

Review Answers for GSC 1580
Exam #2

** This review is intended to aid you in the study process for your second exam. Questions on the exam will be based off of lecture which is the focus of this review. Please be advised that questions on the exam will not be carbon copies of questions on this review. Therefore, understanding of concepts will require for certain questions more than just memory. Please feel free to email the professor with any questions: jbakermaloney@gmail.com****

Know the current order of the eight planets. (See slides)
How big are the planets compared to the space between their orbits?

The planets are very small compared to the orbits between them.

Which planets are terrestrial?

Mercury, Venus, Earth, and Mars

Which planets are Jovian?

Jupiter, Saturn, Uranus, and Neptune

Which planets are classified as the small planets?

Mercury, Venus, Earth, and Mars

Which planets are classified as the large planets?

Jupiter, Saturn, Uranus, Neptune

Name the inner planets.

Mercury, Venus, Earth, and Mars

Name the outer planets.

Jupiter, Saturn, Uranus, and Neptune

Name the inferior planets.

Mercury and Venus

Name the superior planets.

Mars, Jupiter, Saturn, Uranus, and Neptune

How many Mercury's would make 1 Earth?

What rank by size is Mercury?

Eighth largest or smallest.

How many Earth days is 1 mercury year?

88 Years

What is so unusual about the orbit of Mercury?

For every two Mercury Years there are three Mercury Rotations and one sunrise to sunrise day.

What rank by temperature is Mercury?

Second Warmest.

What is a season on Mercury like?

There are no seasons Mercury has no tilt.

What unusual effect would a person standing on Mercury observe when looking at the Sun.

The Sun would rise in the east and at its highest position appear to back up in the sky and then go forward again to set in the west. (i.e. Retrograde motion)

Does Mercury have an atmosphere?

thin to none.

What unusual feature did Mariner 10 photograph on Mercury?

Stress lines that indicate Mercury may be shrinking or did shrink at one time called rupes.

What is the name of the current mission to Mercury?

Messenger

Is it possible to observe mercury with the naked eye ?

Yes.

Why is Venus considered Earth's sister?

Venus and the Earth have similar size, diameter, and Mass

What rank by size is Venus?

Sixth largest planet

What rank by temperature is Venus?

Warmest Planet in the Solar System

What prevents Venus's heat from escaping?

Greenhouse effect

Does Venus have observable phases?

Yes.

Where is Venus located in your sky near the date of your exam?

Look it up !

Know the three conditions in order for a celestial body to be considered a planet.

1. Must orbit Sun.
2. Must have enough of an effective gravitational field to be round.
3. Must not share its orbital center with any other object other than the Sun.
i.e. Cleared it's neighborhood around it.

Why is Pluto not considered a planet?

It has not cleared it's neighborhood around it.

What rank by size is Mars?

Seventh Largest Planet

What is the interior of Mars probably like?

Cool interior, less dense than Earth and probably Iron-nickel core.

Name four large features of Mars.

Tharsis Montes, Olympus Mons, Hellas Planitia, and Valles Marineris

Which of the four in the question above is the region where a giant impact crater is found?

Hellas Planitia

What is the composition of Mar's atmosphere?

Mostly Carbon Dioxide.

What is the name of the largest volcano in the Solar System?

Olympus Mons

What are the names of the three rovers on Mars right now?

Spirit, Opportunity, and Sojourner

Who first announced observations of "canali" on Mars?

Giovanni Schiaparelli

Which astronomer mapped out the canals on Mars?

Percival Lowell

How many satellites (moons) orbit Mars and what are the names?

Mars currently has 2 satellites named Phobos and Deimos.

Astronomers propose that Phobos and Deimos are probably what type of bodies?

Captured Asteroids.

Which of Martian moon is closest to the surface of Mars?

Phobos

What is Valles Marineris?

A huge gash in Mars sorta like the grand canyon but not formed by water.

What is the composition of an asteroid?

Mostly carbons, some silicates and some iron .

What is the name of the largest asteroid and how big in diameter is it?

Ceres

How many Earth's would be needed to make one Jupiter sized planet?

1400 Earths

How many Earth years is one Jupiter year?

1 Jupiter year = 12 Earth years.

If Jupiter was about 10x's as massive what could it have become?

A star.

Does Jupiter have a surface?

Probably not.

What is the composition of Jupiter?

87% Hydrogen 12% Helium

What are the names of the dark bands and light bands found in Jupiter's atmosphere?

Dark bands are belts where gas sinks.
Light bands are zones where gas is rising.

What is the name of the giant storm in the atmosphere of Jupiter ?

The Great Red Spot

What are the names of the four Galilean moons?

Io, Callisto, Europa, and Ganymede

What is the composition of Jupiter's rings?

Mostly dust and rocky debris from Io.

What is the largest moon in the solar system?

Ganymede

What is the most volcanically active moon in the solar system?

Io

Which of Jupiter's moons acts like an electrical generator?

Io

Which of Jupiter's moon's has a thin atmosphere possibly of ozone?

Europa and Ganymede

What comet broke up into 20 pieces and slammed into Jupiter in 1994?

Comet Shoemaker-Levy

What is the composition of Saturn?

75% Hydrogen
25% Helium

What is the composition of the top layers of Saturn's clouds?

Mostly ammonia which makes it look very colorless (bland).

What is so strange about Saturn's rotational period?

It was detected to vary when the Galileo satellite approached.

Who first observed the rings of Saturn and thought they were handles?

Galileo

How many ring divisions are there?

7 divisions (A-G)

What is the Roche limit?

No satellite can exist closer to a planet than 2.44x its radius from the surface.

Why is Titan of great interest to astronomer's?

Possible building blocks of amino acids present which may be the building blocks of organic life.

What mission is currently investigating Saturn and its moon Titan?

Cassini/Huygens

What is so unusual about the rotation of Uranus around the Sun and its axis?

It is tilted to 98 degrees on its axis and rolls like a bowling ball.

What is the composition of Uranus?

83% Hydrogen
15% Helium

What is so unusual about Miranda?

It looks as if it was once broken and then put back together.

How many Earth years is the equivalent of 21 Martian years?

It takes Mars 1.8 Earth Years to go around the sun therefore to reach 21 Martian Years you would need $1.8 \times 21 = 37.8$ Earth Years.

What strange material is thought to exist in the interior of Jupiter?

Fluid Metallic Hydrogen

Name all the planets with rings in orbit around them.

Jupiter, Saturn, Uranus, and Neptune

What is Mars named for?

The God of War

What are asteroids called that are found in an orbit slightly ahead and slightly behind Jupiter?

Trojan Asteroids

What satellite (moon) of Jupiter consists of a thin smooth outer layer of water ice and is thought to contain liquid water underneath?

Europa

Don't forget that Saturn has a lower density than water.

What satellite (moon) of Saturn has liquid water geysers that have been seen by the Cassini mission?

Enceladus

How many moon's currently orbit Neptune?

13

What is different about the discovery of the planet Neptune compared to the other planets?

It was discovered by math first then observed.

What is the Kuiper Belt?

A disk like area just past Neptune's orbit where icy objects are found.

What is the name of the proposed mission to Pluto?

New Horizons

Currently how many satellites (moons) does Pluto have?

4 (Charon, Hydra, Nix, P4)

What unusual feature of Neptune appeared in 1989 and then disappeared mysteriously in 1994?

The great dark spot

Understand that luminous objects produce light and that light is electromagnetic radiation.

Define electromagnetic radiation:

A self-propagating energy from the disturbance of a changing coupled electric field and magnetic field that travels as both a wave and a particle without the need of a medium.

What is a wave?

Any periodic repeating pattern of disturbance in any medium.

Light propagates at the speed of light through a vacuum what is that speed?

$c = 3.00 \times 10^8$ m/s or 299,297,458 m/s

What is a wavelength?

The distance between crests or troughs of a wave.

What is a frequency?

Number of oscillations per second. Unit is measured in hertz (Hz)

Remember Electromagnetic Radiation needs no medium to propagate through.

Name the different waves that make up the electromagnetic spectrum from shortest wavelength (highest energy) to longest wavelength (lowest energy).

Gamma, X-Ray, UV, visible, Infrared, Microwave, Radio

What is a photon?

Elementary particle that carries a packet of energy.

What is the most abundant element in the Universe?

Hydrogen

What is the 2nd most abundant element in the Universe?

Helium

Name the colors of the visible spectrum from shortest wavelength to longest wavelength.

Violet, Indigo, Blue, Green, Yellow, Orange, Red

Define apparent brightness: how bright an object appears to the eye dependent on its distance and energy per unit time.

Define luminosity: amount of energy a body radiates per unit time.

Define apparent visual magnitude: the brightness of a star as seen from Earth given on a logarithmic scale where small numbers indicate brightest stars and large numbers indicate dimmest stars.

What is the faintest apparent visual magnitude the naked eye can resolve?

+6.0

What is the faintest apparent visual magnitude the Hubble Telescope can resolve?

+30.0

How much intensity change is there between each magnitude?

Intensity changes by 2.512 times.

How much intensity change is there between each 5 magnitudes?

Intensity changes by 100 times.

What is the apparent visual magnitude of Vega?

+0.0

Define absolute visual magnitude: apparent magnitude that a star would have at a distance of 10.0 pc away.

Define spectral analysis: method for determining the effective temperatures of the stars which use the absorption of certain wavelengths of a spectrum of electromagnetic radiation.

Define temperature: the average internal motion energy of a particle.

Define effective temperature: temperature of a star in the upper atmosphere and upper layer of the star.

What scale is temperature measured in? Kelvin (K)

What is Wein's Law?

Smaller the wavelength the higher the temperature.

Remember the hotter the bluer...the cooler the redder.

Remember the three types of spectrum.

Continuous spectrum: A gas excited to emit light will radiate at all wavelengths.

Emission spectrum: particular wavelengths of light that are emitted when electrons transition back down to their ground state.

Absorption spectrum: result when radiation passes through a cooler gas and that gas absorbs certain wavelengths of light creating dark bands in the continuous spectrum.

Luminosity of stars are measured in what unit?

Solar Luminosity, $1 L_{\odot}$

How much of the Sun is hydrogen (by mass)? 74%

How much of the Sun is helium (by mass)? 25%

In astronomy any element in a star that is not hydrogen or helium is called what?

A metal.

What happens in the core of the Sun?

Thermonuclear fusion creates hydrogen into helium

What occurs in the radiative zone of the Sun?

Dense area above the core where photons bounce off or are absorbed by other particles.

How long can it take one photon to reach the top layer of the Sun?

16 million years

What happens in the convective zone?

Photons ride packets of rising hot gases that get cooler on their way to the surface. Think about a boiling pot of water.

What is granulation?

Fine structures of bright grains covering the photosphere of the Sun which are caused by convection currents from the convective zone.

Remember the Sun does not rotate as a rigid body.

Understand every step of the proton proton chain and be able to explain those steps. (see sun slides)

What is the surface layer of the Sun called?

Photosphere

What are the two areas of the Sun's atmosphere called?
Chromosphere and Corona

What is the solar cycle?
Pattern of sunspot activity that fluctuates every 11 years.

How can solar flares and coronal mass ejections affect the earth?
If strong enough they can knock out electrical grids and interrupt communications.

What are sunspots?
Areas where the magnetic field lines of the Sun bulge out from the surface and block the hotter gases in that area. This creates cooler patches on the Sun that appear darker than the rest of the surface.

Star A has a magnitude of +1.3 and Star B has a magnitude of -2.0. How much brighter is one star over the other?

$$\text{Dimmer} - \text{Brighter} = 1.3 - (-2.0) = 3.3$$

$$2.512^{3.3} = 20.89$$

Star B is 20.89 times brighter than Star A.

Star A has a magnitude of -26.0 and Star B has a magnitude of -12.0. How much brighter is one star over the other?

$$\text{Dimmer} - \text{Brighter} = -12.0 - (-26.0) = 14$$

$$2.512^{14} = 398359$$

Star A is 398359 times brighter than Star B.

Star A has a magnitude of +0.0 and Star B has a magnitude of +15.0. How much brighter is one star over the other?

$$\text{Dimmer} - \text{Brighter} = 15 - 0 = 15$$

$$2.512^{15} = 1000678$$

Star A is 1000678 times brighter than Star B.