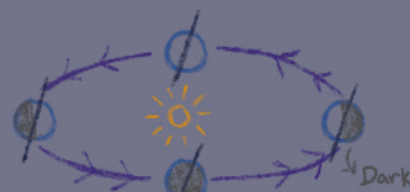


ASTRONOMY

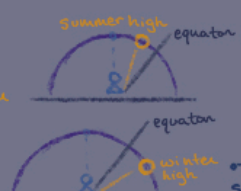
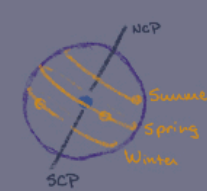
midterm 1

WHAT WE SEE ON EARTH

THE SUN ON EARTH



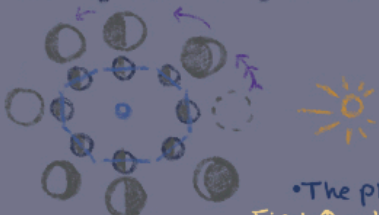
- The Earth's spinning on its axis causes the days and the rising and setting of the sun. The revolving around the sun causes years.
- The sun rises and sets at dif. times of year because of the seasons, the seasons are caused by Earth's tilt on its axis as it rotates the sun.



- Since half the Earth is tilted toward the sun, that half will have longer days.
- The half facing the sun also seems to have the sun higher in the sky. The sun is always highest in the sky at noon.
- The sun higher in the sky provides more direct sunlight, which causes summer to be hotter.

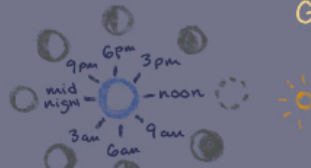
- This also depends on your point on Earth.
- The Equator will always have 12 hour days, and the sun will always pass through the Zenith.
- Meanwhile the poles will have times of year with no sunlight during the day and all sun at night.

MOON PHASES



- We experience moon phases here on Earth because only half of the moon is ever lit by the sun and we see dif. angles of the lit half.

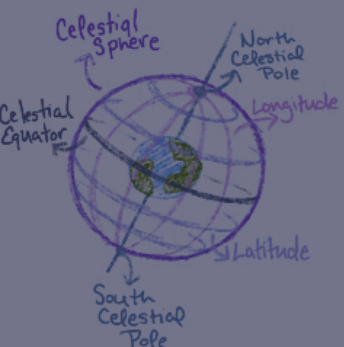
- The phases are New, Waxing Crescent, First Quarter, Waxing Gibbous, Full, Waning Gibbous, Last Quarter, Waning Crescent.



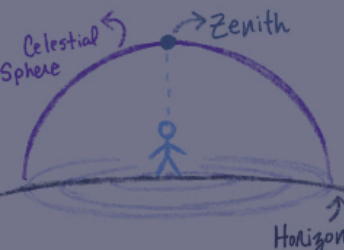
- The different phases of the moon seem to rise and set and reach their peak at different times of day. This is because of what point in the sky the phase appears at.

- The moon rises 6 hours before it's peak and sets 6 hours after it's peak.
- A moon goes through all the phases in a month. The New moon, full moon, and quarter moon phases each only last a day.

CELESTIAL SPHERE



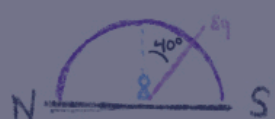
- Let's imagine the sky is projected onto a sphere surrounding the Earth. This is the Celestial Sphere.
- In this section we are going to imagine the sun, stars, planets and moon moving across this sphere to help build our understanding of space.
- We split the celestial sphere up similarly to how we split up the Earth. The Declination is adjacent to the idea of latitude and Right Ascension is adjacent to longitude.
- The Celestial Equator is the projection of the equator onto the celestial sphere.
- And the Celestial Poles are the extension of Earth's axis.



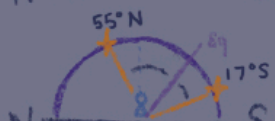
- Further more, we can imagine the Celestial Sphere from our perspective, where we can only see half the sky at the time. (assuming a clear horizon)
- the Horizon is the point where (from our perspective) the sky meets the ground.
- your Zenith is the point in the sky directly above your head.

- We can find stars position in the sky relative to us using their declination...

- 1) find the celestial equator (in C.H. about 40° South of us)



- 2) find the star or other object based on its declination/distance and direction from the equator.



TOOLS

SCIENTIFIC NOTATION

- We use scientific notation to write very large numbers.
- Positive exponent is very large numbers, negative exponent is very small (decimals).

3.2×10^5
320,000
of places to move decimal (pos. move dec. right)

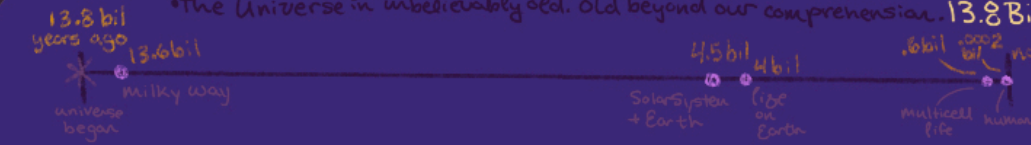
IMPORTANT NUMBERS & UNITS

- Light-Year → The distance light (the fastest obj. in the universe) travels in 1 year. Equal to... ~9.46 Tril. km
- Astronomical Unit → The distance between the sun and the Earth. Equal to... ~149 Mil. km
- Latitude & Longitude → measurements of position on Earth. Latitude measuring degrees from equator, Longitude measuring distance from prime meridian.

OUT THERE.

TIME

- Earth is a planet in our solar system and the solar system is a part of the Milky Way Galaxy and that galaxy is one of many in the universe.
- The universe is unbelievably old. Old beyond our comprehension. 13.8 Bil.



DISTANCE

- The universe is unbelievably big. Like, beyond our comprehension.
 - The observable universe is about 90 Billion light years. Our galaxy is about 100,000 light years wide.
 - Some things in the universe and their distance from us.
- | Object | Distance |
|---|---|
| Moon | 4×10^{-3} ly (1.3 light seconds) |
| Sun | 1.5×10^{-5} ly (8 light minutes) |
| Neptune | 4.5×10^{-4} ly (4 light hours) |
| Proxima Centauri (nearest star) | ~4 ly |
| Sagittarius Dwarf Galaxy (nearest galaxy) | 70,000 ly |
| Andromeda Galaxy (nearest large galaxy) | 2,000,000 ly |

- Since light years are the distance light travels in a year, and we see w/ light, they are also a measure of how long it takes the "image" of something to reach us. The sun is 8 light minutes away so it takes 8 minutes for sunlight to reach us, and the sun we see in the sky is actually the sun from 8 min. ago.
- So looking farther into space we are actually looking back in time.

