

Physics 174 Study Guide for Exam I

13 October, 2006

The actual exam will consist only of multiple choice questions. An exam consisting of short-answer and essay questions would be preferable, but grading it quickly in a class this size is not practical. If the exam were to take this form, it would include questions like those below. If you can answer those questions, you should do well on the exam. You should also make use of the Concept Checks in the textbook, along with the Self-tests in the back of each chapter we have covered.

Sample questions:

What needs drove the development of astronomy in the earliest stages of human civilization?

Given a latitude on Earth:

What is the altitude of the celestial pole above the horizon?

How high above the horizon is the celestial equator where it crosses the meridian?

How high does the Sun get on the longest day of the year? The shortest?

Describe and explain the phases of the Moon as it completes one orbit of Earth.

When and why do eclipses occur?

Describe the path of the Sun with respect to the background stars.

What causes the seasons?

How did Egyptian and Mesopotamian astronomy differ, and why?

How did Mesopotamian and Greek astronomy differ, and why?

List the accomplishments most important to astronomy of any of the following:

The Milesian school

The Pythagoreans

The Rationalists

The Alexandrians

Describe the contributions of any of these early philosophers:

Thales

Empedocles

Aristotle

Aristarchus

Eratosthenes

Hipparchus

Ptolemy

What is an arche? Give some historical examples of attempts to identify it.

Give five arguments for a spherical Earth.

How did Eratosthenes measure the circumference of the Earth? You don't have to use any numbers.

Explain how Aristarchus estimated the relative distances of the Sun and Moon. You don't have to use any numbers, but it would be helpful to explain why his estimate was inaccurate.

Describe the motion and behavior of a superior planet with respect to the background stars.

How do the following theories account for the behavior of the planets? What do they not explain?

The homocentric spheres introduced by Eudoxus

The geocentric model of Ptolemy

The heliocentric model of Copernicus

Compare the Ptolemaic and Copernican systems in terms of the accuracy of their predictions and the ease of computation. What Neoplatonic beliefs led some people to support the Copernican system?

What happened when the lost Greek classics were reintroduced to Christian Europe?

List Galileo's key observations and how they contradicted prevailing beliefs about the heavens.

What were Tycho Brahe's biggest contributions to astronomy?

Describe Kepler's Laws.

Describe Newton's Laws of Motion.

Describe Newton's Law of Universal Gravitation.

Draw a simple wave. Illustrate what the wavelength is. What are frequency and period? How are these quantities related?

What are the components of the electromagnetic spectrum, in order of increasing wavelength (decreasing frequency)? Which side of the spectrum corresponds to the most energetic photons?

How does a wave behave when it encounters a boundary between two media? In other words, what might a wave do at a boundary?

What are reflecting and refracting telescopes?

Why would astronomers want to launch telescopes into Earth orbit?

What advantage does interferometry provide?

What is a blackbody?

How are the temperature of a blackbody and the wavelength of maximum intensity related?

How does the total energy emitted per unit area from a blackbody depend on its temperature?

Why do gravitation and light intensity follow inverse square laws?

What is albedo?

What are Kirchhoff's Laws?

Quantum mechanics states that the energies of atoms and molecules are quantized. How does this allow astronomers to identify elements and compounds on objects we can study only by observation?

What is a Doppler shift, and how does it work?