What is an eclipse?

By NASA, adapted by Newsela staff on 07.17.17
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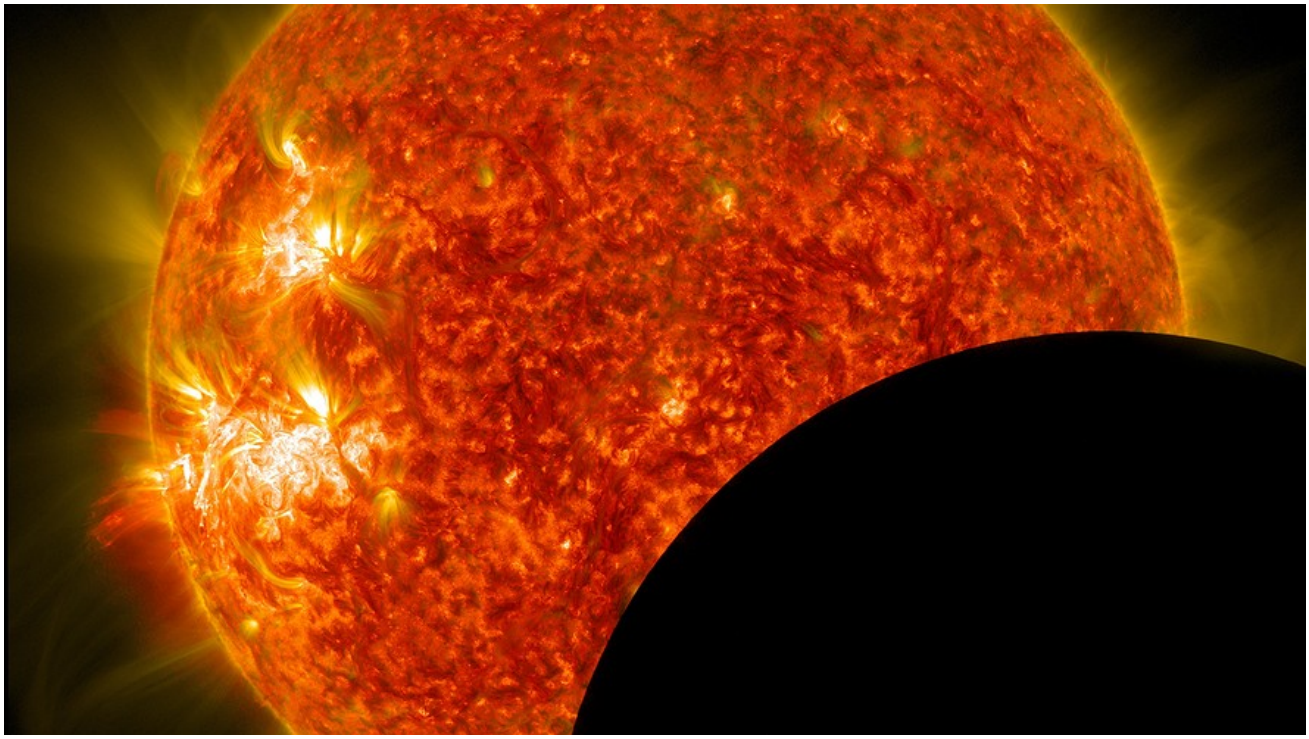


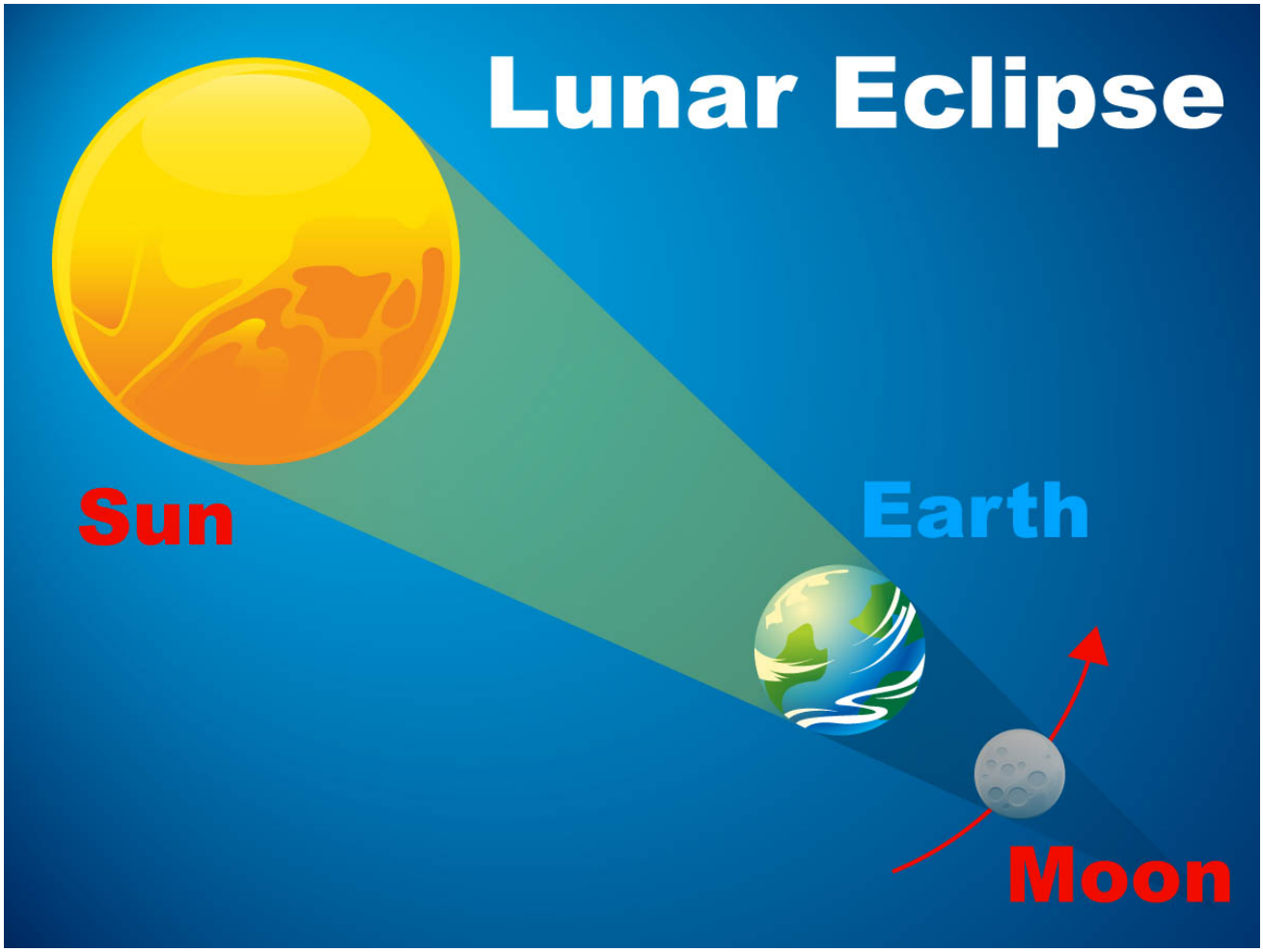
This image of the moon crossing in front of the sun was captured on January 30, 2014, by NASA's Solar Dynamics Observatory observing the eclipse from its vantage point in space. NASA photo

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.

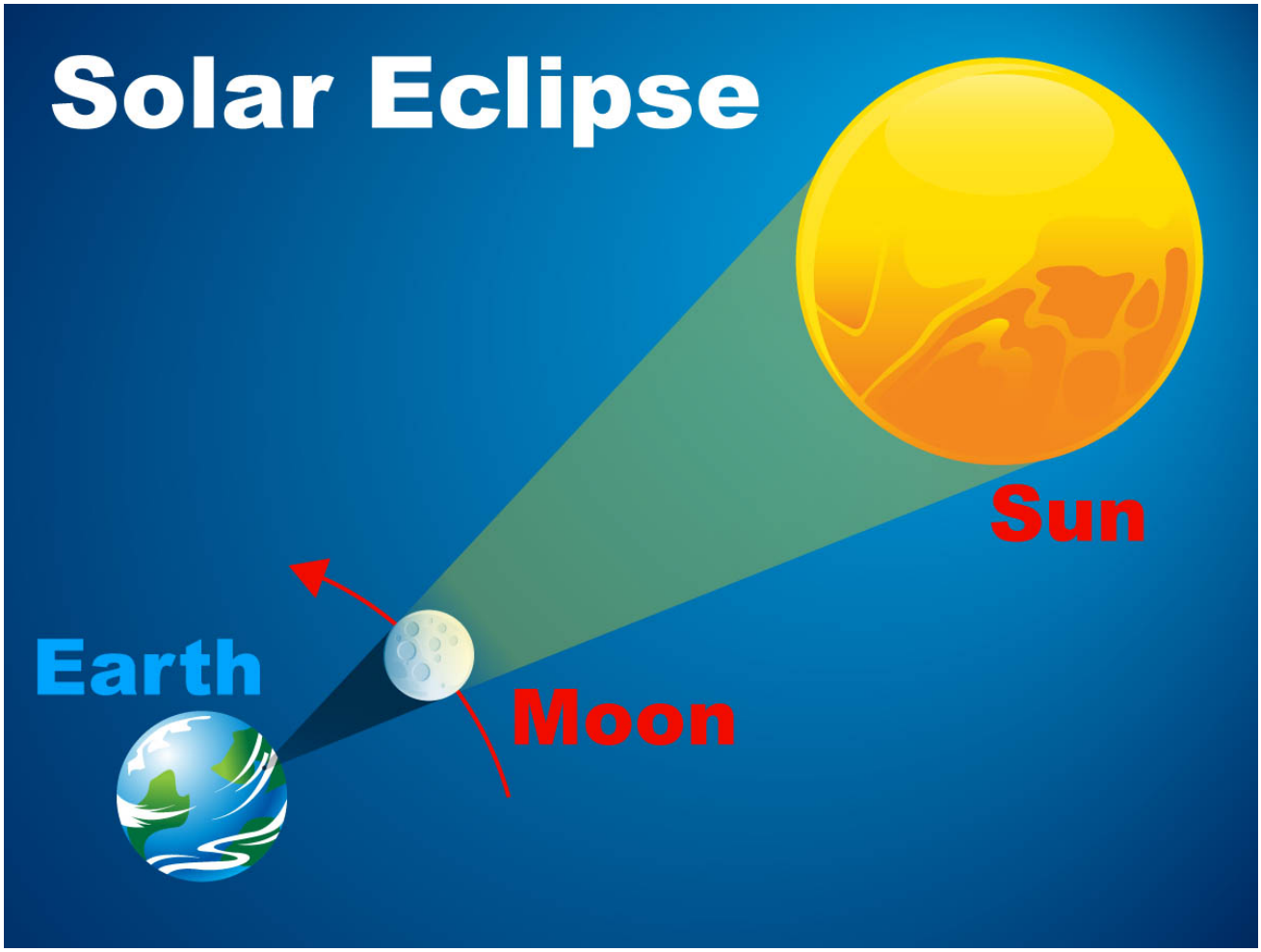


A total lunar eclipse occurs when the moon and the sun are on exact opposite sides of Earth. Although the moon is in Earth's shadow, some sunlight reaches the moon. The sunlight passes through Earth's atmosphere, which causes Earth’s atmosphere to filter or block out most of the blue light. This makes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