Backyard Astronomy

In the mystical moist night air,
Looked up in perfect silence at the
stars. - Walt Whitman

The Sun

- Rises in the “east” and sets in the “west”
- Sunrise exactly in the East only
  at equinoxes (21 March and 22 September)
- Most northern rising and setting
  at summer solstice (21 June)
- Most southern rising and setting at winter solstice
  (21 December)

- Follows a high arc across the sky in
  summer
- Follows a low arc across the sky in
  winter
- Surrounding stars change with seasons
- Follows annual path across the sky
  - ecliptic
- Why is it cold in winter and hot in summer?
The Stars

- Not visible in the day because of atmosphere
- Have fixed positions on the celestial sphere
- Patterns
  - constellations
- Stars near the North Star
  - Trace circles around the North Star
- Stars far from the North Star
  - Rise and set
  - High arcs if nearer north
  - Low arcs if farther south

The Celestial Sphere

- An imaginary sphere surrounding us
- The "inverted bowl" or dome of sky
- A visual and conceptual model
- All heavenly bodies appear to be fixed on it
- Rotates slowly
  - Once a day
  - A little shifted each day
  - The same every year
Celestial Sphere

Stars, no matter how distant, are pictured as being on a single crystalline sphere.

Model: The celestial sphere

The human experience of the celestial sphere

Star Rise and Set

7 P.M. 9 P.M.

East East

Earth spins, shifting the observer and changing the horizon.
**Celestial Coordinates**

- East-West - Latitude - Declination
- North-South - Longitude - Right Ascension
- Celestial Poles
  - North CP is close to North Star *(Polaris)*
  - SCP has no major marker nearby
One of the best ways to get started as a backyard astronomer is to learn the constellations. Find north... use a compass if necessary! No fancy equipment needed! Needed: star chart, dim flash light, dark location.

• Big Dipper is probably most famous star grouping.
• Asterism - easily recognized group of stars
• Big Dipper is part of Ursa Major (Great Bear)
• Pointer stars to Polaris (North Star)
• No “South Star”
As Earth moves, our view of constellations change.
Planet motion through the Zodiac

Planet orbit from night to night
Retrograde Motion

The Moon

- Rises ~50 minutes earlier each day
- Goes through a cycle of phases
  - New
  - Waxing crescent
  - Half (technically, First Quarter)
  - Waxing gibbous
  - Full
  - Waning gibbous
  - Half (technically, Third Quarter)
  - Waning crescent
Bone may show phases of the Moon

Eclipses

- Regular enough to be predicted by ancient peoples
- Solar
  - Moon comes between Earth and Sun
- Lunar
  - Earth’s shadow falls on Moon

Solar Eclipse
Lunar Eclipse

The End