Ch. 1 **Charting the Heavens**

I. Our Place in Space

A. Earth is not  in any way

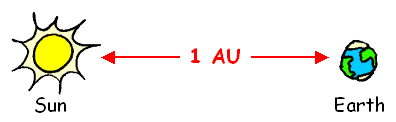
B. Most elements came from 

Exceptions: , \*helium

C. The Universe is !!!!

1. An **AU** is an **astronomical** :

Distance from the  to the 



2. A light year is the \* light travels in a yr. (6 miles!)

Ex/ How long does it take light to travel..

..from the Earth to the Moon? 

..from the Sun to the Earth? 

..from the Sun to Pluto?  *. .*from Alpha Centauri to Earth?



II. The Night Sky

A. Basic info

1. We can see about  stars w/

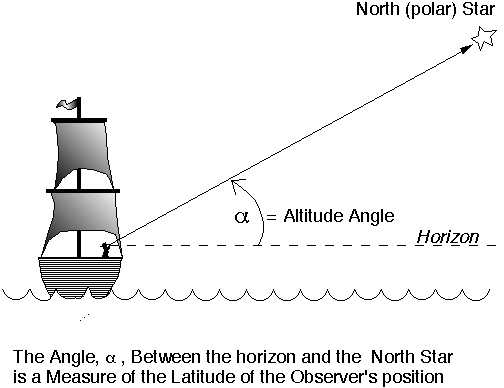
the naked eye on a clear night

2. The point directly above

our heads is called the 

3. The North Star can be used to find

your 



Name 

B. Constellations

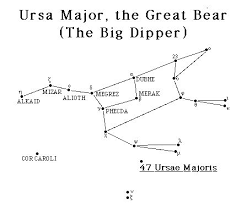
1. Interpretations of the sky varied by

culture Ex/ 

2. Stars are not physically 

3. Orion’s Belt and the Big Dipper

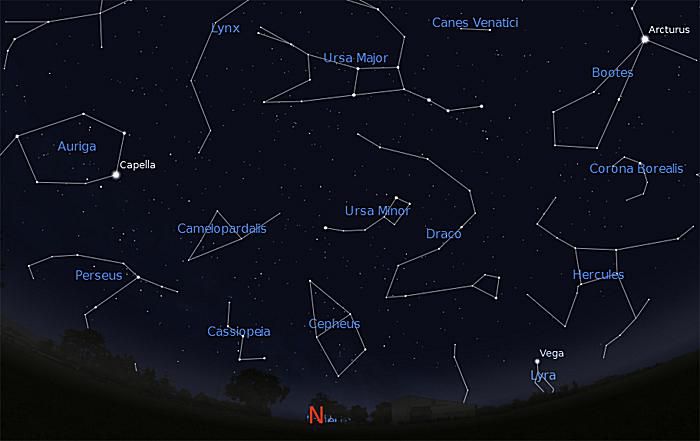
are examples of 



4. Every star is part of one (& only one)

of the  constellations

5. Ancient idea that is still useful



C. Individual stars have been helpful

for navigation, marking yearly

events, etc.. Ex 

D. Names of stars

1. Their home 

2. Rank of their 

Ex/ 

Greek Letters: Alpha, Beta,

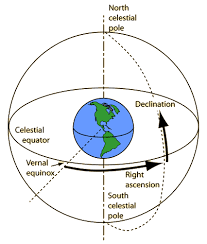
, Delta

E. The Celestial Sphere

1. An imaginary space globe around E

a. Ancient idea (pinholes)

b. Celestial equator; celestial poles



2. Coordinates

a.  (latitude)

Measured in 

b.  **ascension** (longitude)

Measured in hours, minutes, seconds

III. Earth’s Orbital Motion

A. Motion around Sun

1. Earth moves o

in days, so… ~ 0 each day

2. constellations

can be seen all year long

Ex/ 

The rest are **seasonal.**

Ex/ 

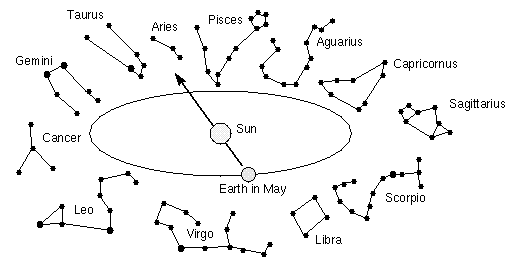
3. The : the Sun’s *imaginary* path through the sky. It’s a line through the sky where all the planets and the Moon are located. It’s where  occur!

4. The **ecliptic** passes through 

(actually 13) constellations

collectively known as the 

(\*not the brightest, oldest, etc..)



5. *Astrology:* The that events

in the heavens influence human events

Ex / Your personal horoscope

B. Earth’s 0 tilt \*know all

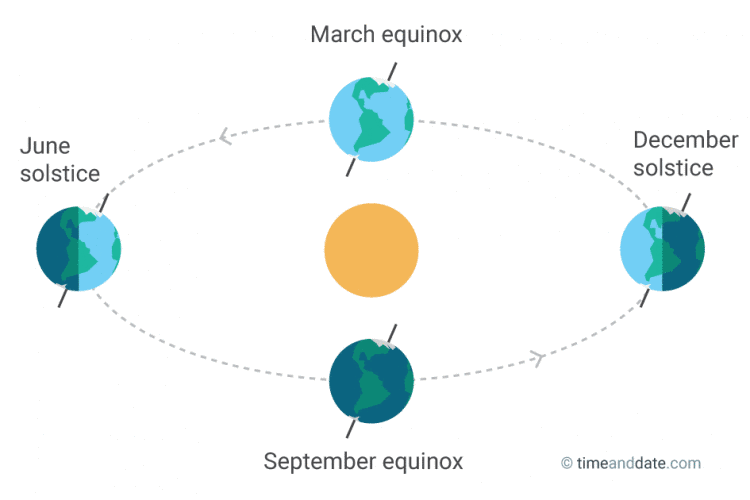
1. Causes the 

a. Summer, Winter  occurs when the Sun’s rays are farthest N and S

b. Fall, Spring 

i. Equal  and 

ii. Sun crosses the 



2.  of Sun in the sky

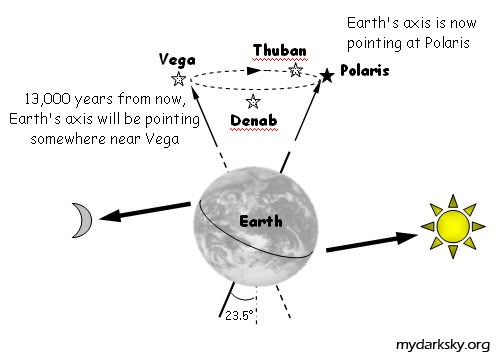
3. Length of 

4. Position of rising

and setting Sun on the 

C. **Precession**

1. Earth -  yr. “wobble”



2. Has an effect on our  -

months “drift” through

different 

3.  Star changes over time

Ex/  for the Egyptians

D. 2 Types of “Days”

1. \***Sidereal day**: Actual time it takes the Earth to spin once- \_hrs.  min.

2.  day (24 hr. day) – the

time from noon to noon.

IV. The Motion of the Moon

A. **Phases of the Moon**

1. The Moon’s motion in the sky

a. Moon moves its  each hour,

or about  0 degree (your thumb!)

b. But the Moon appears to move about

 degrees per hour due to the

2. Cycle of phases -  days

.

3.  (grows) and 

(diminishes) through…

New, crescent, quarter, gibbous, Full

\*New Moon really means  Moon!

4. \*Sidereal vs.  month

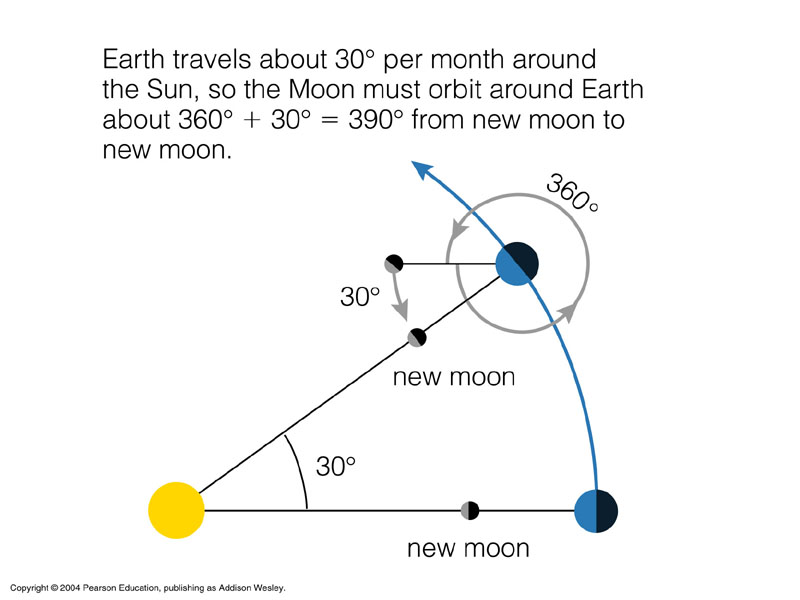
a. *Sidereal*: Actual time for Moon

to circle Earth (  days)

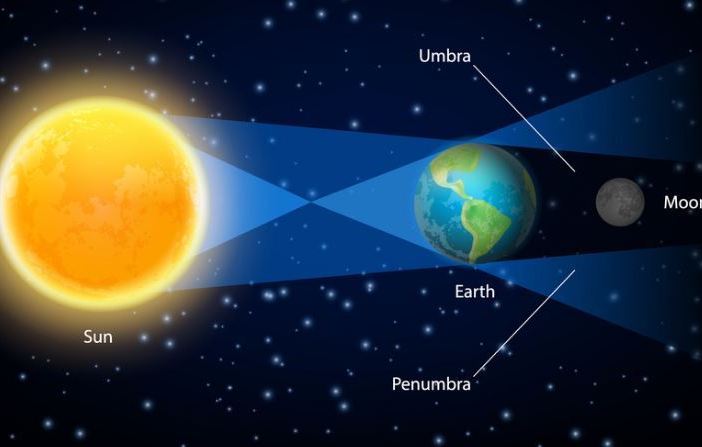
b. *Synodic*: Time to complete the cycle

of phases (29.5)

c. The difference occurs because the  is during that time!



B. **Lunar Eclipses**



1.Earth’s shadow on a  Moon

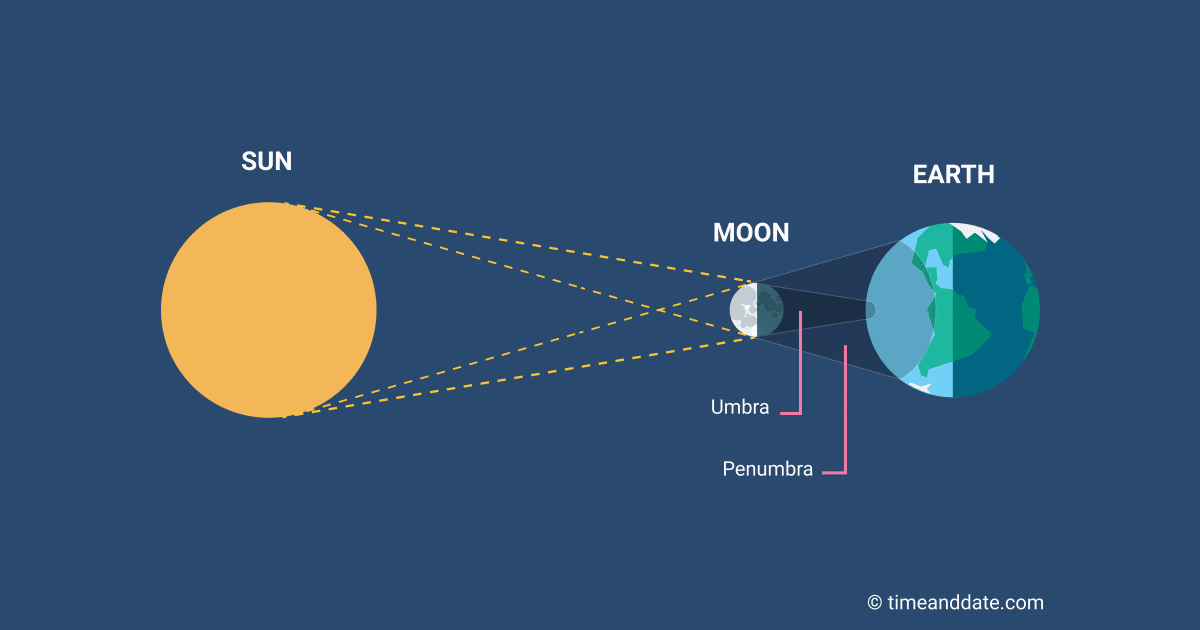
2.May be partial eclipse if not aligned

3. Entire night side of Earth sees it

4. .Max. time of eclipse: min.

5. tint common. Due to Earth’s

 acting as a filter.



C. **Solar Eclipses**

1. ’s shadow crosses Earth

2 May see planets, stars in the daytime!

3. Temp. may drop  degrees!!

4. Max. time of eclipse:  min.

5. Only time the Sun’s upper

atmosphere is visible – the 



6. Only small swath of Earth sees it.

7.  Dark part of shadow (total)

8. :Larger, lighter part

of the shadow (partial eclipse)

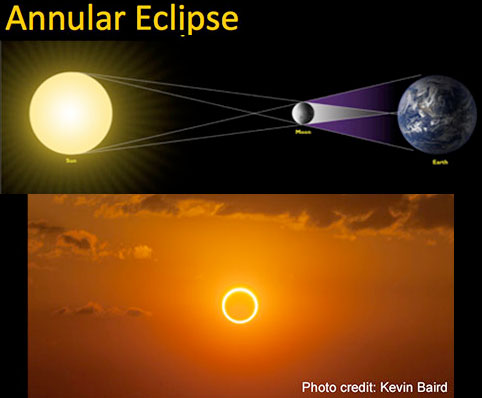
9. Sun  x larger, but  x farther!

10. **Annular eclipse**: Moon sometimes

too far (at \*) and too

small to completely cover the Sun.

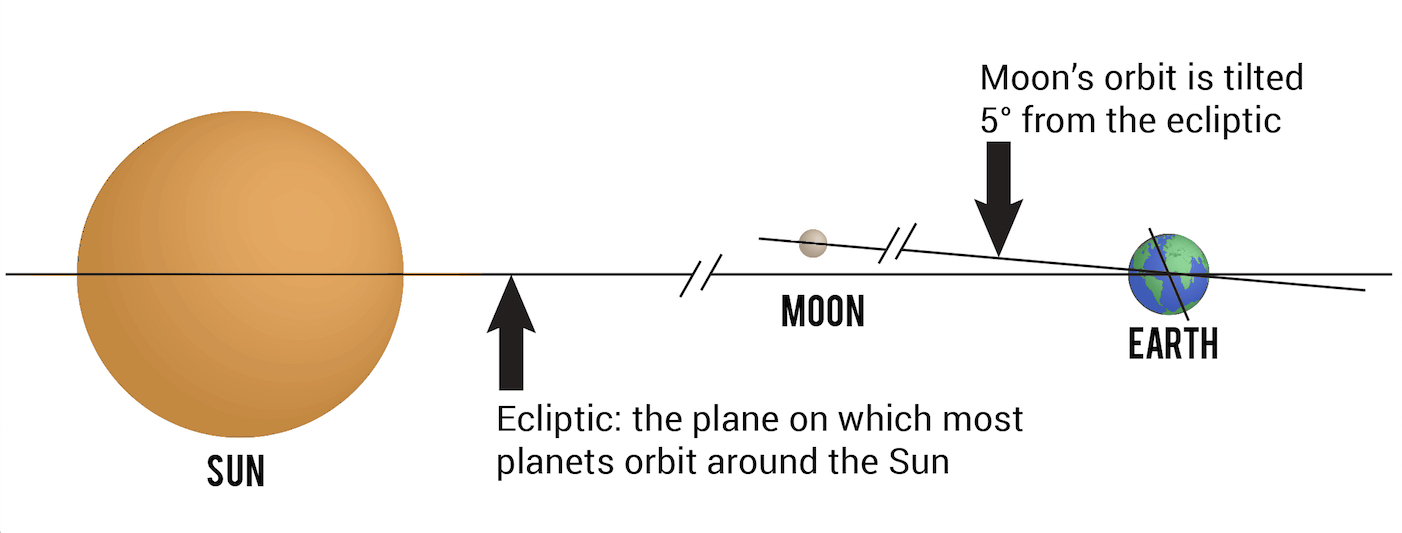
(**Perigee** -closest part of an orbit)



11. Frequency: Every to months

a. Moon’s orbit is  by  0

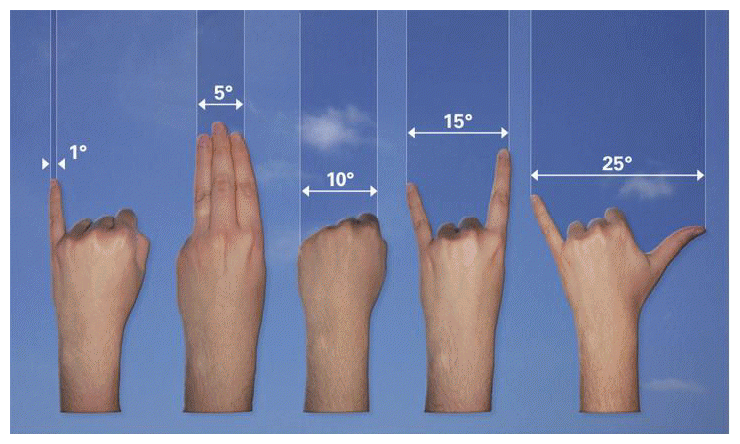
b. Eclipses only occur at 2 



V. Angular Measurements

A. Degree: 1800 from horizon to horizon

Ex/ Extended fist: ~ 0



B. Arc : 1/60th of a degree

Ex/ Sun, Moon: ’ or 0

C. Arc : 1/60th of arc min.

Ex/ Dime 1  away!

D. Actual  &

\_matter

Ex/ Coincidence of Sun, Moon

VI. Sizing Up Earth

A. Eratosthenes (Greece 200 B.C.)

B. Accurately estimated

Earth’s  !

1. Syene: No shadow at noon on a

particular day in the town well

2. Alexandria: angle of shadow 7.20

3. Ratio gave an estimate of 40,000km

4. Less than % error!!