

Key

Astronomy Final Review

Know the following vocabulary words:

- asteroids - Irregular rocky bodies (Iron + nickel)
- asteroid belt - between Jupiter + Mars
- autumnal equinox
- background radiation - low energy microwave radiation left over from Big Bang
- big bang - 13.8 billion years ago - creation of universe
- black hole - end stage of a supermassive star
- Coriolis effect
- comets - Ice + gas - highly elliptical orbits originate from Kuiper belt
- constellations - groups of stars
- craters - Caused by impact
- cyclic tides - pattern repeats b/c lunar cycle (29.5 days/peats)
- Doppler effect - red shift vs. blue shift
- eccentricity - $e = \frac{d}{a}$ $e = 0 - 1$
- ellipse - not a perfect sphere
- focus (foci) - one of the points inside an ellipse (one is always the sun in our S.S.)
- full moon
- galaxy - billions of stars
- geocentric - earth centered
- gravitation - $F = G \frac{m_1 m_2}{d^2}$
- Jovian - gas giants (Jupiter, Saturn, Uranus, Neptune)
- luminosity - how bright a star is
- lunar eclipse - Earth's shadow on moon
- heliocentric - sun centered
- H-R diagram - P_V is EIKT (Fusing)
- main sequence - 90% of a star's life cycle (H \rightarrow He)
- meteors - chunks broken off from asteroids
- moon
- neap tide - low high + high low (lowest range)
- new moon - occurs when moon is positioned between Earth + sun
- neutron star - end stage of a massive star's life
- nuclear fusion - process where you combine light \rightarrow heavy elements to create energy in stars ($4H \rightarrow 1He + \text{light}$)
- quarter moon
- red giant
- red shift - evidence of universe expanding - spectral lines shift to red end spectrum
- revolution - length of year
- rotation
- sunspots
- solar eclipse - when the Earth falls into the moon's shadow

Sept 21st
- 23rd

moon falls in Earth's shadow

chunks broken off from asteroids

Old age (more numerous but shorter length of day)

434

- solar system
 - summer solstice - June 21st
 - super giant - more luminous + larger stars in their old age
 - spring tides - greatest tidal range (high high, low, low)
 - terrestrial planets - Mercury, Venus, Earth, Mars - made of rock
 - vernal equinox - March 21-23
 - white dwarf - end stage of an average mass star. (dimmer but hotter)
 - winter solstice
 - zenith - Dec 21st
- 90° (above your head!)

Be able to answer the following questions:

1. Know the difference between rotation and revolution.

15°/hr rotation (daily) revolution = 1 year = 1°/day
(360°/365 days)

2. How do the stars move around Polaris? How would the stars move around Polaris if the Earth did not rotate?

Circular Arc @ 15°/hr (stay stationary)

3. What is the relationship between the altitude of Polaris and the latitude of the observer?

As Alt ↑, Latitude ↑

4. Be able to recognize the phases of the moon given a diagram of the Earth, Moon and Sun.



5. What causes moon phases?

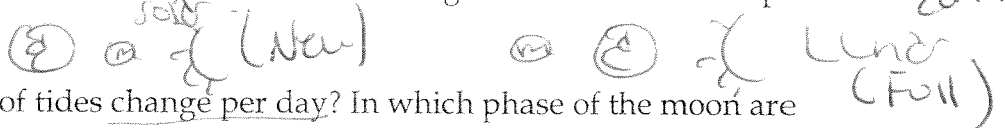
The revolution of moon around Earth

and different % of the illuminated moon being visible

6. How does the relative size of the moon compare with the Earth?

moon diameter / Earth diameter = $\frac{3476 \text{ km}}{12756 \text{ km}} = 0.27$ (1/3 size of Earth)

7. Know the positions of the Earth, Moon and Sun during a lunar and solar eclipse.



8. How does the pattern of tides change per day? In which phase of the moon are the tides the strongest?

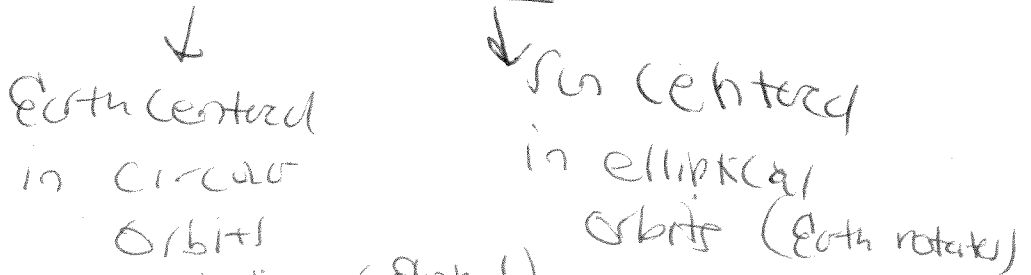
50 min later each day

Spring tides: New + Full
Neap tides: 1st + last quarter

2h, 2 low

12.25 hr tmin apart.

9. Be able to differentiate between the Geocentric and Heliocentric models of the solar system.



10. Know how to use the Earth Science reference tables to answer questions about the characteristics of planets.

ex. 1. How long does it take Venus to revolve around the Sun? 224.7 days

ex. 2. Which planet has the most moons?

(use eqn for mass)

Jupiter, why? Most massive so it has the greatest gravitational force.

(317x more massive than Earth)

11. When is the gravitational attraction between two objects the greatest?

$F_g = \frac{(m_1)(m_2)}{d^2}$
 ↑ mass ↑ Force
 ↓ distance ↓ Force
 Closest together + most massive the largest!

12. When do planets move the slowest and the fastest within their orbit?

Closest to star = fastest furthest = slowest

13. Which planets take the longest to orbit (revolve) around the sun?

(Jupiter)

Furthest out (EIRT)

(Neptune Uranus Jupiter)

14. Know how to calculate the eccentricity of a planet's orbit. What is the eccentricity of a circle?

$e = 0$
 $e = \frac{d}{L}$ - distance between foci / length of major axis.



15. In which season is the Sun the farthest from us? the closest? Be able to diagram the tilt of the Earth relative to the vertical sun's rays during summer vs. winter.

furthest (aphelion) = Summer / July
 closest (perihelion) = Winter / January

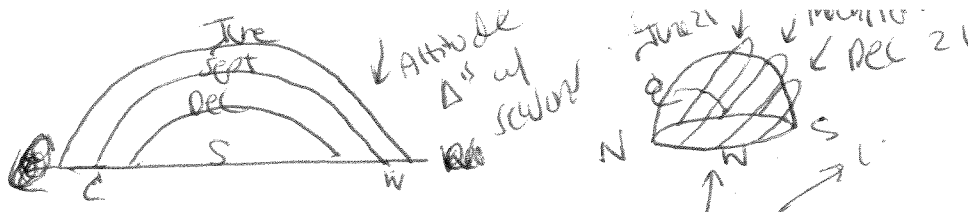
Tilt (23.5°)

16. What two things cause seasons?

revolution around the Sun

17. Know the differences between the seasons- dates, length of daylight, location of sun's zenith (directly overhead), angle of sunlight and relative length of shadow.

Season	Date	Sun Zenith	Angle of Sunlight
Summer Solstice	June 21 st	at 23.5° N	(lowest angle in NYS ~ 71°)
Autumnal Equinox	Sept 21 - 23	at 0°	(mid angle in NYS ~ 48°)
Winter Solstice	Dec. 21 st	at 23.5° S	(lowest angle in NYS ~ 25°)
Vernal Equinox	March 21 - 23 rd	at 0°	(mid angle in NYS ~ 48°)



18. Be able to interpret a diagram of the sun's path and locate how the sun would appear to move across the sky during the summer and winter solstices and the equinoxes.

(Celestial Sphere)

19. In which direction does the sun rise and set? What causes this? How many degrees per hour does the sun move through the sky?

150/hr

E + W (b/c Earth can rotate W → E)

20. When does the sun rise exactly in the East and set in the West?

Equinox

21. Where does the sun rise and set in summer and winter? How would that change if you lived south of the equator?

It wouldn't

It rises NE in summer + SE in winter

22. How does the position of the noon sun in the New Paltz sky change throughout the year?

↑ Alt from Dec 21st → June 21st
 ↓ Alt from June 21st → Dec 21st

23. Why does the sun shine?

24. What is the age of the Earth and the solar system?

4.6 billion

25. What are the types of galaxies?

Spiral, Elliptical, Irregular
 Our Milky Way

26. Using the reference tables, be able to determine information from the H-R diagram such as the temperature, color and luminosity of stars.

at size ↑ luminosity ↑ (E S R T pg 15) * L ↑
 cool = red hot = blue ↑ Temp for Main Seq ↓ Temp

27. Know how the evolution of blue giants differs from the evolution of a small to medium star. What are the final stages of a star's life?

+ Small / low stars end up as white dwarfs
 Large / massive stars - Neutron star or Black hole
 Cosmic background radiation

28. What is the evidence of the big bang theory?

~ 13.7 - 13.3 billion years ago. red shift + (moving away)

29. How does the Coriolis Effect change the direction of winds and ocean currents in the Northern Hemisphere?

30. What causes the Coriolis Effect?

Earth's rotation

Not on winter term

Astronomy RED HOT Study Tips

The sun rises in the east and sets in the west. The stars follow the same path as the sun.

The sun moves about 15 degrees per hour. (360 degrees in 24 hours). The sun's apparent motion around the earth is due to the earth's rotation.

The stars follow a circular path around Polaris.

The first model of the solar system was the geocentric model. This placed the earth in the center of the universe with the sun and stars circling around it.

The model accepted today is the heliocentric model which puts the sun in the center of the solar system and the planets revolving around it.

The earth is tilted 23.5 degrees on its axis. It takes 24 hours for the earth to complete one rotation. It takes one year for the earth to complete one revolution around the sun.

The altitude of Polaris is equal to your latitude.

During the equinox there is an equal amount of daylight and night at every location on earth. During the equinox the noon sun is located directly above the celestial equator.

In the northern hemisphere the longest hours of daylight occurs on June 21. The shortest hours of daylight occur on December 21 (first day of winter).

On June 21 the direct rays of the sun are on the Tropic of Cancer.

On the equinox the direct rays are on the equator.

On December 21 the direct rays are on the Tropic of Capricorn.

All planets orbit the sun in the shape of an ellipse. The eccentricity of an ellipse describes how round or flat the orbit is.

Rounder orbits have a number closer to 0.0, while flatter orbits have a number closer to 1.0. (According to the E.S.R.T. the eccentricity of earth's orbit is 0.017 - a slightly eccentric ellipse.)

The gravitational attraction between 2 bodies in space increases as they get closer (or gain mass) and decrease as they get farther apart (or lose mass).

The closer a planet is to the sun, the faster it revolves (because its gravitational attraction is greater).

The phases of the moon are caused by the different amounts of sunlight reflected off the moon's surface as it revolves around us.

Four moons equal the size of the Earth.

The solar eclipse is when the moon is in front of the sun during a new moon.

The lunar eclipse occurs when the Earth's shadow falls on the moon during a full moon.

The craters on the moon were caused by impact from meteors and asteroids.

Only a small portion of the energy given off by the sun is visible to humans (visible light). Other energies include X-rays and Gamma rays (high frequency, short wavelength, dangerous) and infrared or AC generator waves (lower frequency, longer wavelength, safer).

The angle at which the sun's rays strike the earth's surface is called the angle of insolation.

When the sun is directly overhead it is called zenith.

Solar rays that strike the earth's surface at a 90 degree angle are called direct or vertical rays.

The Earth's shape is slightly oval (oblate spheroid) but in a scale model on a page or a photo the Earth appears perfectly round.

The evidence for the big bang is the red shift and background radiation.

The Coriolis effect is caused by the Earth's rotation.

The Coriolis effect bends winds and ocean currents to the right in the Northern Hemisphere.