

(1) Solar and Lunar Eclipses TUTORIAL

Objective: By the end of this tutorial, you should be able to explain: how solar and lunar eclipses occur and the differences between them

Prior Knowledge

Planets:

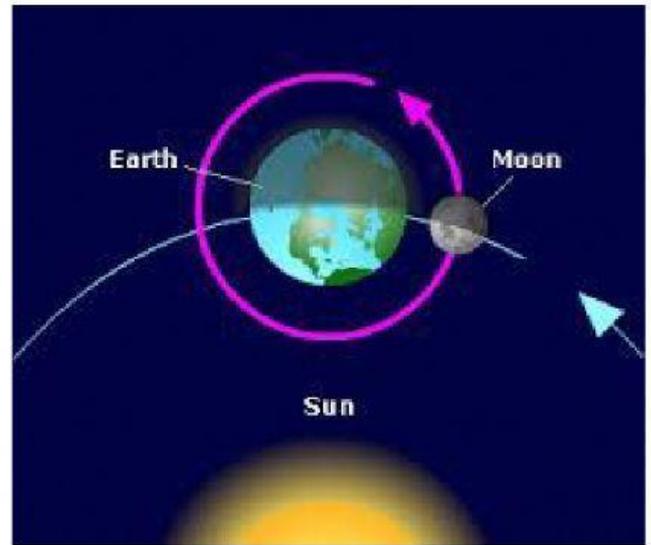
- Mars and Jupiter are visible
- Venus is easier to see at dawn or right before dusk
- They are some of the closest planets to us in our solar system

Gravity:

- A force of attraction between two objects
- Mass is one factor that determines gravitational pull
- The more massive an object the greater the gravitational pull
- Distance between objects is also a factor
- The closer an object is to another, the greater the gravitational pull between the objects

Sun, Earth, Moon System

- Orbit: The path an object takes when it revolves around another object
- Revolve: The movement of an object around another
- Rotation: Spinning of an object on its axis
- One rotation = one day
- Earth: one rotation in 24 hours
- Moon: orbits the earth in about 27 days



Practice 1

Select all true statements regarding the Sun, Moon and Earth system:

The distance to the Sun affects the Earth's orbit around the Sun	The Earth Rotates on its axis in 24 hours
The Earth's gravity and distance to the Moon affects the Moon's orbit	The Moon orbits the Earth in about 27 days

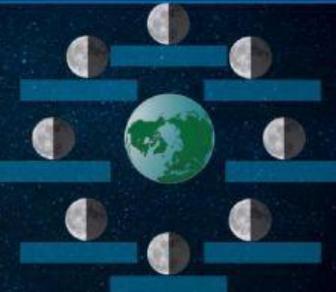
(2) Moon Phases



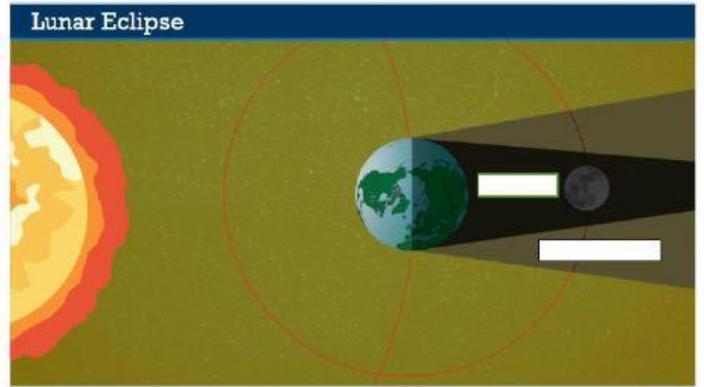
Practice 2

Match the phase names to the phase location. Drag the names onto the locations in the Moon's cycle that represent that phase. Click submit when finished.

- |   |                 |   |
|---|-----------------|---|
| 1 | Third Quarter   | 5 |
| 2 | Waning Gibbous  | 6 |
| 3 | Full Moon       | 7 |
| 4 | Waxing Gibbous  | 8 |
|   | First Quarter   |   |
|   | Waxing Crescent |   |
|   | Waning Crescent |   |
|   | New Moon        |   |



Lunar Eclipse



Mark UMBRA and PENUMBRA shadows!

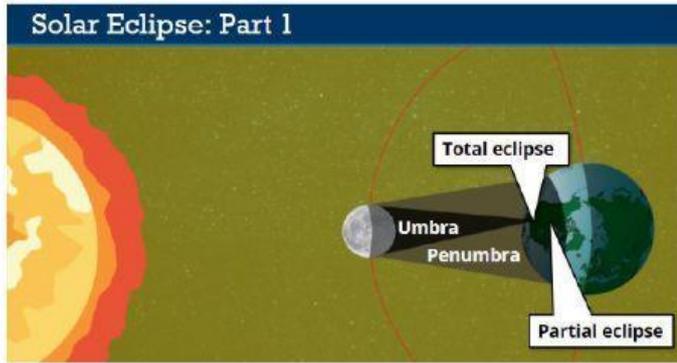
Practice 3

Which of these describe a lunar eclipse? Choose all statements that apply.

- |   |   |
|---|---|
| Occurs at a full moon                                     | The Earth blocks light from the Sun reflecting off the Moon.                |
| When the Moon blocks the Sunlight from hitting the Earth. | A Lunar eclipse doesn't occur every month because of the tilt of its orbit. |

The Moon is about 400 times closer to us than the SUN!

(5)



### Solar vs Lunar Eclipse

#### Solar Eclipse



- The Moon blocks the sunlight to the Earth
- Only a small area on Earth is affected.
- During a New Moon
- Occurs about every 18 months in different areas
- One area might only get to experience a total solar eclipse about once ever 300 years!

#### Lunar Eclipse



- The Earth blocks the sunlight to the Moon.
- During a Full Moon
- Half of the Earth experiences a lunar eclipse at a time.
- Lunar eclipses happen regularly but not once a month. This is affected by the tilt of the Moon's orbit as we orbit the Sun.
- Some light does get through our atmosphere to the Moon- causes a reddish hue of the Moon

### Practice 4

Match the descriptions that help describe a solar eclipse.

Solar Eclipse		The reason the Moon is able to block out the Sun during a solar eclipse	1
Penumbra		A section where no light is able to shine. This area experiences a total solar eclipse.	2
Umbra		The Moon blocks the sunlight from reaching the Earth	3
The moon is 400 times closer than the Sun.		A shadow where a portion of light still is visible. This type of shadow causes a partial solar eclipse.	4

### Final Practice

Drag the descriptions for lunar or solar eclipse to the appropriate box.

Solar Eclipse

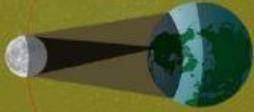
Lunar Eclipse

Solar Eclipse		Lunar Eclipse	
1	Occurs during a Full Moon	3	Affects half of the Earth at one time.
2	Earth blocks the Sunlight to the Moon	5	Occurs during a New Moon
4	Some light gets through our atmosphere and causes the object to look reddish	6	Covers a much smaller area on Earth at a time
7	The Moon blocks the sunlight to Earth	8	The Moon is 400 times closer that helps completely block the light.

### Lesson Review

#### Solar Eclipse

- Caused by the Moon blocking the light from reaching Earth.
- The penumbra is the lighter shadow caused by partial blockage
- Umbra is the total blockage of the sunlight
- Happens during a new moon
- Happens regularly but does not often happen in the same location
- A total solar eclipse covers a very small area.



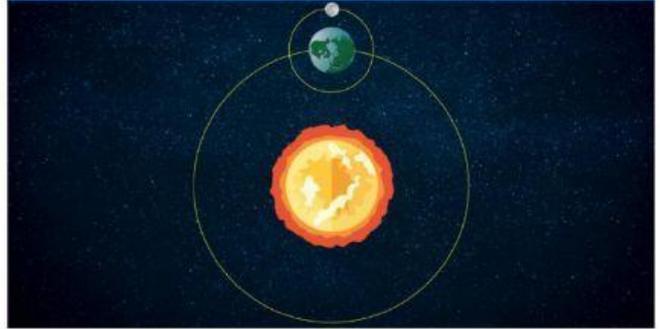
### Lesson Review

#### Lunar Eclipse

- Earth blocks the Sun from Moon
- During a full moon
- Half of Earth experiences it at one time
- It appears they happen more often but they do not
- The Moon's orbital tilt prevents it from occurring every month



### Lesson Review



The Earth revolves around the Sun and the Moon revolves around the Earth!