

This summarizes most, but not necessarily all, topics that will be on the exam

Relations that you should understand. These will not be provided on the exam.

$$F = GMm / D^2 \quad \theta = W / D \quad \text{speed} = w f \quad E = h f$$

Specific topics you should know well:

- * law of Gravitation; how the force changes with mass and/or distance (center-to-center)
- * how does gravity/weight depend upon a planet's mass/radius; what is g on Earth (units)
- * escape velocity (what is it for Earth); what causes tides; why is Earth's rotation slowing
- * why does amplitude of tide depend on lunar phase; why 2 high/low tides per day
- * why do orbiting objects not crash into the Earth; why must they be at high elevations

- * how can light interacts with matter (4 ways); what gives an object its color
- * understand emission, absorption, transmission, reflection; reflection versus scattering
- * relation between wave speed, wavelength and frequency (units); photons, energy of
- * electromagnetic radiation; order of (E, f, w) for electromagnetic spectrum, visible light
- * atomic components, location, charge; atomic number; element, molecule, ion, isotope
- * 3 phases of matter; what is a plasma; melting; evaporation; dissociation; ionization
- * electron transitions in an atom; ground vs. excited states; photon emission, absorption
- * what is meant by chemical fingerprint; 3 types of spectra; how could each be generated
- * thermal radiation; 2 properties of; how can this be used to determine temperature
- * Doppler effect; how relative velocity affects wave frequency, wavelength, speed
- * how can motion be inferred from a spectrum; red shift versus blue shift

- * telescopes; refracting vs. reflecting; why are most modern ones reflecting; refraction
- * light collecting area, angular resolution - dependence on telescope size and wavelength
- * imaging; spectroscopy; timing; examples of each; the CHARA Array (what is it)
- * diffraction limit; why ground based observatories often don't achieve this
- * how does atmosphere affect observations; what is adaptive optics; light pollution
- * what light can be observed from the ground; which only in space;
- * properties of a good observing site; advantages of observing in space
- * how do X-ray telescopes focus light; what is the James Webb Space Telescope
- * interferometry; what determines its angular resolution

- * understand what are Sun, planets, asteroids, comets; their composition; order from Sun
- * distinguishing characteristics of terrestrial and jovian planets
- * why is mercury so hot; why is Venus even hotter; what's the greenhouse effect
- * what makes up Saturn's rings; where/what are the asteroid belt, Kuiper belt, Oort cloud
- * what is Jupiter's great red spot; orbital/rotational alignment of most planets; exceptions
- * why was Pluto demoted; where are most asteroids, comets found; which is Pluto like
- * what 4 things must a Solar System formation scenario explain