

Lecture 5: September 1, 2010

Announcements:

First homework has been posted

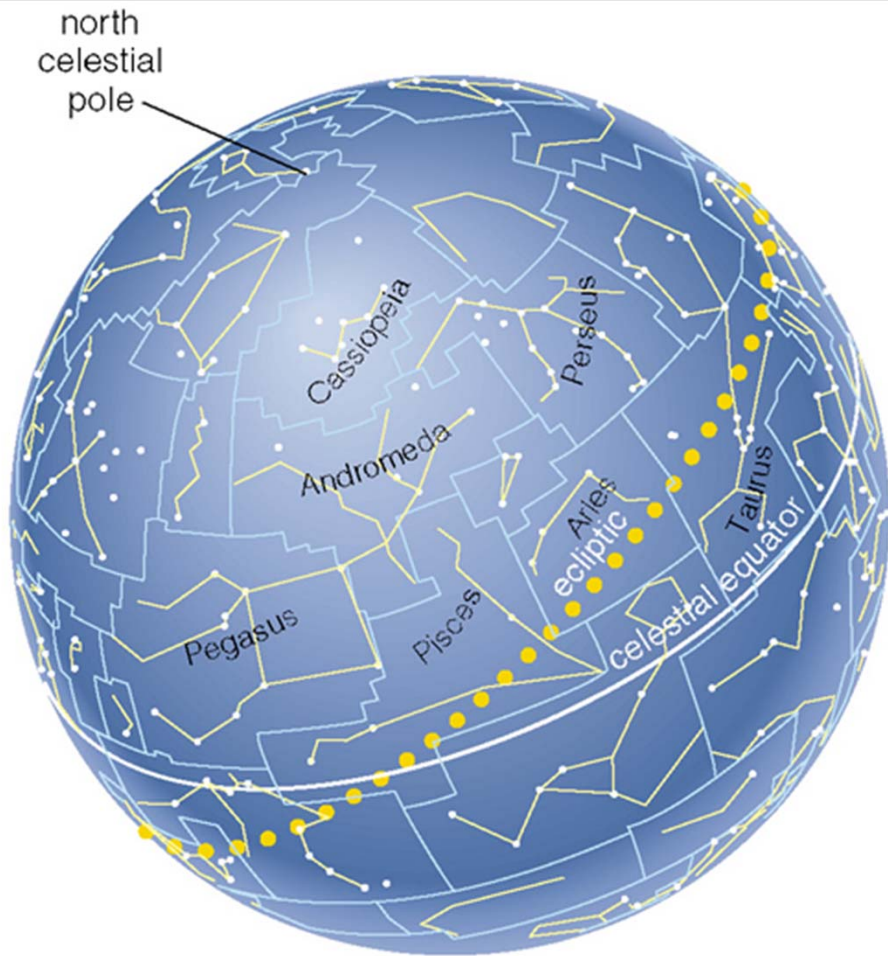
Due Friday (10th)

First Observatory Opportunity Thursday Night

September 2, 8:30pm

Will meet at Fiske Planetarium on Friday 9/17

The Celestial Sphere



- The sky above looks like a dome...a hemisphere..
- If we imagine the sky around the entire Earth, we have the **celestial sphere**.
- This a 2-dimensional representation of the sky
- ← Because it represents our view from Earth, we place the Earth in the center of this sphere.

The Celestial Sphere

North & South celestial poles

the points in the sky directly above the Earth's North and South poles

celestial equator

the extension of the Earth's equator onto the celestial sphere

ecliptic

the annual path of the Sun through the celestial sphere, which is a projection of ecliptic plane

The Local Sky

zenith

the point directly above you

horizon

all points 90° from the zenith

altitude

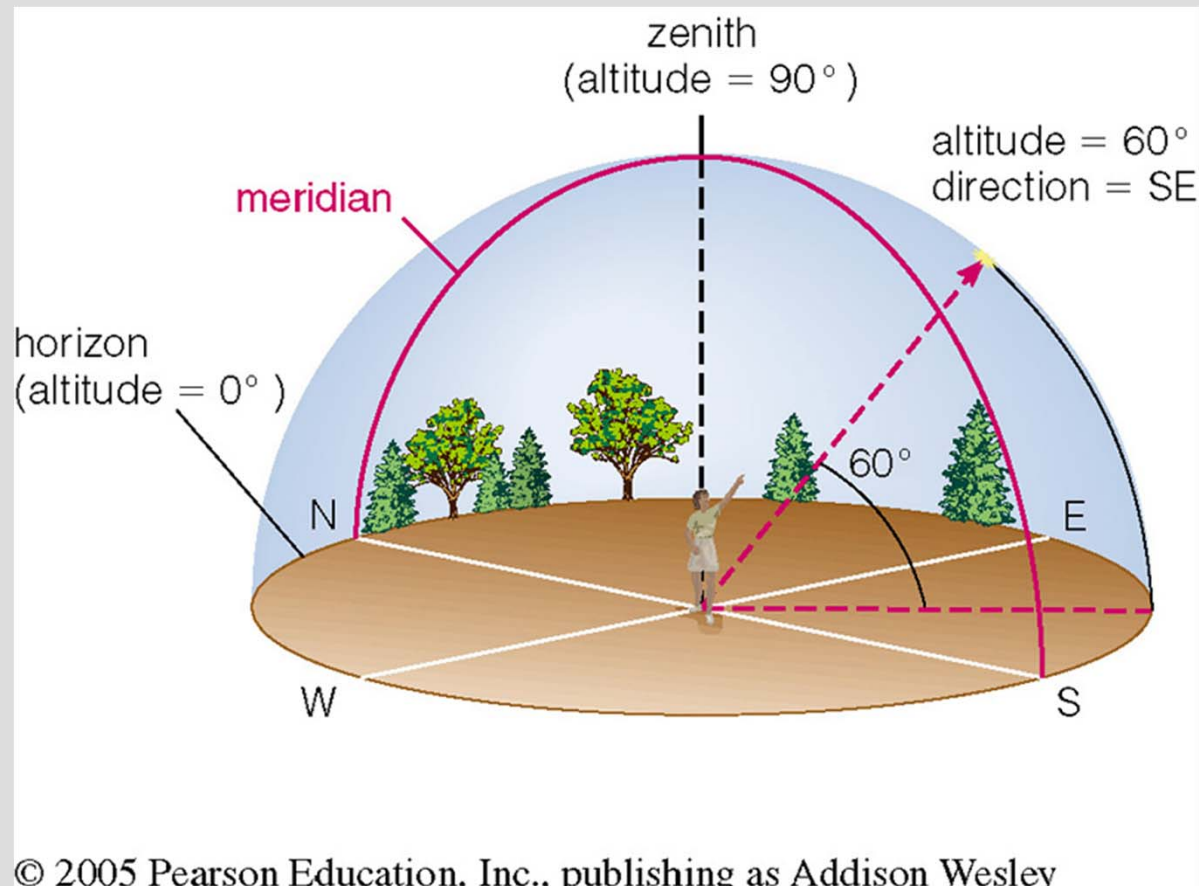
the angle above the horizon

meridian

due north horizon \Rightarrow zenith \Rightarrow due south horizon

To pinpoint a spot in the local sky:

Specify **altitude** and **azimuth** along the horizon



Coordinates on the Earth

- **Latitude:** position north or south of equator
- **Longitude:** position east or west of prime meridian (runs through Greenwich, England)

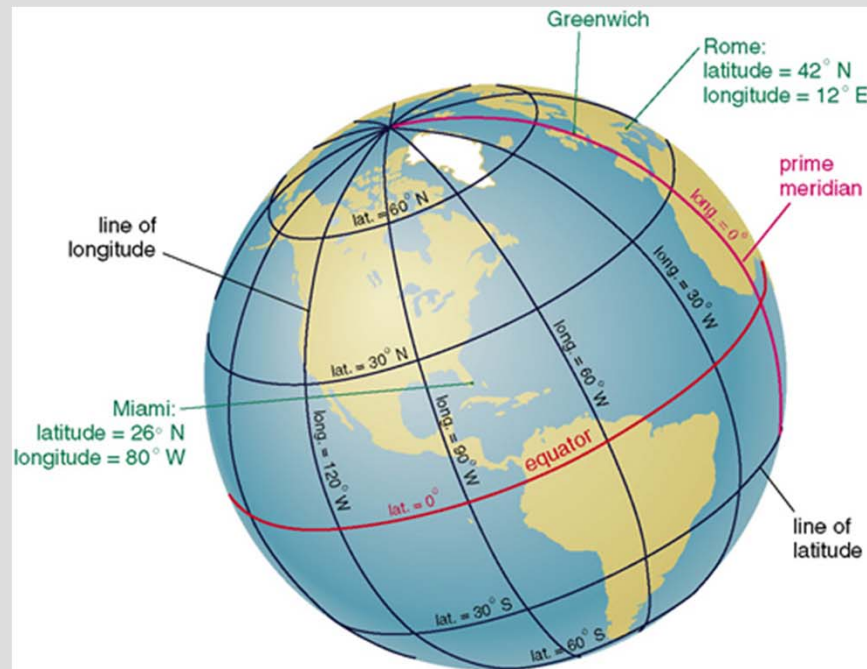
Denver

Lat.:

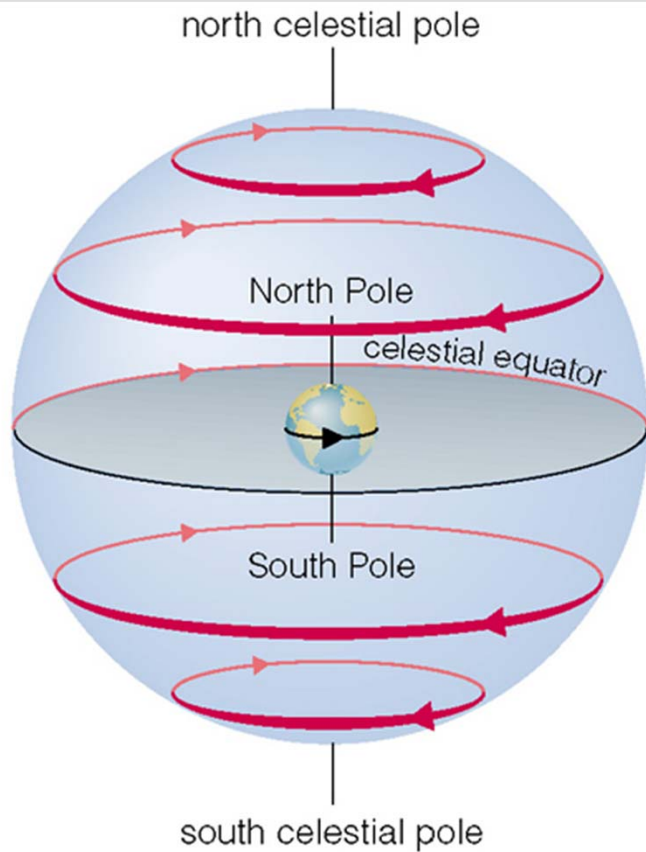
$39^{\circ} 43' 35''$ N

Long.:

$104^{\circ} 57' 56''$ W



The Daily Motion



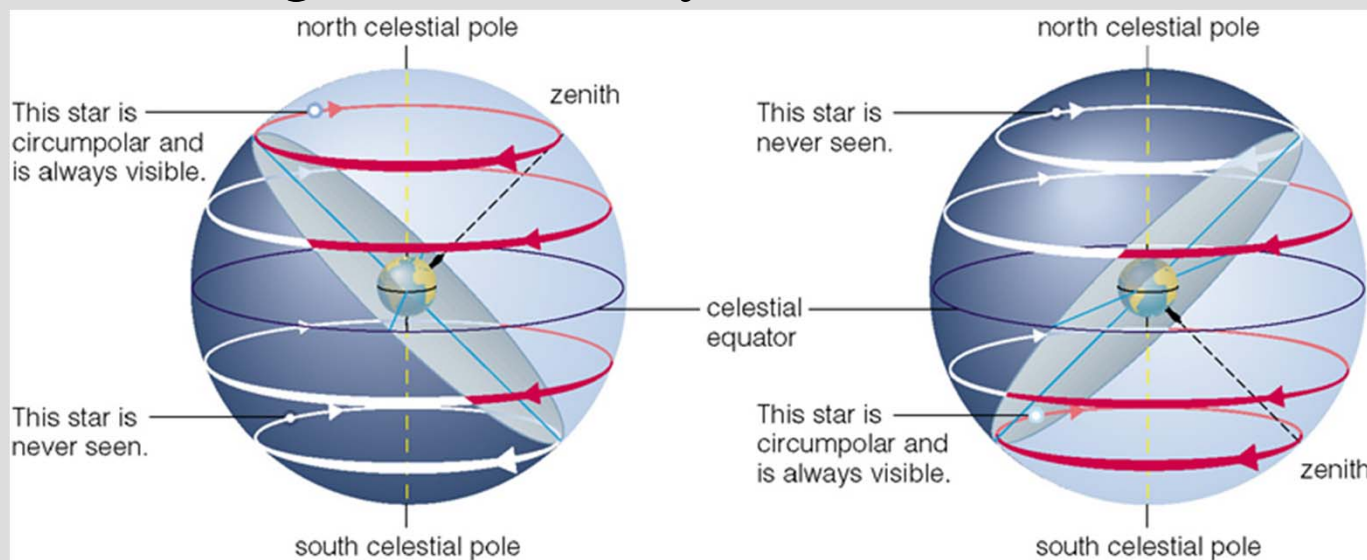
- As the Earth rotates, the sky appears to us to rotate in the opposite direction.
- The sky appears to rotate around the N (or S) celestial poles.
- If you are standing at the poles, nothing rises or sets.
- If you are standing at the equator, everything rises & sets 90° to the horizon.

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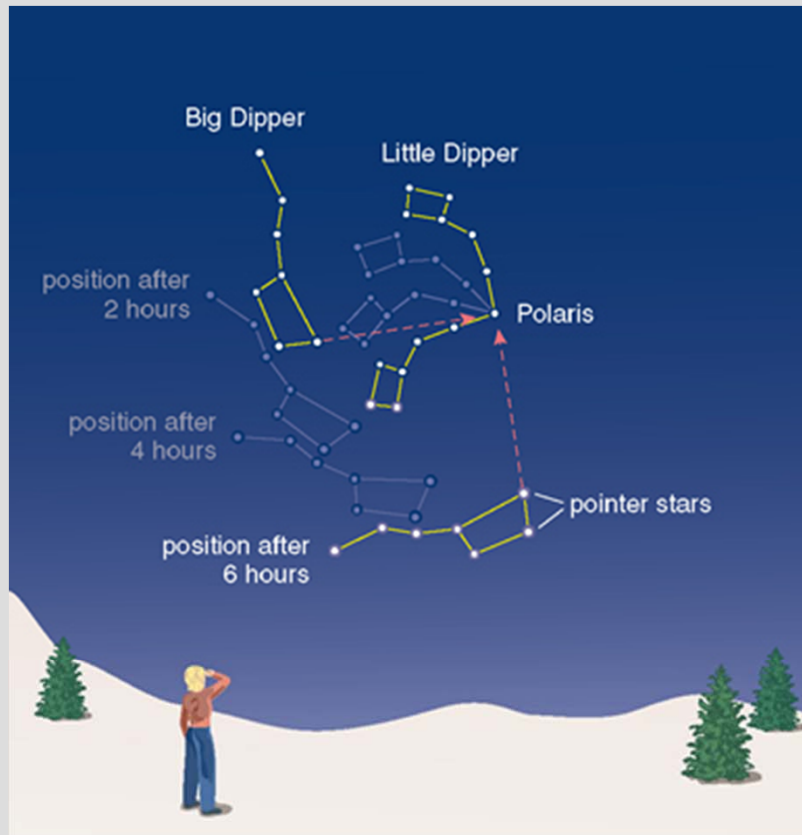
The Daily Motion

- The altitude of the celestial pole = [your latitude].
- All stars at an angle $<$ [your latitude] away from:
 - **your celestial pole** never set. (**circumpolar**)
 - **the other celestial pole** are never seen by you.
- Other stars, (& Sun, Moon, planets) rise in East and set in West at an angle = $[90^\circ - \text{your latitude}]$.

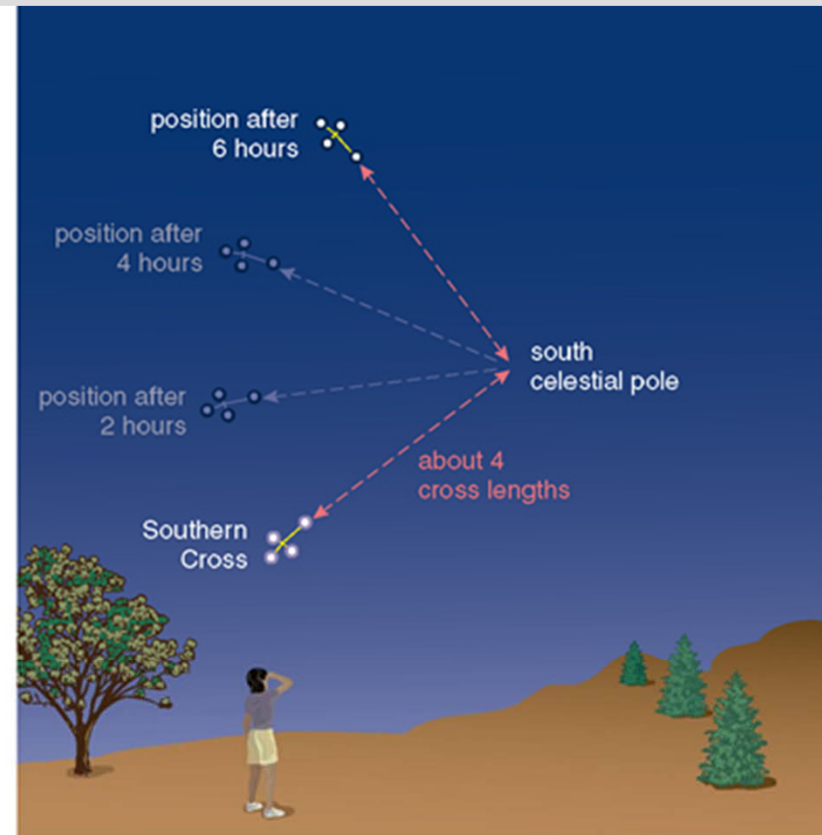


The Daily Motion (IF 2.13)

daily circles --- CCW looking north, CW looking south



looking northward



looking southward

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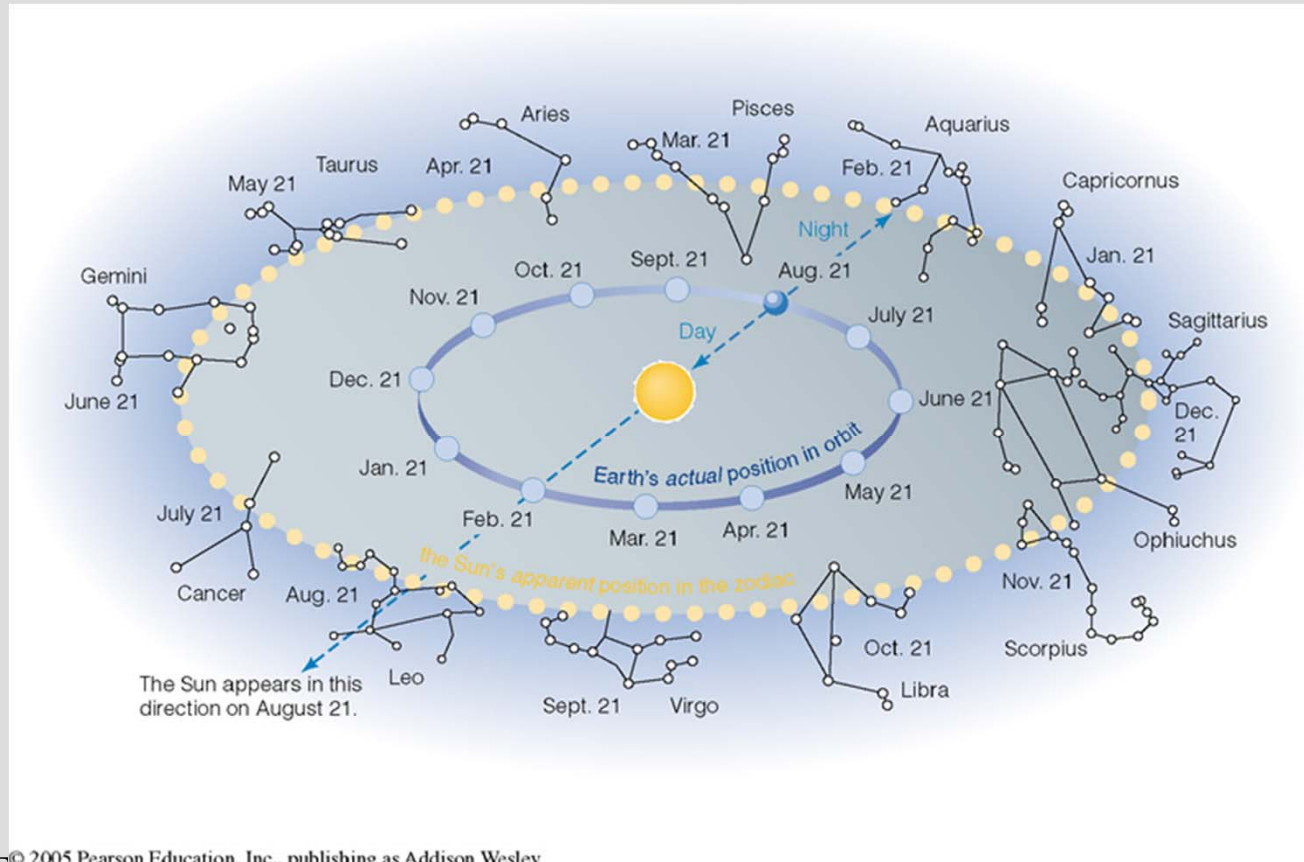
Time Exposure Photograph:

- Estimate time
- Which direction did stars move?



Annual Motion (IF 2.14)

- As the Earth orbits the Sun, the Sun appears to move eastward with respect to the stars.
- The Sun circles the celestial sphere once every year.



2.3 Seasons

Our goals for learning:

- What is the cause of the seasons on Earth?
- Why are the warmest days typically a month after the beginning of summer?