PHYSICS 113
Practice Questions #2

MULTIPLE CHOICE

1. If you want to find stars that are just being born, where are the best places to search?
   a. in HII regions b. in giant molecular clouds c. in regions of ultra-hot interstellar hydrogen gas
   d. in the disks around massive stars that were just recently formed e. Hollywood

2. Why are astronomers much more interested in the luminosity of a star than its apparent brightness?
   a. because luminosity can be measured exactly, but apparent brightness can only be roughly estimated
   b. because the luminosity tells us how bright a star really is, while apparent brightness only tells us how bright it happens to look from Earth
   c. because the luminosity also tells us what elements the star is made of, while apparent brightness cannot tell us a star's chemical make-up
   d. because luminosity can tell us how bright it is inside the star, while apparent brightness only tells us about its outside layers
   e. there is no difference between luminosity and apparent brightness

3. Astronomers arrange the stars into groups called spectral classes (or types) according to the kinds of lines they find in their spectra. These spectral classes are arranged in order of decreasing:
   a. decreasing surface temperature b. increasing mass c. increasing amount of hydrogen
   d. decreasing distance from us e. there is no order to the spectral types

4. Ninety percent of all stars (if plotted on an H-R diagram) would fall into a region astronomers call:
   a. the supergiant region b. the main sequence c. the white dwarf region
   d. the visual region e. the twilight zone

5. A white dwarf, compared to a main sequence star with the same mass, would always be:
   a. larger in diameter b. smaller in diameter c. the same size in diameter d. younger in age e. less massive

6. If a star is 10 parsecs away, how long ago did the light we see from it tonight begins its journey toward us?
   a. 10 years b. 0.01 years c. 10,000 years d. 32.6 years e. 61000 years

7. A type of star that has turned out to be extremely useful for measuring distances is
   a. the eclipsing binaries b. the Cepheid variables c. the main sequence stars
   d. the white dwarf stars e. the stars that lie in the constellation of Orion

8. The higher the luminosity (intrinsic brightness) a Cepheid variable is,
   a. the smaller its mass b. the lower it is on the main sequence of the H-R diagram
   c. the longer the period of its variations d. the closer it is to us e. the larger the telescope we need to observe it

9. Which of the following stars will show the smallest parallax shift?
   a. the Moon b. Jupiter c. the Sun d. Proxima Centauri, the nearest star e. the star 51 Pegasi, about 50 lightyears away

10. The largest types of clouds found in interstellar space are
    a. HI regions -- clouds of neutral hydrogen b. molecular clouds with supplies of dust and molecules
    c. HII regions – clouds of ionized hydrogen d. interstellar grains
    e. all these clouds are approximately the same size

11. Astronomers use the term interstellar extinction to refer to:
    a. the death of the dinosaurs and other species from the collision of an asteroid with the Earth
    b. the death of a massive star when it explodes
    c. the ionization of a region of hydrogen around an extremely hot star
    d. the absorption of radio waves at 21-cm by cold hydrogen atoms
    e. the scattering and absorption of starlight by dust grains in space

12. Which law do astronomers use to determine the masses of the stars in a spectroscopic binary system?
    a. Wien's Law b. Kepler's Third Law c. Stefan-Boltzmann Law d. Hubble's Law e. Jenny Craig's Law

13. The Orion Nebula is
    a. a distant galaxy of stars and raw material
    b. a small disk of gas and dust surrounding a single star that was recently formed
    c. a cloud of gas and dust illuminated by the light of newly formed stars within it
    d. the remnant of a star that exploded several thousand years ago
    e. an illusion caused by activity in the Earth's upper atmosphere

14. When a star settles down to a stable existence as a main-sequence star, what characteristics determines where on the main sequence in an H-R diagram the star will fall?
    a. its mass b. the fraction of its atmosphere that consists of hydrogen
    c. whether it is located on the outer regions or the central regions of the molecular cloud that gave it birth
    d. the speed and direction of its rotation e. the size of the disk around it

15. Why do all stars spend most of their lives on the main sequence?
    a. because the neutrinos created inside the Sun do not carry any energy away with them
    b. because during this stage the star contracts from enormous size to a relatively small ball; this takes a long time
    c. because the fuel for energy production in this stage of the star's life is hydrogen; and that is an element every star has lots of
    d. because in this stage, the processes inside the star do not generate any energy; thus the star can continue in this stage indefinitely
    e. this is an unsolved problem in astronomy, which will be an important project for the two Keck telescopes to work on

16. When the outer layers of a star like the Sun expand, and it becomes a giant, which way does it move on the H-R diagram?
    a. toward the upper right b. toward the upper left c. toward the lower right
    d. toward the lower left e. it moves horizontally, but stays on the main sequence

17. When stars become giants, which of the following does NOT usually happen?
    a. their outer envelopes expand significantly b. they lose a significant amount of mass from their outside layers
    c. their surface temperatures become lower than before d. their overall luminosities increase
    e. their mass grows significantly as they incorporate planets and interstellar matter near the star

18. Which of the following statements about the life of a star with a mass like the Sun is correct?
    a. before the star dies, it will fuse dozens of elements in its core
    b. as the star is dying, a considerable part of its mass will be lost into space
    c. after the main sequence stage, there is no further fusion of hydrogen anywhere in the star
    d. at the end of its life, the star will explode as a supernova
    e. the core of this star will be too massive to form a white dwarf

19. The most stable element in the universe (the one that doesn't "like" to undergo either nuclear fusion or fission) is:
    a. hydrogen b. carbon c. uranium d. technetium e. iron

SHORT ANSWER

1. What is the "Solar Max" and the Maunder Minimum?

2. Sketch the outer (atmospheric) layers of the Sun.

3. How does the Sun produce its energy and how is it transported from thr centre to the surface?

4. Compare and contrast an HI region with an H II region in space.

5. How are protostars formed within interstellar gas clouds?

6. Explain how an intermediate mass star evolves in terms of its track in the HR diagram.

7. Given that star A and star B have the same intrinsic (absolute) brightness, and that star A has an apparent magnitude of +1.0 and a parallax angle of 0.1" (one-tenth of an arcsecond), what is the parallax angle measured for star B if it has an apparent magnitude of +6.0? What is the distance of star B from the Earth in parsecs?