

## Review Sheet for Astronomy Exam 1

Scientific Notation – what is the proper format

Significant Figures – when are/aren't numbers significant, proper rounding

Introduction to the Sky

Basic motions of objects in the sky – daily, monthly, seasonally

Celestial Sphere

Celestial Equator

Celestial North/South Pole

Polaris – position, height above horizon

Constellation

Circumpolar objects

Zenith

Declination (degrees, minutes, seconds)

Right Ascension (hours, minutes, seconds)

Small Angle formula -  $S=R \Theta 0.0175$

Meridian

Those “angle” problems – given a latitude can you find the height of an object given the declination or the declination given the height above the horizon

Motion of the Sun

Seasons

Equinox - Vernal, Autumnal

Solstice - Winter, Summer

Motion of the Sun relative to the Celestial Sphere

Ecliptic

Variation of the declination of the Sun

Tilt of Earth's axis = 23.5 degrees

Cause of Seasons

Tropics of Cancer, Capricorn

Zodiac

Precession of the Earth's rotation axis

Solar day and Sidereal day

Motion of the Moon

Phases

New, Waxing Crescent, First Quarter, Waxing Gibbous,

Full, Waning Gibbous, 3rd (last) Quarter, Waning Crescent

Rising, setting, on your meridian problems

Moon's Sidereal period = orbital period = rotation period = 27.3 days

Moon's Synodic Period = phases period = 29.5 days

Tides

Neap Tides

Spring Tides

Lunar Eclipse

Phase of Moon

Arrangement of Earth, Sun, Moon

Umbra, Penumbra shadows

Types – partial, penumbral, total (umbral)

Solar Eclipse

Phase of Moon

Arrangement of Earth, Sun, Moon

Path of totality

Diamond Ring Effect

Types - Total, Annular, Partial

Motions of Planets - History of Science and Astronomy

Scientific Method

Hypothesis

Theory

Law

Motions of the planets as seen from the Earth – retrograde motions

Early assumptions

Geocentric

Uniform, circular motions

Aristotle's model - geocentric spheres, no observed stellar parallax

Hipparchus' model - deferents, epicycles, eccentric

Ptolemy's model - equants, deferents, epicycles, *Almagest*

Astronomy in other cultures

Nicolaus Copernicus - heliocentric model, circular, epicycles

Tycho Brahe – observations

Johannes Kepler

3 Laws of Planetary Motion

1. Planets move in elliptical orbits with the Sun at one foci

Perihelion, aphelion, Astronomical Unit (AU)

2. Planets move faster at perihelion

3.  $P^2 = k a^3$

Galileo Galilei - telescope observations

Isaac Newton

3 Laws of Motion

1. Law of inertia

2.  $F=ma$

3. Equal and opposite

Universal Law of Gravity

$$F = \frac{GM_1M_2}{R^2}$$

Planetary Configurations

Superior Planets

East/West Quadrature, Opposition, Conjunction

Inferior Planets

Inferior Conjunction, Superior Conjunction,

Greatest Eastern/Western Elongation

## Light

Wavelength

Frequency

Speed of light =  $c$

$c = \lambda f$

Spectrum of Light -

Radio, Microwave, Infrared, Visible (ROYGBIV), Ultraviolet, X-ray,  
gamma-ray

Light Particles - Photons

Energy of a photon

$$E = hf = \frac{hc}{\lambda}$$

Light - Atom interactions

Ground state, Excitation (excited), ionization (ionized)

Spectrum - Kirchhoff's Laws

Continuous

Emission

Absorption

Black body properties

Energy - temperature relations

Wien's Law

$$\lambda_{\max} = \frac{0.0029}{T}$$

Stefan-Boltzmann law

$$E_{\text{total}} = \sigma T^4$$

Doppler Effect – redshift, blueshift

Telescopes

Functions

Collect light, resolve features, magnify objects

Refracting - lenses

Reflecting - Parabolas

Optical Telescopes – GTC, Keck, LBT, VLT, SALT

Radio telescopes - Arecibo, VLA

Satellites - IRAS, Spitzer, Herschel, WISE, IUE, Galex,

Chandra, Integral, Swift, Fermi,

Hubble Space Telescope

Innovations - Interferometry, CCD, Adaptive Optics