The Sky

Perceptions of the Sky

- An Observer-Centered Hemisphere

- Night & Day - Black & Blue - Stars & Sun

- "Atmospheric" & "Astronomical" Phenomena

Weather, Clouds, Rainbows,... *versus* Sun, Moon, Stars, Planets, ...

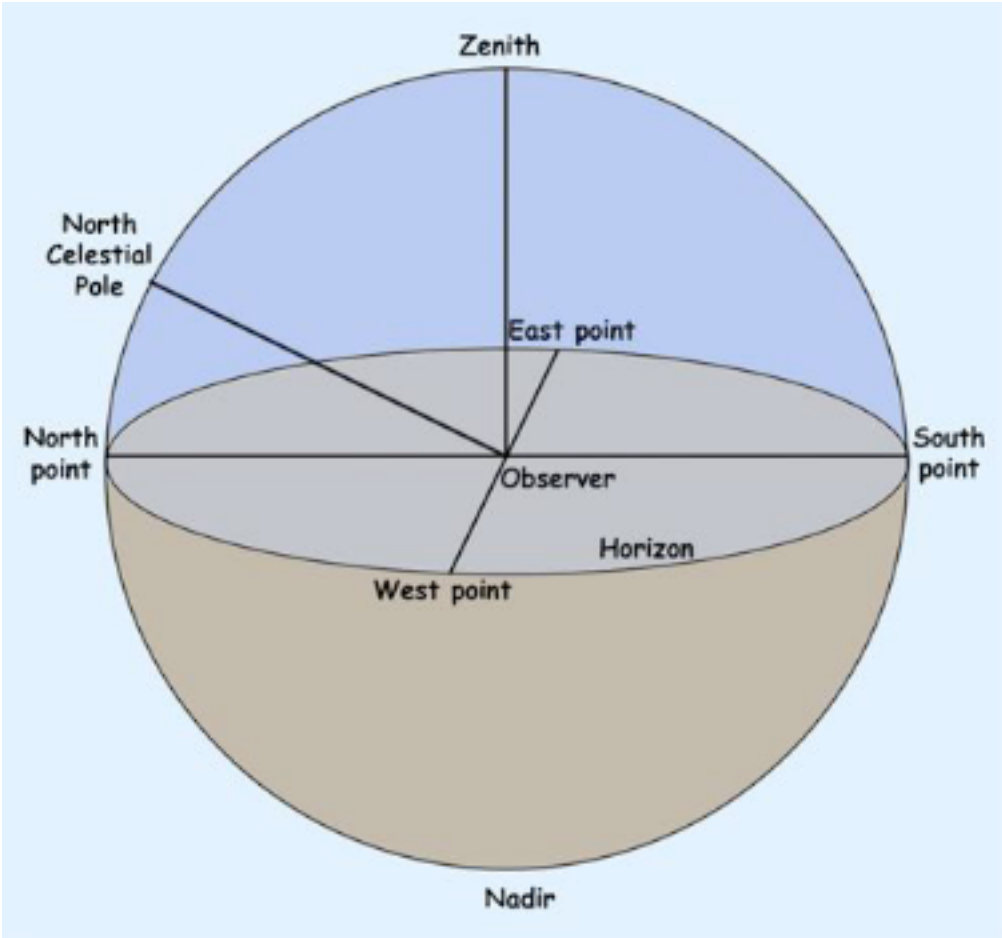
and

Comets & Zodiacal Light; Meteors & Aurorae

- The Sky in History

The Sky as Real: The "Firmament" & "Crystalline Spheres"

The Sky as a Construct: Direction & Distance



Orientation & Nomenclature

- Zenith & Nadir
- The Astronomical Horizon
- The Meridian (AM & PM)
- The Cardinal Directions (N,E,S,W)

Pointing at the Sky: Azimuth & Elevation Angles

The Celestial Sphere

Motions on the Sky

- Diurnal Motions of the Sun, Moon, And Stars
  The Solar, Lunar, and Sidereal Days

- Relative Motions of the Sun, Moon, & Stars

Defining the Celestial Sphere

The Celestial Sphere is Defined by the "Fixed Stars"

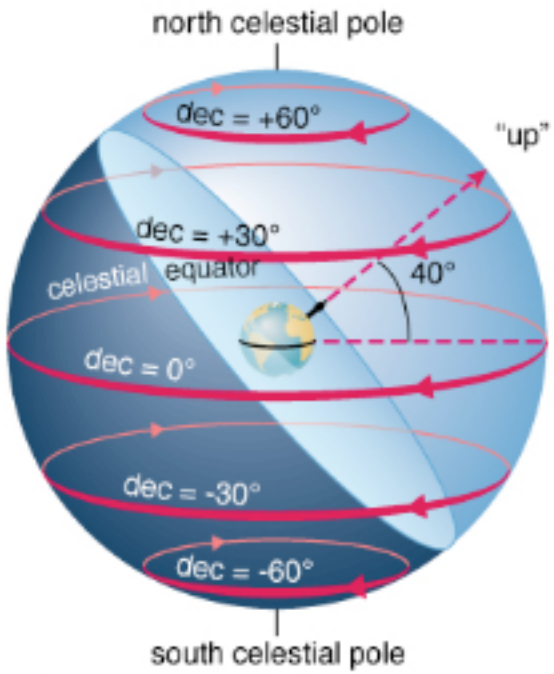
- Fixed Stars: Appearance, Brightness, and Color
  Patterns: Asterisms and Constellations

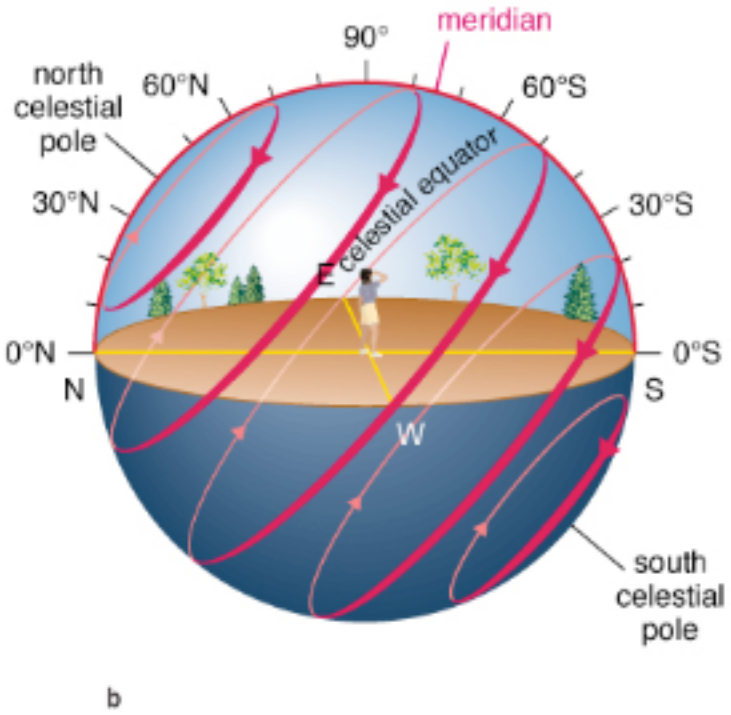
- The (Apparent) Rotation of the Celestial Sphere
  The Sidereal Day of 23h 56m 04s

- The Celestial Poles and the Celestial Equator
  Orientation, Time, and Latitude

The Orientation of the Celestial Sphere

- Geography: The Celestial Sphere on the Observer's Sky
  North & South: The Orientation of the Celestial Poles
  East & West: The Celestial Equator and the Horizon

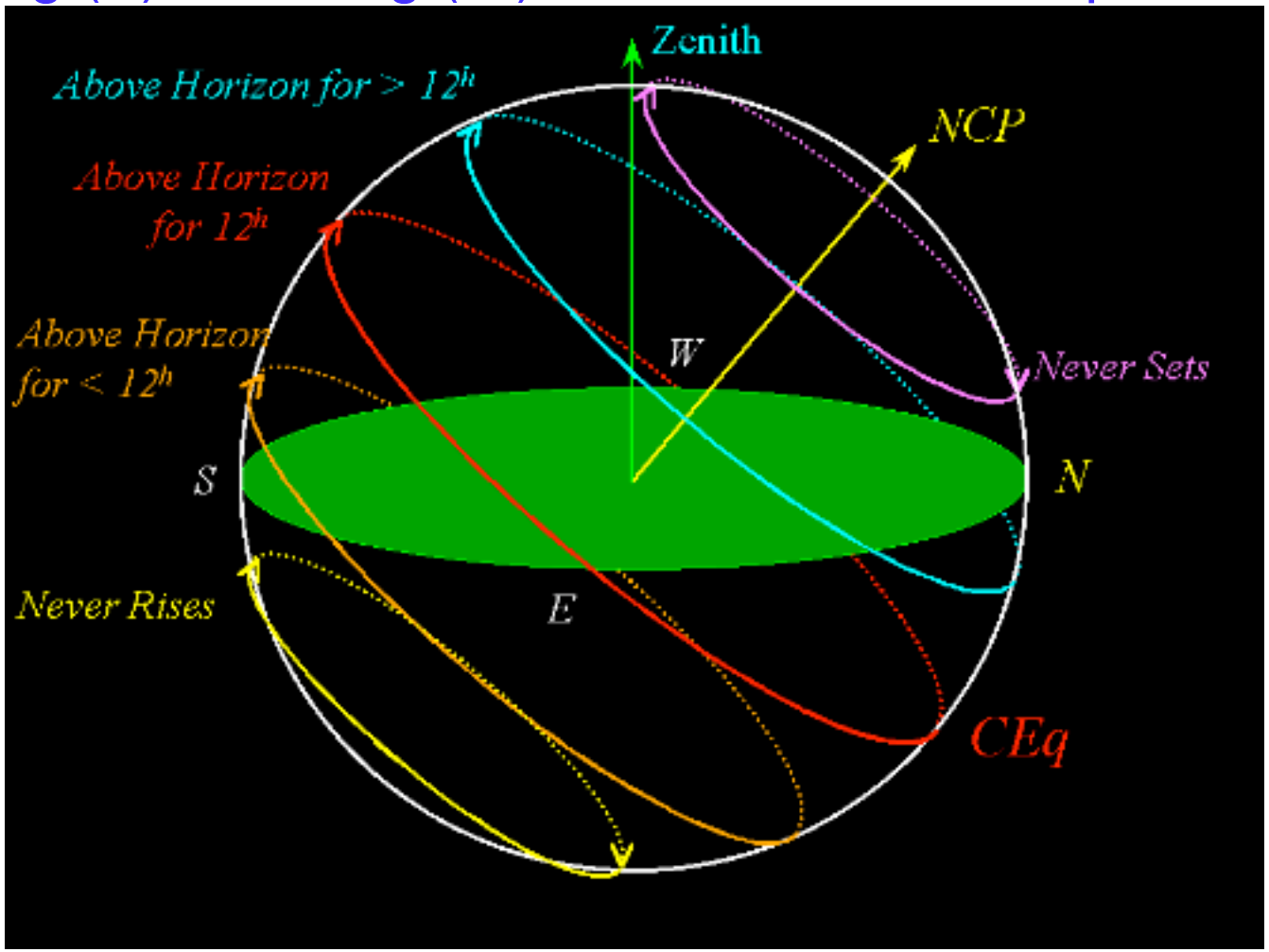




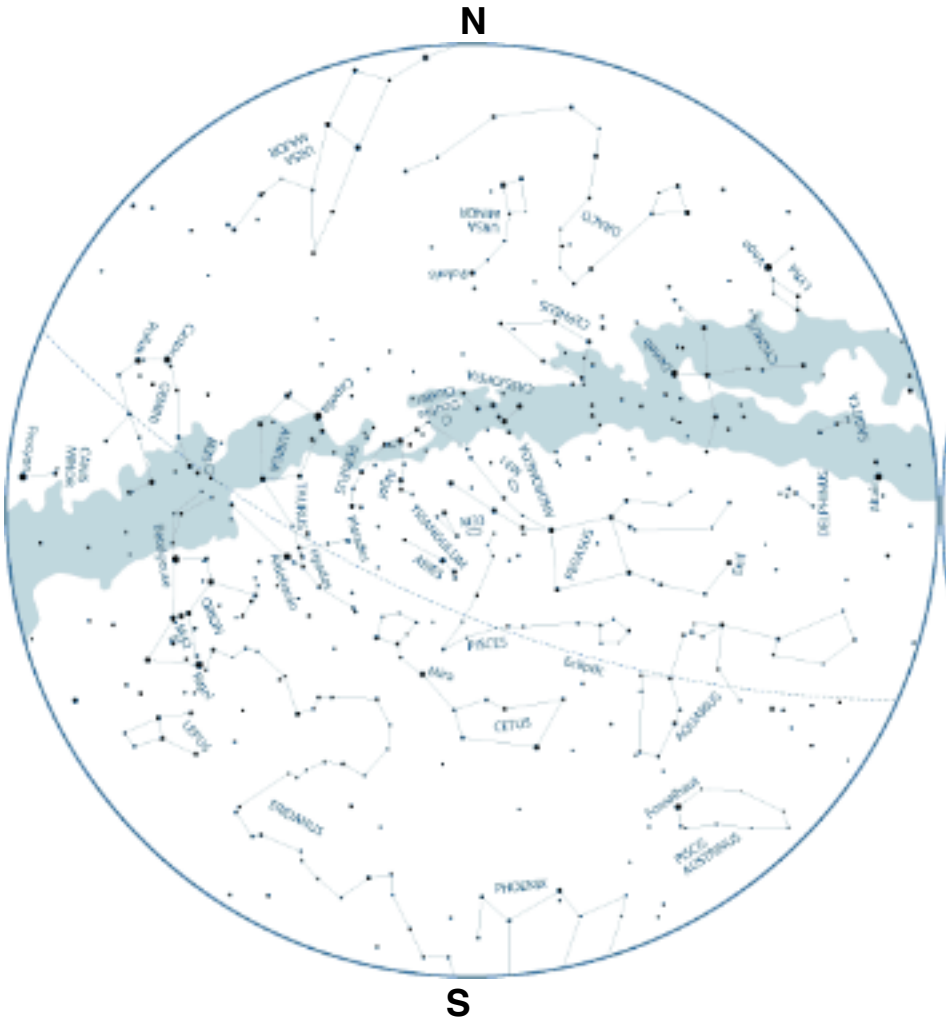
The Apparent Rotation of the Celestial Sphere

The Sidereal Day is $23^h\ 56^m\ 04^s$

Rising (E) & Setting (W) of the Stars: Circumpolar Stars



Hourly Changes in the Appearance of the Nighttime Sky



6:00 PM
2007 JANUARY 15

8:00 PM
2007 JANUARY 15

Motions of Objects on the Celestial Sphere

Remember: The "Fixed Stars" are Fixed

The Wanderers: The Seven *Planetes* or Luminaries

1. The Sun: The Sun's Annual Motion on the Ecliptic
The Sidereal Year

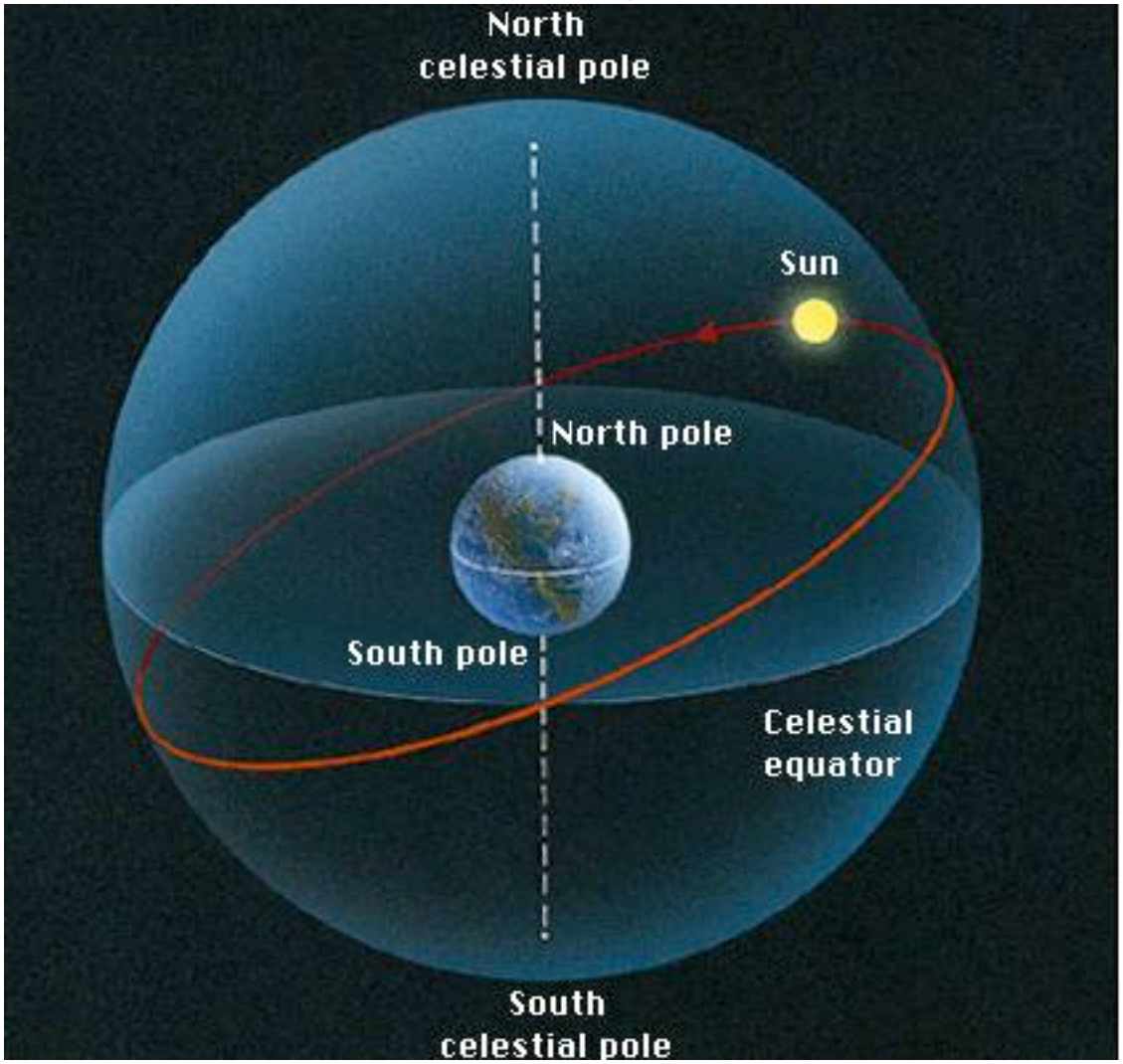
2. The Moon: The Moon's Monthly Path on the Celestial Sphere
The Sidereal Month

3 - 7. The Classical Planets: Direct & Retrograde Motions
The Sidereal Periods of the Planets:
Mercury, Venus, Mars, Jupiter, Saturn
(and later: Uranus, Neptune, and ~~Pluto~~*)

* as well as Comets, Asteroids, Trans-Neptunian Objects, Kuiper Belt Objects, plus "fixed" objects such as nebulae, galaxies,.....

The Ecliptic

The Sun Moves Eastward along a Path Called the Ecliptic



The Sun on the Ecliptic

- The Sun always moves Eastward along a path called the Ecliptic

(Note: $24^h\ 00^m\ 00^s$ is the average length of the Solar Day.)

- The Ecliptic is inclined 23.4° with respect to the Celestial Equator

(The "Obliquity of the Ecliptic")

- It Completes a Circuit of the Ecliptic in One Sidereal Year

(One Sidereal Year is 365.25 days)

- The Sun crosses the Celestial Equator at/on the Equinoxes

Vernal (Spring*) Equinox (S to N) on about 21 March
Autumnal Equinox (N to S) on about 23 September

....and is most distant from the Celestial Equator at/on the Solstices

Summer Solstice (Farthest North) on about 21 June
Winter Solstice (Farthest South) on about 22 December

*...the seasonal references are for the Northern Hemisphere!

Sunlight and Season

The location of the Sun on the Ecliptic determines:

- Where on the horizon the Sun rises and sets
...if it does either!

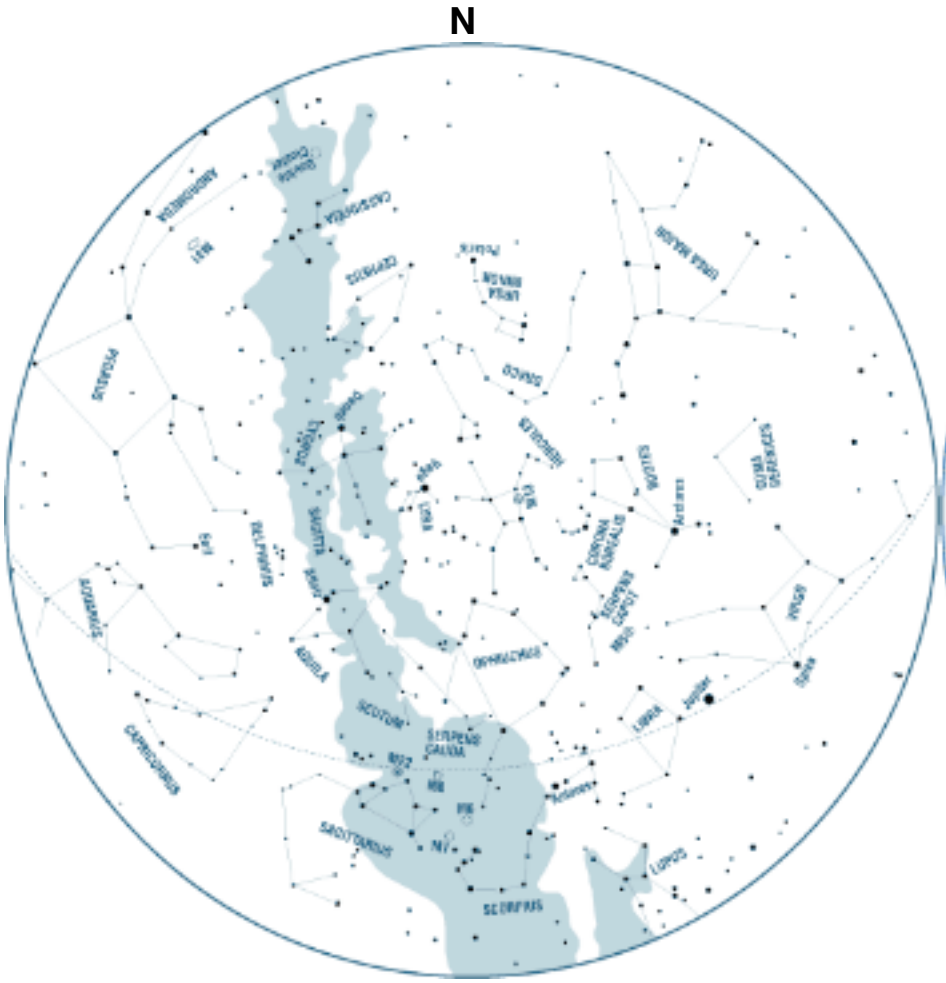
- The length of the day and the length of the night, plus

- The height of the noontime Sun above the horizon
.....and therefore the warmth of the season.

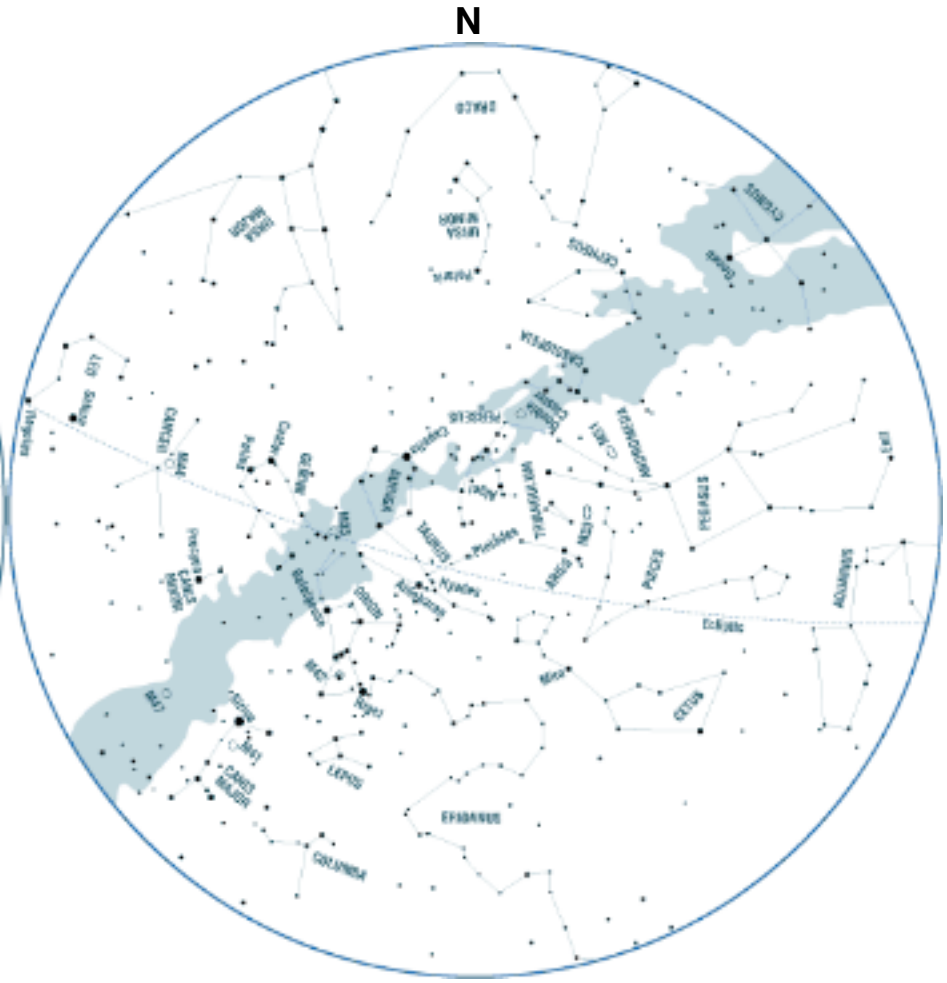
- Which part of the Celestial Sphere is visible at night
...and which part is invisible in daylight.

Note: Again, it is the obliquity of the ecliptic which is responsible for the occurrence of seasons on Earth. Our varying distance from the Sun has almost no seasonal effect; indeed, the Earth is nearest to the Sun in January.

Seasonal Changes in the Appearance of the Nighttime Sky



15 JULY 2006
8:00 PM



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Resumé

The Sky
The Visible Hemisphere
Zenith & Nadir; Horizon & Meridian
Cardinal Directions

The Celestial Sphere
Fixed Stars & Luminaries
Celestial Poles & Celestial Equator
Orientation & Apparent Rotation
Time & Geography

The Ecliptic
The Annual Path of the Sun on the Celestial Sphere
Motions of the Sun on the Celestial Sphere
Equinoxes & Solstices
The Sun and Seasons

Next: The Moon and the Planets