

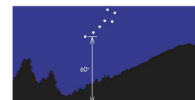
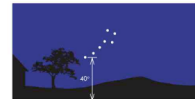
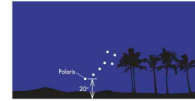
The Sun in the Sky



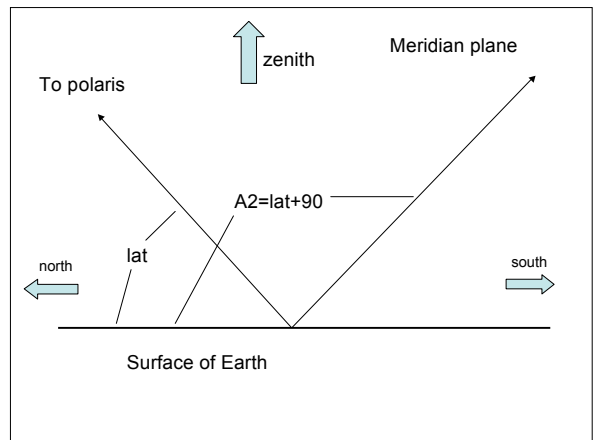
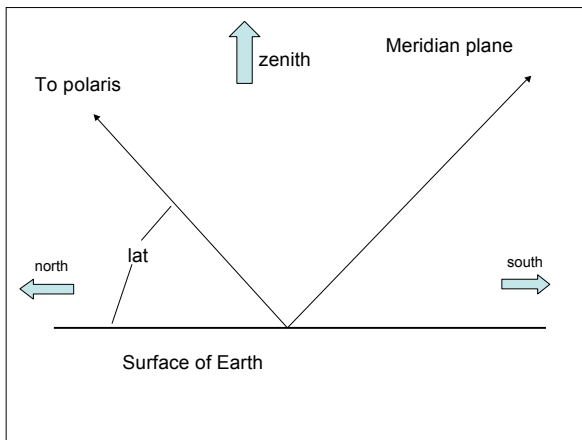
And how it changes in the course of the year

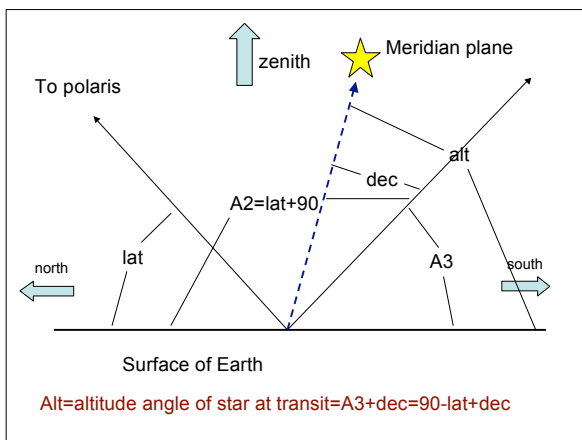
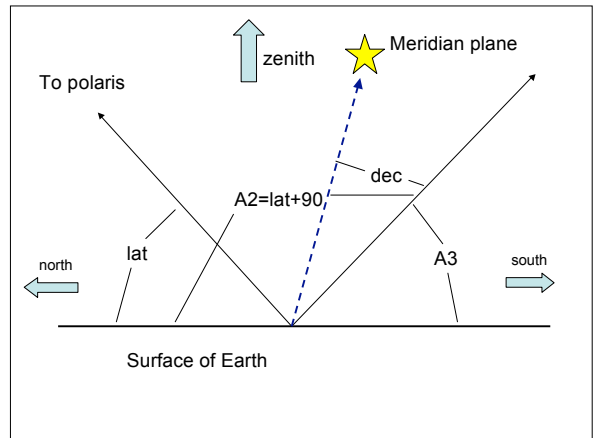
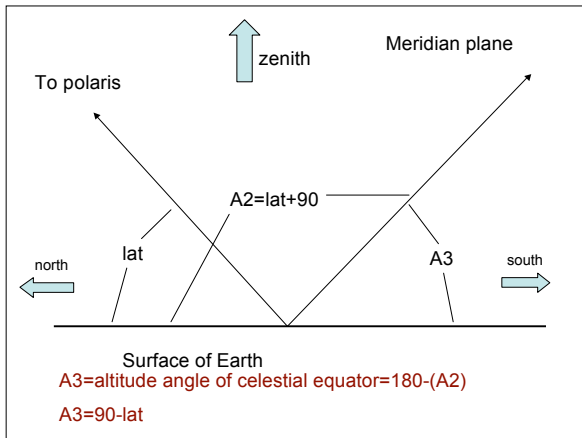
But first...last time we saw that you can determine your latitude from the altitude angle of Polaris (the north star)

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There is a better (and more accurate) way to do it.





The basis of navigation at sea (at least for latitude)

- Your latitude can be precisely measured by the altitude angle (alt) at which a star with declination (dec) transits (crosses the meridian)
- $\text{Alt} = 90 - \text{lat} + \text{dec}$
- So, $\text{lat} = 90 + \text{dec} - \text{alt}$

Let's return to a concept from last time

How do we understand these changes during the year?

We've done this, so what did it do for us? →

- Method 1: introduce a second coordinate system for use on the sky
- Method 2: understand the physics of the solar system (later)
- New coordinate system is like defining your location on Earth (what are the coordinates for locating a position on Earth?)

Measuring the position of the Sun against the background stars

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The path of the Sun through the stars

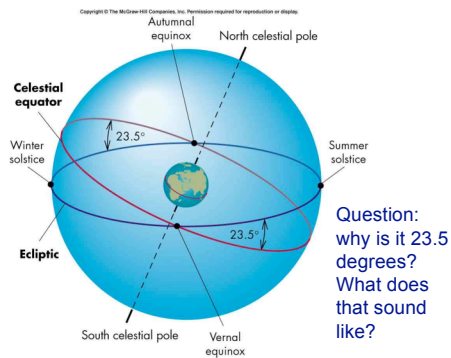
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An important astronomical fact:

During the course of the year, the Sun moves against the background stars just like the planets

→ Find the **ecliptic** on the SC1 chart

Another great circle on the sky...the ecliptic



All annual variations (or most of them) can be “explained” as due to the changing right ascension and declination of the Sun

- The fact that the Sun is lower in the sky in the winter than the summer
- The phenomena of the solstices and equinoxes
- The change in the length of the day
- It’s colder in the winter!

Important terms and concepts in the equatorial coordinate system

- Celestial equator
- North and south celestial pole
- Right ascension (coordinate like longitude, only units are hours, minutes)
- Declination (coordinate like latitude)
- Ecliptic
- Vernal equinox (sometimes called “the first point of Aries”)

Let’s use the SC1 chart to learn something about astronomy



Plot up the positions of the planets (in pencil!)

Current positions of the major planets

- Mercury: RA=19h11m, Dec=-22d
- Venus: RA=21h13m, Dec=-17.5d
- Mars: RA=8h52m, Dec=22.3d
- Jupiter: RA=22h20m, Dec=-11.3d
- Saturn: RA=12h19m, Dec=0.5d
- Uranus: RA=23h37m, Dec=-3.3d
- Neptune: RA=21h49m, Dec=-13.6d

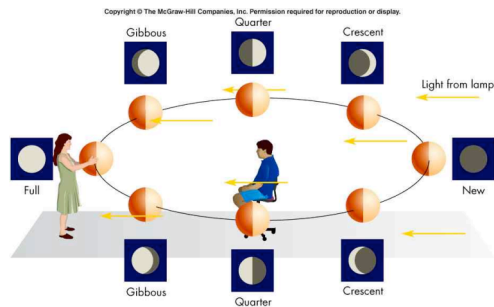
Where are they? Are there any systematic trends?

Before going to an explanation (what does it all mean?)

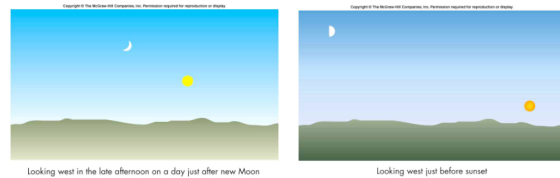


A description of the orbit of the Moon. Any opinions on where you can find the Moon in the sky?

The reason for phases of the Moon



Phases of the moon and position of the Sun



Phases of the moon

