

Exam

Name _____

Rules for the take home exam:

You may use your notes and textbook. You may not talk about the exam with other students. You may not get answers from other students. If any cheating is discovered both students involved will get zeros on the exam. Use the spaces provided on the exam to answer the questions. Please be as neat as possible. (3 points each)

1) Why do spiral arms have a blue color? 1) _____

2) *Process of Science*: How did scientists determine the location of the center of the Milky Way, and why had they been wrong in their previous estimate (where they placed the Sun near the center)? 2) _____

3) Could our Sun ever undergo a nova or a white-dwarf supernova event? Why or why not? 3) _____

4) Briefly describe how a nova event occurs. 4) _____

5) Briefly describe what you would see if your friend plunged into a black hole. 5) _____

6) Why would Earth's orbit be unaffected were the Sun to suddenly become a black hole? 6) _____

7) *Process of Science*: How were neutron stars discovered? 7) _____

8) Lithium, beryllium, and boron are elements with atomic number 3, 4, and 5, respectively. Even though they are three of the five simplest elements, why are they rare compared to many heavier elements? 8) _____

9) What are the three types of pressure that can push against the inward force of gravity? Explain what causes each pressure and where it would be likely to occur. 9) _____

10) Briefly summarize the stages of life for a high-mass star. 10) _____

11) Describe the four distinct stages in the life track of a solar-mass protostar on the H-R diagram and explain why the track is the shape it is. 11) _____

12) Imagine you are plunging into the Sun, starting from Earth. Briefly describe what you will see as you descend. 12) _____

13) Starting from the Big Bang, briefly explain how our solar system came to contain the chemical elements necessary to make Earth and living organisms. 13) _____

14) Suppose the distance to the Moon were twice its actual value. Could we still have solar eclipses? If so, what type(s)? 14) _____

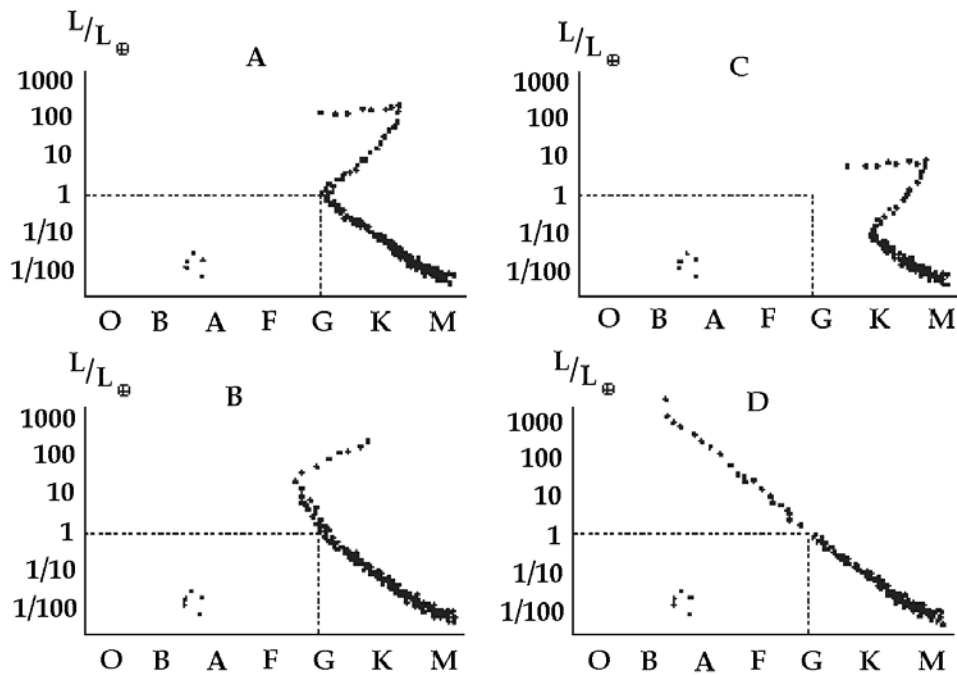
15) Give an example in which thermal energy might be converted to gravitational energy. 15) _____

16) The most common isotope of uranium is U-238, but the form used in nuclear bombs and nuclear power plants is U-235. Given that uranium has atomic number 92, how many neutrons are in each of these two isotopes? 16) _____

17) Briefly explain how we can use spectral lines to determine an object's rotation rate. 17) _____

The following questions refer to the representations below of H-R diagrams for different clusters of stars.

Figure 15.2



18) Which cluster is the youngest? 18) _____

19) Which cluster is the oldest? 19) _____

20) Which cluster is 10 billion years old? 20) _____