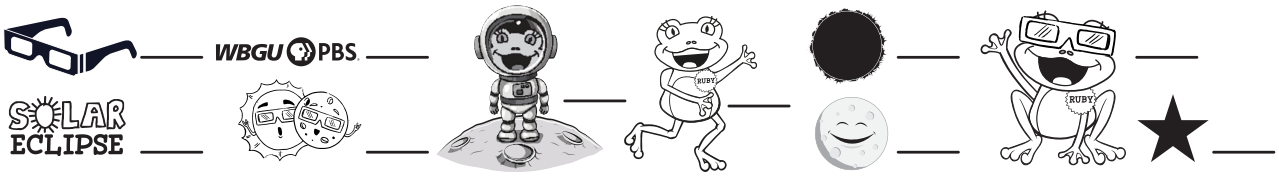
How to Safely View an Eclipse (Pinhole Viewer)

Eclipse Community Preparedness

"Eye" Spy - Help Ruby Count!

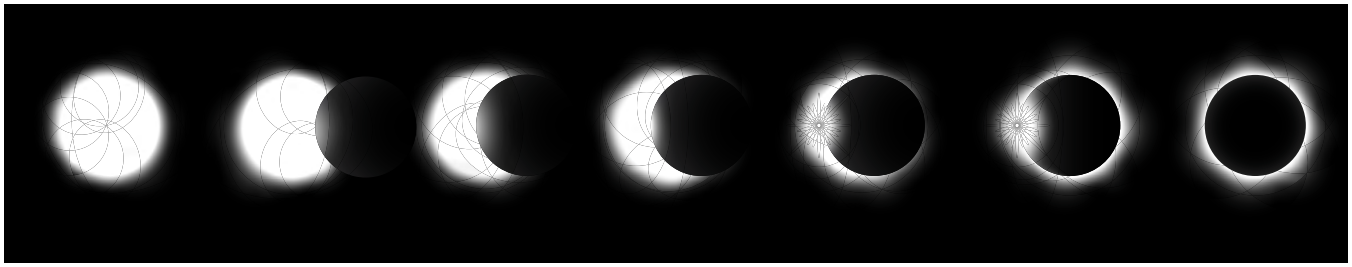


Record how many you find!



Timeline to Totality

Let's explore the exciting stages of a solar eclipse in a way that's easy to understand!



First Contact

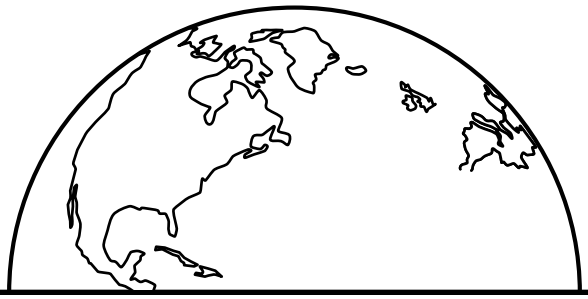
Getting Started

About an hour before the big moment (totality), the Moon begins to touch the Sun, creating a crescent shape. If you look down on the ground near trees with leaves, you may spot some bright images of the partially – eclipsed (crescent) sun. The normal circular-shaped dapples of sunlight through the leaves are no longer round sun images, but crescent ones from the partial eclipse. If there are no trees with leaves, you could also use a colander, straw hat, or foil poked with small holes to observe this pinhole camera effect. Remember to wear your special eclipse glasses to safely observe the Sun.

Approaching Totality

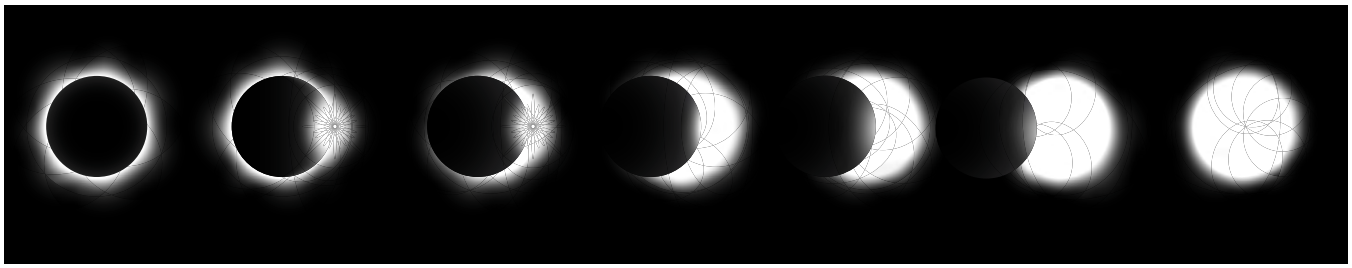
Things are Changing!

About 15 minutes before totality, the Moon covers about ¾ of the Sun. You might notice the weather changing – the temperature drops and winds shift. Shadows might become super clear. The sky gets darker with an eerie tint. Animals might act a bit strange, with crickets, frogs, and birds making louder sounds. Look west to see the shadow of the Moon approaching.



Right Before Totality

Keep an eye out for the last of **Baily's Beads.** When there is only one, it will look like a "diamond ring" around the Sun (the **diamond ring effect**). Now it's SAFE to take off your eclipse glasses.



Totality

The Big Moment!

Now, the Moon fully covers the Sun, and it's total darkness, which usually lasts 2-5 minutes. Take in this moment with all of your senses. Make sure your eclipse glasses are off to see the Sun's beautiful corona. Look around the sky, and you might spot other planets and stars. The air feels even cooler now. The crickets, frogs and diurnal birds might go quiet, and nocturnal animals may get noisy. Enjoy the total eclipse experience!

Third Contact

Wrapping Up Totality

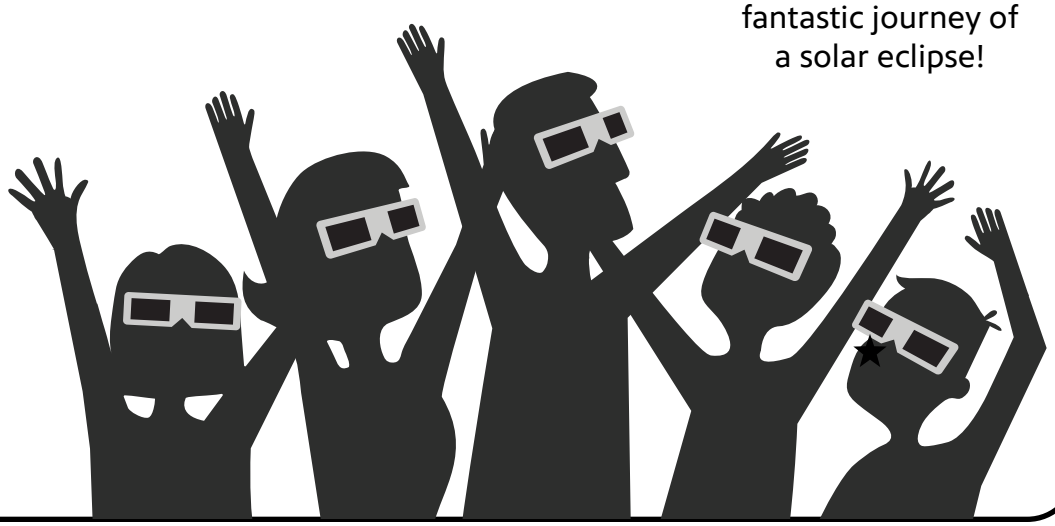
Keep an eye out for the "diamond ring effect" around the Sun on the opposite side. Once you see it, put your eclipse glasses back on. The stages start happening in reverse order.

Fourth Contact

Eclipse Finale

Stick around for the official end of the eclipse. The Moon shadow completely moves off the Sun, and the eclipse is officially over. What an amazing celestial show!

Remember to use your eclipse glasses at the right times and enjoy the fantastic journey of a solar eclipse!



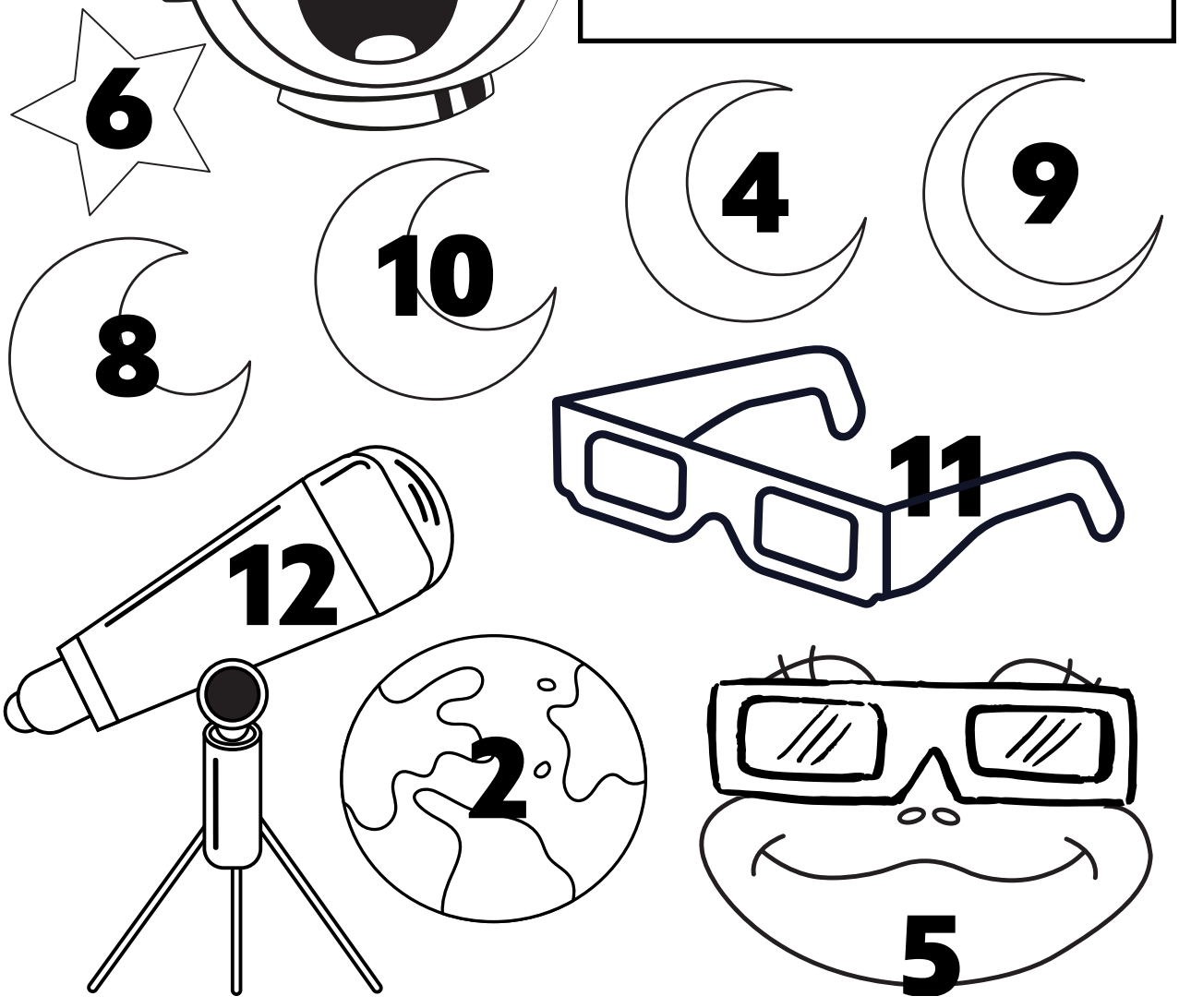
Roll, Add and Color!

Instructions:

1. Roll 2 dice.
2. Add the numbers together.
3. Color the answer!

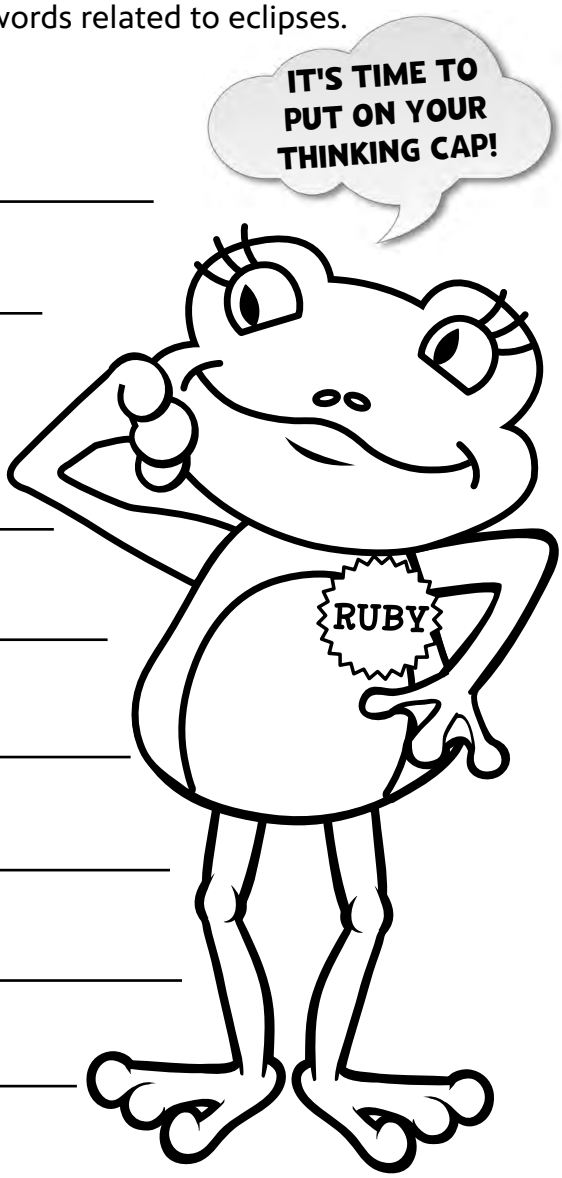
Two player:

Each player chooses a color. The winner is the one with the most colored in at the end.



Warped Words: Cosmic Wonders Scrambled

Help Ruby unscramble the letters to reveal words related to eclipses.

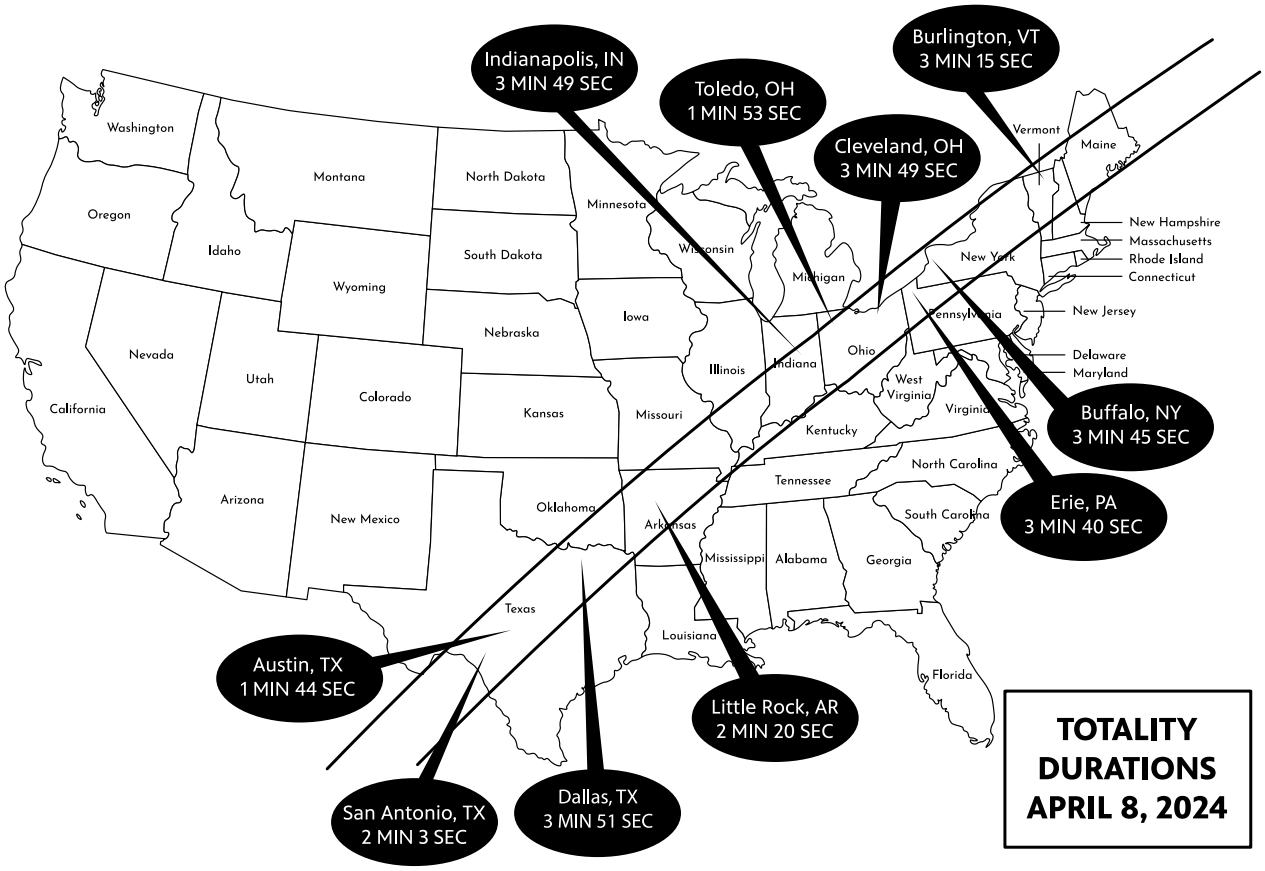


1. RANUL _____
2. ONOM _____
3. NUS _____
4. DOSAWH _____
5. ONRTYSOMA _____
6. ORALS _____
7. CEILPSE _____
8. KDAR _____
9. ATITYOLT _____
10. OIMDAND GRNI _____
11. ACORON _____
12. SEECLPI GSLSAES _____
13. PHELONI EEIWRV _____

Total Solar Eclipse USA Map
April 8, 2024

The big solar eclipse on April 8, 2024, is going to be super cool! It starts in the South Pacific Ocean and travels across North America. The first place in North America to experience total darkness (that's called totality) will be on the Pacific coast of Mexico around 11:07 a.m. Pacific Daylight Time.

After that, the eclipse moves through the United States, starting in Texas and going through Oklahoma, Arkansas, Missouri, Illinois, Kentucky, Indiana, Ohio, Pennsylvania, New York, Vermont, New Hampshire and Maine. Next, it goes into Canada and says goodbye to North America on the Atlantic coast of Newfoundland, Canada at 5:16 p.m. Newfoundland Daylight Time.



Use the U.S. map above to complete the next steps and answer questions about the Total Eclipse on April 8, 2024:

1. Add a compass to the map of the United States.
2. Color the line of totality orange.
3. Color Ohio red.
4. How many total states are in the path of totality for April 8, 2024?

_____

5. List the states that will experience totality:

_____ _____

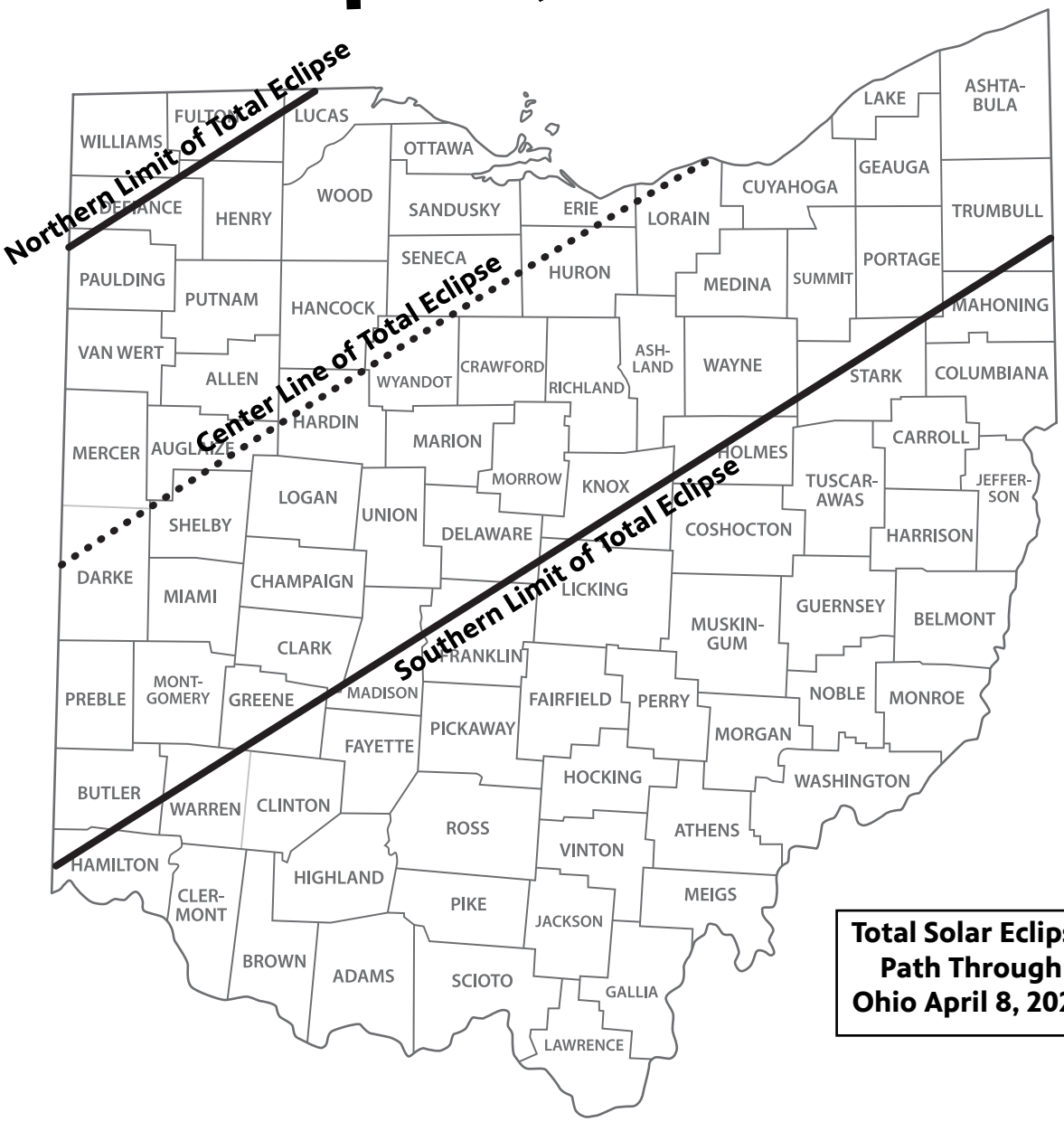
_____ _____

_____ _____

_____ _____

_____ _____

Total Solar Eclipse Ohio Map
April 8, 2024



Total Solar Eclipse Path Through Ohio April 8, 2024

If you live in Ohio, use the map above to complete the following activities:

1. Find the county where you live and color it green.
2. Place a star in your county to represent your hometown.
3. Label your hometown.

If you want to know when total darkness begins in different places, check the table on the next page. Remember, some areas will also see a bit of darkness before and after the total eclipse. It's going to be a fantastic show in the sky!

Totality Times - Ohio Cities

Column A	Column B	Column C	Column D	Column E	Column F
Location	**Partial Eclipse Begins**	**Totality Begins (approx)**	**Totality Ends (approx)**	**Number of Minutes of Totality (Column D minus Column C)**	**Partial Eclipse Ends**
Dayton	1:53 p.m.	3:09 p.m.	3:12 p.m.		4:25 p.m.
Lima	1:54 p.m.	3:09 p.m.	3:13 p.m.		4:26 p.m.
Wapakoneta	1:54 p.m.	3:09 p.m.	3:13 p.m.		4:25 p.m.
Defiance	1:55 p.m.	3:10 p.m.	3:11 p.m.		4:25 p.m.
Findlay	1:55 p.m.	3:10 p.m.	3:14 p.m.		4:26 p.m.
Bluffton	1:55 p.m.	3:10 p.m.	3:14 p.m.		4:26 p.m.
Napoleon	1:55 p.m.	3:11 p.m.	3:13 p.m.		4:26 p.m.
Bowling Green	1:56 p.m.	3:11 p.m.	3:14 p.m.		4:26 p.m.
Fostoria	1:56 p.m.	3:11 p.m.	3:14 p.m.		4:26 p.m.
Tiffin	1:56 p.m.	3:11 p.m.	3:15 p.m.		4:27 p.m.
Toledo	1:56 p.m.	3:12 p.m.	3:14 p.m.		4:27 p.m.
Fremont	1:57 p.m.	3:11 p.m.	3:15 p.m.		4:27 p.m.
Sandusky	1:57 p.m.	3:12 p.m.	3:16 p.m.		4:27 p.m.
Lorain	1:58 p.m.	3:13 p.m.	3:17 p.m.		4:28 p.m.
Cleveland	1:59 p.m.	3:13 p.m.	3:17 p.m.		4:29 p.m.
Akron	1:59 p.m.	3:14 p.m.	3:17 p.m.		4:29 p.m.

Totality Times - Ohio Cities

Use the table on the previous page to answer the following questions.

Find the number of minutes each city on the previous page will experience totality. Write your answers in Column E.
(Hint: Subtract Column C from Column D.)

1. Which cities will experience the longest time in totality? _____

_____

2. How many minutes will those cities experience totality? _____

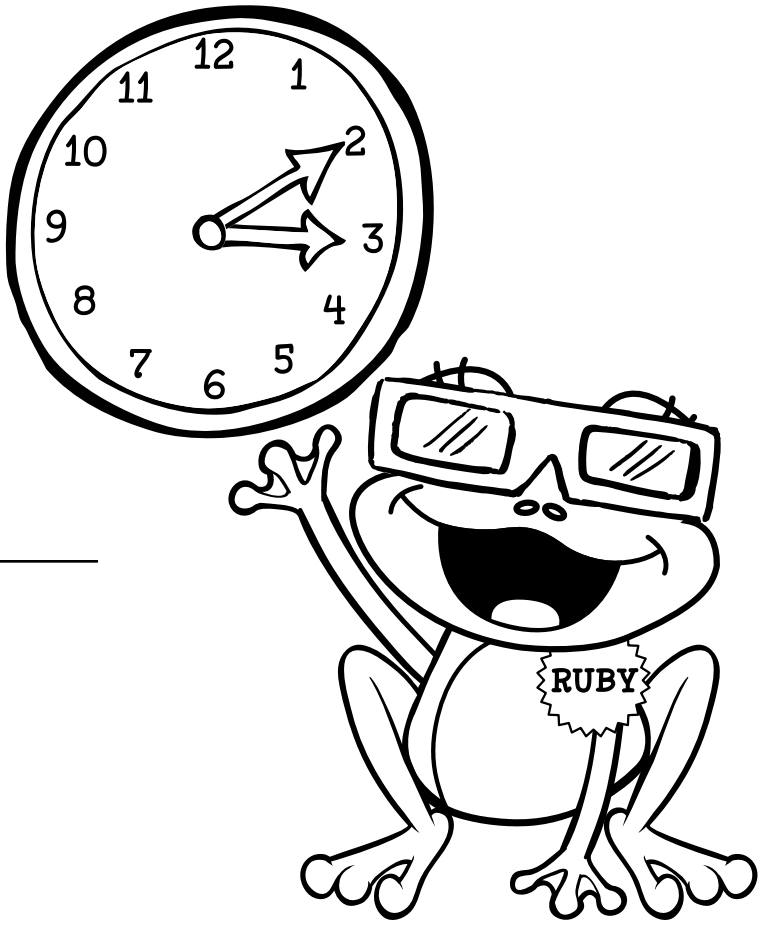
3. Which city will experience the shortest time in totality? _____

4. Find the city in the chart that is the closest to where you live. What is the name of the city?

_____

5. How many minutes will that city experience a total eclipse?

_____



Cosmic Calculations

Solve the following math problems and crack the code for the riddles on the next page.
The letter to the right of the answer is the key letter to solve the riddles.

QUESTION	ANSWER	LETTER
1. The diameter of Earth is (4,339 + 3,579) _____ miles.		U
2. Round the diameter of Earth (answer from #1) _____ to the nearest thousand miles. _____		O
3. Use your answer to #2 to find the approximate radius of Earth. **Hint: The radius is one half of the diameter.* _____		I
4. Round the diameter of Earth (answer from #1) to the nearest hundred. _____		Y
5. The Sun is (1,000÷10) _____ times larger than Earth in diameter.		K
6. The radius of the Moon is about 1,080 miles. What is the diameter of the Moon? **Hint: Double the radius to find the diameter.* _____		L
7. After the April 8, 2024, total solar eclipse, the next total solar eclipse in Ohio will be in the year (1786+313) _____		G
8. The Sun is about (25x16) _____ times bigger than the Moon. **It's also the same number of times as far away from Earth as the Moon.*		S
9. On average, an eclipse will occur in the same place every (250+125) _____ years.		A
10. The longest time a United States city will experience totality during the April 8, 2024, Eclipse is (28÷7) _____ minutes.		E
11. The last coast-to-coast total solar eclipse in the United States was in 2017. How many years are between 2017 and 2024? _____		N
12. The next total solar coast-to-coast eclipse in the United States is in 2045. How many years after 2024 will the next eclipse take place? _____		T
13. There are (9÷3) _____ types of solar eclipses.		H
14. A full moon occurs about every (18+11.5) _____ days.		C
15. About 15 minutes before totality, the Sun will be (25x3) _____% covered by the Moon.		P

Number Bank: 3; 4; 7; 21; 29.5; 75; 100; 375; 400; 2099; 2,160; 4,000; 7,900; 7,918; 8,000

Riddle Me This

Write the corresponding letter with the matching number from the table on the previous page to find the answers to these riddles.

What did the Moon bring to the solar eclipse party?

375		2,160	4,000	2099	3	21		400	7	375	29.5	100		

How do you organize a solar eclipse party?

7,900	8,000	7,918		75	2,160	375	7	4	21					

How does the Man in the Moon cut his hair?

4	29.5	2,160	4,000	75	400	4		4,000	21					

Use this space to work out the answers if needed.

Galactic Giggles: A Celestial Story Adventure

Ask a friend to give an example of the type of word listed below the blank space (noun, adjective, verb, etc.). DON'T tell your friend the sentence the word will describe, or let them read the sentence related to the word. Write down your friend's answers in the blanks. Once finished, read the silly story out loud and enjoy a giggle!

An Eclipse Adventure

One _____ [noun], the _____ [adjective] Sun and the _____ [adjective] Moon decided to have a(n) _____ [adjective] eclipse gathering in the _____ [noun]. They invited all their _____ [adjective] celestial friends to join in the _____ [adjective] celebration.

As the event started, the Sun began to _____ [verb] and the Moon started to _____ [verb] in a _____ [adjective] dance. The planets clapped their _____ [plural noun] and cheered _____ [adverb]. Suddenly, a group of _____ [adjective] space creatures arrived in their _____ [noun] and joined the festivities, bringing a sense of _____ [adjective] excitement to the atmosphere.

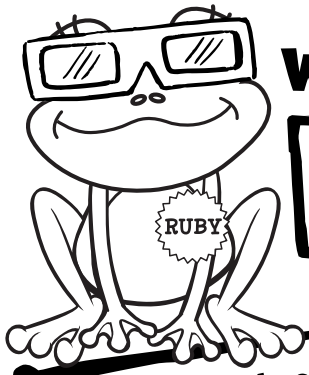
The Sun, feeling _____ [adjective], said to the Moon, "This is the most _____ [adjective] eclipse party ever!" The Moon nodded _____ [adverb] and replied, "Absolutely! The _____ [noun] and the stars are having a blast too!"

Just as the party reached its _____ [noun], the planets and the Sun formed a _____ [noun] conga line, and the Moon _____ [adverb] twirled in the center. The space creatures _____ [verb] along with joy, and everyone shouted, "_____ [exclamation]!"

The eclipse gathering continued until the Sun and the Moon bid farewell. The planets, still feeling _____ [adjective], promised to host an even more _____ [adjective] party the next time the Sun and the Moon decided to dance in the _____ [noun] again.

And so, the _____ [adjective] eclipse celebration became a _____ [adjective] memory in the hearts of the planets, the Sun, the Moon, and the friendly _____ [adjective] space creatures!

Expedition of an Eclipse



WHERE WERE YOU WHEN THE ECLIPSE TOOK PLACE?

Who I watched eclipse with:

Where I watched the eclipse:

What I saw during the eclipse:

Draw it!

Top 3 best moments:

My favorite part of the eclipse was...

Cosmic Crossword Puzzle

Use these clues below to complete the crossword puzzle on the next page.

ACROSS

4 A _____ eclipse happens during the day.

5 The _____ begins to change about 15 minutes before totality. The temperature drops and winds change.

10 Another name for a lunar eclipse is a _____ Moon.

11 _____ might get much sharper as the eclipse approaches totality.

12 A total solar eclipse is a very _____ event in any one place; only once every 375 years on average.

13 The _____ blocks the Sun's light during a solar eclipse.

15 There will be a total solar eclipse across the United States on the eighth day of this month in 2024.

16 The Sun's _____ is 400 times larger than the Moon's.

18 Special safety eclipse _____ must be worn during a solar eclipse.

20 We usually see a full moon about once a _____ .

21 The part of the Sun's atmosphere that is visible only during a total solar eclipse.

DOWN

1 During totality, many diurnal animals will get very _____ .

2 The Sun is _____ hundred times farther away from Earth than the Moon.

3 A _____ solar eclipse happens when only part of the Moon covers the Sun.

6 _____ may get confused during a total solar eclipse.

7 During a partial solar eclipse, the tiny spaces between the leaves will act as _____ projectors, dappling the ground with images of the crescent Sun.

8 A lunar eclipse occurs about this many times per year.

9 The only time it's safe to view a solar eclipse without safety glasses. The time when the Moon completely blocks out the Sun's light.

11 During a solar eclipse the _____ gets darker.

14 It is _____ to look at a lunar eclipse without glasses because this type of eclipse happens at night.

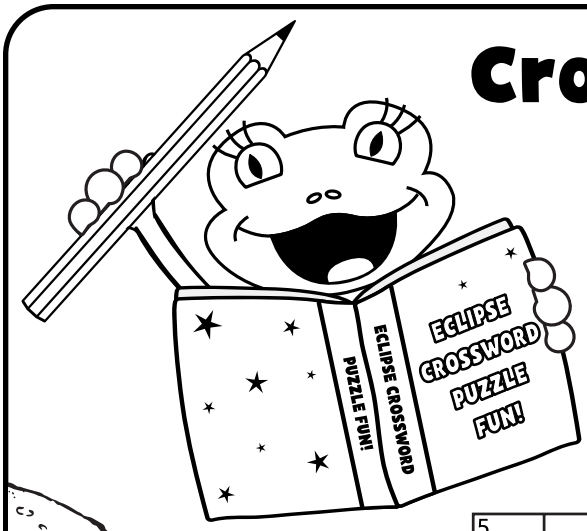
17 The Moon covers ONLY the inside of the Sun in this type of eclipse. It makes a "Ring of Fire" on the outside of the Moon.

19 During a _____ eclipse the Moon gets darker.

WORD BANK

ANIMALS ANNULAR APRIL BLOOD CORONA DIAMETER FOUR
GLASSES LUNAR MOON MONTH PARTIAL PINHOLE QUIET RARE
SAFE SHADOWS SOLAR SUN TOTALITY TWO WEATHER

Crossword Puzzle Fun!



WORD BANK

ANIMALS	ANNULAR	APRIL	BLOOD	CORONA	DIAMETER	FOUR	
GLASSES	LUNAR	MOON	MONTH	PARTIAL	PINHOLE	QUIET	RARE
SAFE	SHADOWS	SOLAR	SUN	TOTALITY	TWO	WEATHER	

Glossary

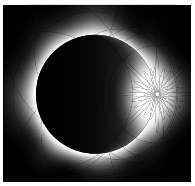
Annular Eclipse: A solar eclipse where the Moon is relatively far from Earth as it passes in front of the Sun and does not fully block the Sun. The edge of the sun remains visible and there is a bright ring around the Moon.

Astronomer: A scientist who studies astronomy. Astronomers observe and analyze celestial objects such as stars, planets, galaxies, and other phenomena in the universe. They use telescopes and other instruments to gather data, conduct research and contribute to our understanding of the cosmos.

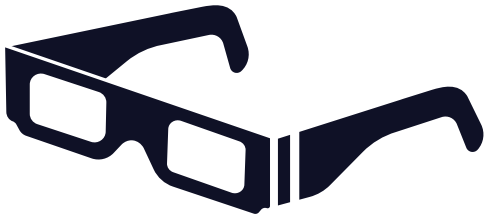
Astronomy: The scientific study of stars, planets and other objects in space. It explores the universe beyond Earth and tries to understand celestial bodies, their movements and how they interact.

Baily's Beads: The last visible dots of sunlight that shine through the Moon's mountains and valleys just before or after totality begins. The uneven surface of the Moon can make several bright spots that look like beads on a bracelet. [Also see Diamond Ring Effect]

Corona: The faint white outer layer of the Sun's atmosphere only visible during totality of a total solar eclipse. It is only visible without eclipse glasses. *This is different from the phenomenon that occurs with an Annular Eclipse - the bright "ring of fire" that always requires glasses. They are similar-shaped appearances but vastly different brightness in terms of eye safety.



Diamond Ring Effect: An effect from the uneven surface of the Moon that makes the Sun look like a diamond ring in the sky just as the last bit of sunlight disappears (or reappears) behind the Moon during totality of a solar eclipse.



Eclipse Glasses: Special glasses that make it safe to look at the Sun without damaging your eyes. They should meet the international safety standard ISO 12312-2, fully shield your eyes and be undamaged.

Full Moon: The phase of the moon when it looks like a full, bright circle in the sky.

Lunar: An adjective to describe something related to the Moon.

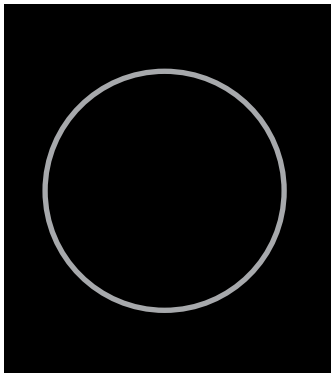
Lunar Eclipse: An event that can happen during a full moon when Earth's shadow blocks sunlight from hitting the Moon.

New Moon: The phase of the Moon when the Moon looks completely dark in the night sky because it's between Earth and the Sun, and the side we see is not being lit by the Sun.

Orbit: A special circular or elliptical path that an object in space follows around another object. The object that is orbiting is called a satellite.

Glossary

Pinhole Projector: A pinhole projector projects an image through a small hole in an object, onto a surface that can be used to observe light.

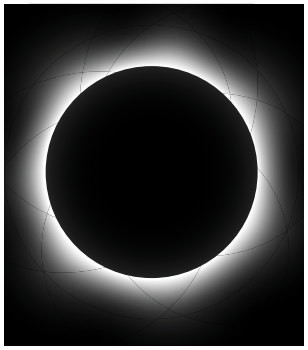


Ring of Fire: Occurs during an Annular Eclipse - the bright light of the sun around the circumference of the moon. Viewing the "ring of fire" always requires glasses.

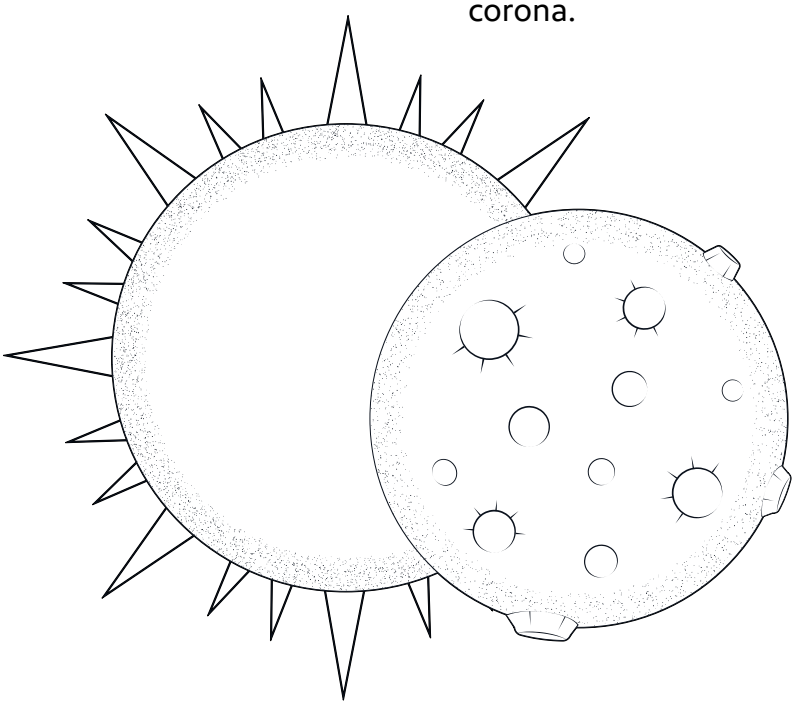
Solar: An adjective to describe something related to the Sun.

Solar Eclipse: A rare event that happens when the Moon's shadow blocks the Sun's light. It can only happen during a new moon.

Total Solar Eclipse: A total solar eclipse occurs when the Moon completely covers the Sun, blocking its light for a short period. This phenomenon happens when Earth, the Moon and the Sun align in a specific way, with the Moon positioned between Earth and the Sun. During a total solar eclipse, the sky darkens, and observers within the path of totality can see the Sun's outer atmosphere, called the corona. Total solar eclipses are rare events.



Totality: Occurs when the Moon completely covers the Sun, making it look like the Sun disappeared. Totality happens during the middle part of the eclipse, and it can last for a part of a second, or for as long as 7 minutes and 32 seconds. It's a special moment when the sky gets dark, and you can see the outer part of the Sun called the corona.

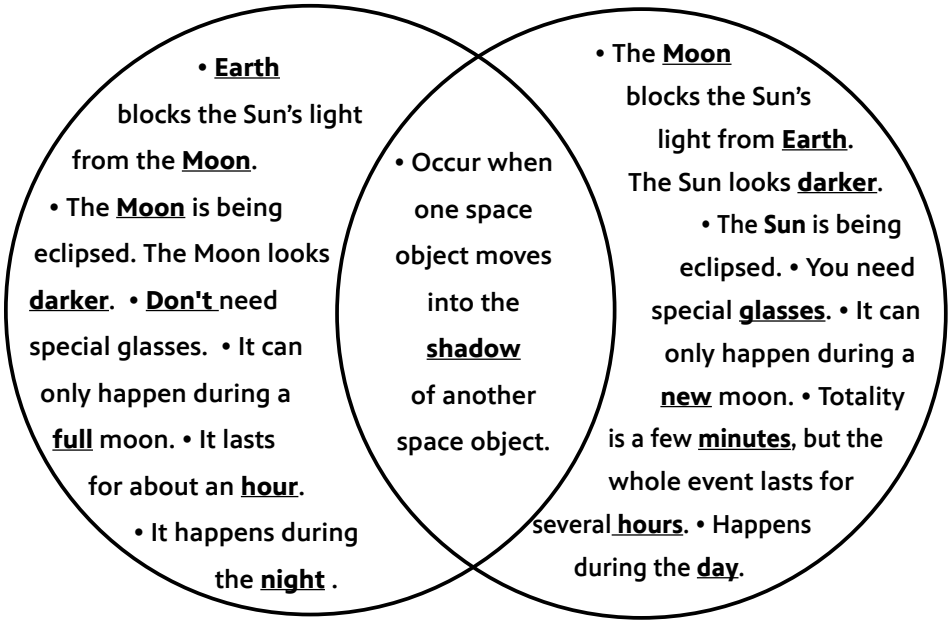


Answer Key

Page 5 – COSMIC WORD QUEST

R	H	D	A	G	E	O	P	T	O	T	A	N	E	R
I	T	L	M	I	C	B	K	R	P	I	N	S	A	T
S	N	P	B	K	L	R	A	N	U	L	N	O	B	S
B	S	U	N	T	O	I	P	B	A	N	U	L	R	P
P	O	R	L	R	O	H	U	G	S	S	C	A	L	O
U	U	N	B	N	G	S	N	T	K	E	A	R	T	H
G	R	I	E	K	R	A	D	P	I	M	E	S	H	E
B	T	L	O	A	T	O	S	E	S	S	A	L	G	R
W	U	O	N	G	I	D	A	Y	L	O	N	K	I	T
H	M	P	T	S	O	P	R	E	T	R	M	R	N	L
A	N	S	I	A	M	A	O	S	C	A	T	W	E	S
I	P	L	E	M	L	R	D	L	T	L	E	R	A	R
K	D	T	R	U	A	T	S	I	S	O	I	P	C	D
M	O	O	N	S	L	I	K	A	O	S	K	P	O	M
B	R	N	K	I	R	A	B	N	O	N	R	B	S	N
P	A	M	N	I	D	L	O	R	U	B	Y	E	K	E

Page 6 – VENN DIAGRAM



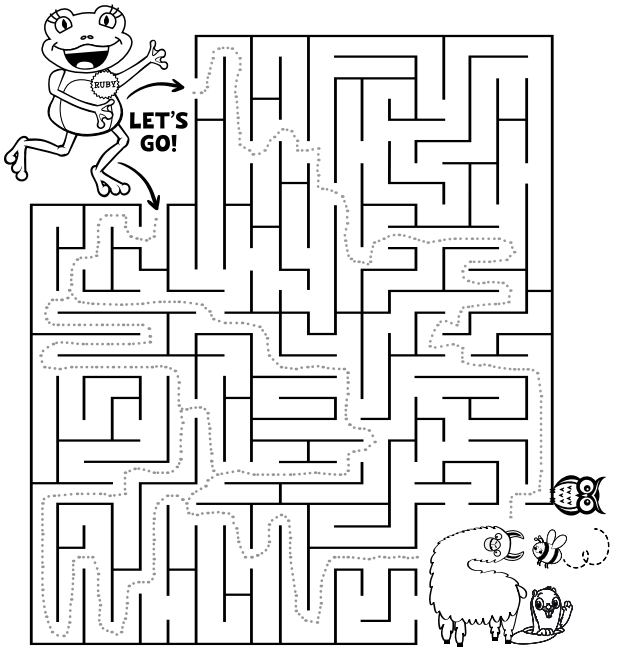
Page 7 – Cosmic Canvas: Create a Celestial Spectacular

3. the Moon

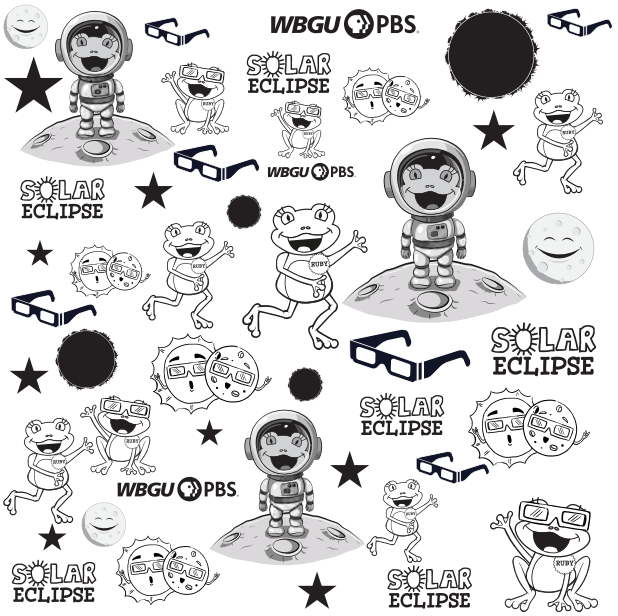
4. a solar eclipse

Answer Key

Page 13 – ASTRO AMPHIBIAN ADVENTURE



Page 15 – "EYE" SPY: HELP RUBY COUNT



Page 19 – WARPED WORDS: COSMIC WONDERS SCRAMBLED

1. Lunar
2. Moon
3. Sun
4. Shadow
5. Astronomy
6. Solar
7. Eclipse
8. Dark
9. Totality
10. Diamond Ring
11. Corona
12. Eclipse Glasses
13. Pinhole Viewer

Page 20 – TOTAL SOLAR ECLIPSE USA MAP – APRIL 8, 2024

4. 13
5. Arkansas, Illinois, Indiana, Kentucky, Maine, Missouri, New Hampshire, New York, Ohio, Oklahoma, Pennsylvania, Texas, Vermont

Page 22 – TOTALITY TIMES – OHIO CITIES

Dayton ..... 3 min.	Findlay..... 4 min.	Fostoria..... 3 min.	Sandusky..... 4 min.
Lima..... 4 min.	Bluffton..... 4 min.	Tiffin ..... 4 min.	Lorain ..... 4 min.
Wapakoneta ..... 4 min.	Napoleon..... 2 min.	Toledo ..... 2 min.	Cleveland..... 4 min.
Defiance ..... 1 min.	Bowling Green.... 3 min.	Fremont..... 4 min.	Akron..... 3 min.

Answer Key

Page 24 – COSMIC CALCULATIONS

	ANSWER	LETTER		ANSWER	LETTER
1.	7,918	**U**	9.	375	**A**
2.	8,000	**O**	10.	4	**E**
3.	4,000	**I**	11.	7	**N**
4.	7,900	**Y**	12.	21	**T**
5.	100	**K**	13.	3	**H**
6.	2,160	**L**	14.	29.5	**C**
7.	2099	**G**	15.	75	**P**
8.	400	**S**			

Page 25 – RIDDLE ME THIS

What did the Moon bring to the solar eclipse party?

A
375

L	I	G	H	T
2,160	4,000	2099	3	21

S	N	A	C	K
400	7	375	29.5	100

How do you organize a solar eclipse party?

Y	O	U
7,900	8,000	7,918

P	L	A	N	E	T
75	2,160	375	7	4	21

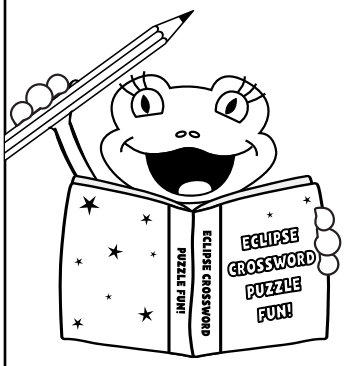
How does the Man in the Moon cut his hair?

E	C	L	I	P	S	E
4	29.5	2,160	4,000	75	400	4

I	T
4,000	21

Answer Key

Cosmic Crossword Puzzle

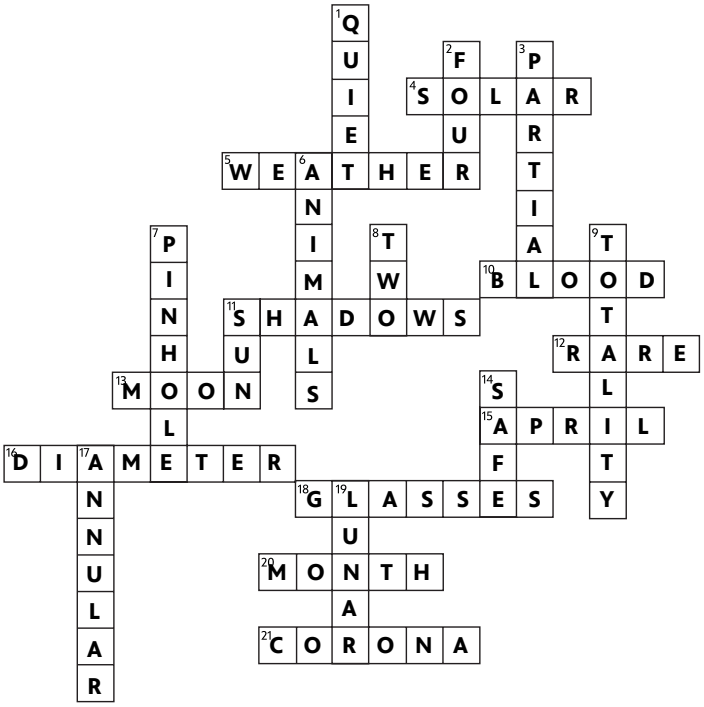


ACROSS

4. A **SOLAR** eclipse happens during the day.
5. The **WEATHER** begins to change about 15 minutes before totality. The temperature drops and winds change.
10. Another name for a lunar eclipse is a **BLOOD** Moon.
11. **SHADOWS** might get much sharper as the eclipse approaches totality.
12. A total solar eclipse is a very **RARE** event in any one place; only once every 375 years on average.
13. The **MOON** blocks the Sun's light during a solar eclipse.
15. There will be a total solar eclipse across the United States on the eighth day of this month in 2024. **APRIL**
16. The Sun's **DIAMETER** is 400 times larger than the Moon's.
18. Special safety eclipse **GLASSES** must be worn during a solar eclipse.
20. We usually see a full moon about once a **MONTH**.
21. The part of the Sun's atmosphere that is visible only during a total solar eclipse. **CORONA**

DOWN

1. During totality, many diurnal animals will get very **QUIET**.
2. The Sun is **FOUR** hundred times farther away from Earth than the Moon.
3. A **PARTIAL** solar eclipse happens when only part of the Moon covers the Sun.
6. **ANIMALS** may get confused during a total solar eclipse.
7. During a partial solar eclipse, the tiny spaces between the leaves will act as **PINHOLE** projectors, dappling the ground with images of the crescent Sun.
8. A lunar eclipse occurs about this many times per year. **TWO**
9. The only time it's safe to view a solar eclipse without safety glasses. The time when the Moon completely blocks out the Sun's light. **TOTALITY**
11. During a solar eclipse the **SUN** gets darker.
14. It is **SAFE** to look at a lunar eclipse without glasses because this type of eclipse happens at night.
17. The Moon covers ONLY the inside of the Sun in this type of eclipse. It makes a "Ring of Fire" on the outside of the Moon. **ANNULAR**
19. During a **LUNAR** eclipse the Moon gets darker.



Extended Eclipse Exploration: Resources and Videos

Electronic copy of this activity guide

bgsu.edu/eclipse

Ohio Department of Education and Workforce 2024 Solar Eclipse Resources

Ohio Learns 360

Eclipse Community Preparedness

April 8, 2024 The Next Solar Eclipse

What is a Solar Eclipse?!

Pinhole Solar Projection Viewer

How to Safely View an Eclipse (Pinhole Viewer)

Why Solar Eclipses Create Those Crescent-Shaped Lights

What is a Lunar Eclipse?!

What is an Astronomer?

How to Explain an Eclipse to a Kindergartner (or a Basic Explanation of an Eclipse)

Astronomer Dr. Douglas Duncan describes the strange behavior of some animals during an eclipse

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Note: ChatGPT was utilized to create the acrostic poem example on page 11 and to adjust the reading level of the text to a 5th grade reading level on the following pages: 2, 4, 8, 12. Reading level revisions were reviewed for accuracy by content experts.

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