

**Astro 10 Sections 105, 112, 103, and 114**  
**Final Review Questions**

Explain how the properties of light allow one to essentially look back in time in our universe.

Write 684.5, 2365982, 0.324, and 0.00681 in scientific notation. Convert  $5.54 \times 10^{-5}$  and  $8.314 \times 10^6$  to numerals.

Construct a spectral diagram from gamma rays to radio waves. Compare their size and discuss how astronomers use each wavelength.

What are absorption lines and emission lines?

If you're listening to KALX at 90.7 FM, what is the station's wavelength?

If you're on your boat moving at 20 km/hour and you're riding over waves at 3 cycles/sec, what are the waves' wavelengths?

Refer to the diagram on page 142 of your reader. If the atom is in level 2 and receives 4 units of energy, will it jump energy levels? To what level will it move? If the atom moves from level 6 to level 4, can its energy be absorbed by another atom in level 2?

How do we determine the chemical composition of stars?

Explain the Doppler effect. What is a redshift?

Use Wien's law to determine the surface temperature of a star with a peak wavelength of 7500 Angstroms. If the star were three times hotter, what would be its peak wavelength?

A star is the same size of the Sun, but with a surface temperature four times that of the sun. What is its luminosity? What if the Star is also twice the size of the Sun?

What is spherical aberration?

You have a telescope with a 12 cm mirror and can use it to barely see the binary star Alberio. How big of a telescope would you need to see star Mateu which is 100 times fainter?

Why does the North Star, Polaris, never set? Why do we never see the Southern Cross in Berkeley?

Why do we have a summer and winter solstice, autumnal and vernal equinox?

Orion is overhead at 10pm in January. When will it be overhead in July? Will you see it?

Explain the retrograde motion of Mars.

Mars has a semimajor axis of 1.5 A.U. What is its period of rotation?

What would your weight be on Mars?

Compare and contrast the properties of terrestrial and Jovian planets. Explain how these properties effect conditions on each planet.

Explain what a Roche limit is and how it effects the formation of rings around a planet.

How were planets found around other stars?

Explain Kuiper-Belt objects.

In general, understand the basic properties of terrestrial planets, Jovian planets, planetary satellites, comets, asteroids, meteoroids. Know major examples.

What is a sunspot? How is it caused? What is a sunspot cycle?

Explain tides on Earth.

Explain what causes solar eclipses? Why don't they happen every month?

What is the distance to a star whose parallax is 0.75 arc seconds? If a star had a distance of 10 Mpc, what is its parallax?

If the Sun were 25 times brighter than it is now, what would be its distance?

In a binary system in which one object is 10 times more massive than the other object, by what factor is object one closer to the center of mass?

Explain what open clusters and globular clusters are.

Inspect and understand the H-R diagram.

Draw timelines of a star's lifetime with mass of the star  $<1.4 M_{\odot}$ ,  $>1.4 M_{\odot}$  and  $<3.0 M_{\odot}$ ,  $>3.0 M_{\odot}$ .  $M_{\odot}$  is the mass of the sun.

Discuss the differences between a nova and supernova.

What are the differences between type Ia and type II supernova?

Explain the synthesis of heavy elements.

Explain how solar eclipses and binary pulsars provided evidence to support Einstein's theory of relativity.

How would the gravitational force on the surface of a star change if the star shrunk to two thirds its original diameter?

Explain the evolution of a black hole. When exactly does it become a black hole? If the black hole is 10 times the mass of the sun, what is its Schwarzschild radius?

What are the four types of nebulae? What makes each one unique?

How was it discovered we were not in the center of our galaxy?

Explain the differences between spiral and elliptical galaxies.

What is the Copernican revolution?

What is a gravitational lens? What does it do? How do we see the effects of a gravitational lens?

What unique conditions come together to form a quasar? How does this differ from an active galaxy?

How do we find supermassive black holes at the center of galaxies?

Explain the implications of Hubble's Law.

**Go through all of the equations listed on the front page of the midterms. Understand what each term means. Which terms are constant? Of the variable terms, what does raising or lowering each do to the other variables?**

**Review all the homeworks, quizzes, and midterms. Work through the sample final.**

**Good Luck!**

What is  $\Lambda$ ? Does it exist?

What is  $\Omega$ ? What is the geometry and fate of the universe if  $\Omega < 1$ ,  $\Omega > 1$ ,  $\Omega = 1$ ?

How might we determine the geometry of the universe and thus the value of  $\Omega$ ?

What is a big crunch? What else is this called?

What evidence is there to support the idea that the universe began in hot big bang?

What is background radiation? What does its existence imply?

What is inflation? How does this theory help to explain problems in the original big bang?

Explain the concept of superstring theories.