Eclipses

True or False?
Which of the following statements is true?
• An eclipse of the Sun occurs when an invisible dragon eats the Sun.
• During eclipses, poisons drop from the sky.
• An eclipse is a sign that the world is coming to an end.

The answer? None of these statements is true. But people from cultures all over the world created these and other stories to explain the mysterious disappearance of the Sun and Moon from the sky.

Today, we know how and why eclipses take place. While eclipses have nothing to do with dragons, poison, or the end of time, they are amazing celestial spectacles.

Solar Eclipse
A solar eclipse occurs when the Moon comes directly between Earth and the Sun. The key word is directly, because the Moon orbits Earth every month, and every month the Moon casts a shadow. We don’t have a solar eclipse every month because the Moon’s shadow falls either above or below Earth during most months. But on rare occasions, when the Sun, Earth and Moon are aligned just right, the Moon’s shadow falls directly on Earth.

During a solar eclipse, the darkest part of the Moon’s shadow cone, called the “umbra”, is often only about 250 kilometers in diameter. As the Earth spins, different parts of it fall within the umbra. People who happen to be in the umbra can see a total blocking of the Sun, or a total solar eclipse. During a total solar eclipse, the air cools and daylight disappears. It becomes dark enough to see stars! For a few breathless minutes, we can see what it’s like to live in a sunless world.

Outside of the narrow path of the umbra, the Moon blocks only part of the Sun and creates a partial solar eclipse. A shadow is cast, but it isn’t as dark as the umbra. This lighter part of the shadow cone is called the “penumbra”. Because the penumbra is much larger than the umbra, a greater area of Earth experiences a partial eclipse than a total eclipse.

Annular Eclipse
In an annular eclipse, most of the Sun is covered, but an annulus (which means “ring” in Latin) of light surrounds the darkened Moon. To understand an annular eclipse, remember that the Moon’s orbit around Earth is an ellipse, not a circle. As a result, the Moon’s distance from Earth varies. When the Moon is closer to Earth, it covers the Sun completely, creating a total solar eclipse. When the Moon is farther away, it appears smaller and cannot completely cover the Sun.

Lunar Eclipse
In a lunar eclipse, Earth comes directly between the Sun and Moon – an alignment that puts the Moon in Earth’s shadow. When the entire full moon falls within the center of Earth’s shadow, or umbra, we have total lunar eclipse. Everyone on the night side of the Moon (half the globe!) can see such an eclipse. Depending on how much dust and how many clouds are in Earth’s atmosphere, the Moon will appear dark brown, red, orange, or yellow. This is because light bounces off Earth, passes through Earth’s atmosphere, and creates a glow on the Moon.

A partial lunar eclipse occurs when only part of the Moon passes through the Earth’s umbra. A penumbral lunar eclipse occurs when the Moon passes through only the lighter part of Earth’s shadow cone – the penumbra. Neither of these lunar eclipses is as colorful as a total eclipse.