**Earth Science Notes ESS 1-1, 1-2, and 1-3**

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| Universe | The universe is made up of: galaxies, stars, black holes, planets, comets, meteors. Everything in space.  \*\* The universe is made of more than 80 billion galaxies. The universe is still expanding today. \*\*   * **Black holes** * A black hole cannot be seen because light is unable to escape from it. A black hole forms when a large star collapses in on itself because of gravity. * **Planets** * A planet is a large rocky or gaseous object that orbits a star. Planets are large enough to sweep away any smaller objects in their orbit. Their orbits are almost circular. * **Comets** * Comets are balls of ice and dust. They are much smaller than planets and their orbit around a star is very elongated, rather than circular. * **Meteors** * Meteors are small rocks. They burn up if they enter a planet’s atmosphere, forming a ‘shooting star’ |
| Galaxy | A galaxy is a large group of many millions of stars that are held together by gravity  \*\* We live in the Milky Way Galaxy  [This Photo](http://wccftech.com/astronomers-discover-strange-stellar-void-center-milky-galaxy/) by Unknown Author is licensed under [CC BY-SA-NC](https://creativecommons.org/licenses/by-nc-sa/3.0/) |
| Solar System | Consist of the sun, and collection of objects that are held in orbit around the sun by its gravitational pull on them  (planets, moons, asteroids.  [This Photo](http://www.astroblogs.nl/2015/09/19/een-realistisch-schaalmodel-van-het-zonnestelsel-gebouwd-de-nevada-woestijn/) by Unknown Author is licensed under [CC BY-SA-NC](https://creativecommons.org/licenses/by-nc-sa/3.0/) |
| Inner Planets | Mercury, Venus, Earth, and Mars are the inner planets. They are rocky.  [This Photo](http://kesspace.wikidot.com/group-u-the-rocky-inner-planets) by Unknown Author is licensed under [CC BY-SA](https://creativecommons.org/licenses/by-sa/3.0/) |
| Outer Planets | Jupiter, Saturn, Uranus, and Neptune are the outer planets. They are considered gaseous planets. Gaseous planets are much larger than the inner, rocky planets.  (Gases planets don’t have a solid surface)  [This Photo](http://kesspace.wikidot.com/group-v-the-gas-giant-planets) by Unknown Author is licensed under [CC BY-SA](https://creativecommons.org/licenses/by-sa/3.0/) |
| Formation of solar system | Our solar system formed around 4.6 billion years ago. The solar system appears to have formed from a disk of dust and gas, drawn together by gravity. |
| Gravity | **Gravity** is the force by which a planet or other body draws objects toward its center. The force of gravity keeps all of the planets in orbit around the sun   1. Gravitational forces from planets cause smaller objects (moons) to orbit around planets.   2. The gravitational force of the sun causes the planets and other bodies to orbit around it, holding the solar system together.   1. The gravitational forces from the center of the Milky Way cause stars and stellar systems to orbit around the center of the galaxy.   Two things affect Gravity:  Mass= More mass= more gravity  Less mass= less gravity  Distance= Decrease distance to object (closer)= Stronger  Increase distance from object (farther)= weaker |
| What affects gravity? | Mass: the more mass the more gravitational force  Distance: As distance increases the force of gravity decreases.  As distance decreases the force of gravity increases. |
| Mass Vs. Weight | Mass is the amount of matter in an object-doesn’t change  Weight is the measure of the force of gravity on an object—this changes according to pull of gravity |
| Rotation vs. Revolution | Rotation: Spinning on its axis   * Earth’s rotation causes day and night. Earth takes 1 day(24 hours) to rotate once. * Causes Day vs Night * The moon rotates on its axis about once a month.   Revolution: the movement of one object around other object. (orbit)   * One revolution of Earth around the sun is 1 year. * The moon orbits the Earth once a month. * Seasons   [This Photo](http://sgaguilarjramos.blogspot.com/2013/01/the-earth.html) by Unknown Author is licensed under [CC BY-SA-NC](https://creativecommons.org/licenses/by-nc-sa/3.0/) |
| Other Notes | * The moon rotates on its axis at the same rate at which it orbits Earth so that the side of moon that faces the Earth remains the same. * The moon’s orbital plane is tilted with respect to the plane of the Earth’s orbit around the sun. * The distance between Earth and the sun stays relatively constant throughout the Earth’s orbit. |
| Seasons | 1. Earth has seasons because its axis is titled as it revolves around the sun.  2. Earth’s axis is always titled at an angle of 23.5 from the vertical.  3. Solar energy travels in a straight line from the sun and hits different parts of the curved Earth at different angels- more directly at the equator and less directly the poles.  4. Because the Earth’s axis tilted, the most direct and intense solar energy occurs over the summer months and the least direct and intense solar energy occurs over the winter months.  5. The change in season at a given place on Earth is directly related to the orientation of the titled Earth and the position of Earth in its orbit around the sun because of the change in the directness and intensity of the solar energy at that place over the course of the year.  6. Summer occurs in the Northern Hemisphere at times in the Earth’s orbit when the northern axis of Earth is tilted toward the sun. Summer occurs in the Southern Hemisphere at times in the Earth’s orbit when the Southern axis of Earth is tilted toward the sun.  7. Winter occurs in the Northern Hemisphere at times in the Earth’s orbit when the northern axis of Earth is tilted away from the sun. Winter occurs in the Southern Hemisphere at times in the Earth’s orbit he the southern axis of Earth is titled away from the sun.  [This Photo](https://scifi.stackexchange.com/questions/18750/why-arent-alien-planets-as-varied-in-climate-as-the-earth) by Unknown Author is licensed under [CC BY-SA](https://creativecommons.org/licenses/by-sa/3.0/)  In June, the north end of the Earth’s axis is titled toward  the sun. In the Norther Hemisphere, the noon sun is high in the sky d there are more hours of daylight than darkness. The sun’s rea are concentrated. It is summer in the Northern Hemisphere.  At the same tie south of equator, the sun’s energy is spread over a larger area. The sun is low in the sky and days are shorter than nights. It is winter in the Southern Hemisphere.  In December, people in the Southern Hemisphere receive the most direct sunlight, so it is summer. At the same time, the sun’s rays in the Northern Hemisphere are more slanted and there are fewer days of daylight. So it is winter in h Northern Hemisphere  \*\*Earth is **closest to** the **sun** every year in early January, when it's **winter** for the **Northern Hemisphere**. **We**'re farthest away from the **sun** in early July, during our **Northern Hemisphere** summer. |
| Moon Phases | [This Photo](http://natscimedwonders.blogspot.com/2012/10/moons-play-waxing-and-waning.html) by Unknown Author is licensed under [CC BY-NC-ND](https://creativecommons.org/licenses/by-nc-nd/3.0/)  **(Must know the order)**  1. Why do we see different phases of the moon?  \* From Earth, we see only one side of the moon.  This is due to the moon’s orbit around the Earth.  While the moon is orbiting around the Earth, the Earth is orbiting around the sun turning on its axis.  The movements of the moon and Earth affect how much of the moon we see.  We can’t see the moon at all times because the moon doesn’t produce its own light. It reflects the sun’s light. As the moon moves in its orbit, different portions of it are visible because of the reflected light.  The phases repeat every 29 days.  2. Explain why it appears the moon is producing light.  The moon doesn’t produce any of its own light. It reflects the sun’s light.  3. The sun always lights half of the moon. (we can’t always see it though)  4. How long does it take for a lunar cycle to happen?  29.5 days  5. What is the difference between waxing and waning?  Waxing- moon is increasing in size  Waning- moon is decreasing in size  6. What phase will we see during?  Week 1:\_\_\_\_New Moon \_\_\_  Week 2: First Quarter  Week 3: Full Moon  Week 4: Third Quarter |
| Tides | [This Photo](http://worldbuilding.stackexchange.com/questions/58583/tidal-forces-of-tidally-locked-moon-orbiting-a-gas-giant) by Unknown Author is licensed under [CC BY-SA](https://creativecommons.org/licenses/by-sa/3.0/)  ( Must be able to draw diagram, and know where gravity is pulling to cause high tide)  1. What are tides?  Tides are the rise and fall of ocean waters due to the gravitational attraction of the moon and the sun and the rotation of Earth.  2. What causes tides?  Tides are caused by gravitational attraction from the moon.  The moon because of gravity pulls the water creating a bulge which creates high tide.  The opposite side has low tides because of the bulge.  3. Have many tides occur in a day?  2 high  2 low  4. What is high tide?  \* Is the time in which the ocean water reaches a high level before beginning to fall.  \* Environment becomes flooded with ocean water.  \* Organisms have adapted to long periods of immersion in saltwater.  \* The part of the ocean directly **facing the moon**, bulges towards the moon.  \* These bulges are called high tide.  5. What is low tide?  When high tides occur, water is drawn away from the area between the high tides, which causes low tides to occur.   * Beach and environment exposed * Organisms have adapted to long periods with limited water   6. What is a spring tide?  A spring tide occurs during either a full moon or a new moon when the sun, Earth, and moon are in a straight line.  This causes tides to be higher than usual and low tides to be lower than usual.  7. What is a neap tide?  A neap tide occurs during either a first quarter moon or a third quarter moon. This is when the positions of the sun, Earth, and the moon form a right angle. This causes high tides to be lower than usual and low tides to be lower than usual. |
| Eclipse | [This Photo](https://en.wikipedia.org/wiki/Googol) by Unknown Author is licensed under [CC BY-SA](https://creativecommons.org/licenses/by-sa/3.0/)  **Solar Eclipse**  **(**must know why/ how it occurs and draw diagram)  In the shadow of the moon during a total solar eclipse, solar energy is prevented from reaching that part of Earth because the moon is located between the sun and Earth.  [This Photo](http://vega00.com/2011/01/descripcion-de-un-eclipse-de-luna-y-un.html/) by Unknown Author is licensed under [CC BY-SA-NC](https://creativecommons.org/licenses/by-nc-sa/3.0/)  **Lunar Eclipse**  (must know why/how it occurs and draw diagram)  A lunar eclipse occurs at **FULL MOON** when the Earth is directly between the mon and the sun. During a lunar eclipse, Earth blocks sunlight from reaching the moon. |