

# Key Points of Understanding for Benchmark Test Review

*This list is to serve as a helpful study aide in highlighting the key points for the benchmark test. It is also advised to use your returned tests and quizzes, notes, textbook and internet resources to supplement your studying.*

*The teacher's class notes are available at <http://feldmannscience.weebly.com>*

## 1. Earth's Cosmic Address

- Order:: Sun-Mercury-Venus-Earth-Mars-\*Asteroid Belt\*-Jupiter-Saturn-Uranus-Neptune
- The Cosmic Address is arranged from smaller to larger:  
Earth -> Solar System -> Milky Way Galaxy -> The Local Group -> The Universe

## 2. Big Bang Theory/Expanding Universe

*9/15 Notes on "How Did the Solar System Form?"*

- Proposes that the universe began as a single point and has been expanding ever since.

## 3. Solar Nebular Hypothesis

*9/15 Notes on "How Did the Solar System Form?"*

- Describes the formation of our Solar System (sun and planets) from a nebula around 4.6 billion years ago.
- The nebula collapsed into a spinning disk, influencing the revolution of our 8 planets move in the same direction. The Sun formed, followed by planetesimals slamming into each other to form our planets.

## 4. Kepler's 3 Laws of Planetary Motion

*9/4 Notes on "Kepler's 3 Laws"*

- Kepler's 1<sup>st</sup> Law – All planetary orbits are elliptical in shape.
- Kepler's 2<sup>nd</sup> Law – (Equal Areas Law) A line joining a planet to its sun sweeps out equal areas in equal times as the planet travels around its orbit. Planets travel faster in the orbits closer to the Sun and slower when far away from the Sun.
- Kepler's 3<sup>rd</sup> Law – (Periods Law) The square of a planet's period equals the cube of the semi-major axis.  $P^2 = d^3$   
The farther away a planet is from the Sun, the longer its period (time to revolve around the sun).

## 5. Fusion vs. Fission, Fusion in the Stars

*9/16 Notes on "The Sun"*

- Fusion – Process in a star's core in which lightweight hydrogen nuclei combine into heavier helium nuclei.
- Fission – Process in which heavy atomic nuclei split into smaller, lighter nuclei.

## 6. Electromagnetic Waves/Radiation

*9/17 Notes on "Electromagnetic Spectrum"*

- Electromagnetic radiation is classified by its wavelengths.
- Electromagnetic radiation includes visible light, infrared and ultraviolet radiation, radio waves, microwaves, X rays and gamma rays.

## 7. Earth's 2 Lines of Defense

*9/22 Notes on "Earth's Magnetic Field"*

- First line of defense – Earth's magnetic field.
- Second line of defense – Earth's atmosphere.

## 8. Photosynthesis

*9/23 Notes on "Photosynthesis"*

- Solar energy is transformed into chemical energy through photosynthesis.
- Water + Sunlight + Carbon Dioxide → Oxygen + Glucose

## 9. Differential Heating

10/6 Notes on "Differential Heating & Barycenter"

- Different substances absorb and retain heat at different rates.
- Land (soil, rock, sand) heats fast and cools fast.
- Water heats slowly and cools slowly.

## 10. Earth's Rotation & Tilt

9/29 Notes on "Rotation vs. Revolution"

- The Earth's rotation (spin) is a day.
- The Earth rotates on its axis.
- The Earth's axis has a tilt of 23.5 degrees.

## 11. Earth's Equatorial Bulge

9/29 Notes on "Rotation & Revolution"

- Rotation of the Earth causes an equatorial bulge.

## 12. Earth's Revolution

9/29 Notes on "Rotation & Revolution"

- The Earth's revolution (orbit) is a year.
- The Earth revolves around the Sun.

## 13. Reasons for the Seasons-Equinox and Solstice

10/1 Notes on "Earth & The Seasons"

- Seasons the Earth are due to both the tilt of the Earth and its revolution around the Sun.
- Northern and Southern hemispheres experience opposite climates
- The Equinoxes and Solstices mark the start of each of the four seasons:
- Equinox happens twice a year with 12 hours of daylight and 12 hours of night (Vernal & Autumnal Equinox).
- Solstice happens when the Sun reaches its highest point in the sky (Summer Solstice) with greatest amount of daylight and its lowest point in the sky (Winter Solstice) with least amount of daylight.

## 14. Precession

10/3 Notes on "Rotating Earth"

- Precession is the slow, top-like wobbling of the spinning Earth.
- Precession is caused by the equatorial bulge of the Earth.
- Precession changes direction of axis, does not affect the seasons, influences constellations at the pole.

## 15. Nutation

10/3 Notes on "Rotating Earth"

- Nutation is a small nod-like movement on the Precession circle.
- Nutation is caused by the gravitational pull by the moon and Sun.
- Nutation changes the tilt of the axis by  $\frac{1}{2}$  degree and therefore has some effect on the seasons

## 16. Barycenter

10/6 Notes on "Differential Heating & Barycenter"

- The barycenter is the point in space around which two objects orbit and can vary slightly in its location.
- The Sun orbits the solar system's barycenter because of the planets' tug (gravitational pull) on the Sun.

## 17. Tides

10/14 Notes on "Water on the Move-Tides"

- Tides are due to both the Moon and the Sun's gravitational pull. The Moon influences the tides more than the Sun due to being close in distance to the Earth.
- Spring Tides = Greatest Tidal Range, High high tides and super low low tides. Occurs during a New and Full Moon
- Neap Tides = Smallest Tidal Range, Low high tides and low low tides. Occurs during 1<sup>st</sup> and 3<sup>rd</sup> quarter Moons