THINGS YOU NEED TO KNOW FOR THE REGENTS

**CHAPTERS 10, 11 IN WORKBOOK**

Astronomy

Motions of Celestial Objects

* The **Celestial sphere** is a coordinate system for objects in the sky



* The movement of these objects is a **cyclical change**
* Earth rotates at 15o/hr which causes celestial objects to move at that rate
* **Suns Path Diagrams**





The sun is always in the southern part of the sky at noon in the continental US.

Winter: sunrise SE, sunset SW; Summer: sunrise NE, sunset NW.

Spring and Fall: sunrise E, sunset W

Seasons

* Tilt of the Earth and revolution cause the seasons
	+ Earth is tilted 23.5o



* Angle of Insolation
	+ Direct rays (90o ; vertical) of the sun hit the Earth between the latitudes of 23.5oN (summer, June 21) and 23.5oS (winter, Dec. 21) . Equinoxes: direct rays at the Equator
	+ The greater the angle of insolation, the greater the intensity of insolation (the higher the sun is in the sky, the more intense the sunlight)
	+ This varying angle of insolation results in seasons
	+ Altitude of the noontime sun on the solstices and the equinoxes can be calculated using the following formula:

**90o – latitude of the observer + tilt of 23.5o or zero = altitude of noon sun**

* Revolution
	+ Earth revolves around the Sun at a rate of approximately 1o per day – 365 days in a year, 360o in a full circle

Moon

* Moon phases



Waning crescent

waning gibbous

* It takes 27 1/3 days for the moon to complete one full revolution. This is called a **Sidereal Month**
* It takes 29.5 days for the moon to complete a full cycle of phases. This is called a **Synodic Month**
* **The difference between a sidereal month and a synodic month is due to the fact that the Earth is revolving around the Sun while the moon is revolving around the Earth**
* Eclipses
	+ An eclipse is named after the object that is blocked from our view from Earth
	+ A **lunar eclipse** occurs when the Earth’s shadow blocks out the moon during a full moon phase
	+ A **solar eclipse** occurs when the moon blocks out the Sun during a new moon phase

***Lunar Eclipse***



***Solar Eclipse***



* Tides
	+ Tides are affected mostly by the gravitational pull exerted on Earth from the moon. However, the Sun contributes to affect the tides to a lesser degree
	+ A **Spring Tide** results in the tides on earth being the highest high tides and lowest low tides. This is the largest differencebetween high tide and low tide. The moon is in either a **New moon or Full moon** phase during this time.
	+ A **Neap Tide** results in the tides on earth being the lowest high tides and highest low tides. This is the smallest difference between high tide and low tide. The moon is in either a **First Quarter or Last Quarter** phase during this time.



* Models of the Solar System
	+ Geocentric – Earth in the center



* + Heliocentric – Sun in the center



* Eccentricity = the degree of elongation of an ellipse
	+ Formula: e = distance between foci/length of the major axis
* Orbital Speed and Gravitational Attraction
	+ Highest during the position of the orbit in which the planet is closest to the gravitational force (at perihelion—when Earth is closest to the sun); lowest at aphelion (Earth farther from the sun)
* Kepler’s Laws
	+ Planets travel on an *elliptical* orbit around the Sun, not a circular orbit
	+ Equal swept area over equal time
	+ As distance from the Sun increases, the orbital period of the planet uniformly increases
* Big Bang Theory
	+ Origin of the Universe
		- The universe is constantly expanding
			* Doppler effect – Observers from Earth notice a **redshift** of celestial bodies indicating that they are moving *away* from us
			* Background microwave radiation is suspected to be left over from the initial big bang
* Stars
	+ Begin as balls of gas and dust and accumulate as gravitational force pulls the particles together (protostar)
	+ Not classified as a “star” until capable of nuclear fusion
	+ Stars convert nuclear fusion 🡪 electromagnetic energy
	+ Lifecycle of a star depends upon whether a star has low mass or high mass



* Stars are classified by luminosity and temperature
	+ Chart can be found on page 15 of the ESRT
* Planets (pg 15 ESRT)
	+ Terrestrial (Earth-like)
	+ Jovian (Jupiter-like)