

Review for GSC 1580
Exam #1

** This review is intended to aid you in the study process for your first exam. A lot of the questions on this review mirror the study questions given in class however, not all the study question answers will be found in this review. Questions on the exam will be based off of lecture which is the focus of this review and your study questions. However, be aware that there may be questions on the exam that may not be a part of this review or your study questions. 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:
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What is the celestial sphere?

The celestial sphere is the model of an imaginary sphere that surrounds Earth that astronomers use to describe star position and motion.

What is the celestial equator?

The celestial equator is the imaginary circle on the celestial sphere that runs parallel to the Earth's equator.

What is the North Celestial Pole (NCP) and the South Celestial Pole (SCP)?

These are the imaginary markers of the Northern most and Southern most points on the celestial sphere which align to the geographical North and South poles on Earth.

What is the zenith?

The point directly above the observer at 90 degrees from the horizon.

What is the nadir?

The point directly below the observer at -90 degrees from the horizon.

Where is the horizon?

The horizon is located at 0 degrees. It is the line at which the sky meets the ground.

Where is the celestial meridian?

The celestial meridian is the imaginary line drawn from the northern horizon through the NCP and Zenith down to the southern horizon.

Know how to draw the local celestial sphere for any northern latitude and understand how to find the NCP, Celestial Equator, Horizon, and Celestial Meridian. (study examples from class)

What path do the stars take on the celestial sphere.

Star motion is from East to West around the NCP and SCP, and parallel to the celestial equator.

Where are the stars located at their highest altitude above the horizon?

The celestial meridian

The path that defines the Sun's motion on the celestial sphere is called the what?

The Ecliptic

The ecliptic is tilted to what angle to the celestial equator?

23.5 degrees

During what date is the sun at its highest altitude & lowest altitude?

Highest	summer solstice
Lowest	winter solstice

During what dates does the ecliptic cross the celestial equator?

vernal equinox
autumnal equinox

The approximate latitude and longitude of Somewhere, USA is 40.0° N and 83.05° W. At what altitude can the celestial equator be found from the horizon in Somewhere, USA.

Celestial Equator Altitude = $90 - \text{observers latitude}$

Celestial Equator Altitude = $90 - 40.0 = 50.0$ S

How far above the horizon is the sun at noon on the summer solstice (use info from above)

Highest altitude = Celestial Equator + $23.5 = 73.5$ S

How far above the horizon is the sun at noon on the winter solstice (use info from above).

Lowest altitude = Celestial Equator - $23.5 = 26.5$ S

During the vernal and autumnal equinox how far above the horizon is the sun (use info from above).

Sun is intersecting celestial equator so for Somewhere, USA it would be 50.0 S

At what altitude can the NCP be found (use info from above).

Altitude of NCP = Observers latitude
Altitude of NCP = 40.0 N

Define diurnal motion.

The apparent daily motion of the stars, planets, and Sun in the sky.

Define an asterism.

A grouping of stars that may be found within another constellation or consist of stars from several different constellations.

Name the circumpolar constellations.

Ursa Major
Ursa Minor
Cassiopeia
Cepheus
Camelopardalis
Draco

What is the North star called?

Polaris

How many stars can be seen with the unaided eye?

Few thousand stars

How many stars are estimated to exist in the observable Universe?

70 sextillion

Define Constellation.

A group of stars visibly related to each other that move in a fixed imaginary pattern across the sky from East to West.

How many official constellations are there?

88

How many constellations officially lie within the area of the zodiac?

There are 13 constellations that are within the band of the zodiac.

What purpose did the constellations serve during ancient astronomical time?

Constellations divided the sky up into mapped sections and were used for calendars and human survival.

Be able to explain why there are two types of day the Solar Day and Sidereal Day (see lecture #2 slides.)

How many constellations did the ancient astronomers map in the sky?

Ancient astronomers mapped 50 patterns in the sky.

How many constellations did modern astronomers add to the celestial sphere?

Modern astronomers mapped another 38.

Name some well known asterisms.

Big Dipper, Little Dipper, Orion's belt, Summer and Winter Triangle.

What is the terminator?

The line that defines night and day that slowly creeps across the Earth over the 24 hour rotation.

When the Earth is at its closest approach to the Sun it is said to be at what position?

Perihelion

When the Earth is at its furthest approach to the Sun it is said to be at what position?

Aphelion

When the Earth is closest to the Sun what season is it in the Northern Hemisphere? Why?

It is winter when perihelion occurs. This is because the Northern Hemisphere is tilted away from the Sun and light rays that reach the Earth's surface are more spread out hence less intense.

The first observations of the sky that are recorded by ancient man were observations of what? How were they recorded?

Phases of the moon. They were recorded on animal bones.

What was ancient man concerned with most when viewing the sky?

Time, Calendar of the seasons, Human Survival, and mysticism.

The first people recorded to notice that there were "wandering stars" in the sky were?

Mesopotamians

The Chinese took century long observations of what phenomena?

Eclipses

What are the set of 12 (or 13) constellations found in the plane of the ecliptic called?

The Zodiac

Name the ancient 12 constellations that make up the zodiac region.

Cancer	Capricorn
Libra	Scorpius
Sagittarius	Aquarius
Pisces	Virgo
Taurus	Leo
Gemini	Aries

Be able to give four pieces of evidence that the Earth is spherical as discussed in lecture (see lecture 1 slides.)

Name the 13th zodiac constellation that was left out due to size.

Ophiuchus

What word is a derivative for the Greeks word for the “wandering stars”?

Planet

The apparent motion of a planet to back up in the sky and then move forward again is called what?

Retrograde Motion

Name three pre-modern models of celestial movement.

Crystalline Sphere Model
Epicyle Model (Ptolemaic Model)
Copernican Model

The Earth centered theory where the Earth is fixed and the Sun, Moon, planets, and stars revolve around the Earth is called the what?

Geocentric System

The Sun centered theory where the Earth, Moon, and, planets revolve around the Sun is called what?

Heliocentric System

The first Greek to formalize the crystalline sphere model was?

Pythagoras

Plato is known for his platonic solids. What solid shape represents the Universe according to Plato?

Dodecahedron

Who changed the crystal sphere model to include 55 minor spheres?

Aristotle

What did Aristotle explain caused the movement of the concentric spheres of his model?

The Prime Mover

Who was the first to suggest the heliocentric system for the Solar System?

Aristarchus

Why was Aristarchus's idea of the heliocentric model ignored?

Parallax of close star's was not correctly accounted for in this theory.

What is parallax?

The apparent difference in position of a body (such as a close star) as seen from some point on the earth's surface over a six month span.

Can the unaided eye see parallax of stars?

No.

Can a telescope be used to record parallax of nearby stars?

Yes.

What was Eratosthenes important contribution to astronomy?

Measured a pretty accurate size of the Earth's circumference.

In what book did Ptolemy first suggest his theories on the motion of celestial bodies?

Almagest

What model of celestial motion is accredited to Ptolemy?

Epicycle Model

What great work did Copernicus write that explained the heliocentric model?

On the Revolutions of the Celestial Orbs

Tycho Brahe believed Copernicus's heliocentric model was incorrect. What model did Brahe support?

Geocentric Theory

What planet did Brahe make very accurate observations of to aid in Kepler's laws of orbital motion?

Mars

State Kepler's first, second, and third Laws.

First Law: Planets move in elliptical orbits with the Sun at one focus of the ellipse.

Second Law: The orbital speed of a planet varies so that a line joining the Sun and the Planet will sweep over equal areas in equal time intervals.

Third Law: The amount of time a planet takes to orbit the Sun is related to its orbit size, such that the period, P , squared is proportional to the semi-major axis, a , cubed.

What is a force?

A push or pull on an object with mass.

Who is credited with the invention of the telescope?

Hans Lippershey

What did Galileo call the four bodies he saw orbiting Jupiter?

Medicean Stars

Inertia is a tendency for a body to remain in motion.

State Newton's first, second, and third Laws.

Newton's First Law – A body continues in a state of rest or motion in a straight line at a constant speed unless made to change that state by forces acting on it.

Newton's Second Law- The amount of acceleration that a force can produce depends on the mass of the object being accelerated.

Newton's Third Law – When two objects interact they create equal and opposite forces on each other.

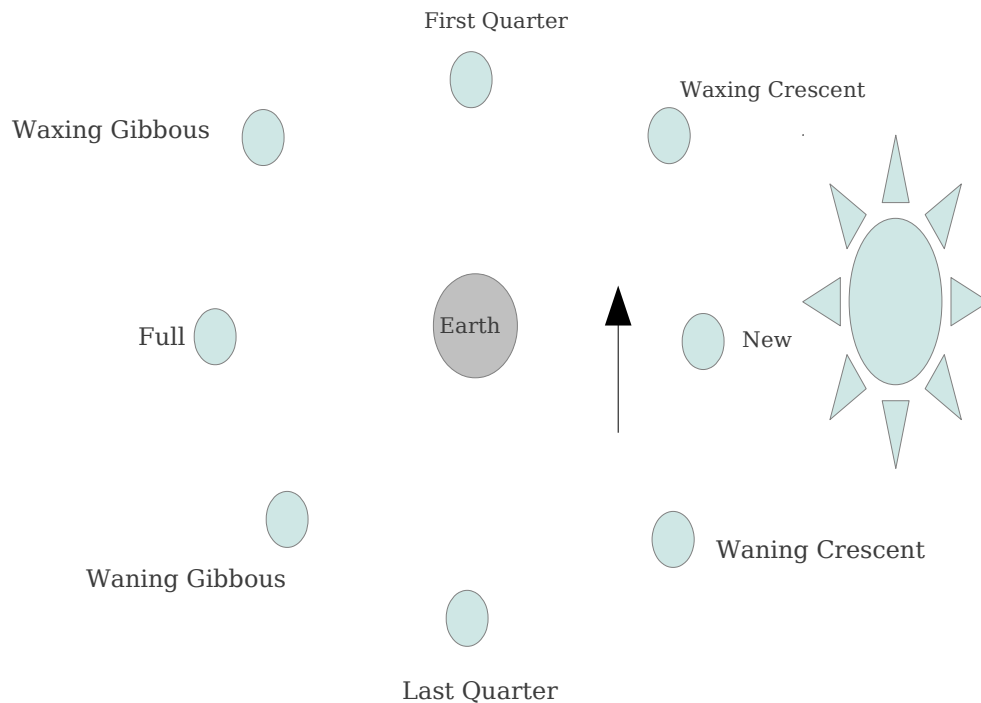
State Newton's Law of Gravitation.

Every mass exerts a force of attraction on every other mass. The strength of the force is directly proportional to the product of the masses divided by the square of the separation.

Who is thought to be the first notable woman astronomer ?

Hypatia of Alexandria

Make sure you know all phases of the moon as well as the shapes that represent those phases. These are only the positions not the shapes find those on the slides.



What theory of moon formation explains that the Moon was once a part of the Earth and due to an early rapidly spinning Earth was separated from the Earth near the Pacific Ocean basin ?

Fission Theory

The Capture Theory claims the moon was formed how ?

Moon was originally formed elsewhere in the Solar System and was grabbed by the Earth's gravitational pull.

The Condensation Theory claims the moon was formed how?

Moon and Earth condensed separately from nebula gases within the same area.

The most widely accepted theory of moon formation is what theory ?

Giant Impactor Theory

What percentage is the moon's diameter compared to the Earth's diameter?

27%

How many moon masses would be needed to make one Earth?

81

How long is a sidereal month ?

27.321 days

How long is a synodic month ?

29 days 12 hours 44 min 2.8 sec.

The Moon's orbit is tilted to the plane of the Earth by how much ?

5 degrees

What is the moon's rotational period around it's axis?

Same as the synodic month

The only side we ever see of the moon is ?

Near side

How much of the moon surface can an observer record over one synodic month ?

Approx. 60%

What is the edge of light that appears to creep gradually across the moon called ?

Terminator

When the moon is waxing is the moon growing or diminishing in light?

Growing in light

When the moon is waning is the moon growing or diminishing in light?

Diminishing in light

What phase is the moon in conjunction with the Sun and Earth?

New Moon

What phases is the moon at syzygy?

New and Full Moon

What phases is the moon at quadrature?

First Quarter and Last Quarter

The New moon represents what "age" or day for the lunar cycle?

0 days

At what phase does the moon lag behind the Sun by 6 hours?

First Quarter

At what phase is the moon ahead of the Sun by 6 hours?

Last Quarter

Know what times each major phase of the moon rises and sets. (see slides lecture #3)

Know the current phase of the moon the night before your exam.

Either go outside and look or look up this info on-line.

Earthshine is created by what process?

A double reflection of the Earth reflecting light onto the moon and then the moon reflecting back toward the Earth.

What is the term for the closest distance between the Earth and the Moon?

perigee

What is the exact alignment that must occur for a lunar eclipse?

Sun-Earth-Moon

The Earth's shadow has two parts what are they?

Penumbra and Umbra

Name the three types of lunar eclipses.

Penumbral Eclipse, Partial Eclipse, and Total Eclipse

What is the exact alignment that must occur for a Solar eclipse?

Sun-Moon-Earth

Name the three types of Solar eclipses?

Partial Eclipse, Total Eclipse, and Annular Eclipse

What is the moon's distance when an Annular eclipse occurs?

Furthest from Earth or Apogee

What is the name of the powdery substance covering the moon's surface?

Regolith

How much surface gravity does the moon have compared to the Earth?

$1/6^{\text{th}}$ of the Earth's gravitational pull.

Be able to explain the difference between a neap tide and a spring tide.