

Lecture 9: September 13, 2010

- How much does Pike's Peak weigh?

Announcements:

Second homework is posted on website and is due next Monday, September 20.

Next Observatory opportunity is Tuesday, September 21

**Will meet at Fiske Planetarium
this Friday, 9/17**

Redo: find time with the Moon

Finding Latitude with the Sun

- Measure angle from horizon to Sun at maximum – while on the meridian.
- Subtract Declination of Sun on that date
- Subtract from 90 degrees

- Note use southern horizon in northern hemisphere and vice versa

Finding Latitude with the Stars

- Measure angle from horizon to star at maximum – while on the meridian.
- Subtract Declination of star
 - Use negative declination if star is in southern sky
- Subtract from 90 degrees

- Note use southern horizon in northern hemisphere and vice versa
- Watch for sign change in Southern Hemisphere

Finding Longitude with the Sun

- Must have clock and have it calibrated to a known time zone.
- Calculate time in Greenwich (Universal Time)
- Measure what time (UT) Sun crosses your meridian
- Subtract 12 from measured UT (military time)
- Multiply by 15
- Positive=West, Negative= East

Finding Longitude with the Stars

- Must have clock and have it calibrated to a known time zone. Must know date
- Calculate time in Greenwich (Universal Time)
- Measure what time (UT) star crosses your meridian
- Calculate or look up RA of Sun on that date
- Calculate when Sun will cross the meridian
 - Subtract RA of star from RA of Sun
 - Add that number of hours to star crossing time
- Subtract 12 from measured UT (military time)
- Multiply by 15
- Positive=West, Negative= East

3.2 The Ancient Roots of Science

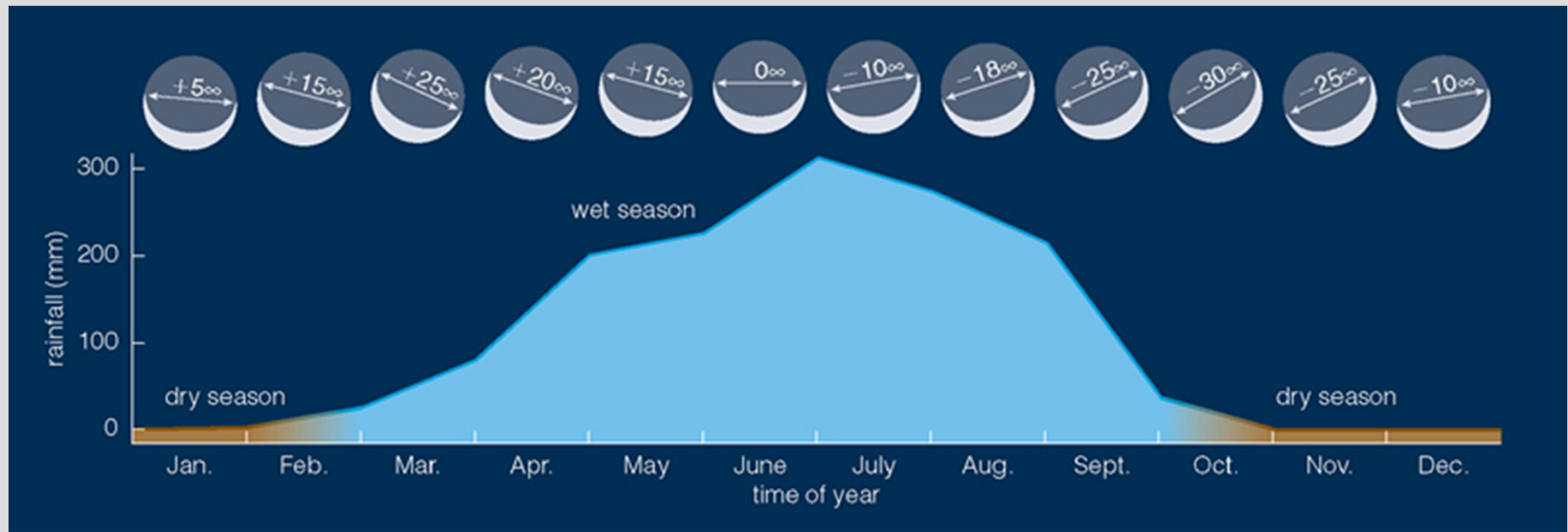
Our goals for learning:

- How is modern science rooted in ancient astronomical observations?
- Describe several impressive ancient astronomical accomplishments.

Ancient Astronomy

- Many cultures throughout the world practiced astronomy.
- They made careful observations of the sky.
- Over a period of time, they would notice the cyclic motions of:
 - Sun
 - Moon
 - planets
 - celestial sphere (stars)
 - Told of time of year, seasons, weather, etc.
Important to an agricultural/hunting lifestyle.

Central Africa



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Archaeologists have found a lunar calendar on an animal bone *circa* 6500 B.C.

Modern names - Ancient roots

<i>Object</i>	<i>Teutonic Name</i>	<i>English</i>	<i>French</i>	<i>Spanish</i>
Sun	Sun	Sunday	dimanche	domingo
Moon	Moon	Monday	lundi	lunes
Mars	Tiw	Tuesday	mardi	martes
Mercury	Woden	Wednesday	mercredi	miércoles
Jupiter	Thor	Thursday	jeudi	jueves
Venus	Fria	Friday	vendredi	viernes
Saturn	Saturn	Saturday	samedi	sábado

Planet = wanderer (Greek)

Month from moonth, lunar cycle

a.m. = ante meridiem

p.m. = post meridiem

A year from seasons and position of the Sun in the sky

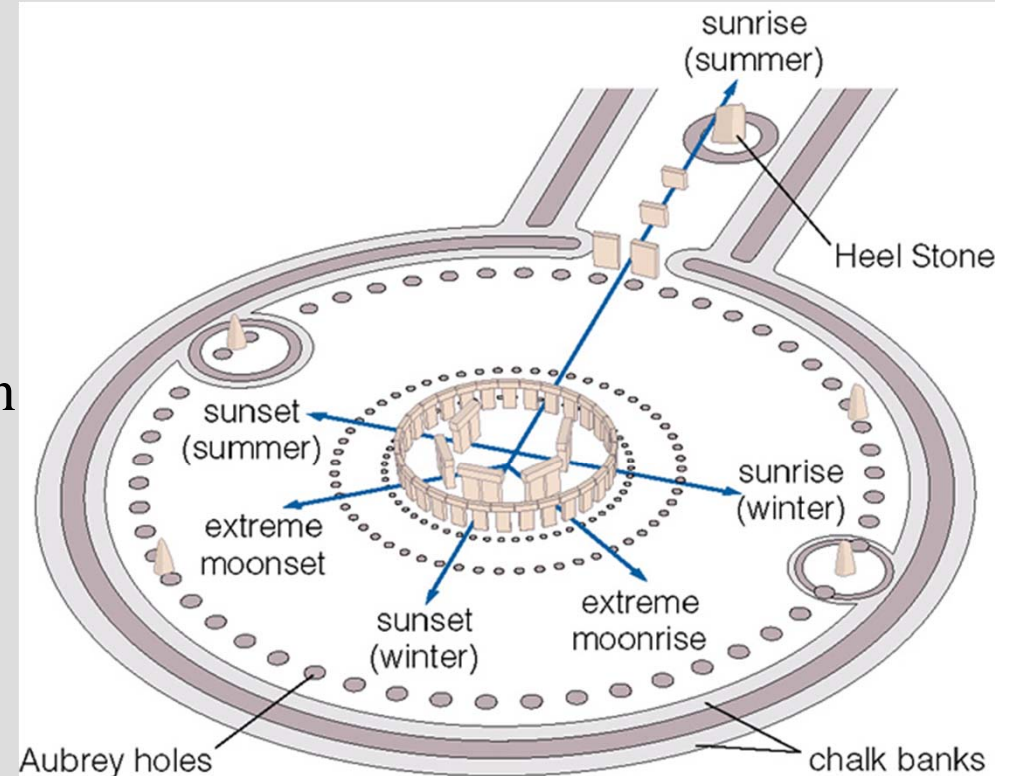
Seasons told by what stars are present

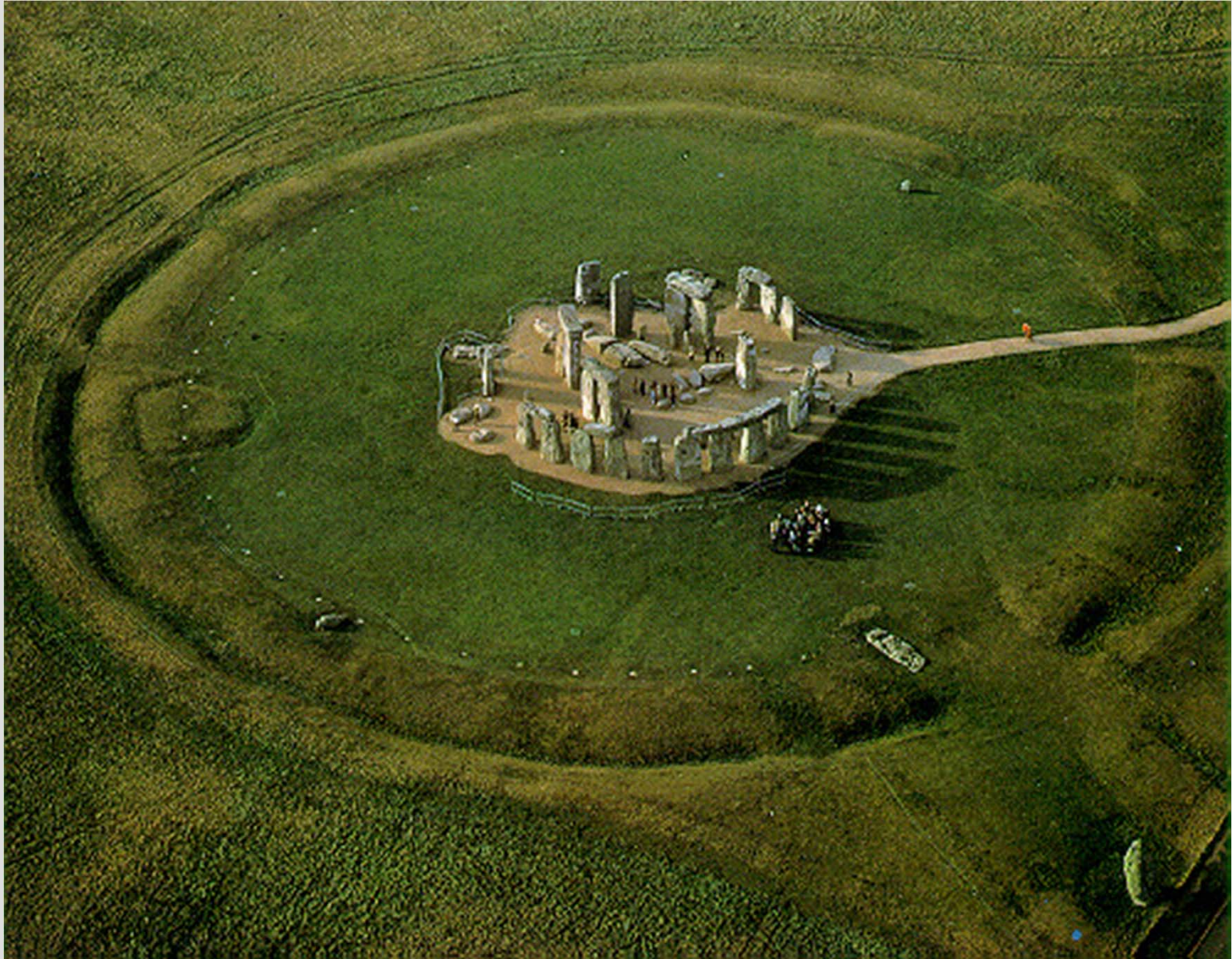
Egyptians divided the amount of daylight into 12 parts, hence a 12 hour cycle to our day.

Stonehenge (2750 - 1550 BC)

This famous structure in England was used as an observatory.

- If you stand in the middle:
 - the directions of sunrise & sunset on the solstices is marked.
 - the directions of extreme moon rise & set are marked.
- The Aubrey holes are believed to be an analog eclipse computer.





Mayans (fl. A.D. 400 – 1200)



the Observatory at Chichén Itzá

- lived in central America
- accurately predicted eclipses
- Venus was very important
- marked zenial passages
- Mayan mathematics
 - base 20 system
 - invented the concept of “zero”
- Most knowledge lost when conquistadors burned their writings.