Myths and Legends: The Greek gods in the stars and constellations

By Charles D. Shaw, adapted by Newsela staff on 01.27.17
Word Count **668**
Level **820L**

TOP: Here is an astronomical chart showing a bear forming the constellation of stars known as the "Great Bear." It is also known as Ursa Major in Latin. This chart was drawn by Sidney Hall in 1825. The seven brightest stars, located in the Bear's hindquarters and tail, form the famous Big Dipper. BOTTOM: The "Great Bear" seen in the sky. Courtesy of Wikimedia Commons.

Greek mythology began thousands of years ago. There was a need to explain natural events, disasters and events in history. The Greeks believed there were gods and goddesses who had supernatural powers and human feelings and looked human. These ideas were passed down in beliefs and story telling.

The Greeks thought the stars were the homes of bright spirits who once had lived on Earth. In fact, they often spoke as if the stars were the spirits themselves. In the northern sky were seven bright stars that have been admired for thousands of years. These were sometimes called the "Dipper," and are part of a larger group of stars named the "Great Bear." This is the story, or myth, of the "Great Bear."

Zeus Sends "Great Bear" And "Little Bear" Up To The Stars

Hera, queen of gods, became jealous of a beautiful woman named Callisto. The goddess changed Callisto into a bear so dogs and hunters would chase her through the forest.

When Callisto was a beautiful woman, she had a son she loved dearly. But when she was a bear she did not dare to go near him. Years passed and one day Callisto accidentally met him in the woods. She ran toward him. Callisto had forgotten that she was a wild beast.

The young man was afraid. He was just about to kill her with his spear, when Zeus, the king of the gods, saw what was about to happen and stopped it. Then he sent both of them up to the heavens as stars. The mother is the "Great Bear," and another smaller group of stars nearby is called the "Little Bear."

Orion And Artemis

Here is another myth. Poseidon, the king of the sea, had a son named Orion, who was a giant that loved hunting. His father had taught him how to walk on and under water.

Orion loved Merope, daughter of the king of an island filled with wild beasts. To marry the king's daughter, Orion had to kill all the wolves and bears. He did as the king asked. But he was not allowed to marry her. One night the king got Orion drunk with wine and took away his sight. Now blind, Orion wandered around until he found Hephaestus, the god of fire, who felt sorry for the poor blind giant. Orion was sent up to meet Apollo, the god of the sun, who gave Orion his sight again.

Apollo's sister, Artemis, the goddess of the hunt, fell in love with Orion and wanted to marry him. But Apollo was against them being together. One day he saw Orion wading in the sea with his head just out of the water.

"Sister," said Apollo, "you think you are a good shot with your arrows."

"Yes, I am," Artemis said.

"Well, do you see that black thing bobbing up and down in the sea? I don't believe you can hit it with your arrow," Apollo said.

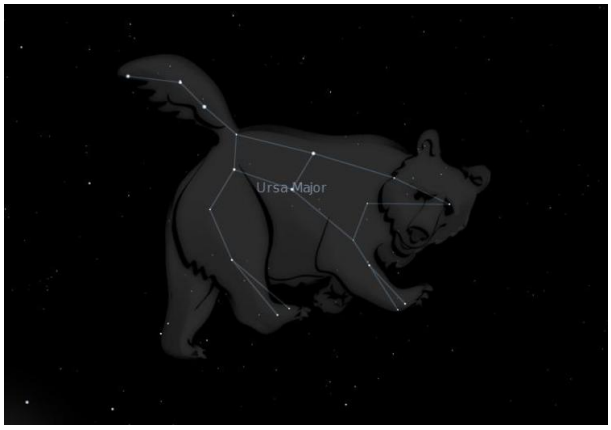
Artemis shot the arrow and the black thing disappeared. After a while, the waves rolled poor Orion to the shore. Artemis could not bring back him back to life, but sent him up to the stars with his dog, Sirius, and seven sisters, the Pleiades, who had hunted with Artemis.

Groups Of Stars Shaped Like Animals

There is another myth about a group of stars, called the Hyades. When Bacchus, the god of wine, was a little child, his mother, Semele, died, and he was left helpless. A family of sisters pitied him and took care of him until he was grown up. The king of the gods was greatly pleased with their kindness, and rewarded the sisters, by taking them up to heaven and making them shine like stars.

Other constellations, or groups of stars, are shaped like animals. Not only are there two bears, but also a lion, bull, ram, goat, crab, scorpion and two fishes.

From "Stories of the Ancient Greeks" by Charles D. Shaw.



Quiz

1 Which section of the article highlights the reasons why the Greeks created myths?

(A) the caption beneath photograph 1

(B) Introduction [paragraphs 1-2]

(C) "Orion And Artemis"

(D) "Groups Of Stars Shaped Like Animals"

2 Based on the section "Groups Of Stars Shaped Like Animals," how did the king of the gods reward the sisters?

(A) by turning them into stars in heaven so that they always shine

(B) by giving Bacchus seven sisters to look after him

(C) by turning Bacchus into a star to shine forever

(D) by reuniting the family of sisters with their mother

3 Why does the author include the section "Zeus Sends Great Bear And Little Bear Up To The Stars"?

(A) to explain the different animal shapes in the sky and how the Greeks believed they came to be

(B) to provide the background story of how Poseidon and Zeus created all of the stars in the sky

(C) to describe reasons why the Greeks believed Zeus was the most important god

(D) to explain the Greek myth behind two constellations shaped as bears

4 What purpose does the introduction [paragraphs 1-2] serve in developing the main idea of the article?

(A) It provides a modern-day scientist's perspective on Greek mythology.

(B) It gives the reader further details about a photo from the beginning of the article.

(C) It gives the reader context about the ancient Greeks and why they told their stories.

(D) It gives the reader specific details about a myth mentioned later in the article.

Big Questions: What is the brightest star?

By NASA SpacePlace, adapted by Newsela staff on 08.22.19
Word Count **689**
Level **MAX**

Image 1. A wide-field image of the region of sky in which the Summer Triangle is located. This is a giant triangle in the sky composed of the three bright stars: Vega (top left), Altair (lower middle) and Deneb (far left). Deneb is one of the brightest starts in the universe. It appears dimmer than Vega because its distance from Earth is much greater. Photo: NASA/ESA

Have you ever wondered, "What is the brightest star?"

Of course, the star that appears the brightest to all of us on Earth is the sun. The sun is a rather typical star, not all that different from many of the ones you see at night. We live so close to it, though, that it outshines everything else. Even the next closest star is more than a quarter of a million times farther from Earth, so it is not surprising that the light from the sun overwhelms that from other stars.

It might be more fun to think about how bright the stars are themselves, without regard to how they look from Earth. After all, as much as we cherish Earth, our planet is not in a special place in the universe. It isn't really fair to rank the sun as the brightest only because it is nearest Earth. Suppose we could put all stars at the same distance from us. Then which one would be the brightest?

Imagine you are in a boat on the ocean at night, and you see a light. How would you know how bright the light really is? Is it a weak light on a nearby boat or a brilliant one on a distant island? If you know how far it is, then you have an idea of how bright it really is. But now suppose the night is foggy. In that case, it is much harder to judge the true brightness of the light, because you don't know how much of the light is blocked by the fog.

To find out the true brightness of a star, scientists need to know how far it is. There are some very clever ways of gauging the distances to stars. However, these generally work well only for stars that are in the sun's neighborhood of the Milky Way galaxy. The more distant stars are just so fantastically far from us, that measuring their distances accurately is too difficult. Making it still harder to know how bright a star really is, there is a kind of patchy fog between the stars. Space is not truly empty. Although it is not exactly the same as the fog on Earth, gas and dust in space can dim the light of stars. Without a good way to know how much of this interstellar fog is blocking the light, there is no reliable way to discover the true brightness of a star.

Although we don't know which star truly is the brightest, we know some are remarkably bright. You can see one of them any clear night in the summer. Deneb is the northeastern of the three stars that form a large and easily seen grouping called the Summer Triangle. While Deneb shines the brightest in the constellation Cygnus, 17 other stars glow brighter in our night skies. But Deneb is much farther from Earth than most of the other stars you see. This giant is around 100,000 times brighter than the sun. If Deneb were the same distance from Earth as Vega, another star in the Summer Triangle, not only would it outshine all the stars and planets visible at night, but it would even be bright enough to see in the daytime!

Deneb pays a precious price for shining so brilliantly. It is using up its stellar fuel at a furious rate. It will burn itself out after a relatively brief appearance as a star of our galaxy. While the sun (and Earth) are more than 4.5 billion years old, Deneb is a youngster at only a few million years. And it will last only a few million years more before it dies a spectacular death. In the meantime, less showy but more typical stars like the sun will continue their more tranquil lives. They will ultimately shine for perhaps 1,000 times as long as a powerhouse like Deneb.

Remember in the winter, when you are gazing at the constellation Orion, to think about the two brightest stars there: reddish Betelgeuse and white Rigel. Like Deneb, they could outshine the sun like a searchlight next to a match.

Quiz

1 Which sentence from the article shows Deneb's MAIN problem?

(A) Deneb is the northeastern of the three stars that form a large and easily seen grouping called the Summer Triangle.

(B) While Deneb shines the brightest in the constellation Cygnus, 17 other stars glow brighter in our night skies.

(C) But Deneb is much farther from Earth than most of the other stars you see.

(D) It will burn itself out after a relatively brief appearance as a star of our galaxy.

2 One conclusion a reader could make after reading the article is that many factors make it difficult for scientists to determine which star is truly the brightest.

Which of the following statements accurately paraphrases evidence from the article to support the conclusion?

(A) The sun steals light from nearby stars so it is impossible to know if those stars have more light than the sun.

(B) Scientists have not been able to figure out a way to measure the distance of stars in this galaxy and their brightness.

(C) The light from some stars are dimmed by space fog and some stars are too far away to measure their brightness.

(D) Scientists think that stars that are far away are not as bright as stars that are close by but they cannot prove it.

3 What does the word “overwhelms” suggest as it is used in the following sentence?

> *Even the next closest star is more than a quarter of a million times farther from Earth, so it is not surprising that the light from the sun overwhelms that from other stars.*

(A) that the light that reaches us from the sun erases the light from other distant stars

(B) that the light that reaches us from the sun emphasizes the light from other distant stars

(C) that the light that reaches us from the sun reflects the light from other distant stars

(D) that the light that reaches us from the sun drowns out the light from other distant stars

4 Read the selection from the article.

> *Of course, the star that appears the brightest to all of us on Earth is the sun. The sun is a rather typical star, not all that different from many of the ones you see at night. We live so close to it, though, that it outshines everything else.*

Which of the following words, if it replaced the word "typical" in the sentence above, would CHANGE the meaning of the sentence?

(A) unique

(B) average

(C) normal

(D) common

What is a black hole?

By NASA.gov, adapted by Newsela staff on 03.02.20
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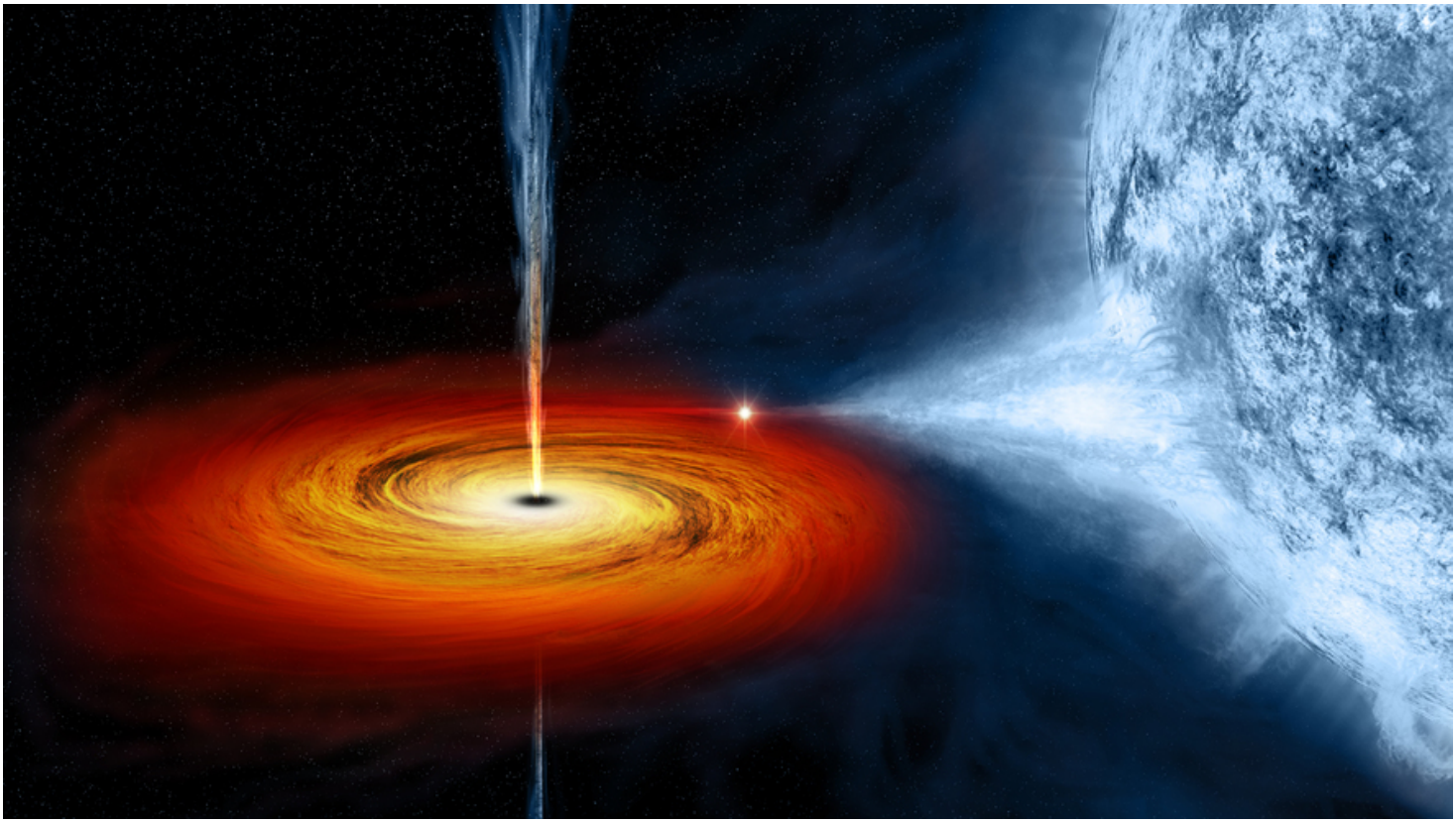
Level **980L**



TOP: The black hole Cygnus X-1 formed when a large star caved in. This black hole pulls matter from the blue star beside it; NASA/CXC/M.Weiss. BOTTOM: An artist's drawing shows the current view of the Milky Way galaxy. Scientific evidence shows that in the center of the Milky Way is a supermassive black hole; NASA/JPL-Caltech.

A black hole is a region in space where the pulling force of gravity is so strong that light cannot escape. The strong gravity occurs because matter has been pressed into a tiny space. This compression can take place at the end of a star's life. Some black holes are a result of dying stars.

Because no light can escape, black holes are invisible. However, space telescopes with special instruments can help find them. They can observe the behavior of material and stars that are very close to black holes.

How Big Are Black Holes?

Black holes can come in a range of sizes, but there are three main types of black holes. The black hole's mass and size determine what kind it is.

The smallest ones are known as primordial black holes. "Primordial" is a word that means something that existed at the beginning of time. Scientists believe this type of black hole is as small as a single atom but with the mass of a large mountain.

The most common type of medium-sized black holes is called "stellar." The mass of a stellar black hole can be up to 20 times greater than the mass of the sun. It can fit inside a ball with a diameter of about 10 miles. Dozens of stellar black holes may exist within the Milky Way galaxy, a large group of stars held together by gravity that is home to Earth and the sun.

The largest black holes are called "supermassive." These black holes have masses greater than 1 million suns combined. Each one would fit inside a ball with a diameter about the size of the solar system.

Scientific evidence suggests that every large galaxy contains a supermassive black hole at its center. The supermassive black hole at the center of the Milky Way galaxy is called Sagittarius A. It has a mass equal to about 4 million suns. It would fit inside a ball with a diameter about the size of the sun.

How Do Black Holes Form?

Primordial black holes are thought to have formed in the early universe, soon after the big bang.

Stellar black holes form when the center of a very massive star collapses in on itself. This collapse also causes a supernova, or an exploding star.

Scientists think supermassive black holes formed at the same time as the galaxy they are in. The size of each supermassive black hole is related to the size and mass of its galaxy.

If Black Holes Are "Black," How Do Scientists Know They Are There?

A black hole cannot be seen because of the strong gravity pulling all of the light into the black hole's center. However, scientists can see the effects of its strong gravity on the stars and gases around it. If a star is orbiting a certain point in space, scientists can study the star's motion. This tells them if it is orbiting a black hole.

When a black hole and a star are orbiting close together, high-energy light is produced. Scientific instruments can see this high-energy light.

Could A Black Hole Destroy Earth?

Black holes do not wander around the universe, randomly swallowing worlds. They follow the laws of gravity just like other objects in space. The orbit of a black hole would have to be very close to the solar system to affect Earth, which is not likely.

If a black hole with the same mass as the sun were to replace the sun, Earth would not fall in. The black hole would keep the same gravity as the sun, so the planets would orbit the black hole as they orbit the sun now.

Will The Sun Ever Turn Into A Black Hole?

The sun does not have enough mass to collapse into a black hole. In billions of years, when the sun is at the end of its life, it will become a red giant star. When it has used the last of its fuel, it will

throw off its outer layers. Then it will turn into a glowing ring of gas called a planetary nebula. Finally, all that will be left of the sun is a cooling white dwarf star.

How Is NASA Studying Black Holes?

NASA is learning about black holes using spacecraft and telescopes. In 2008, the U.S. space agency launched the Fermi Gamma-ray Space Telescope. It is observing a form of light known as gamma rays in search of black holes. Instruments like these help scientists answer questions about the origin, evolution and destiny of the universe.

Quiz

1 Choose the paragraph in the section "How Big Are Black Holes?" that suggests that a black hole's mass can be much greater than its size.

2 Which section highlights the idea that gravity plays an important role in studying black holes?

(A) "How Do Black Holes Form?"

(B) "If Black Holes Are 'Black,' How Do Scientists Know They Are There?"

(C) "Will The Sun Ever Turn Into A Black Hole?"

(D) "How Is NASA Studying Black Holes?"

3 What is MOST likely the reason the author included the section "Could A Black Hole Destroy Earth?"

(A) to disprove an existing idea about black holes

(B) to encourage further research of black holes

(C) to explain how the orbits of black holes change

(D) to show how black holes and the sun are alike

4 Fill in the blank. The author mainly explains the importance of black hole research by:

(A) interviewing multiple experts on the significance of black holes in the universe

(B) providing extensive descriptions of how black holes affect Earth's galaxy

(C) explaining the causes and effects of black holes on objects in space

(D) describing how black holes are formed and then classified.

What is an eclipse?

By NASA, adapted by Newsela staff on 03.30.20
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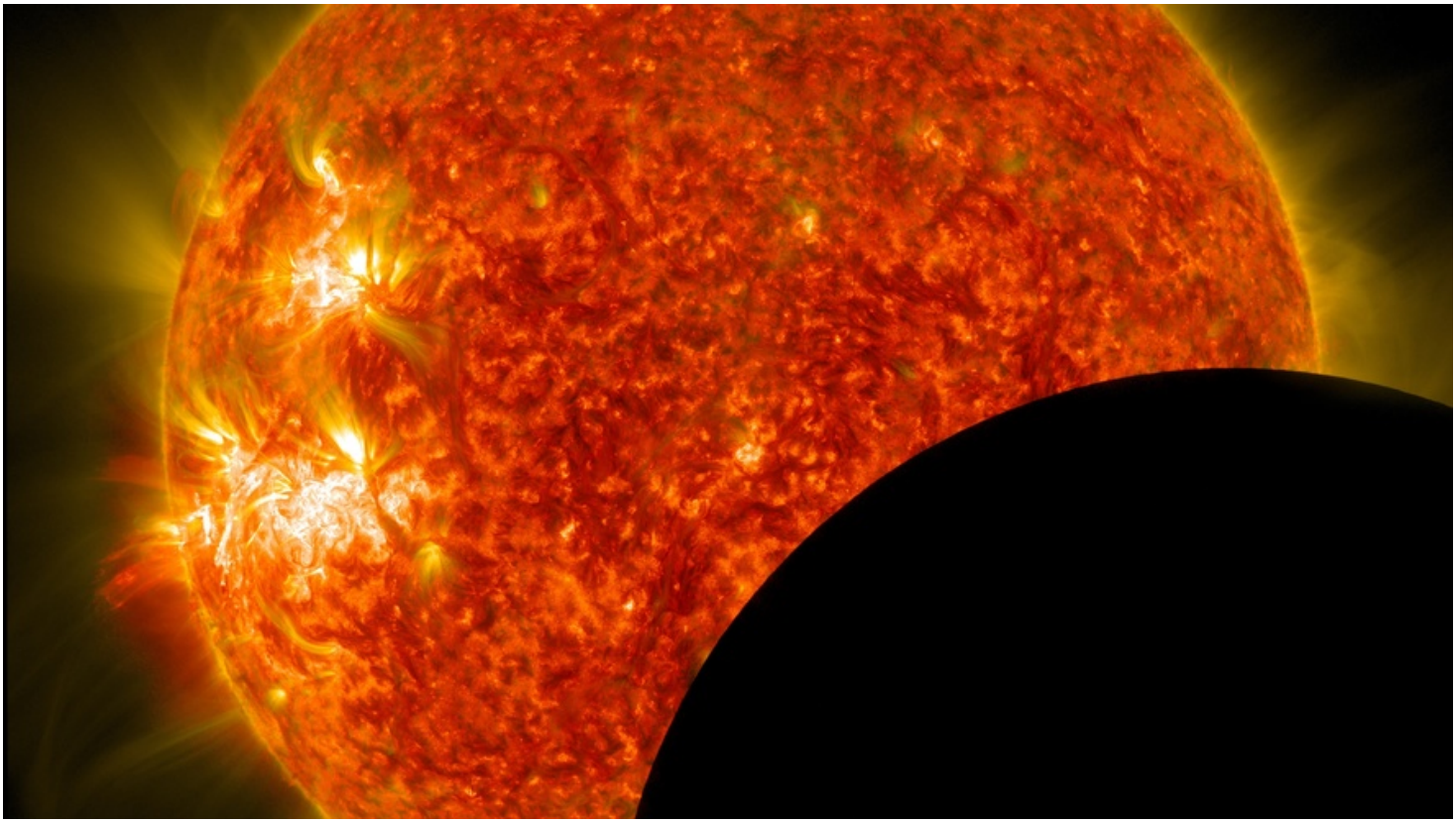
Level **940L**



This image of the moon crossing in front of the sun was captured on January 30, 2014, by NASA's Solar Dynamics Observatory observing the eclipse from its vantage point in space. NASA photo

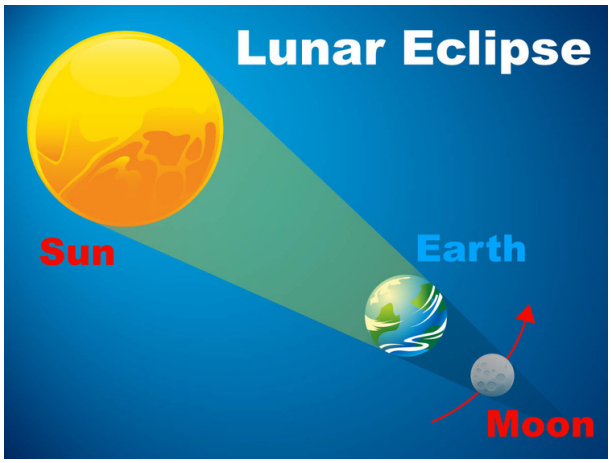
An eclipse happens when one heavenly body such as a moon or planet passes into the shadow of another heavenly body. There are two types of eclipses on Earth: lunar eclipses and solar eclipses. The first are eclipses of the moon, while the second are eclipses of the sun.

Lunar Eclipses

The moon orbits Earth and, at the same time, Earth orbits the sun. Sometimes Earth moves between the sun and the moon. When this happens, Earth blocks the light from the sun, which normally is reflected by the moon and which causes the moon to shine. Instead of light hitting the moon's surface, the moon is covered by Earth's shadow. This is an eclipse of the moon — a lunar eclipse. A lunar eclipse can occur only when the moon is full.

A lunar eclipse can be seen from Earth at night. There are two types of lunar eclipses: total lunar eclipses and partial lunar eclipses.

A total lunar eclipse occurs when the moon and the sun are on exact opposite sides of Earth. Although the moon is in Earth's shadow, some sunlight reaches the moon. The sunlight passes through Earth's atmosphere, which causes Earth's atmosphere to filter or block out most of the blue light. This makes the moon appear red to people on Earth, and is the reason why lunar eclipses are sometimes called blood moons.

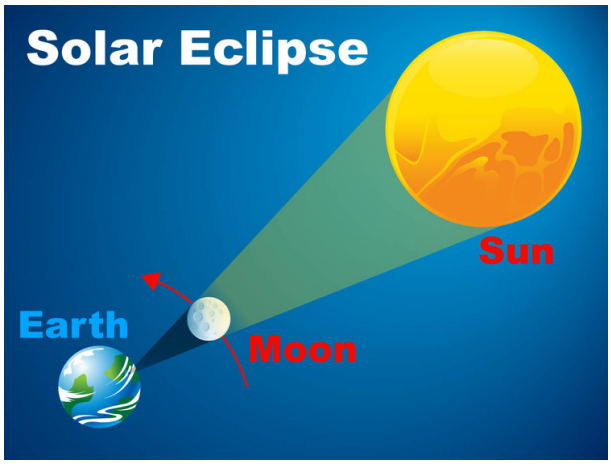


A partial lunar eclipse happens when only a part of the moon enters Earth's shadow. In a partial eclipse, Earth's shadow appears very dark on the side of the moon facing Earth. What people see from Earth during a partial lunar eclipse depends on how the sun, Earth and moon are lined up.

A lunar eclipse usually lasts for a few hours. At least two partial lunar eclipses happen every year, but total lunar eclipses are rare. It is safe to look directly at a lunar eclipse.

Solar Eclipses

Sometimes when the moon orbits Earth, it moves between the sun and Earth. When this happens, the moon blocks the light of the sun from reaching Earth. This causes an eclipse of the sun, or solar eclipse. During a solar eclipse, the moon casts a shadow onto Earth.



There are three types of solar eclipses.

The first is a total solar eclipse. A total solar eclipse is only visible from a small area on Earth. The people who see the total eclipse are in the center of the moon's shadow. The sky becomes very dark, as if it were night. For a total eclipse to take place, the sun, moon and Earth must be in a direct line.

The second type of solar eclipse is a partial solar eclipse. This occurs when the sun, moon and Earth are not exactly lined up. The sun appears to have a dark shadow on only a small part of its surface.

The third type is an annular solar eclipse. An annular eclipse happens when the moon is farthest from Earth. Because the moon is farther away from Earth, it seems smaller and does not block the entire view of the sun. The moon in front of the sun looks like a dark disk on top of a larger sun-colored disk. This creates what looks like a ring around the moon.

During a solar eclipse, the moon casts two shadows on Earth. The first shadow, called the umbra, gets smaller as it reaches Earth. It is the dark center of the moon's shadow. The second shadow,

called the penumbra, gets larger as it reaches Earth. People standing in the penumbra will see a partial eclipse, while people standing in the umbra will see a total eclipse.

Solar eclipses happen once every 18 months. Unlike lunar eclipses, solar eclipses only last for a few minutes.

Why Does NASA Study Eclipses?

NASA is the U.S. space agency. Its full name is National Aeronautics and Space Administration. Experts and scientists at NASA observe how the moon, sun, stars and planets move, and they also study solar eclipses.

Scientists use solar eclipses as an opportunity to study the sun's corona. The corona is the sun's top layer. During an annular eclipse, NASA uses ground and space instruments to view the corona when the moon blocks the sun's glare. The sudden blocking of the sun during an eclipse reduces the light and changes the temperature on the ground. This creates conditions that can affect local weather and animal behavior.

Viewing Safety

It is important to never look directly at the sun — it can permanently damage your eyes!

The only safe way is through special-purpose solar filters, such as eclipse glasses or handheld solar viewers. Homemade filters or ordinary sunglasses, even very dark ones, are not safe for looking at the sun.

An alternative method for safe viewing of the partially eclipsed sun is with a pinhole projector. With this method, sunlight streams through a small hole — such as a pencil hole in a piece of paper — onto a simple screen, such as a piece of paper or the ground. It is important to watch the screen, not the sun.

Quiz

1 Why can a lunar eclipse only happen during a full moon?

(A) It's the only time the moon is bright enough for an eclipse to be visible at night.

(B) It's the only time when the sun, Earth, and the moon are lined up such that Earth's shadow falls on the moon.

(C) It's the only time when the moon is a full circle; during other phases the moon is already partly blocked by Earth's shadow.

(D) It's the only time that a blood moon can appear; these are necessary for a lunar eclipse.

2 Read the section "Solar Eclipses."

Which detail from the section suggests that people see eclipses differently based on their locations?

(A) The first is a total solar eclipse. A total solar eclipse is only visible from a small area on Earth.

(B) The sky becomes very dark, as if it were night. For a total eclipse to take place, the sun, moon and Earth must be in a direct line.

(C) Because the moon is farther away from Earth, it seems smaller and does not block the entire view of the sun.

(D) People standing in the penumbra will see a partial eclipse, while people standing in the umbra will see a total eclipse.

3 During a total solar eclipse, the entire sun is covered by the moon. During an annular solar eclipse, most of the sun is covered, except a ring that appears around the moon. What can you tell about the moon's orbit since there are both total solar eclipses and annular solar eclipses?

(A) The moon's orbit is a circle; it is always the same distance from Earth.

(B) The moon's orbit is elliptical, or oval; the moon moves closer and further from Earth at different times.

(C) The moon's orbit is unpredictable; scientists do not know when it will be close or far away.

(D) The moon's orbit goes at the same speed as Earth's rotation; it is always in the same spot in the sky.

4 Read the conclusion below.

There is a very specific and narrow timeframe in which eclipses can occur.

Which sentence from the article provides the BEST support for this statement?

(A) A lunar eclipse can occur only when the moon is full.

(B) What people see from Earth during a partial lunar eclipse depends on how the sun, Earth and moon are lined up.

(C) Sometimes when the moon orbits Earth, it moves between the sun and Earth.

(D) This creates conditions that can affect local weather and animal behavior.

5 When can NASA scientists most easily study the sun's corona?

1. *during an annular solar eclipse*
2. *during a total solar eclipse*
3. *during a partial solar eclipse*

(A) 1 only

(B) 1 and 2

(C) 1 and 3

(D) 1, 2, and 3

6 Read the sentence from the section "Why Does NASA Study Eclipses?"

During an annular eclipse, NASA uses ground and space instruments to view the corona when the moon blocks the sun’s glare.

Which of the following words, if it replaced "glare" in the sentence above, would CHANGE the meaning of the sentence?

(A) brilliance

(B) glow

(C) heat

(D) shine

7 Why would lunar eclipses last longer than solar eclipses?

1. *The Earth's shadow on the moon is much larger than the moon's shadow on Earth.*
2. *The sun is much bigger and brighter than the moon.*
3. *The moon moves faster than the Earth.*

(A) 1 only

(B) 1 and 2

(C) 1 and 3

(D) 1, 2, and 3

8 Read the sentence from the introduction [paragraph 1].

An eclipse happens when one heavenly body such as a moon or planet passes into the shadow of another heavenly body.

What is the meaning of the phrase "heavenly body" as it is used in this sentence?

(A) a religious object

(B) an object in space

(C) a mysterious object

(D) an object similar to Earth