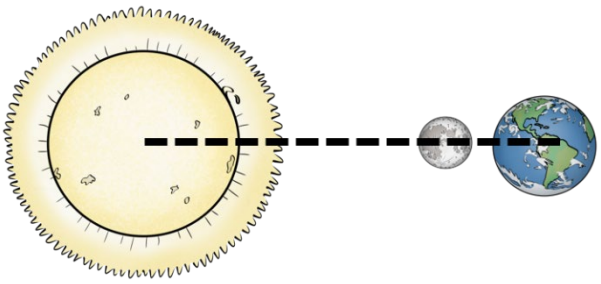
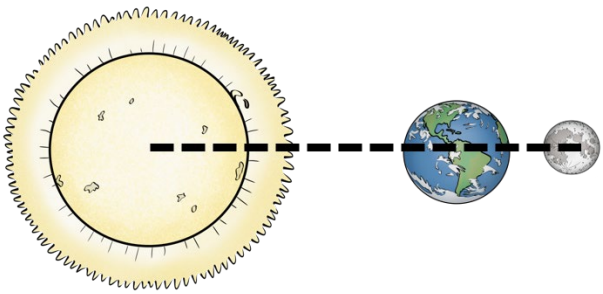
Eclipses

Date: **Name:**

What is an eclipse?

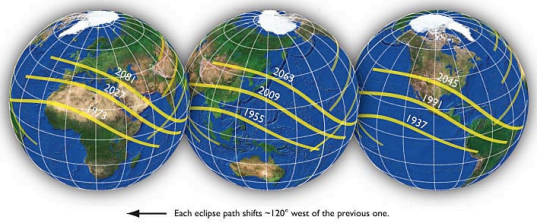
An eclipse is an _____ involving objects _____ on one another. There are two main types of eclipses, _____ eclipses and _____ eclipses. Solar eclipses occur when the _____ casts a shadow on _____. Lunar eclipses occur when the _____ casts a shadow on the _____.

	
Solar eclipses occur when the _____ passes between the _____ and _____.	Lunar eclipses occur when the _____ is located between the _____ and the _____.

Eclipses can only occur when the Sun, Earth and Moon are _____. This alignment is called _____ (si-zi-gee). The geometry of Sun, Earth and Moon aligning in syzygy repeats in _____.

Can eclipses be predicted?

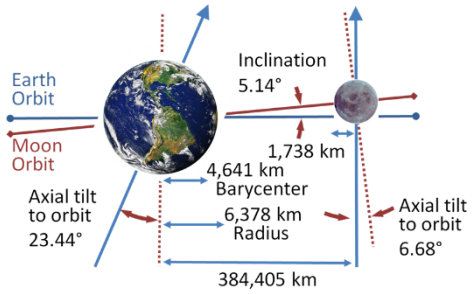
_____**!** About 3000 years ago the Chaldeans knew about the cyclic patterns of eclipses. By tracking lunar eclipses, the Chaldean astronomers determined that the Sun, Moon and Earth return to their same orientation roughly every 18 years. This cycle, called the _____, also works for tracking solar eclipses. Every 18 years the same patterns of eclipses are seen with a predictable shift in location.



We now know precisely how long it takes for one Saros Cycle: 18 years, 11 days and 8 hours. Because of this solar and lunar eclipses can be predicted decades, even centuries in advance!

Solar Eclipses

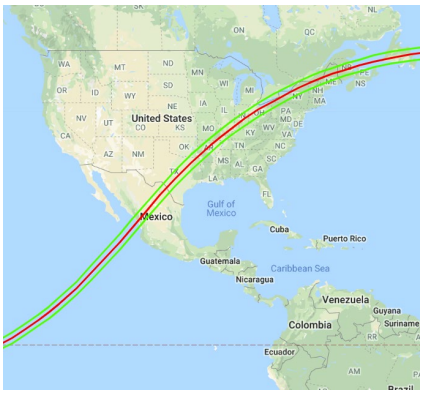
Solar eclipses occur when the _____ _____ on the _____. A solar eclipse can only occur during a _____, because the Moon has to be in between the Earth and the Sun. A solar eclipse _____ occur every New Moon (and a lunar eclipse does not occur every Full Moon) because the Moon's orbital path is _____ by about _____.



There are 3 types of solar eclipses: total, partial and annular.

	Image	Description
Total Solar Eclipse		In a _____, the Moon completely blocks the Sun. This is event is called _____. Only the Sun's _____, its outermost layer, is visible. The Moon must be slightly _____ to Earth for a total solar eclipse to occur. A total solar eclipse occurs because the Moon's _____ from Earth is about the same as the Sun's apparent size. A total solar eclipse allows astronomers to study the Sun's outermost layer, the corona, which otherwise cannot be seen too well because the Sun is so _____.
Partial Solar Eclipse		A _____ occurs when the Moon only blocks a _____ of the Sun. The Moon crosses in front of the Sun off-center. Parts of Earth experience _____ during the eclipse, but it does not get extremely dark during the day.
Annular Solar Eclipse		An _____ occurs when the Moon is farther from Earth, and it can only block the _____ of the Sun. The outer areas of the Sun, more than just the corona, are visible but the majority of the sunlight is blocked.

The type of eclipse you observe depends also on your location. Areas in the red band experienced the total solar eclipse. At this time, the black dot is experiencing the totality. Areas farther away observe less blockage of the Sun.



A total solar eclipse will occur over North America on April 8, 2024. The red line indicates the path of the _____ on Earth. Areas within the two green lines will observe a _____. Areas above and below the green lines experience a _____.

Viewing a Solar Eclipse

Special caution must be taken when viewing the Sun, even during a solar eclipse. Looking at the Sun can cause serious _____. Sunglasses do not provide enough protection. Special _____ must be worn to protect the eyes. Eclipse glasses are so dark you will only be able to see the Sun through them.

Using _____ or _____ during a solar eclipse can cause even more _____ to your eyes because the _____ is more _____. Only telescopes with _____ can be used to observe the Sun during a solar eclipse. A pinhole camera is a great way to observe a solar eclipse. A small hole is made in an opaque material like aluminum foil. When the sun's light passes through the pinhole an image is created on the other side.

Lunar Eclipses

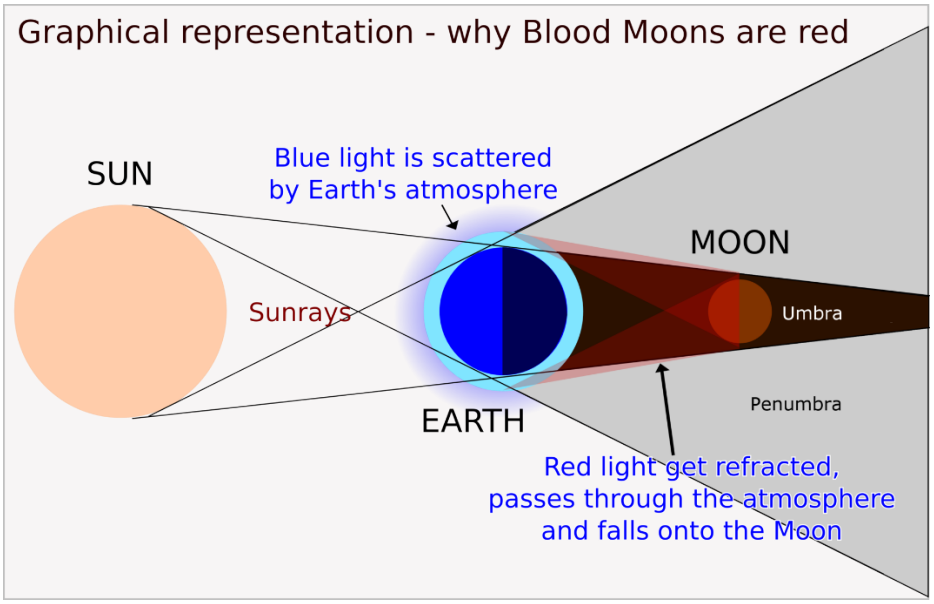
Lunar eclipses occur when the _____ _____.

A lunar eclipse occurs during the _____ phase, in which the Earth is in between the Sun and the Moon. Normally, during a Full Moon the Moon is bright. When a lunar eclipse occurs, the Moon will go from _____ _____ as it passes through Earth's shadow.

Like solar eclipses, lunar eclipses can be _____ or _____. There are no annular lunar eclipses because Earth's shadow is much larger than the Moon's shadow. Lunar eclipses can last up to a couple of _____, where as the totality of a solar eclipse only lasts a few _____.

During a total lunar eclipse, the Moon appears _____. This is sometimes called a "_____". Different cultures had their own explanations for this phenomenon, but it is quite simple to explain using the science and the geometry of the Earth's shadow.

When a lunar eclipse begins the Moon passes through the _____, an area in which _____ from the Sun is blocked. As the Moon continues it's orbit around the Earth, it will pass through the Earth's _____, which is the darkest part of Earth's shadow. Light from the Sun still passes through Earth's atmosphere. The _____ is _____ by Earth's atmosphere and only the _____ the atmosphere. The red light that passed through is reflected by the Moon, so the Moon appears _____ during a _____.



If you were to stand on the Moon's surface during a lunar eclipse, at first it would be very bright (recall lunar eclipses occur during a Full Moon). Then you would see the Earth passing in front of the Sun and it would get very dark. From your point of view, you would see a _____ _____ around the Earth – that is _____!

Viewing a Lunar Eclipse

There are _____ needed to view a lunar eclipse. _____ or a _____ will give you an even better view. Just get permission to view because the lunar eclipse will happen late at night.

Independent Practice

Q1. What is an eclipse? What are the two major types of eclipses?

Q2. Complete the table comparing solar and lunar eclipses.	
Draw and label diagrams to show the alignment of the Sun-Earth-Moon system during a…	
Solar Eclipse	Lunar Eclipse
During which lunar phases does a solar eclipse occur?	During which lunar phases does a lunar eclipse occur?
What are the three types of solar eclipses?	What are the two types of lunar eclipses?
What protective measures must be taken to safely view a solar eclipse?	What protective measures must be taken to safely view a lunar eclipse?

Q3. Define "syzygy".

Q4. Explain the difference between a total solar eclipse and an annular solar eclipse. Use diagrams to aid your written explanation.

Q5. Explain why the Moon turns red during a total lunar eclipse.

Q6. Research a specific culture's interpretation of a "blood moon". What is their story? Why do you think they told this story?

Q7. Describe a misconception you previously had about eclipses. What helped to fix that misconception?