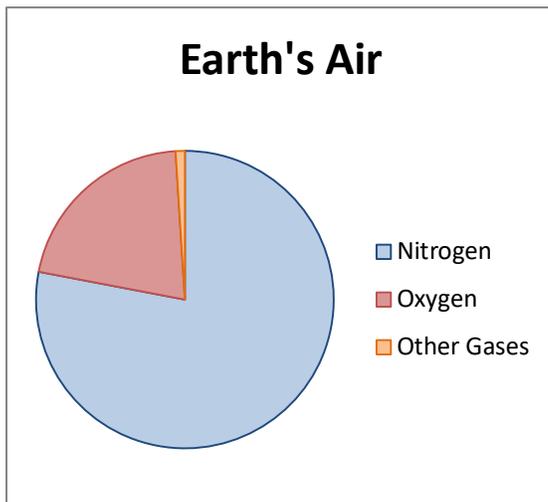
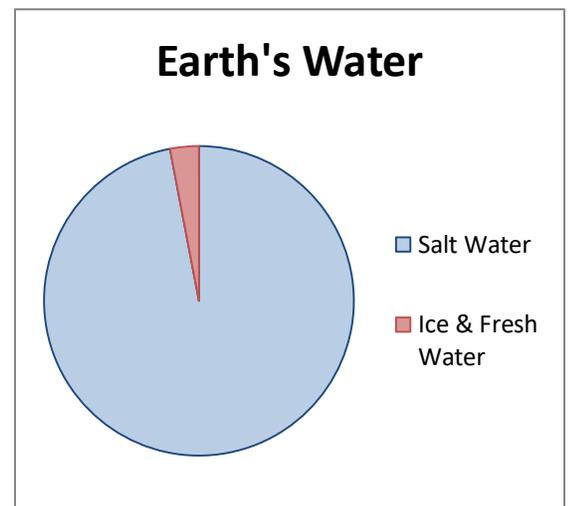


## Chapter 2 Notes: The Earth in Space

### 2.1 Earth: A Unique Planet

- Earth is the only known planet with both \_\_\_\_\_ on its surface and an atmosphere that contains a large amount of \_\_\_\_\_.
- Earth is the only planet known to support \_\_\_\_\_.
- Earth is an \_\_\_\_\_ spheroid (a flattened sphere).
- The spinning of the earth on its axis causes the \_\_\_\_\_ regions to flatten and the equatorial zone to bulge.
- The earth's **axis** is an imaginary straight \_\_\_\_\_ running through the earth from the North to the South pole.

- The Hydrosphere and Atmosphere:
  - **hydrosphere** – all the earth's \_\_\_\_\_
  - Earth is \_\_\_\_\_% water. \_\_\_\_\_% of this water is found in the salty oceans. The remaining \_\_\_\_\_% is fresh water that is found in lakes, rivers, streams, \_\_\_\_\_, and polar ice sheets.



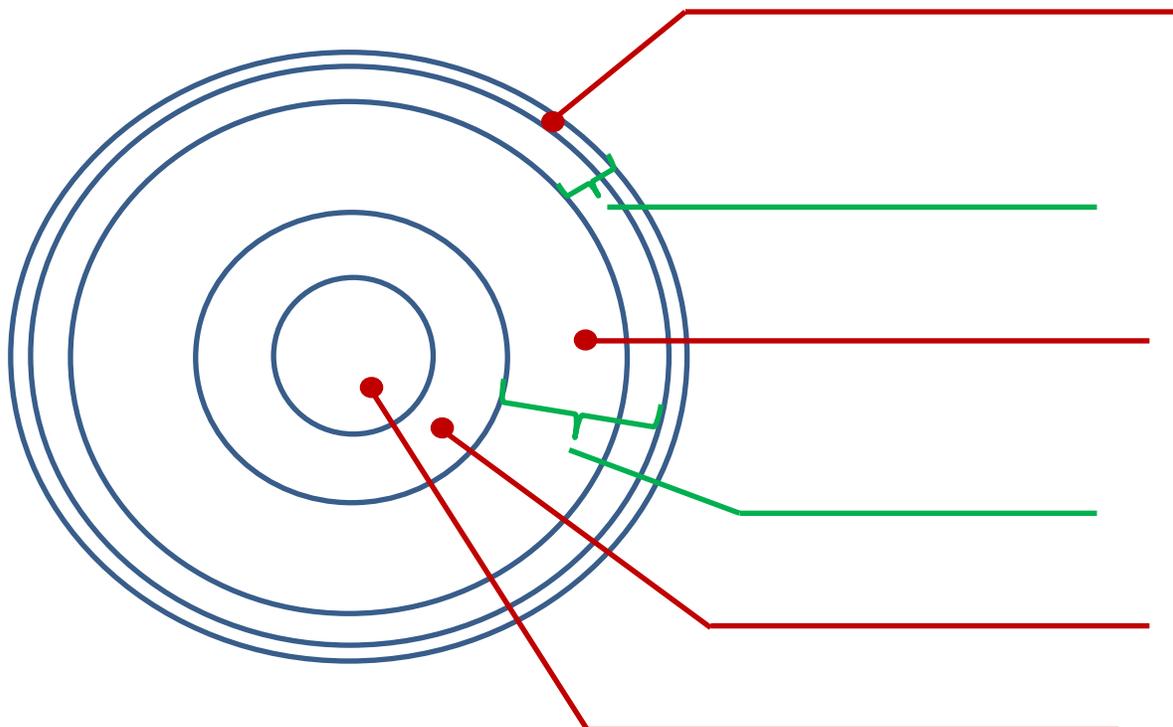
- **atmosphere** – thick blanket of \_\_\_\_\_ surrounding the earth
- The atmosphere provides the \_\_\_\_\_ you breathe and \_\_\_\_\_ the earth from the sun's harmful radiation.
- The atmosphere is \_\_\_\_\_% Nitrogen, \_\_\_\_\_% Oxygen, and \_\_\_\_\_% other gases

- The Earth's Interior
  - Scientists use \_\_\_\_\_ (vibrations that travel through the earth that are produced by earthquakes and other explosive reactions on earth's surface) to study the earth's interior.

○ Zones of the Earth:

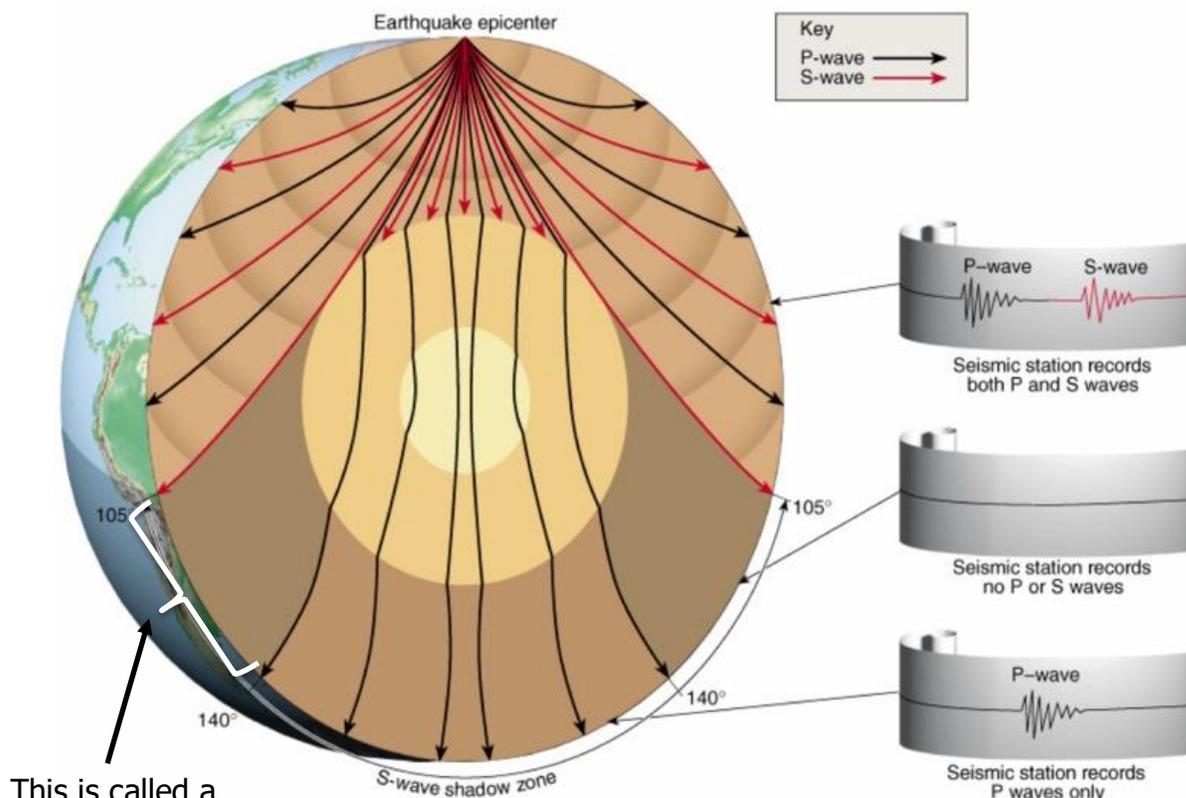
1. **crust** – the thin, solid outermost \_\_\_\_\_ of the earth
  - Only makes up \_\_\_\_\_ % of earth’s mass
  - *Oceanic crust* – the crust beneath the oceans; 5-10km thick
  - *Continental crust* – the crust that makes up the continents; 15-80 km thick
2. **mantle** – a zone of rock (nearly 2,900 km thick) that lies just beneath the \_\_\_\_\_
  - Makes up \_\_\_\_\_ of earth’s mass and is divided into two regions:
    - *Lithosphere* – the uppermost part of the mantle; \_\_\_\_\_ and brittle
    - *Asthenosphere* – the deeper portion of the mantle; because of enormous heat and pressure, the solid rock has \_\_\_\_\_ (the ability to flow).
3. **core** – forms the \_\_\_\_\_ of the earth and is made mostly of \_\_\_\_\_
  - Makes up almost \_\_\_\_\_ of earth’s mass
  - *Outer core* – dense liquid layer
  - *Inner core* – dense, solid sphere

***Label the following zones of the earth based on your completed notes above:***



○ Seismic Waves

- Two types of seismic waves:
  - \_\_\_\_\_ (*P waves*) travel through liquids, solids, and gases
  - \_\_\_\_\_ (*S waves*) travel only through solids
- Both wave types are affected by the \_\_\_\_\_ of the material through which they travel. Both travel \_\_\_\_\_ through more rigid materials.
- The speed of seismic waves \_\_\_\_\_ abruptly 32 to 70km beneath the earth's surface. This change in speed of the waves makes up the \_\_\_\_\_ between the crust and the mantle and is called the Mohorovičić (pronounced moe-huh-roe-vuh-chich) discontinuity after the scientist who discovered it.
- **shadow zones** – areas on earth's surface where \_\_\_\_\_ seismic waves are detected or where only \_\_\_\_\_ waves are detected.
  - These occur because the materials that make up the earth's interior are not \_\_\_\_\_ in rigidity. When seismic waves travel through materials of differing rigidities, their \_\_\_\_\_ changes, causing the waves to \_\_\_\_\_ and change direction.



This is called a \_\_\_\_\_ zone.

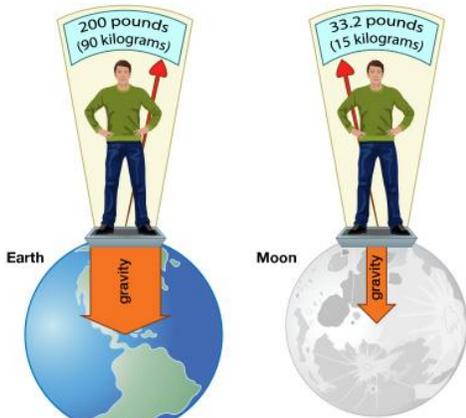
○ The Earth as a Magnet

- The earth has two magnetic \_\_\_\_\_. These regions even effect an area of \_\_\_\_\_ that extends beyond the earth's atmosphere called the **magnetosphere**.
- What is the source of the magnet?
  - It's a possibility that the motion of the liquid \_\_\_\_\_ in the earth's outer core produces electrical currents that create the earth's magnetic field.
  - But that may not be the case – both the sun and moon have magnetic fields, yet the sun contains very little \_\_\_\_\_ and the moon does not have a \_\_\_\_\_ core.

○ The Earth's Gravity

- **gravity** – the \_\_\_\_\_ of attraction that exists between all matter in the universe
- Newton's **law of gravitation** – the force of attraction between any two objects depends upon their \_\_\_\_\_ and the \_\_\_\_\_ between them.
  - The \_\_\_\_\_ the masses of the two objects and the \_\_\_\_\_ together they are, the greater the force of gravity between them.

Effect of gravity on Earth versus on the Moon



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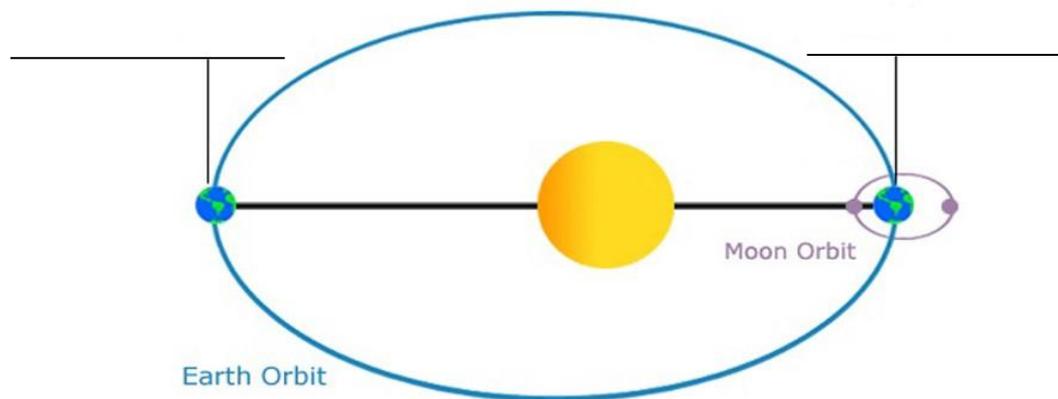
- The mass of the earth exerts a force of gravity that pulls objects toward the \_\_\_\_\_ of the earth.
  - This is measured by \_\_\_\_\_ – the strength of the pull of gravity on an object.
  - Weight and mass are NOT the same. Mass is the amount of \_\_\_\_\_ in an object. Weight is the \_\_\_\_\_ of gravity on that matter. The mass of an object does not change with \_\_\_\_\_, but its weight does.

2.2 Movements of the Earth

- The earth is moving around the \_\_\_\_\_ at an average speed of 106,000 km/hr. This movement is called **revolution**.
  - Each revolution takes 364.24 days or 1 year.

- As the earth revolves around the sun, it also spins on its \_\_\_\_\_. This motion is called **rotation**.
  - Each complete rotation takes 24 hours or 1 day.
  - The most observable effects of rotation are day and night. The earth rotates from \_\_\_\_\_ to \_\_\_\_\_ (which causes the sun to appear to rise in the east and set in the west).
  
- The Revolving Earth
  - The earth's \_\_\_\_\_, or path around the sun, is slightly elliptical, or \_\_\_\_\_-\_\_\_\_\_. Therefore, the earth is not always the same distance from the sun.
    - **perihelion** – closest point to the sun
    - **aphelion** – farthest point from the sun

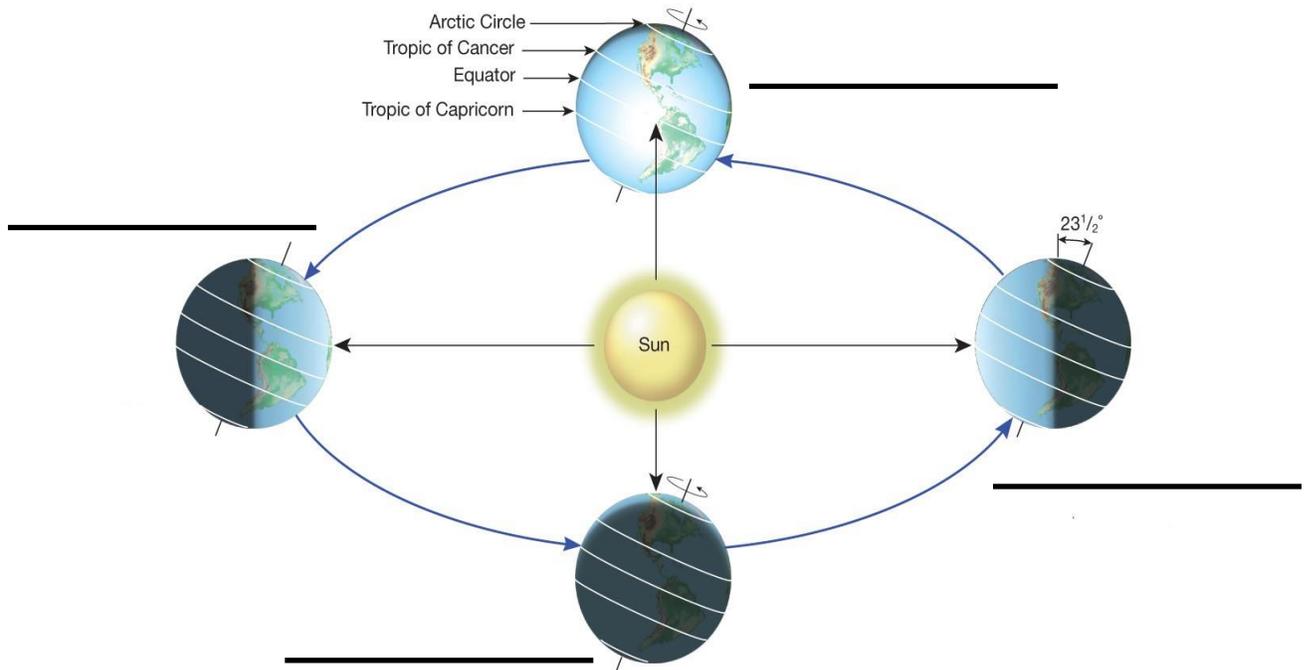
*Label the following either perihelion or aphelion:*



- The earth's orbit lies in a \_\_\_\_\_ with its axis tilted \_\_\_\_\_ degrees. The tilt causes portions of the earth to experience varied amounts of light, helping to create different \_\_\_\_\_ and to determine different ecological zones.
  
- **Summer solstice** – when the sun's rays strike the earth at a 90° angle along the Tropic of \_\_\_\_\_.
  - Marks the beginning of summer in the Northern Hemisphere; June 21 or 22
  - The Northern Hemisphere has the \_\_\_\_\_ hours of daylight at the summer solstice
  - The sun follows the \_\_\_\_\_ path across the sky

- **Winter solstice** – when the sun’s rays strike the earth at a 90° angle along the Tropic of \_\_\_\_\_ .
  - Marks the beginning of \_\_\_\_\_ in the Northern Hemisphere; December 21 or 22
  - The Northern Hemisphere has the \_\_\_\_\_ hours of daylight
  - The sun follows its \_\_\_\_\_ path across the sky
  
- **Autumnal equinox** – when the sun’s rays strike the earth at a 90° angle along the equator
  - Marks the beginning of the \_\_\_\_\_ season in the Northern Hemisphere; September 22 or 23
  
- **Vernal equinox** – when the sun’s rays strike the earth at a 90° angle along the equator
  - Marks the beginning of the \_\_\_\_\_ season in the Northern Hemisphere; March 21 or 22

***Label the following with the correct solstice or equinox term:***



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- **precession** – circular motion of the earth’s axis
  - As the earth rotates about its axis, the direction in which the axis \_\_\_\_\_ SLOWLY changes in relation to the distant \_\_\_\_\_
  - This is caused by the gravitational \_\_\_\_\_ exerted on the rotating earth by the \_\_\_\_\_, \_\_\_\_\_ and other \_\_\_\_\_.

- The earth's axis completes one full circle every \_\_\_\_\_ years.
- Time Zones
  - Using the sun as the basis for measuring time, 12:00 noon is defined as the time when the sun is \_\_\_\_\_ in the sky.
  - The sun appears highest over different locations at different times; so, to avoid problems, earth's surface is divided into \_\_\_\_\_ standard time zones. In each zone, \_\_\_\_\_ is set as the time when the sun is highest over the \_\_\_\_\_ of that zone.
  - Where does one day change into the next?
    - The **International Date Line** runs from North to South through the \_\_\_\_\_ Ocean. When it is 8am Friday west of the line, it is 8am Thursday east of the line. The line is drawn here to avoid cutting through islands and continents.
    - During the summer, most of the US uses **daylight saving time** – where clocks are set one hour ahead of standard time in \_\_\_\_\_ and then set back to standard time in \_\_\_\_\_. This provides an additional hour of daylight during the summer evenings.
- *Circadian Rhythm* – our body's internal \_\_\_\_\_ which follows a 24 hour cycle that controls many of our body's processes
  - No one understands exactly what controls circadian rhythms, but they regulate patterns of sleeping and waking, daily changes in body \_\_\_\_\_, hormone secretions, \_\_\_\_\_ rate, blood pressure, \_\_\_\_\_, coordination, and memory.
  - Studies indicate that the cycle of \_\_\_\_\_ and \_\_\_\_\_ caused by the earth's rotation sets and resets our circadian rhythm.

### 2.3 Artificial Satellites

- **satellite** – any object in \_\_\_\_\_ around another body with a larger mass
  - In order for a satellite to orbit the earth, it must attain (and keep) a particular \_\_\_\_\_ above earth's surface. The higher the orbit, the less \_\_\_\_\_ required to keep in orbit.
- In 2002, when our textbooks were printed, hundreds of satellites orbited the earth. Today, there are \_\_\_\_\_ artificial satellites orbiting earth (according to NASA).

- What are some uses of satellites?
  - To gather and transmit \_\_\_\_\_ information.
  - To relay radio, \_\_\_\_\_, and television signals to and from earth.
  - To send out radio signals that help pilots of ships and aircraft determine their \_\_\_\_\_ (example: GPS).
  - To study \_\_\_\_\_.
- Satellites are put into orbit by powerful computer-guided \_\_\_\_\_. Once in place, the \_\_\_\_\_ detaches. The earth's gravity holds the satellite in orbit.
- **geosynchronous orbit** – a satellite in orbit directly above earth's \_\_\_\_\_ and moving in the direction of the earth's rotation
  - A satellite in this orbit always remains at the \_\_\_\_\_ point above the equator and appears to be \_\_\_\_\_ in the sky.
  - Useful in communications
- **polar orbit** – an orbit that carries the satellite over the earth's North and South \_\_\_\_\_
  - After a certain number of revolutions, a satellite in this orbit will have surveyed the entire \_\_\_\_\_ of the earth
  - Useful in mapping the earth's surface and for tracking \_\_\_\_\_
- Most satellites follow a slightly elliptical orbit about the earth
  - *Perigee* – the point \_\_\_\_\_ to the earth; satellite travels at its \_\_\_\_\_
  - *Apogee* – the point \_\_\_\_\_ from the earth; satellite travels at its \_\_\_\_\_

*Label the following either perigee or apogee:*

