Astronomy 115
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Only a few people will be able to add this class.
Creating A Model

Whenever we try to understand a new concept, it’s useful to create a model. A model is a representation of the real world that is easier to visualize.

Models can be made with paper, with computers or our minds.

Our model for space is called the Celestial Sphere.
The Celestial Sphere is an imaginary sphere around the Earth.

We can locate any star or planet on this sphere.

(In this model, we ignore the fact that stars are very far away)
The Celestial Sphere

In addition to North, South, East and West we have:

Zenith: The “Highest Point” directly above.

Horizon: Circle between sky and Earth

(Nadir: The “Lowest Point”, directly below.)
Three points on the Celestial Sphere:

**North Celestial Pole**: Point in space just above the North Pole of Earth

(The North Star is near the North Celestial Pole)

**Celestial Equator**: a circle in space above the Equator

**South Celestial Pole**: Point in space just “above” the South Pole of Earth
Viewing the Sky from Earth

• Our view of the sky depends on where we are on Earth.
• People in the Southern Hemisphere cannot see the North Star.
• People who live on Earth’s equator can see stars both North and South of the Celestial Equator.
• The *motions* of stars also depend on your location.
If we lived at the North Pole

Latitude 90°
If we lived in Alaska…
Latitude for San Francisco: 38°

North celestial pole

Latitude 30°
If we lived at the Equator...
Cycles of the Sun

• In addition to rising and setting every day, the Sun undergoes yearly changes.
• It is in the sky more in Summer and less in Winter.
• The Sun rises and sets from different locations throughout the year.
• This fact was carefully observed by ancient people, and used to predict the Seasons.
An Ancient Observatory

Stonehenge
Built ~2500 BC in England
Mayan Observatory
Built ~600 AD at Chichen Itza, Mexico
The Annual “Motion” of the sun

- At night, we see different constellations at different times of the year.
- The constellations we see are always those *away from* the Sun.
- As Earth orbits around the Sun, we view the Sun from different perspectives.
- If we could see the stars behind the Sun, we would see it pass in front of 13 constellations.
- These are called the constellations of the **Zodiac**.
The Annual Motion of the Earth

Earth revolves around the Sun
The Sun appears “in front of” just 13 constellations.
(Note: You can’t see a constellation when the Sun is “in front of” it)
Throughout the year, the Sun moves from one constellation of the Zodiac to another. This path in the sky is called the **ecliptic**. But... the dates when this happens have slowly changed.
What’s Your (Real) Sign?

This is where the Sun is found at different times of the year

- Capricorn - Jan 21 to Feb 17
- Aquarius - Feb 17 to Mar 12
- Pisces - Mar 12 to Apr 19
- Aries - Apr 19 to May 14
- Taurus - May 14 to Jun 21
- Gemini - Jun 21 to Jul 21
- Cancer - Jul 21 to Aug 11
- Leo - Aug 11 to Sep 17
- Virgo - Sep 17 to Oct 31
- Libra - Oct 31 to Nov 21
- Scorpius - Nov 21 to Nov 30
- Ophiuchus - Nov 30 to Dec 18
- Sagittarius - Dec 18 to Jan 21

Note: These dates are based on the true position of the Sun and don’t agree with most astrological dates! …due to Precession of the Earth’s axis.