

## Unit 10 Formative Assessment – Astronomy

### The Universe:

1. Indicate the age of the Universe: 13.7 Billion Years Old

The age of the Earth: 4.6 Billion Years Old

2. Identify *two (2)* pieces of evidence that support the Big Bang Theory:

A: **Cosmic Background Radiation** – *Low temperature waves detected as it moves through the vacuum of space suggesting that the original wave must have begun from a cosmic explosion.*

B: **Gravity** – *Responsible for allowing hot gas and dust particles to “clump” together in a process called accretion to form early galaxies, solar systems, stars, planets, and moons.*

3. The Nebular Hypothesis deals directly with the formation of:

→ **Nebular Hypothesis** = Formation of *Solar Systems (Stars & Planets)*

→ **Big Bang Theory** = Formation of *Universe*

4. Put a checkmark next to each Terrestrial Planets that were formed in the same manner as the Earth.

**Mercury**

Neptune

**Venus**

Saturn

**Mars**

Jupiter

Uranus

5. Place the following in order of SIZE in our universe. Begin by labeling largest with a 1.

- 3 Solar System
- 1 Universe
- 2 Milky Way
- 4 Earth

6. What does a *red shift* in the light of distant galaxies suggest about the universe?

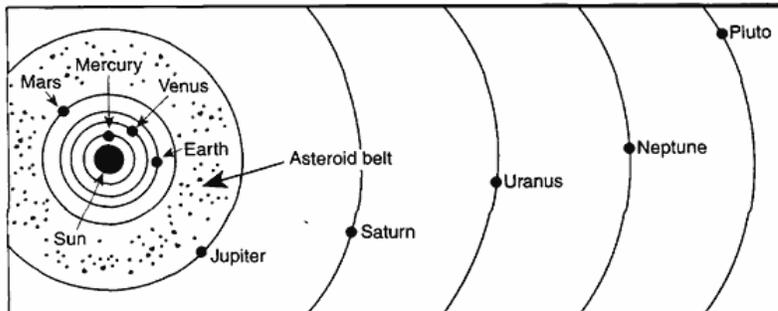
**A red shift suggests that the universe is *EXPANDING***

**Motions & Solar System:**

7. The force between the Earth and moon that is responsible for the tides is

- a. **Gravity**
- b. Current
- c. Electromagnetic Radiation
- d. Precession

8. The actual orbit of the planets in our solar system is:



( Not drawn to scale )

- a. Elliptical with the earth at one foci
- b. **Elliptical with the sun at one foci**
- c. Circular with the sun at the center
- d. Circular with the earth at the center

9. Mercury is farthest from the Sun at a point called the

- a. **Aphelion**
- b. Perihelion
- c. Nutation
- d. Barycenter

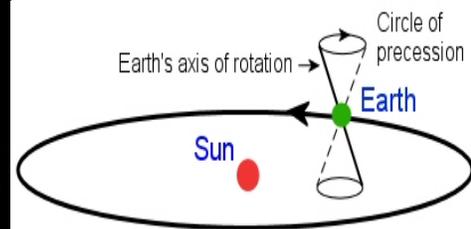
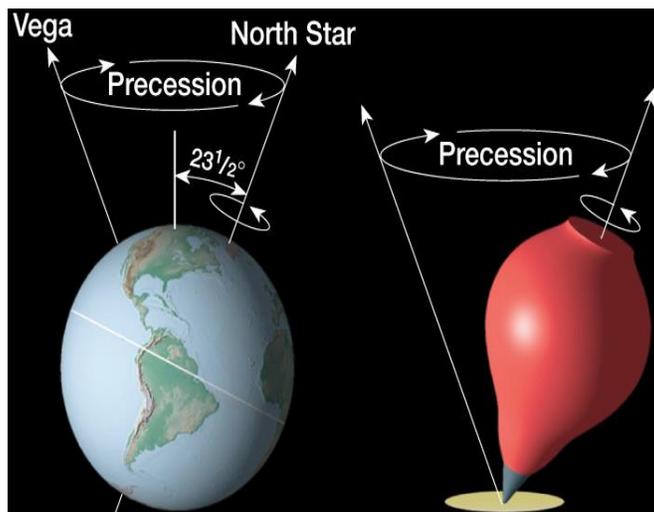
10. If the tilt of the Earth's axis is decreased from  $23.5^\circ$  to  $5.5^\circ$ , what would happen to Raleigh's summer temperatures?
- They would increase dramatically
  - They would decrease dramatically**
  - The annual seasonal fluctuation would be smaller
  - The annual seasonal fluctuation would be larger

→ **At  $23.5^\circ$ , summer in northern hemisphere & winter in southern hemisphere**

→ **At  $5.5^\circ$ , both northern and southern hemispheres will get about the same summer temperatures due to very small tilt in axis that will point farther away from Sun, and therefore receiving *less* solar energy.**

11. Illustrate AND describe each of the following:

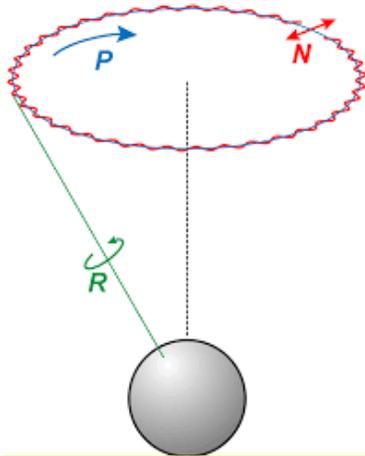
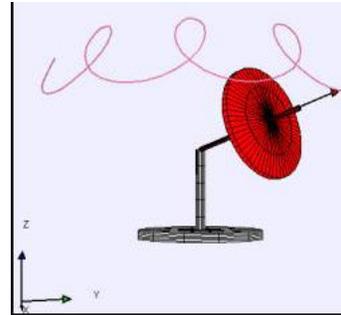
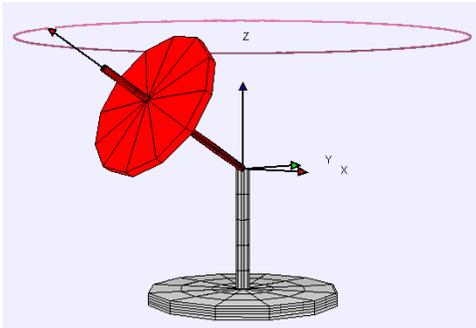
**Precession**



As the earth orbits the sun, it also slowly wobbles. When viewed from above, the earth's orbit is counterclockwise but the direction of precession is clockwise.

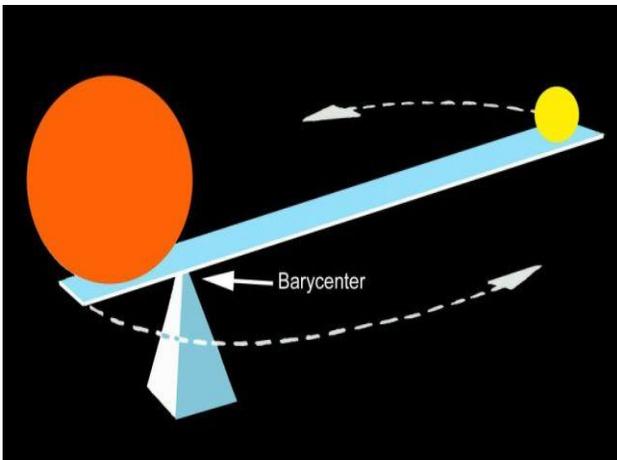
**Slow and continuous rotation of Earth's axis as Earth rotates, acting to change direction of axis - ~26,000 year cycle**

## Nutation



**Wobbling or swaying motion of Earth's rotational axis DURING precession**

## Barycenter



**Center of mass between two objects as they orbit one another and balance each other**

12. What change would occur if the revolution time of Mars increased?

- a. **The Martian year would be longer**
- b. The Martian day would be longer
- c. The Martian day and year would be the same
- d. There would be no difference in the time of a day or year

13. The notion that the Sun is at the center of our solar system, and all other planets revolve around it is

based on the **Heliocentric** model.

14. The age of the solar system: **4.6 Billion Years (About same age as Earth)**

### The Sun (Stars):

15. The Sun's source of energy is

- a. **Nuclear fusion**
- b. Nuclear fission
- c. Photosynthesis
- d. Chemical burning

→ **Nuclear Fusion = Hydrogen atoms combine to produce single Helium atom**

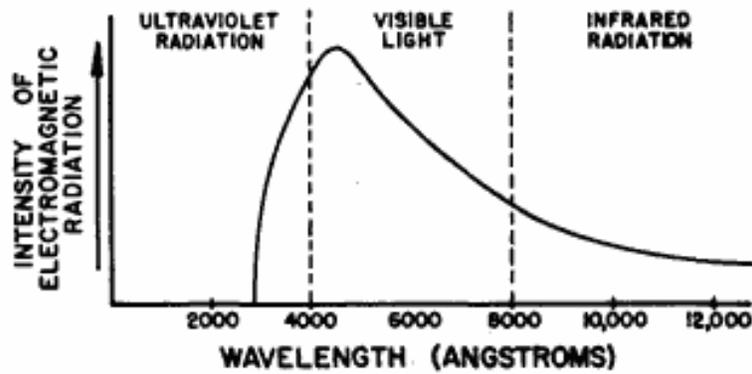
16. Energy is transferred from the sun to the Earth through

- a. **Electromagnetic waves (radiation)**
- b. Red shifts
- c. Density currents
- d. Molecular collisions

- \* **Radio Waves**
- \* **Gamma Rays**
- \* **Ultraviolet**
- \* **Infrared**
- \* **Visible Light**
- \* **Microwaves**
- \* **X-Rays**

17. List three (3) ways in which Earth is protected from Sun's radiation:

- A: Magnetosphere**
- B: Earth's Atmosphere**
- C: Stratospheric Ozone Layer**



18. What statement is best supported by the graph above?

- a. **Maximum intensity of radiation given off is in the visible spectrum**
- b. Maximum intensity of radiation given off is in the infrared spectrum
- c. Maximum intensity of radiation given off is in the ultraviolet spectrum
- d. Maximum intensity of radiation is the same despite wavelength range

19. Which of the following forms of solar radiation are completely blocked from reaching the Earth's surface?

- a. **X-rays**
- b. Ultraviolet Light
- c. Radio Waves
- d. Microwaves

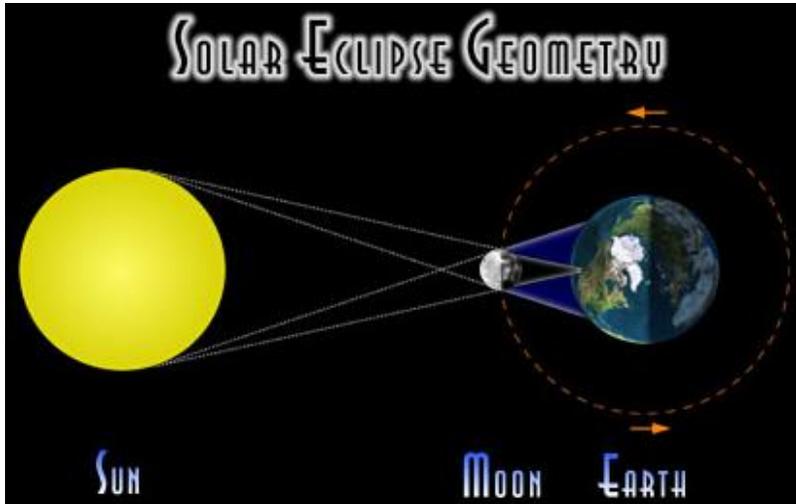
**X-rays have very short wave lengths (high frequency) and therefore will not reach Earth's surface.**

### Earth & Moon:

20. Which of the following best describes Earth's shape?

- a. **Sphere with a slight bulge along the equator**
- b. Sphere with a bulge in the Northern Hemisphere
- c. Ellipse with a slight bulge along the prime meridian
- d. Ellipse with a bulge near the poles

21. Describe AND diagram a solar eclipse.

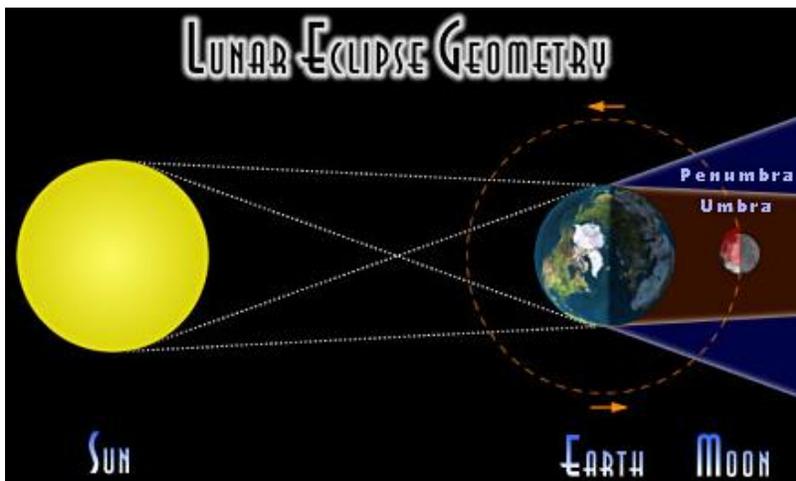


\* When Moon casts a shadow on Earth, causing Sun to go dark (blocked view)

\* Moon comes between Sun and Earth

\* Typical during New Moon phases

22. Describe AND diagram a lunar eclipse.



\* When Earth casts a shadow on Moon, causing Moon to go dark (blocked view)

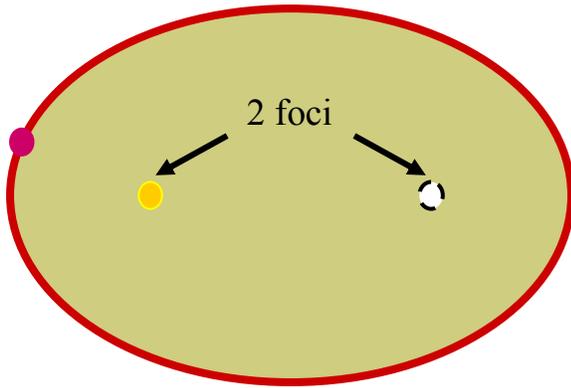
\* Earth comes between Sun and Moon

\* Typical during Full Moon phases

23. The **moon** has the greatest impact on Earth's ocean tides because it is **closer** (*closer/farther*) to Earth than the Sun.

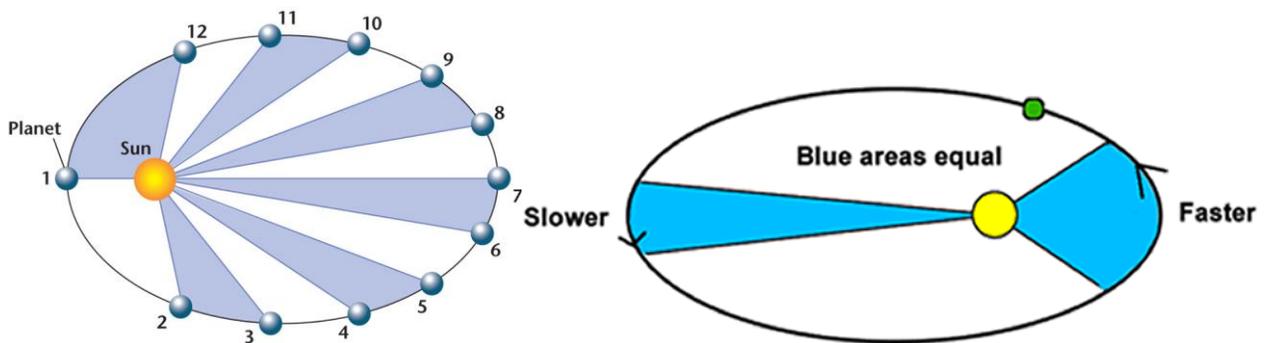
**Kepler's Laws:**

24. Describe AND diagram Kepler's 1<sup>st</sup> Law of Planetary Motion.



**\* Orbit of every planet is an *ELLIPSE* with Sun at one focus and nothing at the other focus**

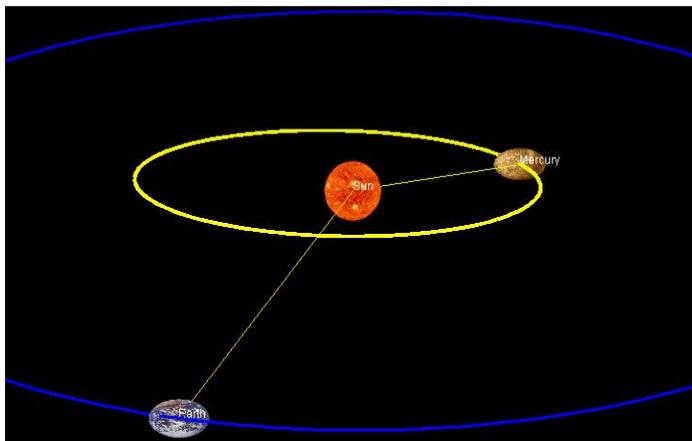
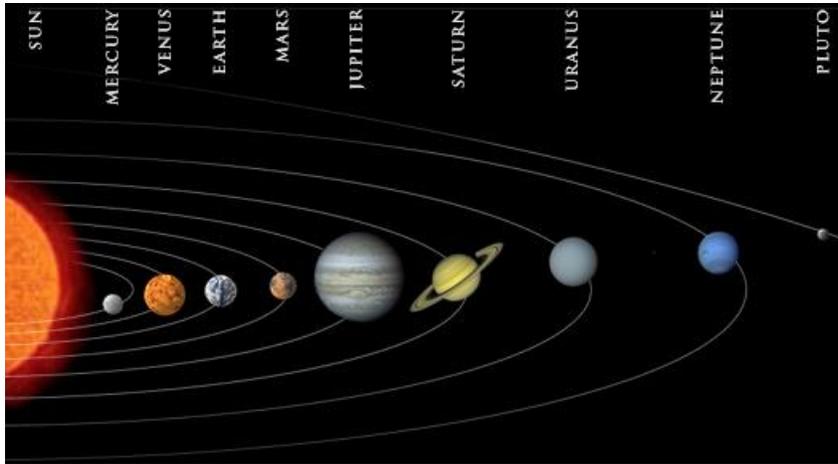
25. Describe AND diagram Kepler's 2<sup>nd</sup> Law of Planetary Motion.



**\* A: Planet moves *fastest* in its orbit when *closest* to Sun (Perihelion) & vice versa**

**\* B: Equal *areas* of space are swept out in equal amount of *time***

26. Describe AND diagram Kepler's 3<sup>rd</sup> Law of Planetary Motion.



- \* A planet's period (time) of revolution is related to its distance from Sun
- \* Farther from Sun = Longer revolution period
- \* Also known as the *Harmonic Law of Planetary Motion*