

Name (1pt):

Physics 20083 - Spring 2007 Final A

Instructions:

1. Answer 11 of the following 12 questions in the space provided. If you need extra space, please use the back of the page and make an appropriate notation on the front of the page so that I will know where to look for your complete answer.
2. Clearly indicate with a big "X" which question you do not want me to grade. Allow time when you are finished for me to double-check your exam to ensure you have clearly marked a question for omission and that you have answered 11 questions and not accidentally skipped a page. If you do not clearly mark a question out, I will grade the first 11 you answered.
2. Each question is worth a total of 9 points.
3. Each question requires an answer that is typically no more than two or three sentences long or perhaps a diagram and 1-2 sentences. Some questions do not require explanations. This will always be explicitly stated.
4. You may not use your own paper, book, notes or a calculator for this exam.
5. You will have 2 hours and 30 minutes to complete the exam and turn it in.

1. Why do stars twinkle while planets do not?

2. Two possible theories proposed to explain the Sun's luminosity were gravity-related. First, some thought that the Sun was shrinking slowly, turning its gravitational energy into heat. Second, some thought that meteors and other debris were striking the Sun, the impacts delivering enough energy to provide its heat. Explain the evidence or arguments against each of these two ideas.

3. Explain how and why ionization species are related to the temperature of a gas.

4. If a star has weak Hydrogen lines, there are three possible reasons for this. Name and briefly explain each one.

5. Explain how and why we can distinguish interstellar absorption lines from ordinary stellar absorption lines in stellar spectra.

6. Astronomers observe an eclipsing binary system at a great distance so that the two stars appear as a single blob of light. Explain what we would need to measure and how we would go about determining the mass of the central star in the system, assuming it is much more massive than its companion, which is in a roughly circular orbit.

7. Why do we see no green stars?

8. Explain the evidence in the rotation curve of our galaxy that leads us to believe about 90% of the matter in our galaxy is dark matter. A graph would help here.

9. What are "ghost" gamma-ray bursters (GRB's), and what is the accepted explanation for why these GRB's are different from ordinary GRB's.

10. For part (a) of this question, explain how and why the metallicity of a star is related to its age. For part (b), suppose we are considering the low mass, red main sequence star known as Barnard's Star, one of the closest stars to our own Sun. Would you guess that this star has a higher metallicity than our Sun? Lower metallicity? Or can it not be determined? Explain your answer.

11. Describe the distribution of quasars in the visible Universe. Explain why this distribution does or does not violate the Copernican Principle.

12. Using a Hubble diagram to help, explain how Astronomers hoped to use Hubble's Law to estimate the density of the Universe. Describe and explain what a high density vs low density Universe would look like on a Hubble diagram.

