

Astronomy Final Review Mrs. Cohn

Name: _____

Block: _____

Know the following Vocabulary: Use your text book chapters 1-10

Background Radiation: - Low Energy / Low Temp microwave energy ^{left over} from the Big Bang

Doppler Effect: Shifting of wavelengths (short or long) as objects move toward or away.

Redshift: - when ^{always happens} wavelengths become stretched as an object moves away.

Blueshift: - shifted to blue end of spectrum / shorter wavelengths / moving closer.

Galaxy: Collection of billions of stars.

Big Bang: The theory of how the universe was created; everything started from one ^{small point} ~~everything~~

Universe: ~~everything~~

Nebula: Cloud of dust and gas.

Main Sequence Star: 90% of a star's life, where fusion and gravity are in balance.

Red Giant/Red Supergiant: End of a star's life after a main sequence star expands

Supernova: explosion from collapse of a supermassive star.

White Dwarf: left over core from an average star / dying star.

Neutron Star: End of a massive star's life (entirely made of neutrons!)

Black Hole: Continued collapse inward after an implosion in a massive star.

Nuclear Fusion: The process of combining lighter elements into heavier elements.

Terrestrial Planets: Land / solid planets - M, V, E, M

Jovian Planets: Gas giants - J, S, U, N

Eccentricity: how numerically stretched out an orbit is (0 - 1) ^{least} _{most}

Ellipse: an oval / ~~circle~~

Focus point/Foci (plural): one is the star a planet is orbiting around, another is a random point in space.

Aphelion: Earth is furthest from the sun (summer).

Perihelion: Earth is closest to the sun (winter, w.H.).

Apogee: moon is furthest from Earth.

Perigee: moon is closest to Earth.

Apparent Diameter: the apparent size of a celestial object as our distance from it changes.

Comet: - gas, ice, dust and originates from the Kuiper belt.

Asteroid: - rocky/metal and originates between Mars + Jupiter

Meteor: - debris from asteroids that enter Earth's atmosphere (shooting stars)

Constellation: grouping of stars to form a character

- Rotation: Time it takes Earth to spin on axis (360°)
- Revolution: Time it takes Earth to move 360° around the Sun
- Spring Tide: The highest of high tides and lowest of low tides (large range).
- Neap Tide: The lowest of high tides and highest of low tides (small range)
- Lunar Eclipse: When the moon revolves into the shadow of the Earth
- Solar Eclipse: When the moon revolves to cast out the sun (blocks)

MAJOR CONCEPTS FROM EACH UNIT:

1.) The theory of how the universe started is referred to as the BIG BANG

- What is the estimated date of the age of universe? 13.7-13.8 billion
- How did temperature change as the universe expanded? temp ↓
- The first atoms were? Hydrogen (H) + Helium (He)
- Left over radiation from the Big Bang is known as? Cosmic Background Radiation
- The age of the solar system (our sun and our planets)? 4.6 billion
- Additional evidence that the universe is expanding, Hubble's law comes from?

Redshift of most stars and galaxy confirm objects are moving away from us

2.) Doppler Effect:

- If a galaxy/star is redshifted, the wavelengths of light become stretched/longer, moving toward the red end of the spectrum. This means an object is moving away.
- If a galaxy/star is blue shifted, the wavelengths of light become compressed/shorter, moving toward the blue end of the spectrum. This means an object is moving toward us/closer.

3.) The Milky Way Galaxy:

- Is what type of Galaxy? Spiral
- How far are we from the center? 2/3rd of the way out / on one of the spiral arms
- What lies at the center? Black hole
- Our sun is orbiting around what? The center of the milky way (black hole)

4.) The Life Cycle of a Star:

- All stars start out as: Nebulas
- Most stars spend 90% of their life cycle in this next stage: Main Sequence
- Depending upon their mass, a star will either expand into a red giant, or a supergiant. During this stage, the stars temperature decreases but its luminosity increases because its size is increases, thus emitting more light.
- Whether a star expands or contracts, depends upon two forces:
 - Gravity (inward)
 - Nuclear Fusion (outward)
- Nuclear fusion is when lighter Hydrogen elements combine under high temperature and pressures to form one heavier element of Helium. A star loses TOTAL mass as this process

→ In main sequence stars.

continues because it takes more hydrogen to create one helium. The fuel of main sequence stars is

- Hydrogen. As a star ages it will become more composed of Helium.
- f. Only high mass stars can fuse elements heavier than Carbon.
 - g. At the end of an average stars life, it will shed it's outer layers, and all that will remain is a condensed core. This star is called a white dwarf, and it is smaller, its temperature is hotter than our sun, however it is less luminous because it is smaller.
 - h. Only supermassive stars will end up as either neutron stars or black holes following a super nova explosion.

5.) H-R classification (pg 15)

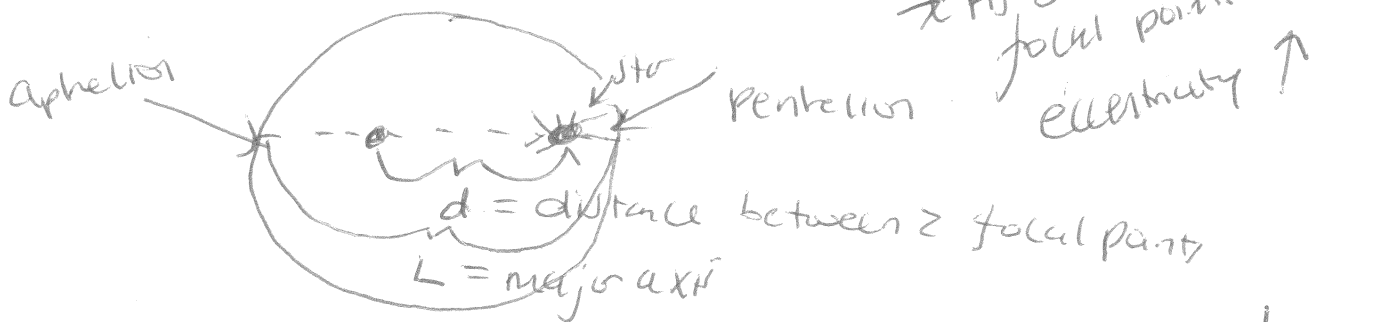
- a. An astronomer can infer the temperature of a star by looking at its color. Red is considered cool and violet/blue very hot.
- b. The temperature of a star does not determine the luminosity, unless it is a main sequence star. Only for main sequence stars does an increase in temperature increase the luminosity.
- c. In general, luminosity is most determined by the size of a star. The super giant stars are the brightest.

6.) **Planetary Models:** Please refer to your Venn Diagram completed in class to compare and contrast both. Be able to identify visuals of each model

- a. Geocentric model: Earth - centered, with circular orbits
- b. Heliocentric model: Sun - centered with elliptical orbits

7.) Planetary Motions:

- a. Keplers 1st law: All planets have elliptic orbits. (0-1)
- b. The formula for eccentricity is: $e = \frac{d}{L}$
- c. Draw an ellipse below. Label the focal points and the major axis.



- d. Kepler's 2nd law: As the distance between an object orbiting the sun increases, its orbital velocity ↓
- e. Kepler's 3rd law: As the distance between an object orbiting the sun increases, its orbital period ↑ (longer) (see reference table pg 15)
- f. Law of Gravity in relation to mass and distance:
 - i. As the mass of objects increase, the gravitational strength ↑ $F_g = (m_1)(m_2)$
 - ii. As the distance between two objects increases, the gravitational strength ↓

$$F_g = \frac{1}{d^2}$$

g. The earth is furthest from the sun during the aphelion. This is when the sun's apparent diameter will look the smallest. The earth is closest to the sun during perihelion, thus the apparent diameter will be largest.

8.) Planetary Data:

a. Terrestrial Planets are:

by IFEWKT mercury, Venus, Earth, Mars
 - smaller, more dense, revolve faster, rotate slower, less self gravity

b. Jovian Planets are:

Jupiter, Saturn, Uranus, Neptune.
 - larger, less dense, revolve slower, rotate faster, more self gravity

9.) Earth's rate of rotation:

Time to spin on axis

$$360^\circ / 24 \text{ hours} = 15^\circ / \text{hr}$$

explains: (Star arcs, night+day, moonrise/moonset, Coriolis effect, Foucault's pendulum)

10.) Earth's rate of revolution:

Time to orbit

$$360^\circ / 365 \text{ days} = 1^\circ / \text{day}$$

explains: The Seasons (with tilt), The Changing of constellations from season to season.

11.) Seasons:

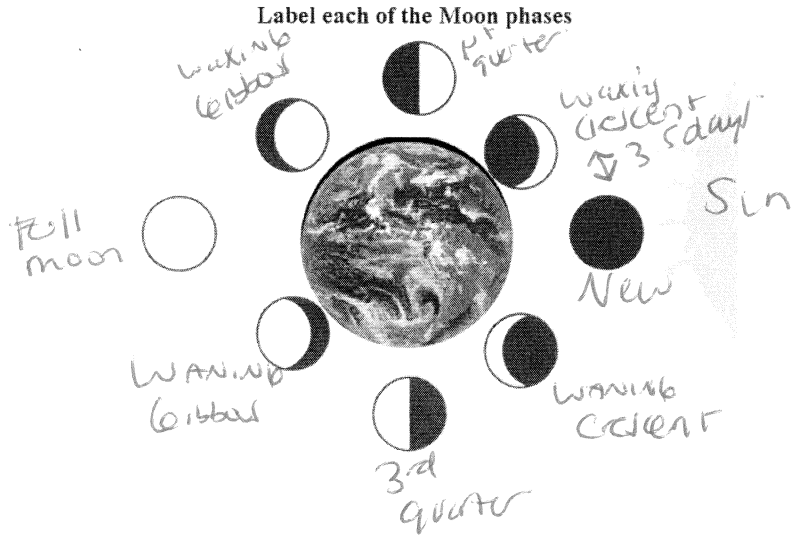
- a. Are caused by the Earth's tilt as we revolve.
- b. Memorize your Brownstein table of seasons review completed in class for June 21, Dec 21, Vernal and autumnal equinoxes.
- c. Have visuals of the celestial spheres for NY, Equator, North and South Poles (all in your notes)
- d. As the angle of insolation increases, the intensity of light ↑
- e. As the angle of insolation increases, the length of a shadow ↓
- f. The angle of insolation increases from Dec 21st until June 21st, and decreases from June 21st back to Dec. 21st. The length of day ↑ from December 21st to June 21st, and ↓ from June 21st to Dec. 21st.
- g. Noon time shadows in NYS will always point: North (but the sun is always South at solar noon)
- h. THERE IS NOTHING IN THE ESRT TO HELP YOU WITH THIS UNIT!

12.) THE MOON:

- a. Phases of the moon are caused due to the Moons revolution around the Earth.

b. There is always 50 % of the moon illuminated, but we can not always see that portion.

c.



- d. A solar eclipse occurs during which phase? New
- e. A lunar eclipse occurs during which phase? Full
- f. How many days does it take the moon to rotate? 27.3 to revolve? 27.3 This causes us to: See the same side of the moon!
- g. How many days does it take to complete one full lunar cycle? 29.5 days (b/c Earth is also revolving around Sun)
- h. Eclipses are rare because the moons orbit is Not in line with the Earth's orbit.
- i. There are 2 high tides and 2 low tides each day. From high tide to the next high tide, or low tide to the next low tide there is approximately 12.5 hours.
- j. High tides always occur where the moon is positioned closest to the Earth and on the opposing side. Low tides always occur at right angles to those positions.
- k. Spring tides occur when the moon is at which two lunar phases? Full + New
- l. Neap tides occur when the moon is at which two lunar phases? 1st + 3rd quarter

