

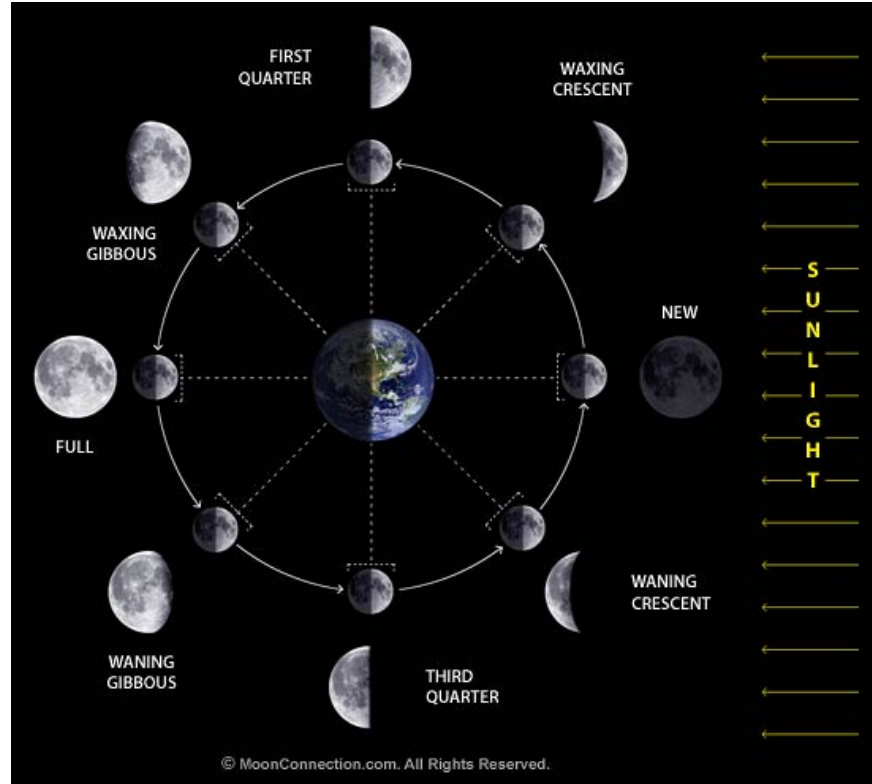
**“Lunar Phases and Eclipses”**  
**Newcomer Academy**  
**Middle School**  
**Visualization Three**

Chapter	Subtopic/Media	Key Points of Discussion	Notes/ Vocabulary
1	The Moon	<p><b>Fascination</b>  Humans have always been fascinated with the Moon. We have legends, myths, songs, and nursery rhymes about the highly visible object.</p> <ul style="list-style-type: none"> <li>• Lore = Man on the Moon, Made of Cheese, Martians</li> <li>• Nursery Rhymes = Cow Jumped over the Moon</li> <li>• Legends = Rabbit on Moon, Werewolves</li> <li>• Lunacy – (<i>Luna</i> = Latin for Moon)</li> </ul> <p><b>Exploration</b>  Moon Landing Movie Clip  1<sup>st</sup> man to step foot on the Moon was Neil Armstrong, on July 20, 1969. Twelve men have walked on the Moon, since.</p> <p>We have sent Probes to other planets and placed rovers on Mars, but this is as far as man has physically traveled into space.</p> <p>The Apollo 11 Lander, Flag, and Footprints are still there. There is not any <b>atmosphere</b> (wind or weather) to disturb the prints.</p> <p><b>Information</b>  Distance from Earth = 238,900 miles / 384,400 km  Approximately 1 light second</p> <p><b>Revolution</b> of Moon = 27.3 days: About one Month... “moon-th”  <b>Rotation</b> of Moon = 27 days, 7 hours, 43 minutes (27.3 days)</p> <p>One side of the Moon is always facing the Earth:  <b>Synchronous</b> rotation is caused by unsymmetrical distribution of mass in the Moon</p> <p><u>More Facts and Information</u>  Diameter = (3,474 km) ¼ size of Earth (12,742 km)  Volume = You could fit 50 Moons inside the Earth  Surface Area = If you could unwrap the Moon it would fit inside of Asia... (Moon 37.9million km<sup>2</sup>)</p> <p>Mass = 1.2% that of Earth (81 Moons = 1 Earth)  Gravity = 1/6 that of Earth  Temperature = 253°F/-387°F  Importance = Ocean Tides and Stabilizes 23.5° Tilt of Earth</p>	<p><b>Lesson 2 + 3</b></p> <p><b>Atmosphere</b></p> <p><b>Revolution</b></p> <p><b>Rotation</b></p> <p><b>Synchronous</b></p>

**Phases**

Lunar phases are a result of the Moon's position in its orbit and the location of the viewer.

**Lunar Phase**



**New Moon**

**Waxing**

**Crescent**

**First Quarter**

**Gibbous**

**Full Moon**

**Waning**

**Last Quarter**

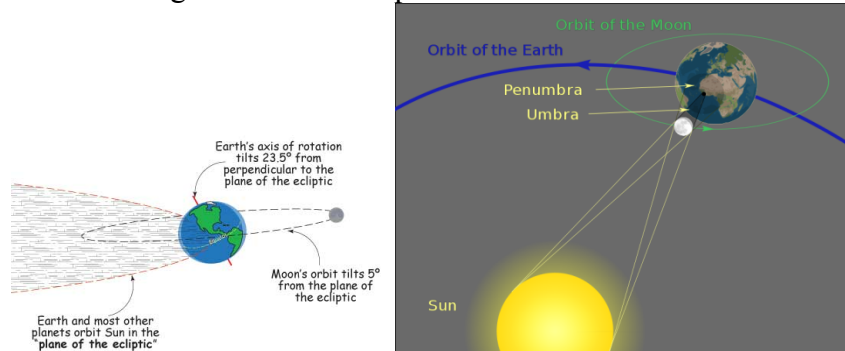
- New Moon
- Waxing Crescent
- First Quarter
- Waxing Gibbous
- Full Moon
- Waning Gibbous
- Third (Last) Quarter
- Waning Crescent

3

### Eclipses

#### Solar

The orbit of the Moon is not perfectly aligned to the Earth's orbit which is on the plane of the **ecliptic**; it is slightly tilted (5 degrees). This orbit causes the Moon to cross paths with the Sun at different times and locations, resulting in a **solar eclipse**. This occurs during the New Moon phase.



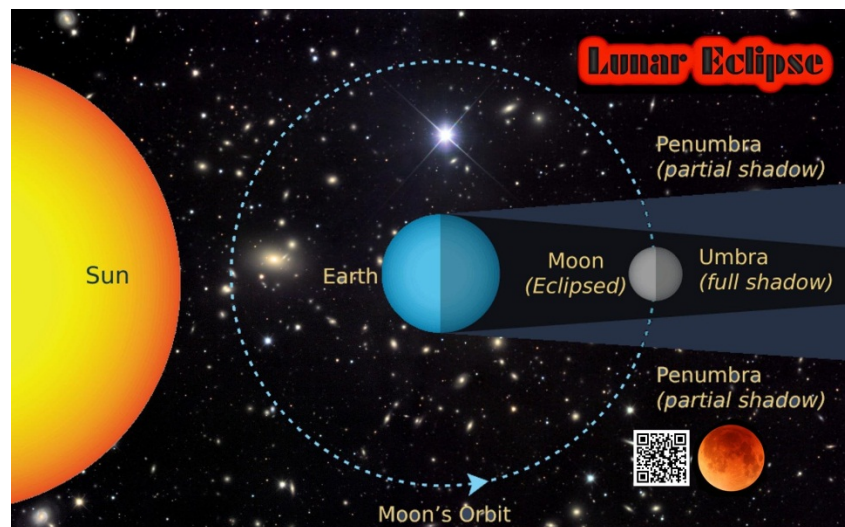
Lesson 6

Ecliptic

Solar Eclipse

#### Lunar

A **lunar eclipse** can occur during a Full Moon if the Earth's shadow is cast on the Moon when it falls within the plane of the ecliptic.



Lunar Eclipse

5

### Gravity and Tides

#### Importance of Tides

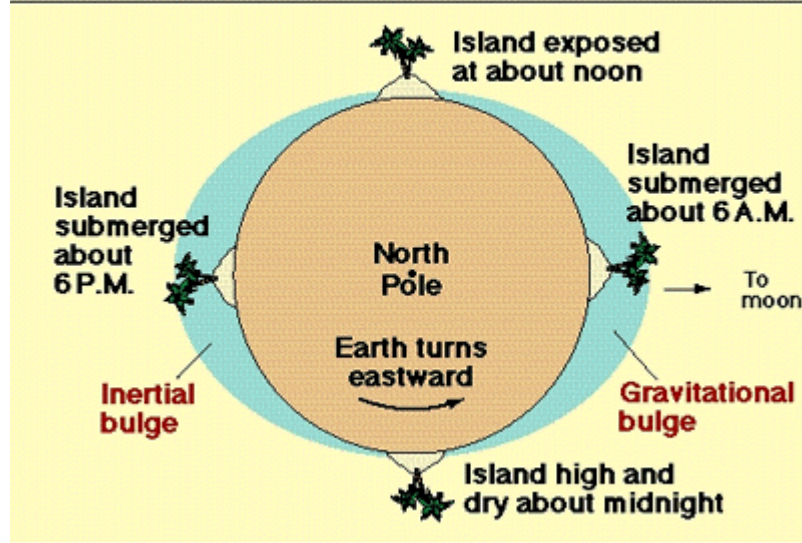
Tides allow for life to flourish on Earth. Approximately every 12 hours the ocean water level swells to its highest point called a "**high tide**". When the water sinks to its lowest level it is termed a "**low tide**". The high tides bring in nutrients for stationary animals and deposits food on the beaches for animals during low tide.

Lesson 16

High Tide

Low Tide

## Earth's Rotation beneath Tidal Bulges

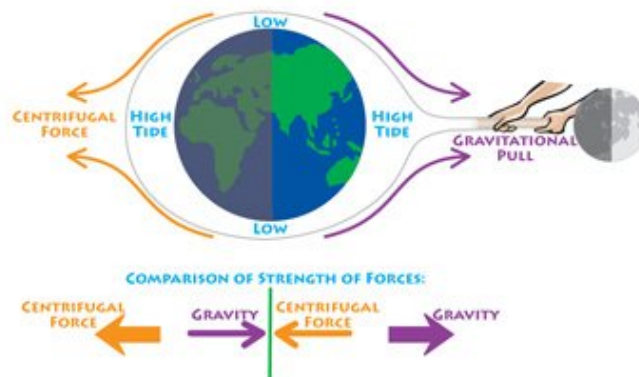


This **cycle** of high and low tides allow for tidal pools, small bodies of water that teem with life. This also churns water and oxygenating the ocean and modulating (evenly distributes) the water's temperature.

### Tides on Opposite Sides of Earth

Water is deepest on the side of the Earth closest to the Moon. This is due to the **gravity** of the Moon pulling on the water. The opposite side of the planet is also experiencing a high tide, because the Moon is pulling the solid Earth away from the water and **centrifugal/inertial** forces fill in the area with water.

Diagram / Diagrama 4



### Spring and Neap Tides

Tides can become particularly high during a **spring tide**. This is when the Earth, Moon and Sun lineup, on the Full or New Moon phase. The combined gravity of the Sun and Moon result in distinctly high tides.

During the First Quarter or Last (3<sup>rd</sup>) Quarter Moon, when the Sun is at a right angle to the Earth/Moon alignment, **neap tides** occur. These tides result in lower-than-normal high tides.

Cycle

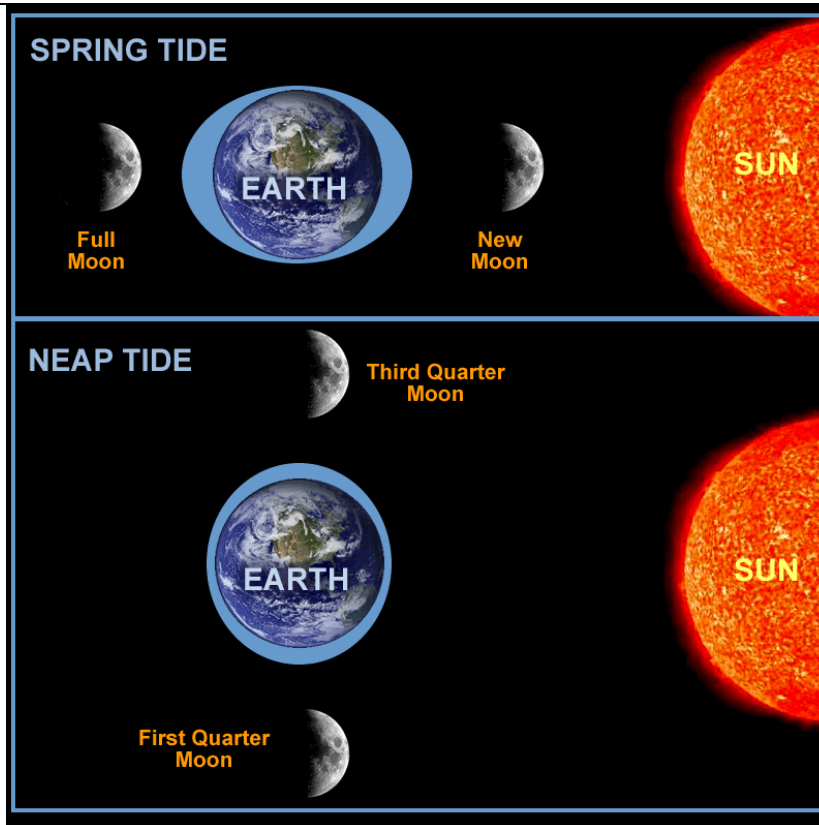
Gravity

Centrifugal

Inertia

Spring Tide

Neap Tide



6	Other Moons	<p><b>Jupiter</b>          Jupiter has over 67 moons. The most <b>unique</b> are Io and Europa. Io is squeezed and released by the gravitational force of Jupiter (300X the Earth to Moon), resulting in extreme volcanic activity. Europa is a moon that is believed to have an ocean below a large layer of ice. Where there is liquid water, there is a chance for life to exist.</p> <p><b>Saturn</b>          Titan is the only moon known to contain liquid, besides the Earth. The only difference is that Titan has liquid <b>methane</b>. This produces an atmosphere and methane cycle that results in clouds, rain, rivers, and lakes.</p> <p><b>Neptune</b>          Neptune's moon Triton is unique because of its tilt and the resulting seasons. The moon experiences two 40 year cycles where the poles temperature <b>fluctuates</b> a few degrees. The results in cryo-volcanoes.</p>	<p><b>Unique</b></p> <p><b>Methane</b></p> <p><b>Fluctuate</b></p>
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