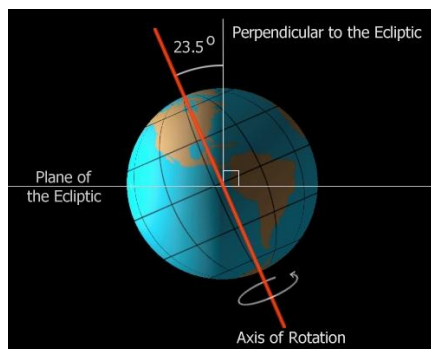


# Physical Science

## Chapter 22 The Earth in Space

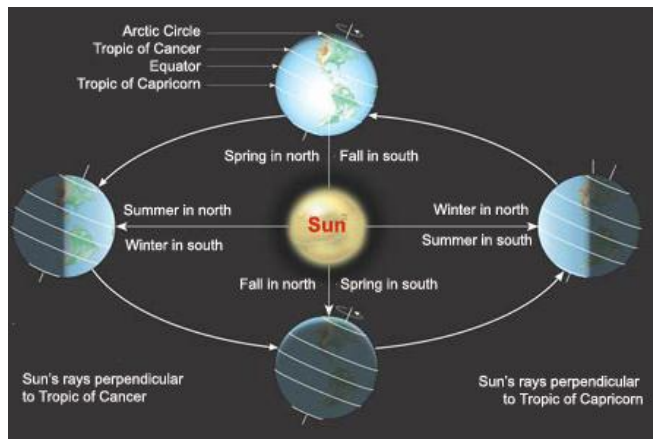
### Earth's Rotation

- **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 – 1 24 hour day and night cycle



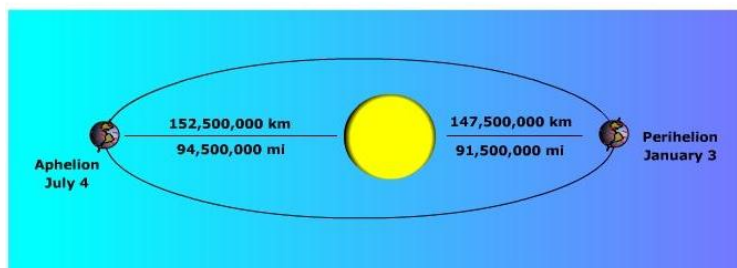
# Earth's Revolution

- **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)

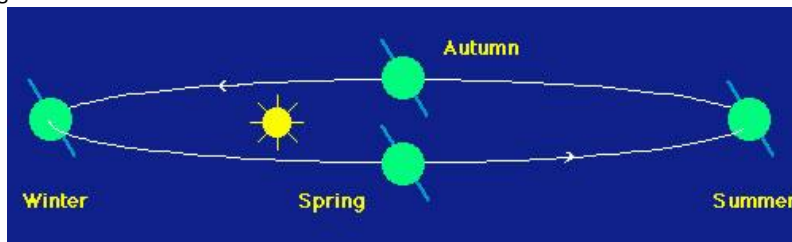


**Apogee** – that point in the Earth elliptical orbit where the Earth & Sun are farthest apart

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

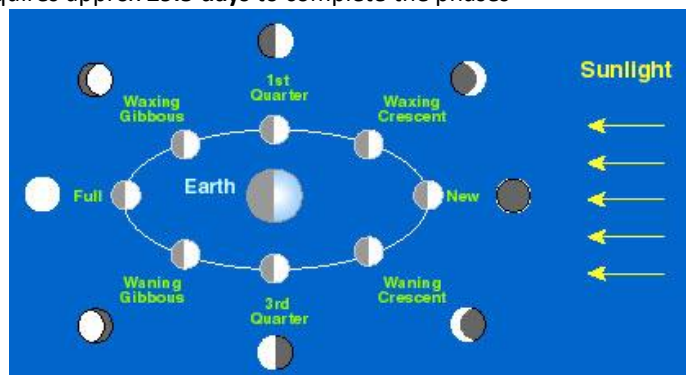
# Seasons

- 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 Southern 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.



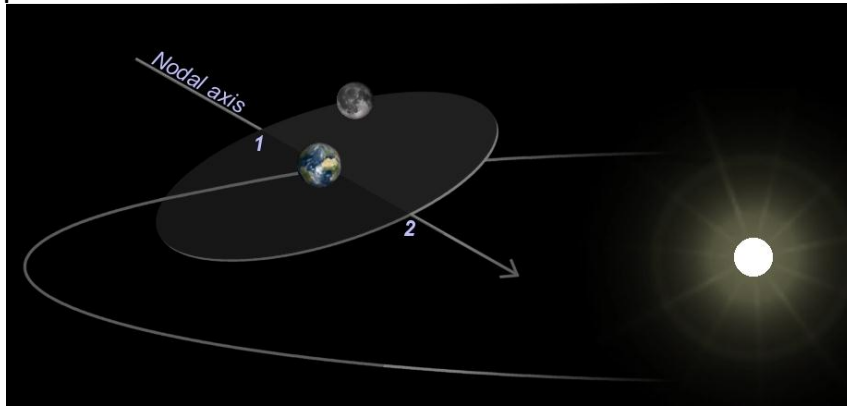
## Moon Orbits the Earth

- 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



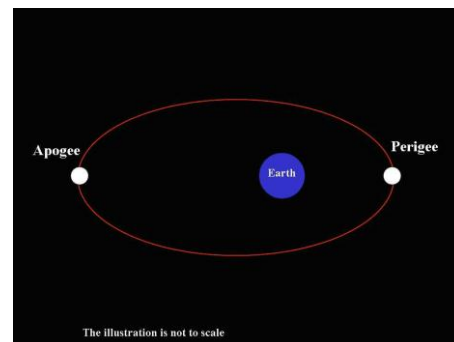
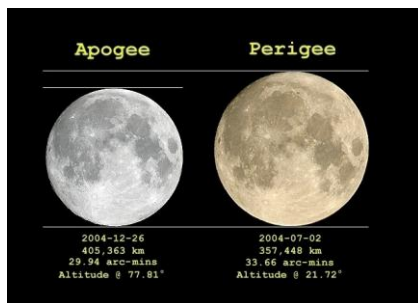
## Lunar Orbit around the Earth

- Earth's Moon: on average it is **250,000 miles** away
- Mass is **1/6** that of the Earth
- Moon's orbit is tilted at approx **5 degrees** above the plane that the Earth orbits the sun.



## Lunar Orbit around the Earth

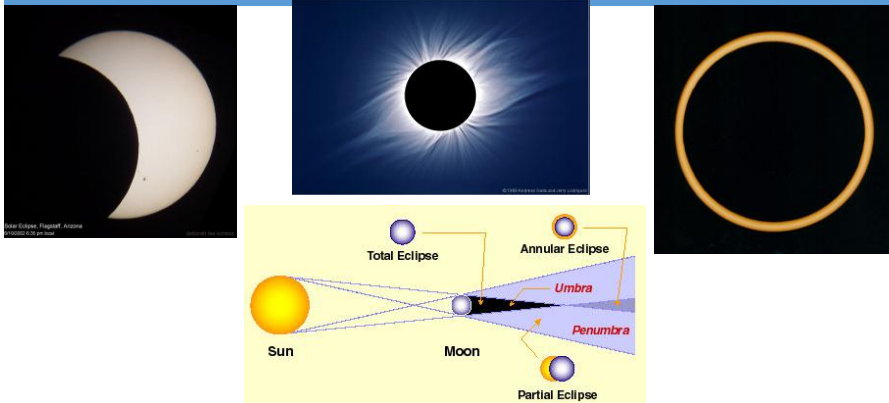
- Apogee & Perigee – results in visible difference in size of the moon in our night sky.



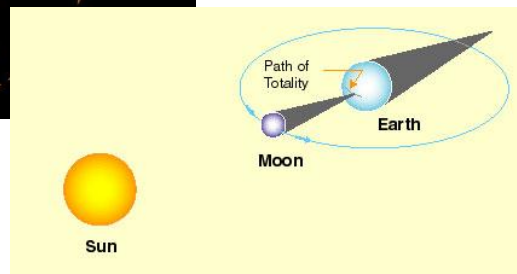
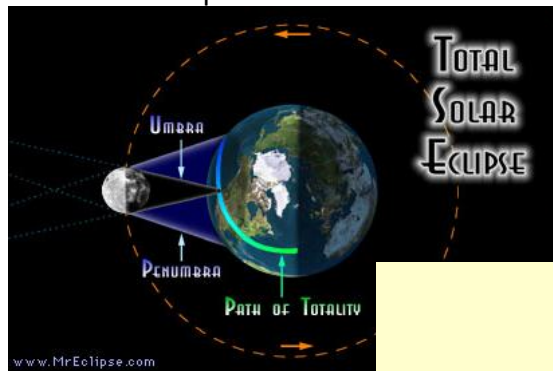
## Solar Eclipses – 3 Types

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

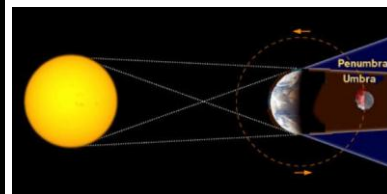
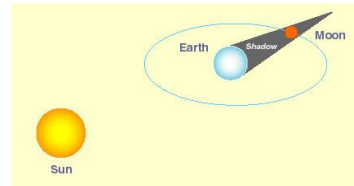


## Solar Eclipse – Path of Totality



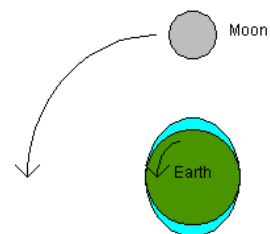
## Lunar Eclipse

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



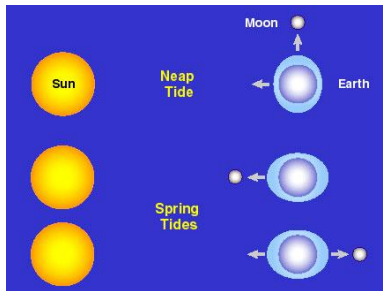
## Daily High & Low Tides

- 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 closest to and farthest from the Earth are low tide areas of the Earth.
- Usually two high tides and two low tides each day

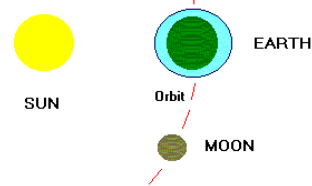


## Spring & Neap Tides

- **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
- **ii. 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



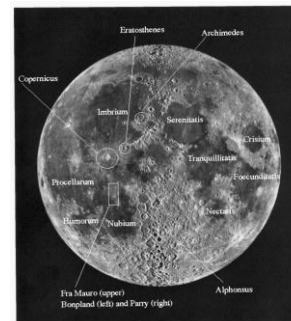
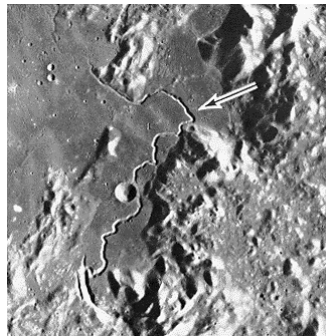
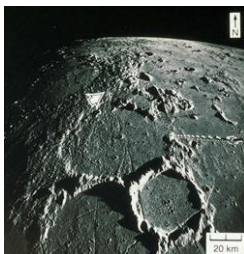
2. The bulge is large when the Moon and Sun are in line - this is a 'spring' tide



3. The bulge is at its smallest when the Moon is along the line of the Earth's orbit around the Sun - this is a 'neap' tide

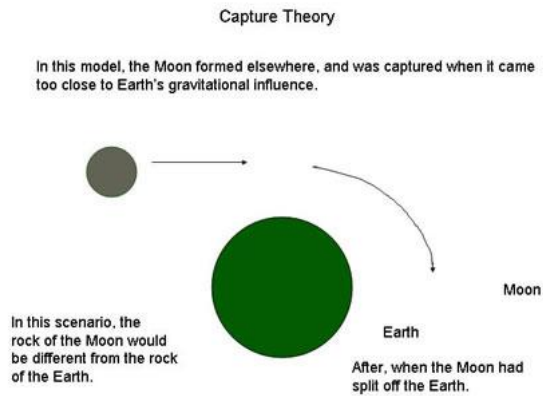
## Features of the Moon

- **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



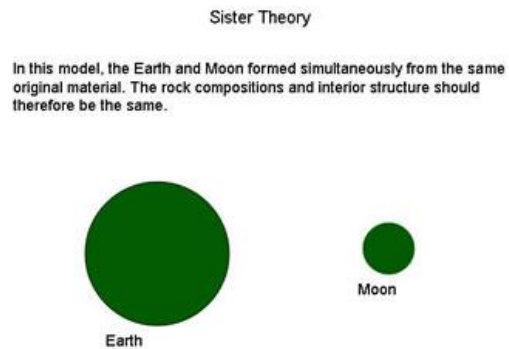
## Moon Origins – Capture Theory

- **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



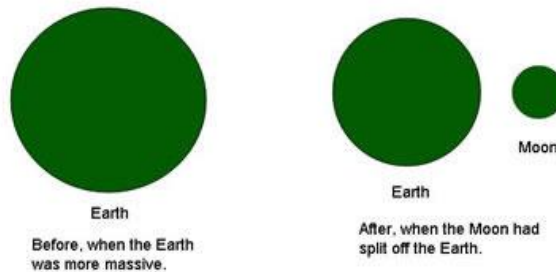


## Moon Origins – Daughter Theory

- **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

### daughter theory

In this model, the Moon formed when a large chunk of the early molten and fast-spinning Earth sort of bled off. The rock compositions should be similar, but the interior structure might differ if the molten Earth were not yet a homogenous mixture.

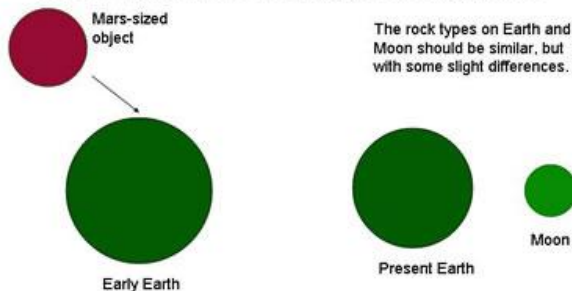


## Moon Origins – Collision Theory

- **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.

### Giant Impact Theory

In this model, a Mars-sized object crashed into the Earth at an angle that resulted in a large chunk of the Earth being ripped out, forming the Moon.



Most widely believed of the 4 theories

I'm done.... Are you?