ASTRONOMY NOTES

FORMATION OF THE UNIVERSE:

_____ is the most widely accepted theory explaining the formation of the universe.

- All matter and energy was concentrated in an extremely _____.
- About _____ billion years ago, a _____ occurred.
- Matter and energy were propelled outward and the universe began to _____. It is still _____ today.

HOW DO WE KNOW THIS?

- _____ was measured and it was NOT at zero degrees Kelvin (also known as absolute zero).
- _____ detected and is thought to be the leftover energy from the big bang
    - (scientist received 2006 Nobel Prize in Physics)
- _____ – mostly hydrogen with a smaller amount of helium.

The _____ is the major energy source for weather changes in the atmosphere and most of all life that exists on Earth – starting with photosynthesis by plants. The sun's energy reaches Earth in forms of energy known as the _____. Some of these are filtered out by the atmosphere, but most reach Earth.

The _____ is the major energy source for weather changes in the atmosphere and most of all life that exists on Earth – starting with _____ by plants.

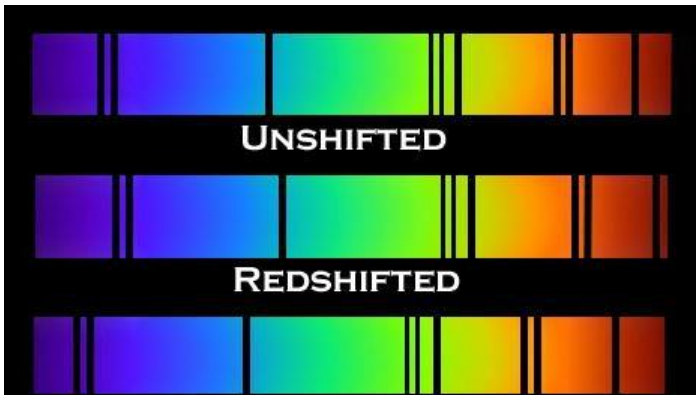
The sun's energy reaches Earth in forms of energy known as the _____. Some of these waves are filtered out by the atmosphere, but most reach Earth.

MOVING OBJECTS IN SPACE

_____ is the shift in the wavelength of light moving toward or away from an observer.

On Earth, we *hear* this through the change in pitch for sirens or oncoming trains.

In space, we SEE this difference as a _____ in the spectrum of light given off by that object as seen through an instrument known as a _____.



Sketch a light wave from a blue shift. Add labels.

Sketch a light wave from a red shift. Add labels.

The spectrum of an object gives clues about the object's motion.

- If the object is moving _____from the observer, the _____ _____ and is seen as a slight move to the red end of the spectrum. This is known as a _____ .
- If the object is moving _____ the observer, the _____ _____ and is seen as a slight move to the blue end of the spectrum. This is known as a _____.

HUBBLE'S LAW & ISAAC NEWTON:

Edwin Hubble analyzed the data and noticed that the galaxies that were the _____ from Earth were moving the _____.

What does this mean? It means the universe is _____.

This is known as _____.

_____ – one of the most highly regarded scientists of the late 1600's. Famous for his laws of motion and … _____

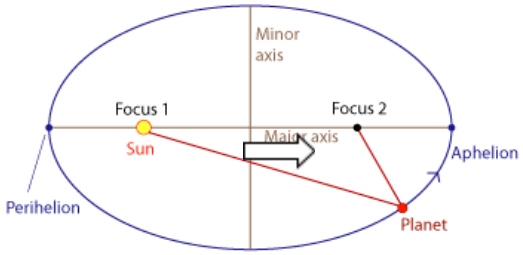
which states that every point with mass in the universe is attracted to every other point with mass. The level of attraction is dependent on the size of the objects and the distance between them.

This force of attraction is known as _____.

A famous astronomer, Johannes Kepler, formulated 3 laws that described planetary motion:

_____

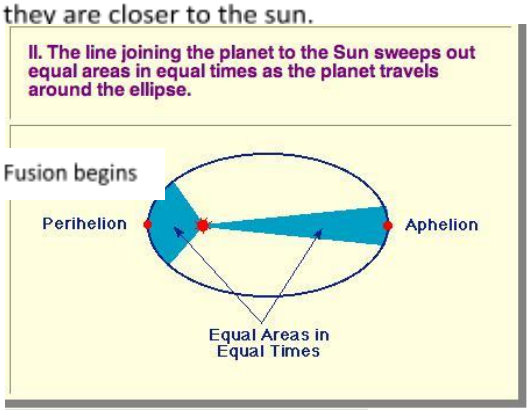
____ planets move around the sun in an elliptical orbit and the sun is at one focus.



An elliptical orbit of a planet
(greatly exaggerated)

_____

___ work together to state that planets move slower when they are farther from the sun and faster when they are closer to the sun.



FORMATION OF THE SOLAR SYSTEM

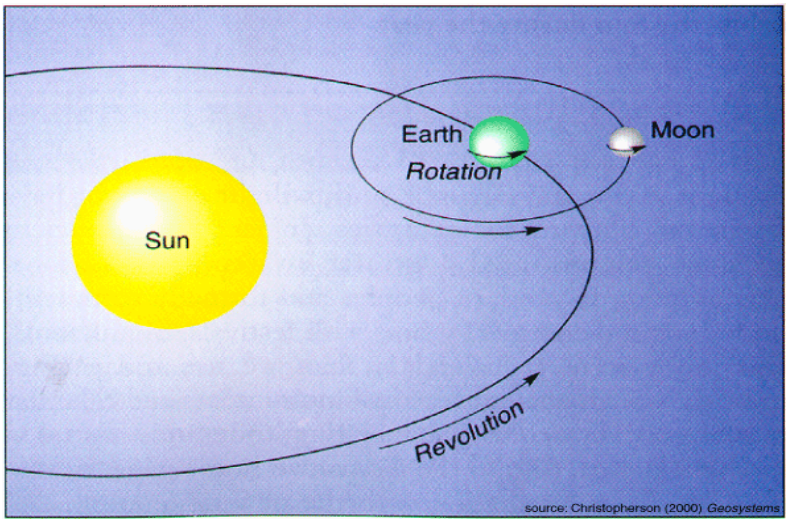
Our solar system includes the _____ and the _____ the sun.

In 1796, a Frenchman named _____ proposed his _____, which says that the sun and the planets all came from the same _____. The entire solar system all formed at the same time. This is known as the _____.

EARTH AND ITS MOTIONS:

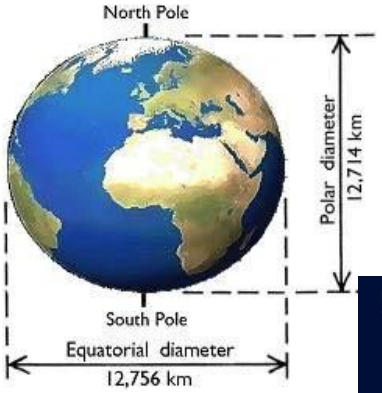
Ancient Greeks believed in a _____ view of the solar system, which states that _____ is at the center. At the beginning of the 16th century, a scientist named _____ proposed the shocking idea that the _____ was at the center.

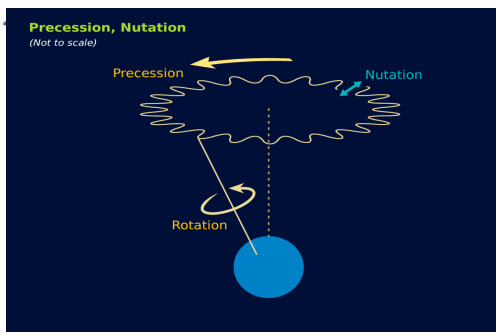
This view is known as the _____ solar system.



Earth moves in two basic ways:

1. _____
   - Earth spinning on its axis
   - Takes just under 24 hrs to complete
2. _____
   - Earth moving around the Sun
   - Takes just over 365 days to complete
   - _____ – point at which Earth is closest to the Sun (Jan 3rd)
   - _____ – point at which Earth is farthest away from the Sun (July 4th)





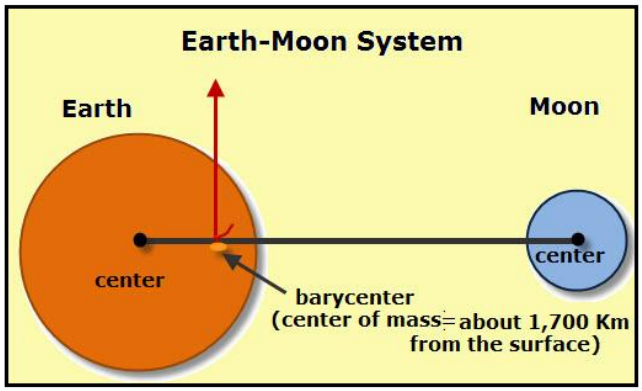
Earth is NOT a perfect sphere. It is an _____ – slightly wider across the equator (due to its rotational spin)

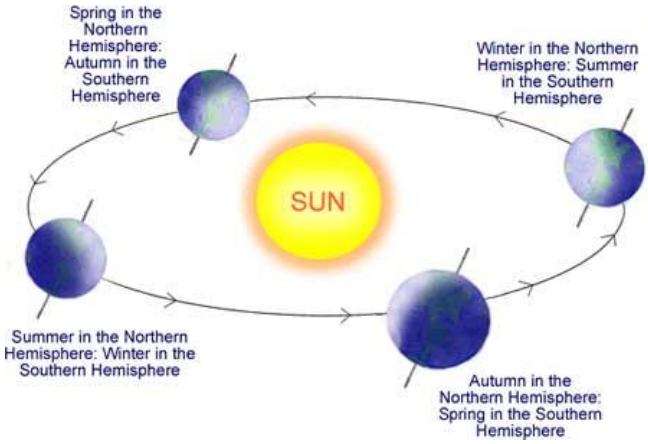
Earth's axis is not stable. It moves/wobbles (like a top). This is known as _____. It's very slow - 26,000 years to complete one cycle.

Within the precession are additional motions known as _____. These are smaller motions back and forth as the precession occurs.

What Is A Barycenter??

In the case of Earth and the Sun, both bodies orbit around the "center of mass" between them. This point is called the _____. There is also a barycenter within the solar system. The Sun does not remain stationary, but it also revolves around the solar system's barycenter.





<u>The Reason for the Seasons</u>

The Sun's rays hit Earth differently at different times throughout the year. This is because of the tilt of Earth on its axis and results in the seasons of summer, fall, winter and spring.
Tilted _____ the sun = _____ (longer periods of daylight). Tilted _____ from the sun = _____

_____: Point when daylight is at its extreme

- Summer Solstice – Daylight is at its _____
- Winter Solstice – Daylight is at its _____

_____: Point when daylight is equal to darkness

- Spring Equinox (vernal)
- Fall Equinox (autumnal)

<u>EARTH'S MOON:</u>

Development of the Moon:

The _____ suggests the moon's origins.

- Suggests the moon formed when a large object (size of _____) crashed into Earth early in its formation.
- _____ thrown off eventually came together to form _____.
- The moon has stayed the same for approximately _____.

Three Motions of the Moon:

1. _____ - every 27.3 days
2. _____

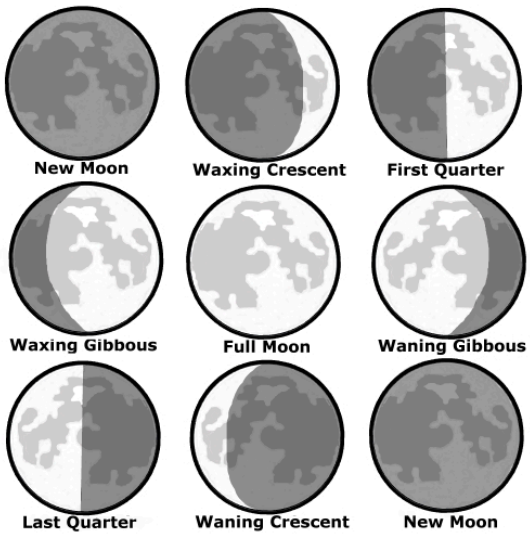
3. _____

- The moon _____ in the same time it takes to _____

around Earth. This means we only see about _____**%** of the moon.

- The moon does not give off its own light, it merely _____.
- As the moon revolves around Earth, different parts of the lit side of the moon are seen. The _____ of the visible portion changes and we call these changing shapes _____.

As the illumination gets greater and greater, we say the moon is _____. As it gets less and less, we say it is _____.

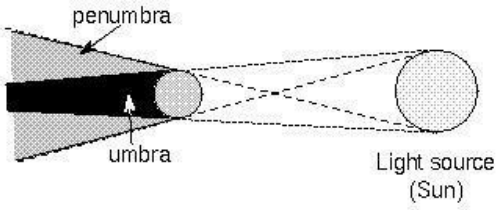


<u>Eclipses:</u>

Eclipse – _____

Two Types of Shadows:

1. _____: Total or complete shadow
2. _____: Partial shadow



<u>Solar Eclipse</u>

Occurs when the _____ is between the _____ and the _____.

- Always occurs during a _____.
- Visible by only one small area on Earth
- Moon is covering up the sun.

_____ solar eclipse – seen by people within the _____

- _____ solar eclipse – seen by people within the _____

- Total solar eclipse never lasts more than _____ due to the speed of the _____.

Create a LABELED sketch of a solar eclipse that shows the position of Earth, the moon, & the sun. Be sure to draw in the shadows (iumbra & penumbra).

Lunar Eclipse

Occur when the _____ is between the moon and the _____.

- Always occurs during a _____.
- Lunar and solar eclipses occur with approximately _____ frequency.
- However, people see the _____ eclipse more because _____

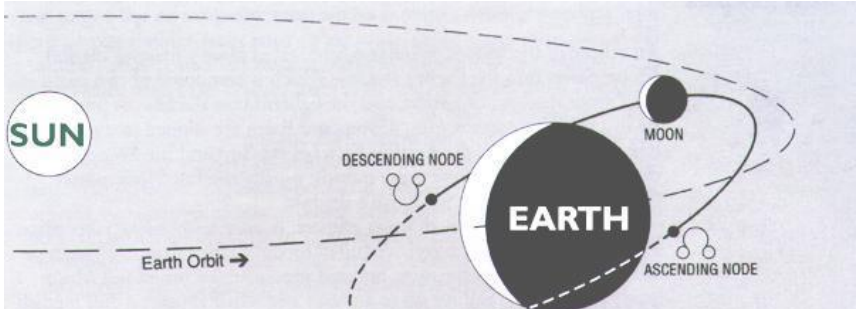
_____.

Create a LABELED sketch of a lunar eclipse that shows the position of Earth, the moon, & the sun. Be sure to draw in the shadows (iumbra & penumbra).

Why don't eclipses happen every month?

_____

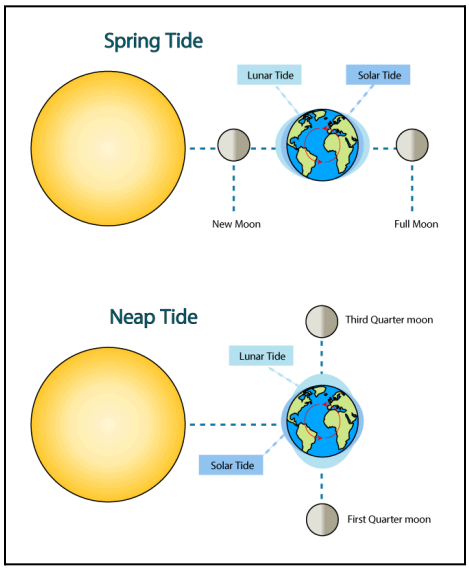
- Usually, the _____ is off.



THE MOON & TIDES

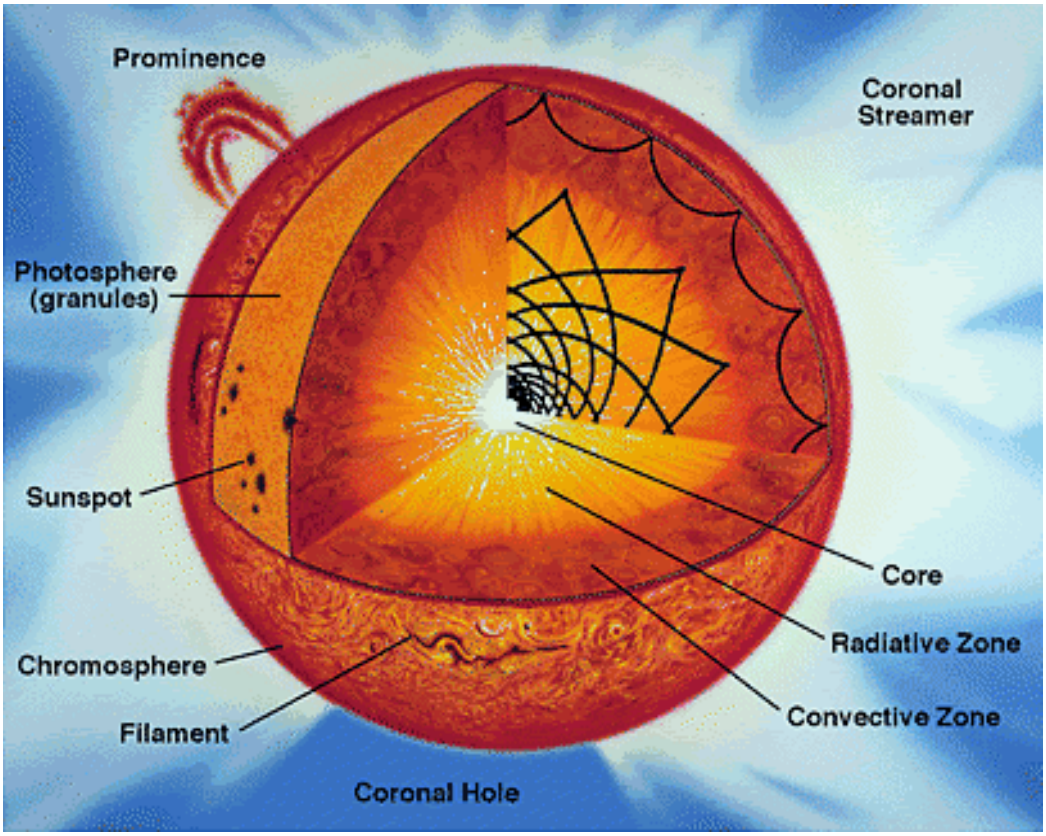
The moon plays a large role in ocean tides. The _____ of the moon causes ocean water to accumulate more on one side of Earth, resulting in a _____.
When the sun and moon are in alignment (_____ moon phases), the pull of water is even greater and results in a special tide known as a _____.

When the sun and moon are at right angles to each other (_____ moon phases), the pull of water is less and is known as a _____.



WHAT ABOUT OUR SUN?

Our sun is just one of billions of stars in the _____ galaxy. It is the closest to us and the only one we can study in great detail. By analyzing its spectral lines, scientists at NASA have determined that it is _____ hydrogen and almost _____ helium.



3 BASIC REGIONS OF THE SUN

1. _____ - at the center, 10% of total, entirely plasma (27 million ˚C)
    - _____ - 92% of the sun is hydrogen and this combines together (fuse) to form helium.
    - H (1 proton) + H (1 proton) → He (2 protons)
    - _____ is given off and this causes the sun to _____.
2. _____ - energy produced in the core through 2 inner zones
3. _____ - includes the outermost layer known as the _____.
    - ❀ Prevents most of sun's atomic particles from escaping
    - ❀ Some particles DO escape = _____
    - ❀ This layer seen only during _____

SURFACE FEATURES OF THE SUN:

_____ – dark area on the surface of the sun

- dark color because it's _____ than surrounding area

- The number of sunspots varies every _____ years. This is known as the _____.

_____– clouds of glowing gases form huge arches

- jump from one _____ to another

_____ – violent eruption of electrically charged particles

- sometimes the particles reach Earth's atmosphere and produce _____ (Northern and Southern Lights.)