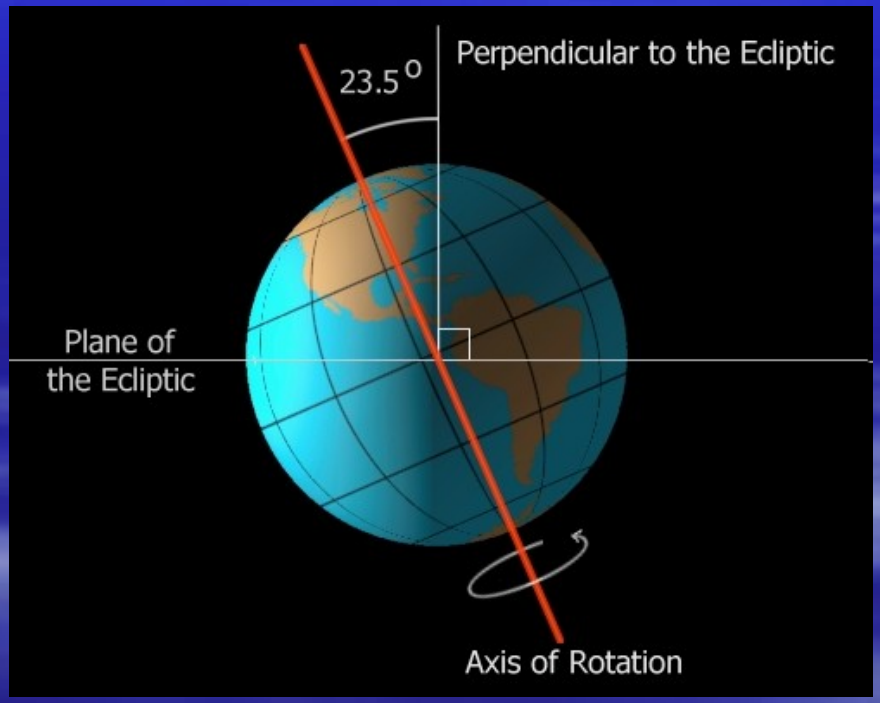
The Earth in Space

- Astronomy
- The study of the moon, stars and other objects in space

- SWBAT- Demonstrate how Earth moves in space and explain the cause of the seasons on Earth

Earth's Rotation

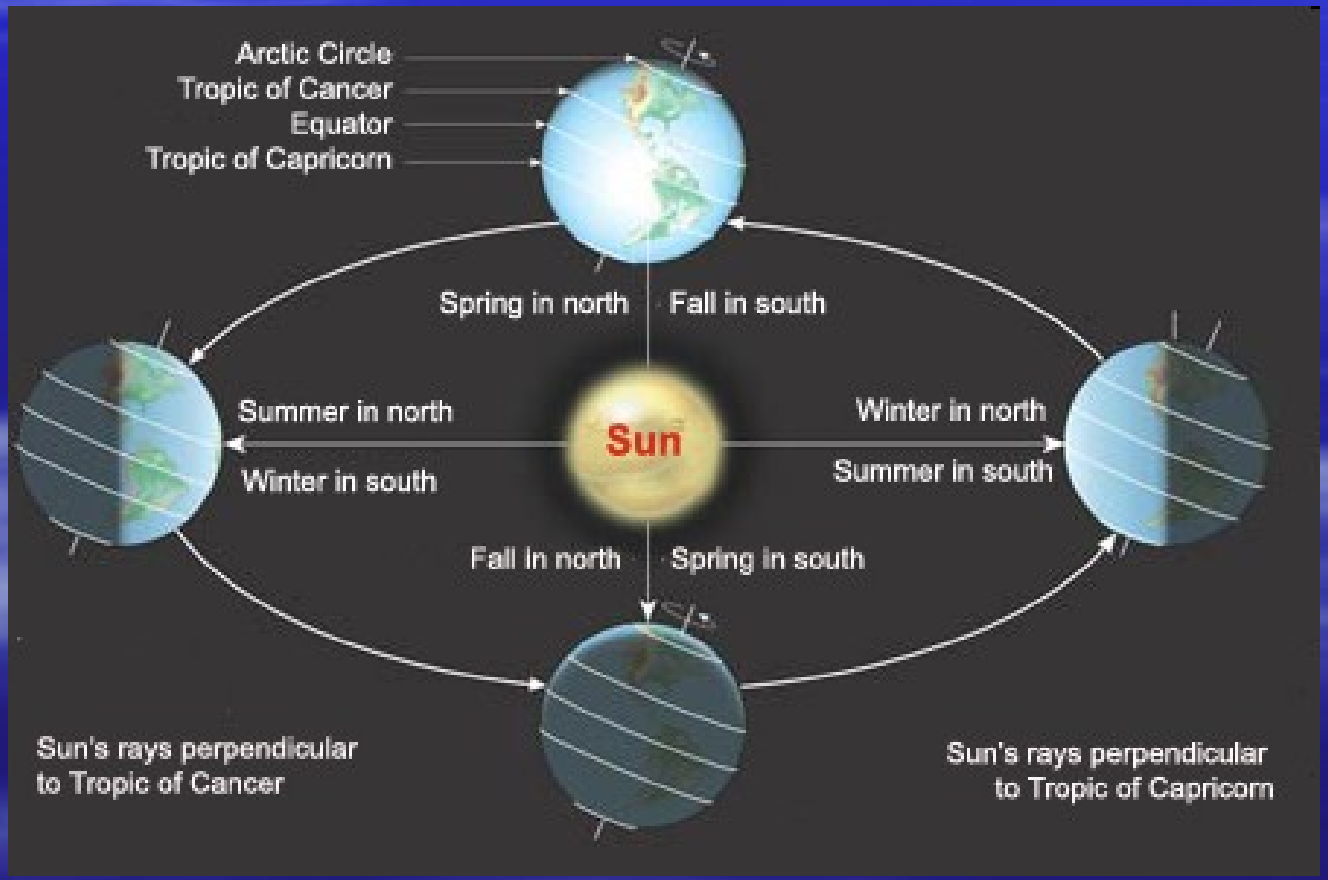
- **Axis** –
- imaginary line passing through the North and South Pole
  - Earth's axis is tilted at **23 ½ degrees**



- **Rotation**:
- the Earth spinning on its axis one time – a 24 hour, day and night cycle

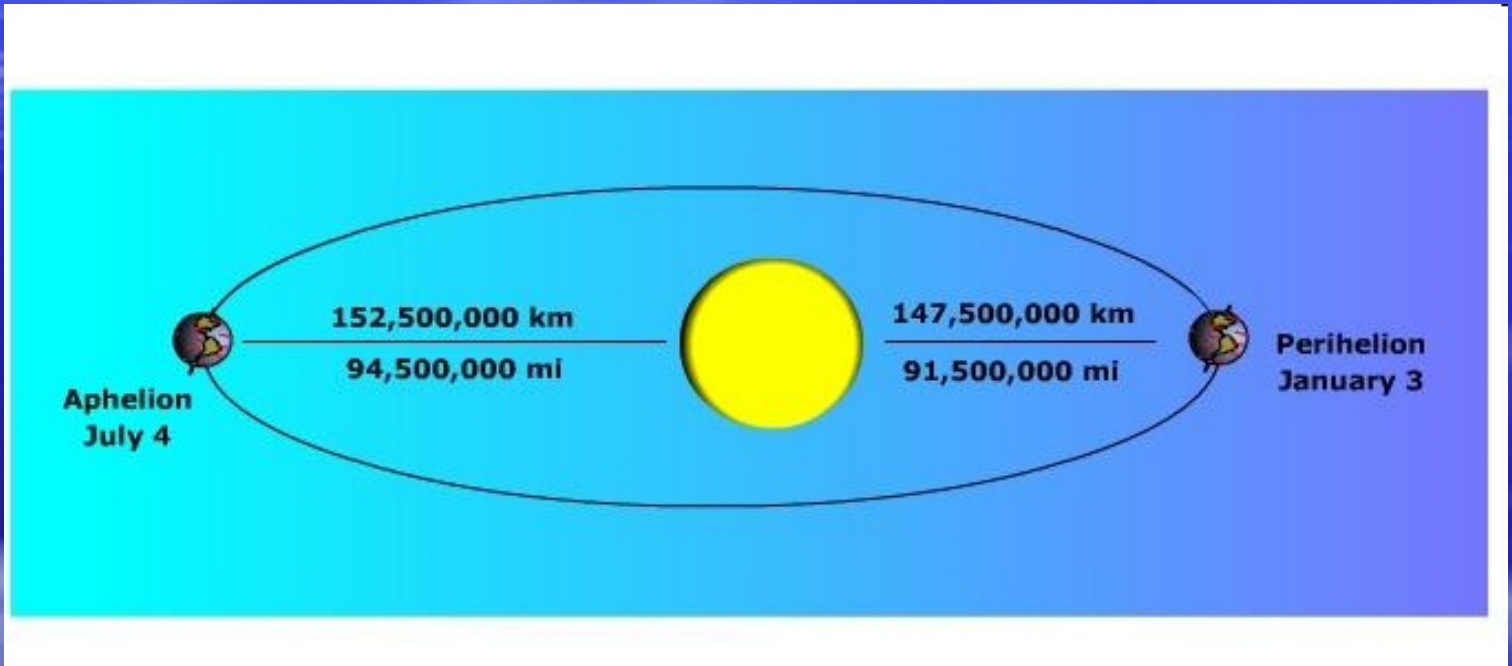
Earth's Revolution

- **Revolution**: The movement of one object orbiting around another in space. One revolution of the Earth around the Sun requires 365 ¼ days…. 1 year.



Earth's Revolution

- **Apogee** (Aphelion) & **Perigee** (Perihelion)



Apogee – that point in the Earth elliptical orbit where the Earth & Sun are farthest apart

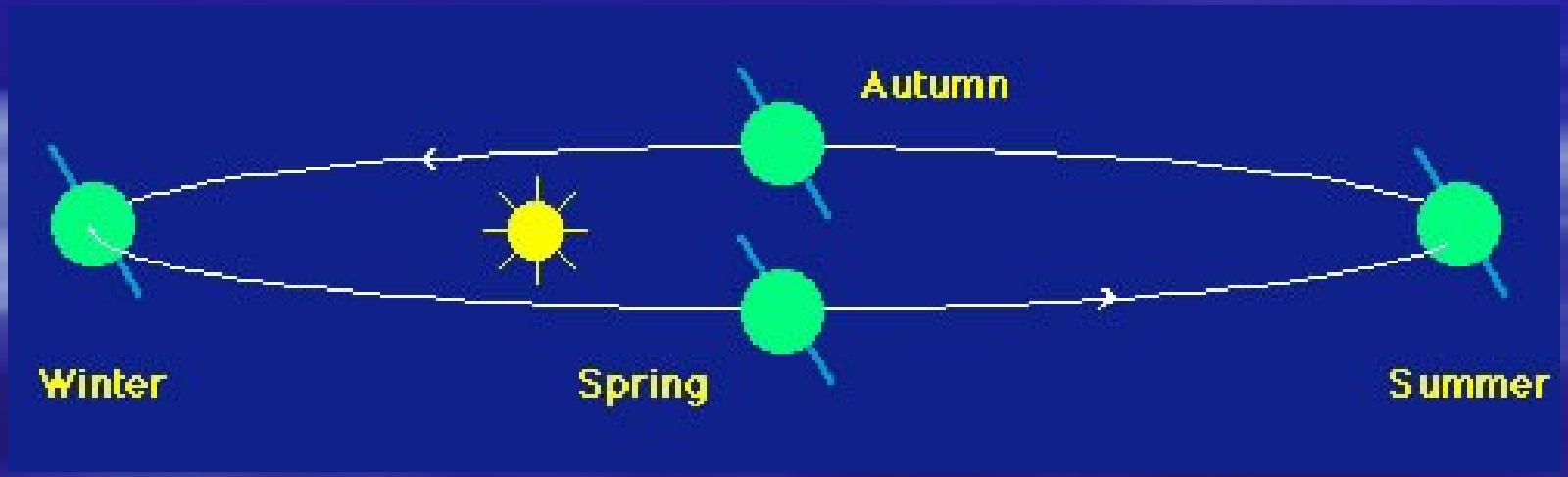
Perigee - that point in the Earth elliptical orbit where the Earth & Sun are closest together

4/27/15

- SWBAT- Describe two factors that keep the moon and Earth in orbit.

Why do Seasons Occur?

- Seasons occur because of the Axis tilt of the Earth.
- North pole pointed toward the sun results in more direct sun light hitting the northern hemisphere…. Summer in the northern hemisphere, winter in the Southern hemisphere. **Summer Solstice** usually around **June 21**
- Six months later North pole points away from the sun, less direct light hits the northern hemisphere… Winter occurs in northern hemisphere, Summer in the Summer hemisphere. **Winter Solstice** usually around **Dec 21**
- **Spring Equinox** – around **March 21**; date there is an equal length of daylight and nighttime hours.
- **Autumnal Equinox** - around **September 23**; date there is an equal length of daylight and nighttime hours.

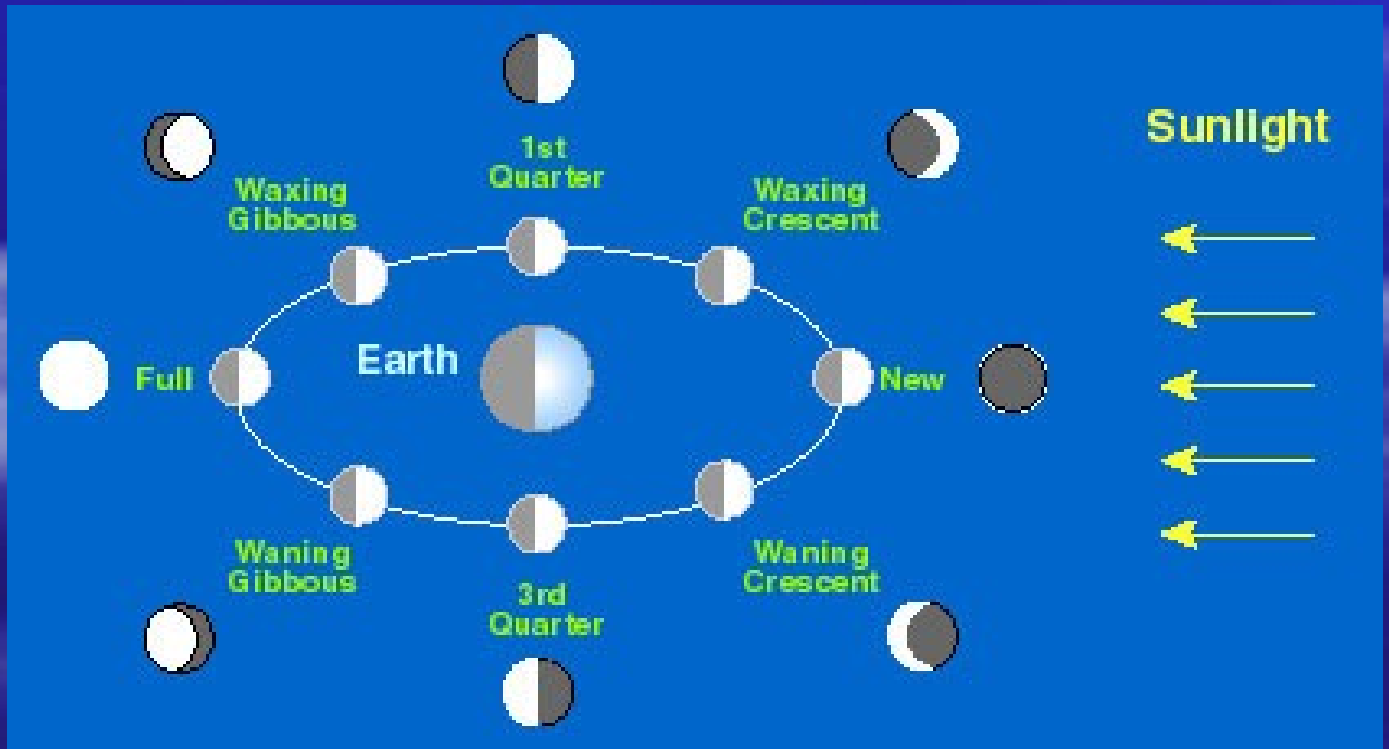


4/29/15

- Do Now: When the moon is growing in size we call it what kind of a moon? And what phase of the moon can we not see, because the moon seems blocked by the Sun?
- SWBAT- Describe Solar and Lunar eclipses. And identify the causes of tides

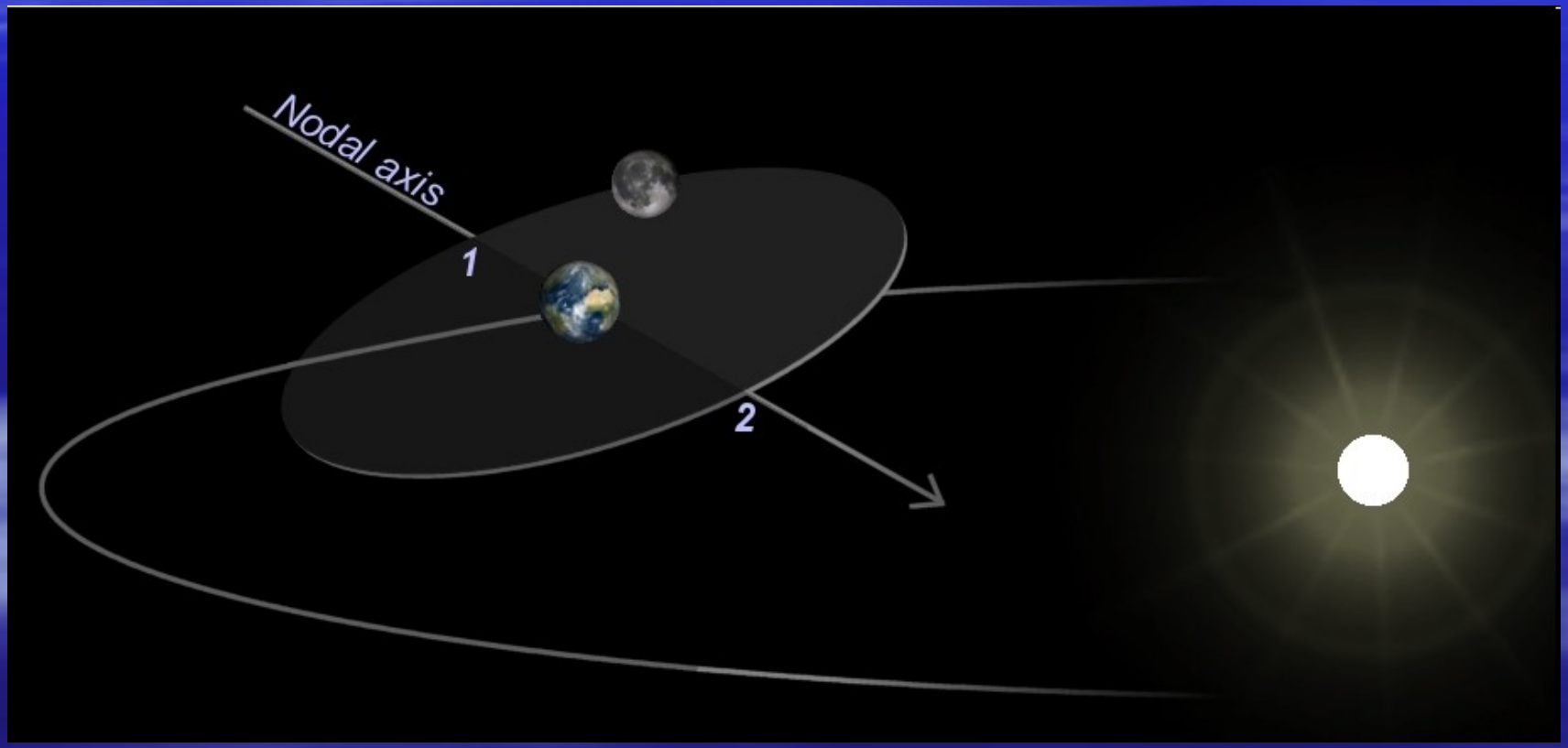
Moon Orbits the Earth

- The moon revolves (**orbits)** the Earth every **27.3 days** and **rotates** on its axis every **27.3** days. This causes the same side of the moon to always face the earth.
- Phases of the moon**:**
- **New moon – Waxing Crescent – 1st Quarter – waxing gibbous – Full moon – Waning gibbous – 3rd Quarter – Waning Crescent - New Moon**
- Requires approx **29.5 days** to complete the phases



Lunar Orbit around the Earth

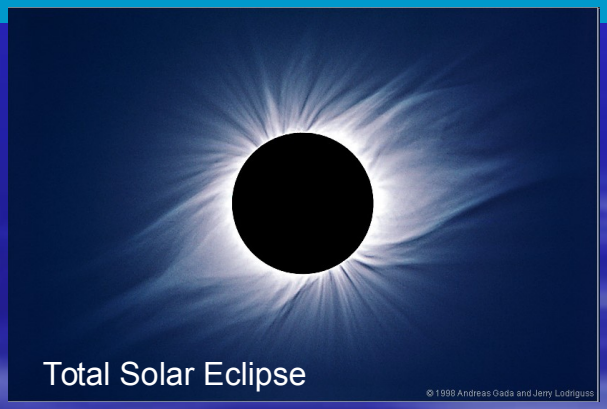
- Earth's Moon: on average it is 250,000 miles away
- Mass is 1/6 that of the Earth

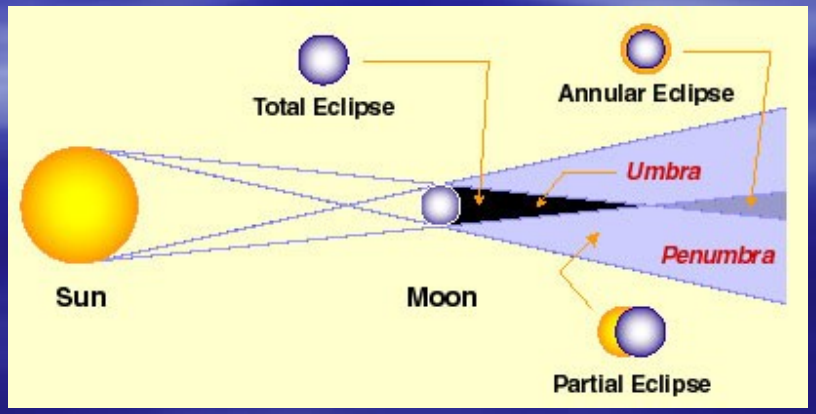


Solar Eclipses – 3 Types

When the moon's shadow hits the earth a **solar eclipse** occurs.

- 1. When the entire sun is hidden by the moon a **total eclipse** occurs. This happens when the **umbra** part of the shadow falls on the Earth.
- 2. When only part of the sun is hidden by the moon a **partial eclipse** occurs. This happens when the **penumbra** part of the shadow falls on the Earth.
- 3. When moon is too far away for it to completely block out the sun but allows the sun to remain visible around the edges of the moon an Annular Eclipse occurs.
- Can occur only during New Moons





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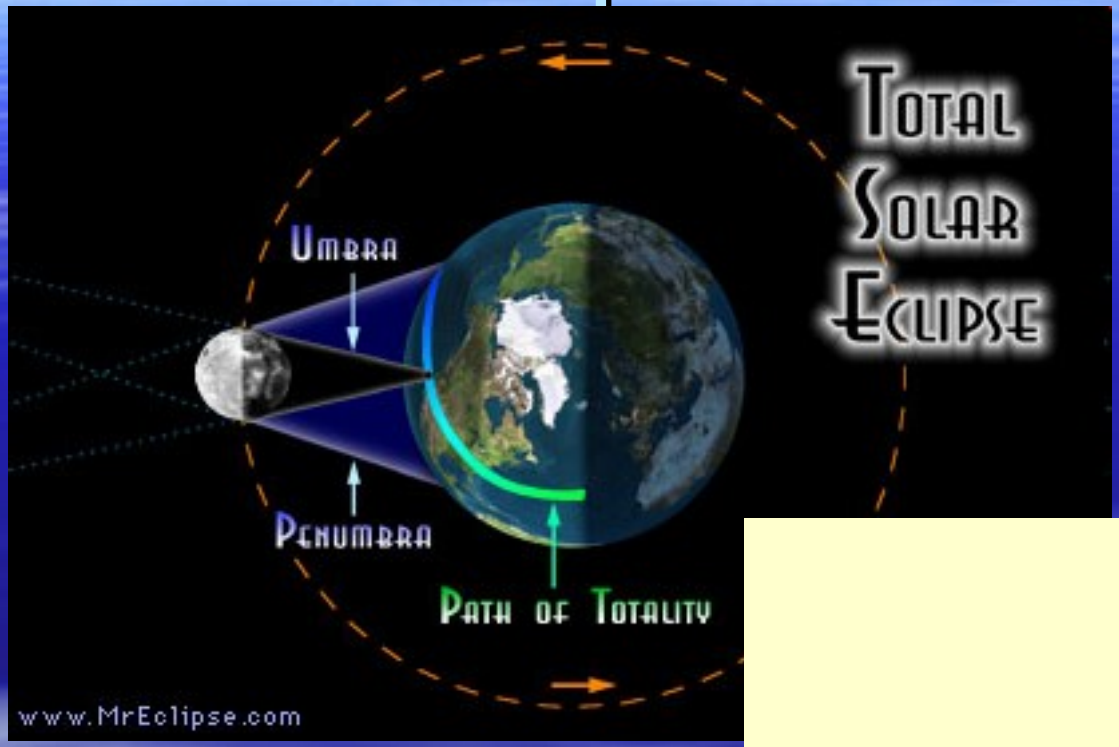
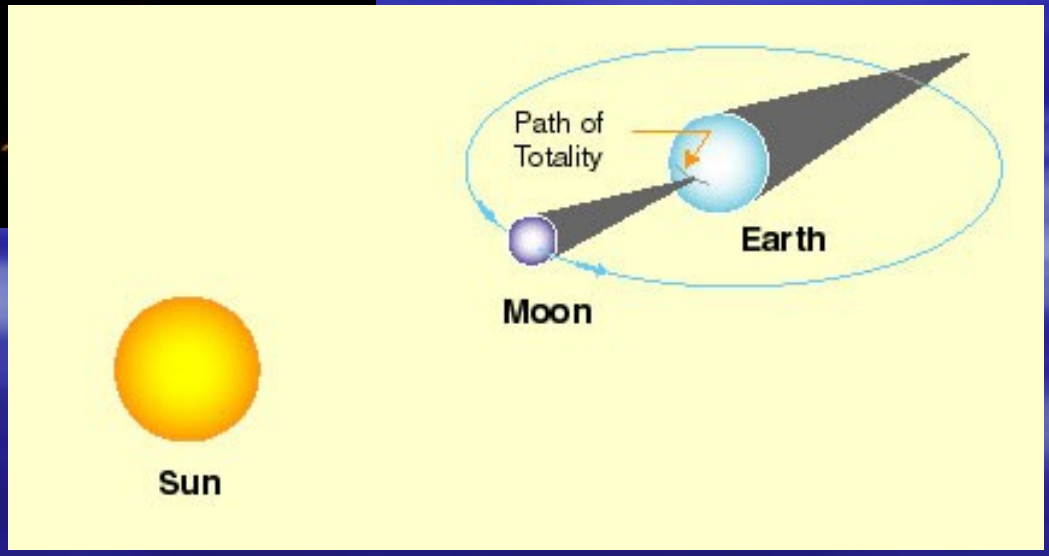
- Do Now- What type of an Eclipse only occurs during a full moon?

- SWBAT- Identify the causes of tides and explain how the moon formed

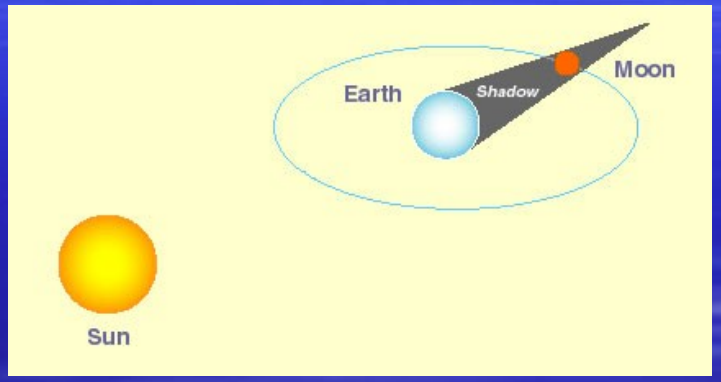
Solar Eclipse – Path of Totality

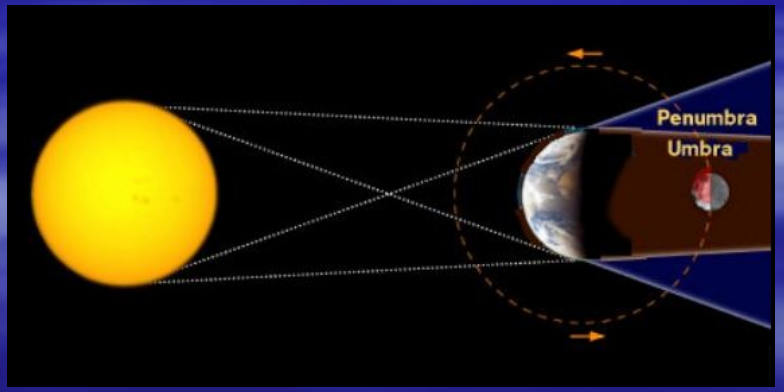




Lunar Eclipse

- When the umbra of the Earth's shadow hits the moon a **lunar eclipse** occurs
- Occurs only during a full moon





5/8/15

- Do Now- When the Southern Hemisphere seems to be tilted more towards the Sun, what season are we experiencing in New Jersey? And what Season is the lower part of Brazil experiencing ?
- SWBAT- Describe features found on the moon's surface, identify some chararacteristics of the moon and explain how it formed

Daily High & Low Tides

- Moon and Sun gravity play important parts in the cycle of tides on the Earth.
- Moon's gravity plays a strong role in the formation of tides than does the sun's gravity.
- **High Tide**:

  1. Moon's gravity pulls the water on the Earth nearest to the moon towards it. This creates a "bulge" in the water that faces the moon, a high tide.

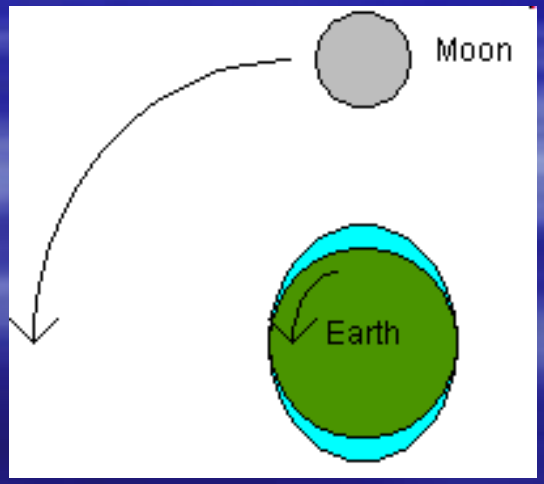
  2. Another high tide occurs on the opposite side of the Earth because the moon pulls stronger on the Earth than the water farthest from the earth and "leaves this water behind" hence another high tide here.

- **Low Tide**:

  1. Water on the sides of the Earth perpendicular to those two areas closet to and farthest from the Earth are low tide areas of the Earth.

- Usually two high tides and two low tides each day
- 6hrs 12 mins in between a low and high tide

or 12 hr 25 mins between high to high and low to low



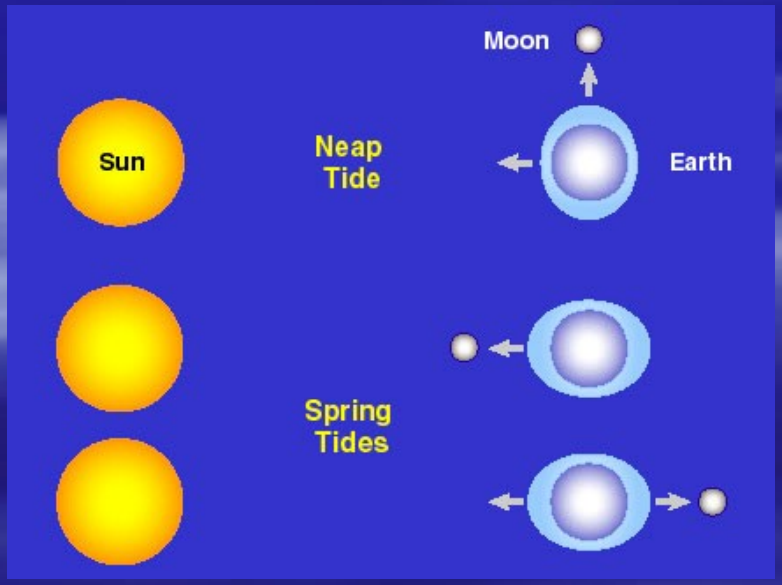
Spring & Neap Tides

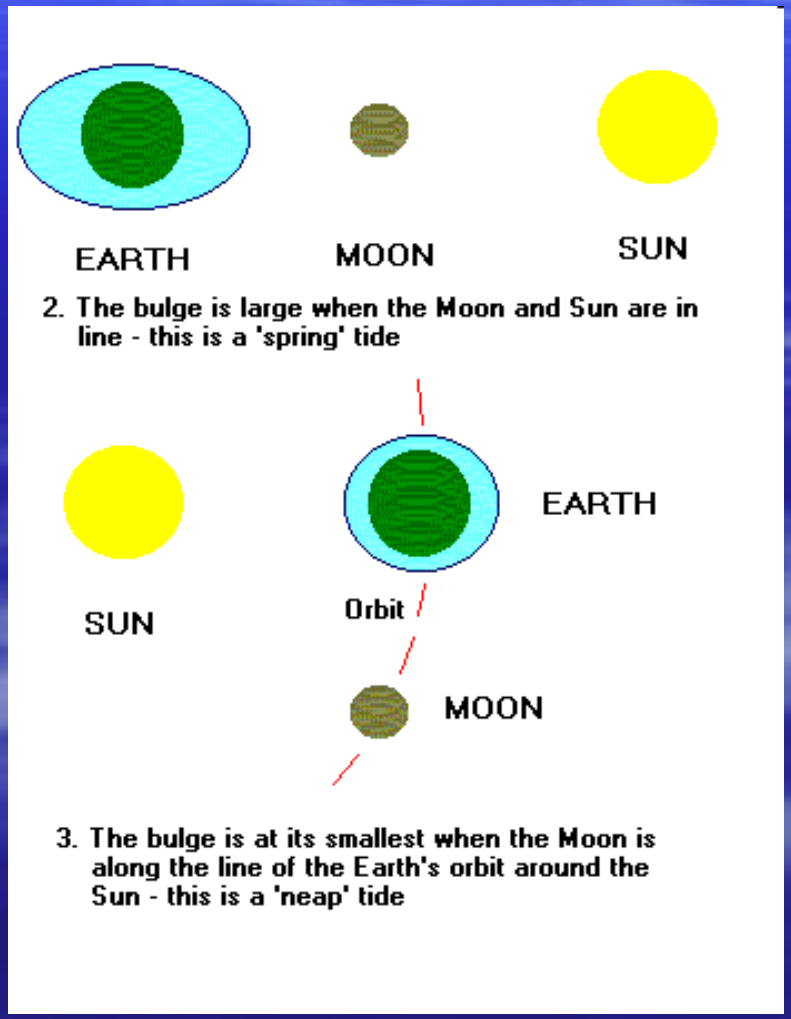
Spring Tides:

- 1. When the Sun and the Moon line up together with the Earth, their gravity act together causing extremely high high tides and very low low tides.
- 2. Occur during new or full moons

Neap Tides:

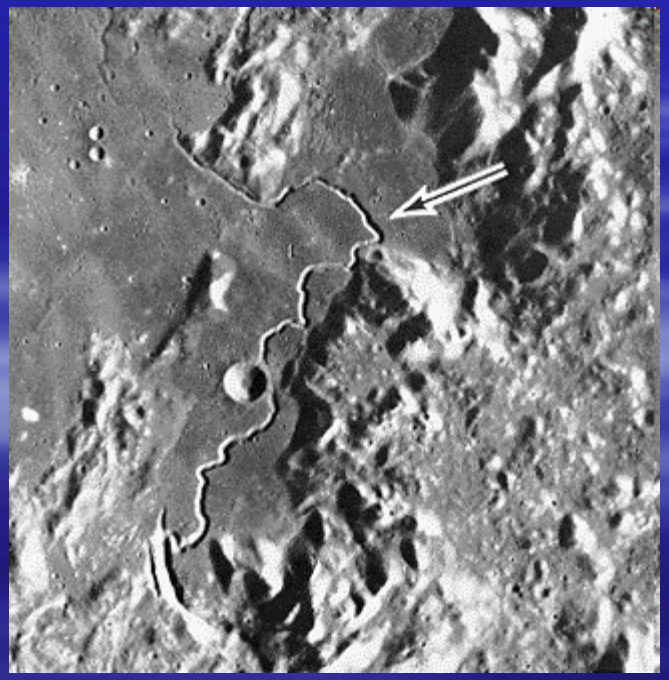
- 1. When the sun and moon are perpendicular to the Earth their gravity comes close to canceling each other out. Consequently the high and low tides have the least difference in their high and low points.
- 2. Occur during 1st and 3rd quarter phases of the moon

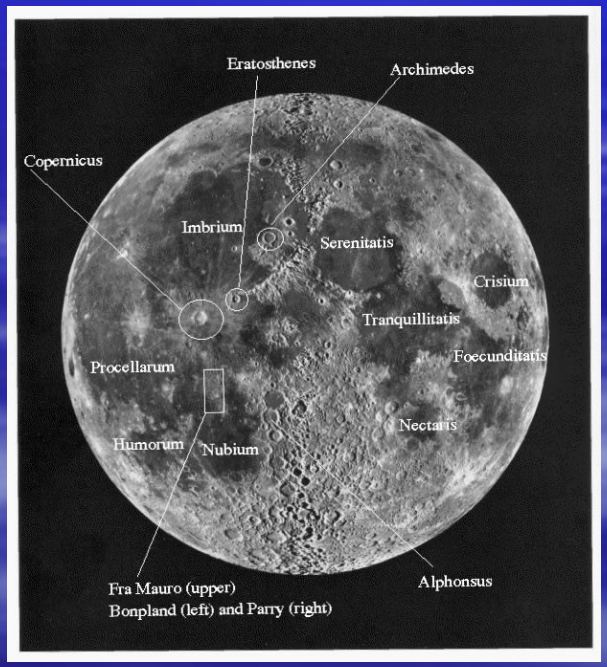




Features of the Moon

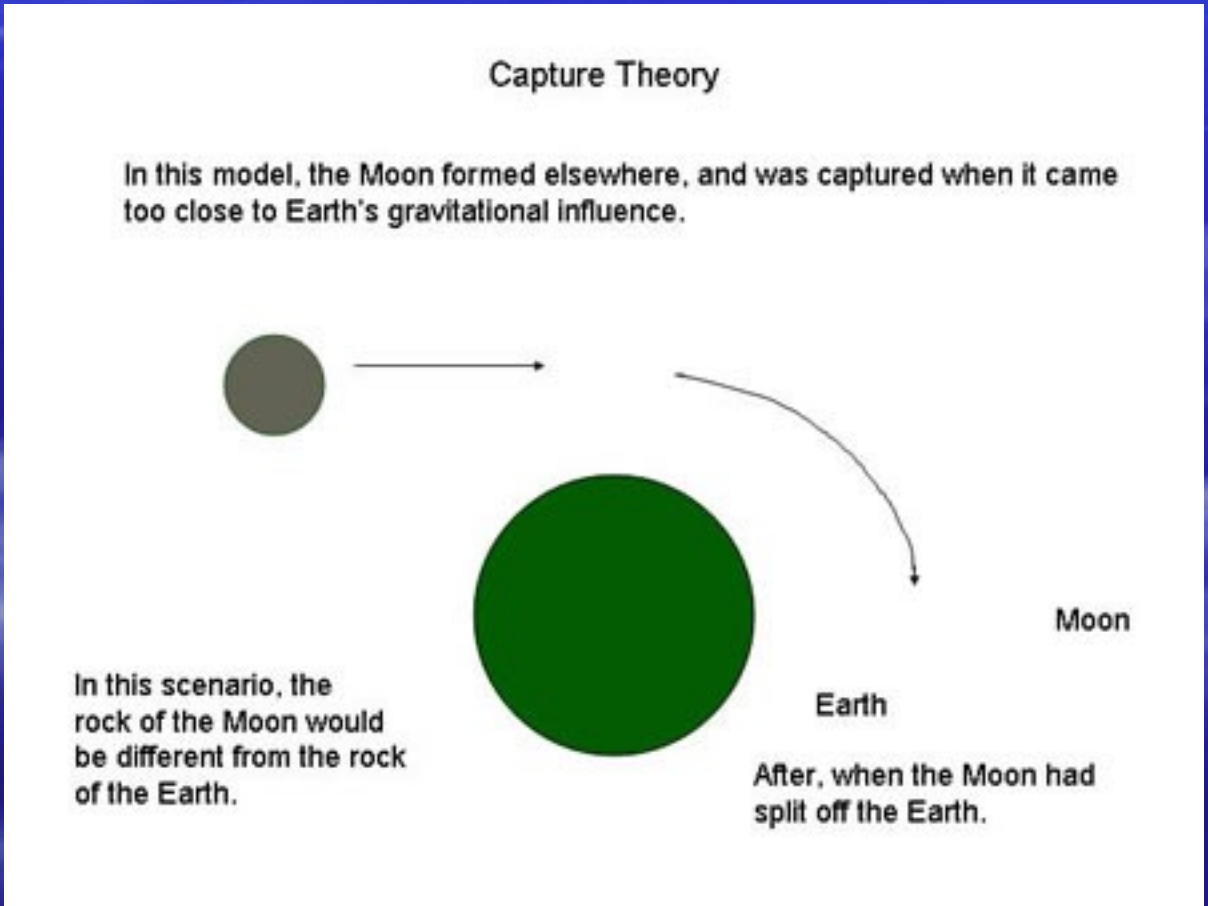
- **Craters**: round pits on Lunar surface caused by the collision of the asteroids
- **Highlands**: Mountains on the moon
- **Maria**: Lunar “seas” – not “water seas” but formed after asteroid collisions broke through the thin lunar
- **Rilles:** Valleys on the moon





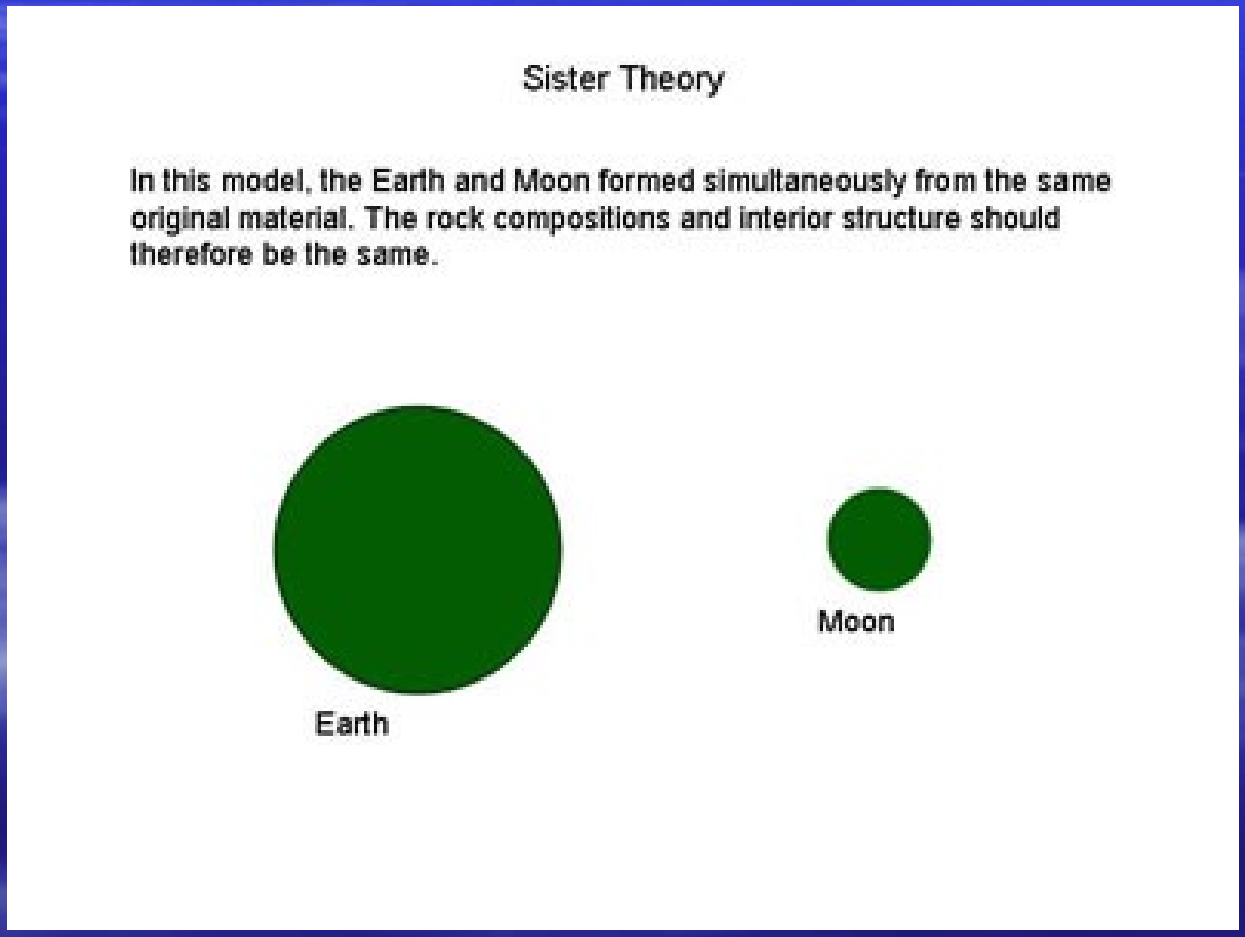
Moon Origins – Capture Theory

- **Capture theory**: a foreign body traveling through space was captured by the Earth's gravity and remains in orbit



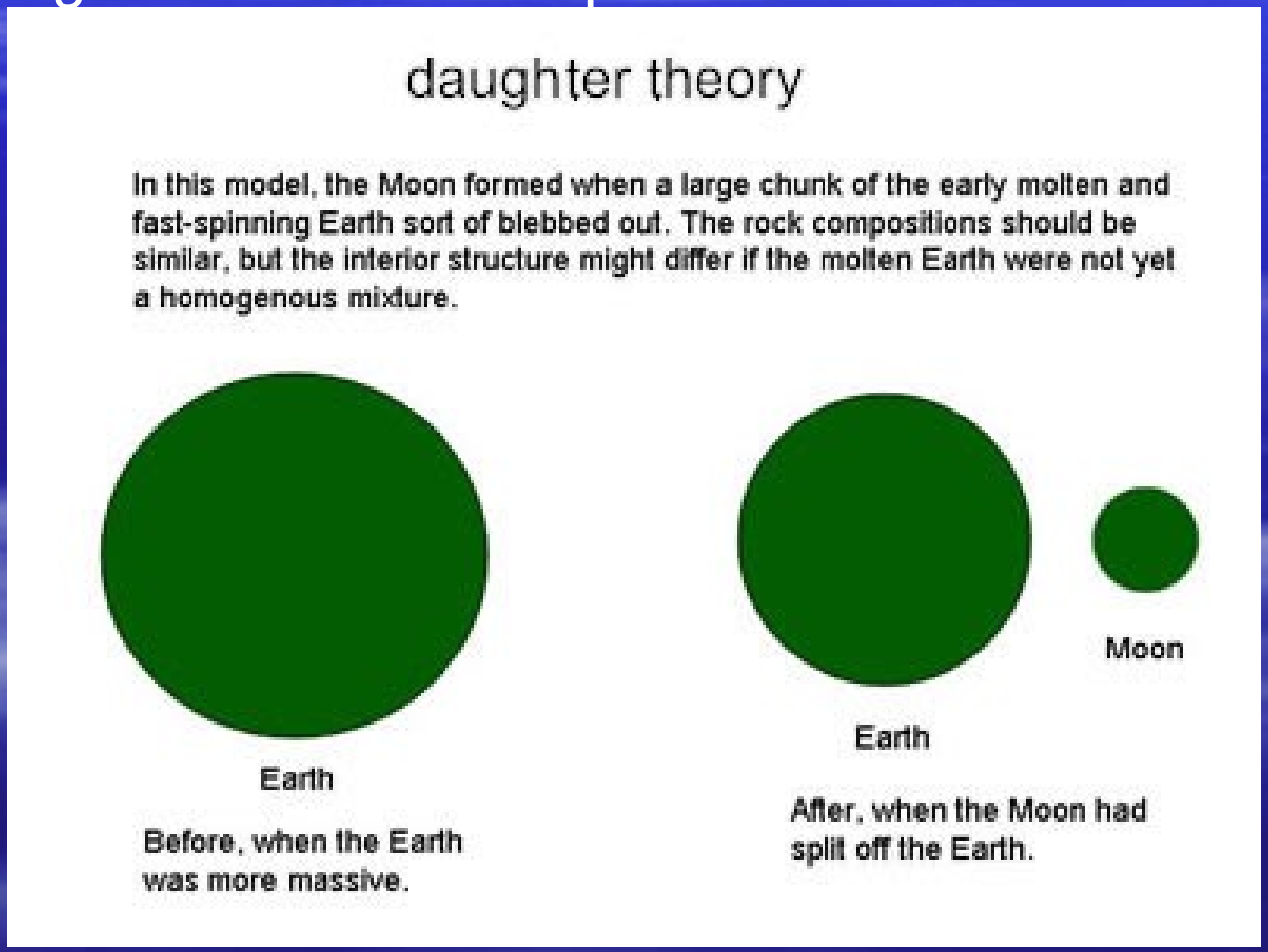
Moon Origins – Sister Theory

- **Sister Theory**: The moon formed separately at about the same time as the Earth



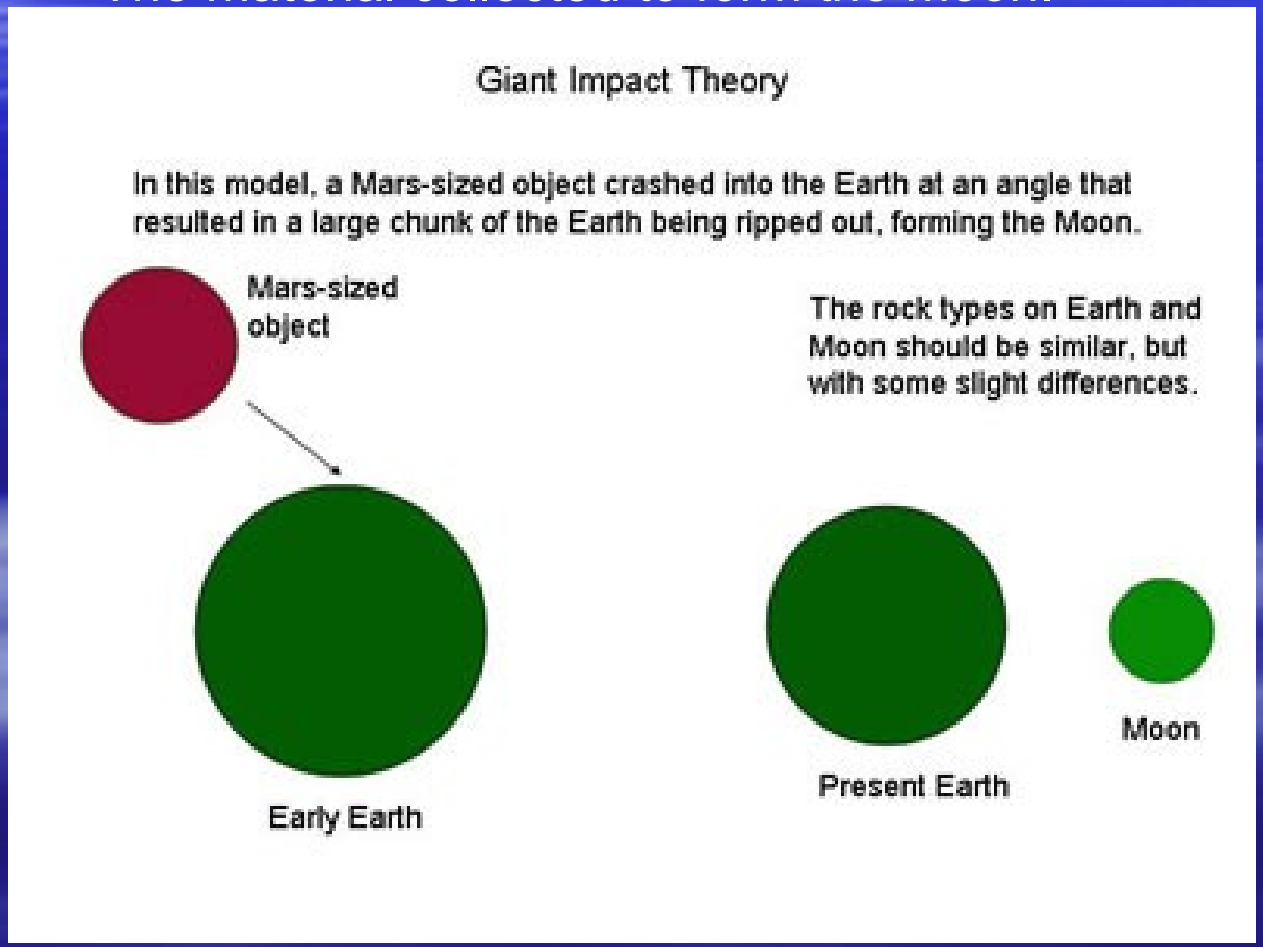
Moon Origins – Daughter Theory

- **Daughter theory**: During formation of the Earth, the earth spun so fast that the moon was thrown away from the forming Earth and developed into the moon



Moon Origins – Collision Theory

- **Collision Theory**: This is the theory that best fits the evidence, when the Earth was very young and consisted of molten rock, a collision with an object about the size of Mars occurred and flung material into orbit. The material collected to form the moon.



Most widely believed of the 4 theories