

AUBURN UNIVERSITY

SUMMER 1990

ASTRONOMY TEST III

NAME _____ STUDENT NUMBER _____

There are a possible 106 points.

Section I. TRUE/FALSE (1 point each)

- _____ 1. The luminosity of a star is the amount of energy emitted per unit of time.
- _____ 2. The corona is the coolest part of the Sun.
- _____ 3. Sunspots are explosions on the Sun.
- _____ 4. A parsec is a unit of distance.
- _____ 5. The color index is the wavelength of light at which a star emits the most radiation.
- _____ 6. The light curve of an eclipsing binary will display a regular periodicity.
- _____ 7. If you know a star's spectral class, then you can use spectroscopic parallax to get a good estimate of its distance.
- _____ 8. Most known stellar masses were originally determined from stars in binary systems.
- _____ 9. The Russel-Vogt Theorem says that fusion takes place at the center of the Sun.
- _____ 10. More massive stars live longer because they have more fuel to burn.
- _____ 11. Radiation pressure is the pressure created by the force exerted by photons of light.
- _____ 12. Open clusters are found in the galactic plane.
- _____ 13. The main sequence has some breadth to it and the lower edge is called the zero-age main sequence.
- _____ 14. Fusion reactions involving elements heavier than iron are endothermic.

- _____ 15. An object that displays a redshift must necessarily have a high recessional velocity.
- _____ 16. A neutron star may have a mass of up to 2 or 3 solar masses.

Section II. MULTIPLE CHOICE (2 point each)

- _____ 1. An outburst of ionized gas from the Sun accompanied by γ -ray emissions is a
- (a) spicule
 - (b) solar flare
 - (c) prominence
 - (d) magnetic storm.
- _____ 2. A double star that is detected by variations in position is a(n)
- (a) optical double
 - (b) astrometric double
 - (c) variable star
 - (d) spectrum binary.
- _____ 3. Giants and supergiants may be up to how many times the Sun's diameter?
- (a) 10
 - (b) 100
 - (c) 1,000
 - (d) 100,000
- _____ 4. The Zeeman effect is
- (a) the splitting of spectral lines due to a magnetic field
 - (b) the apparent acceleration as measured from Doppler shifts
 - (c) the emission of γ -rays at the Sun's center
 - (d) measured with the B-V color index.
- _____ 5. The force that holds protons and neutrons together in the nucleus is
- (a) electromagnetic
 - (b) gravitational
 - (c) strong nuclear force
 - (d) weak nuclear force.
- _____ 6. In the triple-alpha reaction
- (a) 3 helium nuclei combine to give a carbon nucleus
 - (b) 2 hydrogen nuclei combine to give deuterium
 - (c) ${}^3\text{He}$ is formed along with a γ -ray
 - (d) energy is absorbed.

- _____ 7. Older clusters have stars with outer layers that retract as the stars cool. The stars move from the giant or supergiant area to the main sequence of the H-R diagram producing
- (a) white dwarfs
 - (b) planetary nebula
 - (c) the horizontal branch
 - (d) the helium flash.
- _____ 8. If an object 2 solar masses were to collapse, it would form a
- (a) white dwarf
 - (b) brown dwarf
 - (c) neutron star
 - (d) black hole.
- _____ 9. The best way to detect a neutron star or black hole is
- (a) by their strong Doppler shifts
 - (b) as binary X-ray sources
 - (c) from their light curves
 - (d) from their radio emissions.

Section III. FILL IN THE BLANK (2 points each)

1. The balance between gravitational pull and pressure due to heat from the center of a star is the _____.
2. Radiation produced at the center of the Sun is in the form of _____. It is absorbed and reemitted over and over taking _____ years to reach the surface.
3. The "surface" of the Sun is the _____. The layers of the atmosphere are the _____, _____, and _____.
4. The spotty appearance of the solar surface caused by convection is called _____.
5. The solar wind is _____

6. The Maunder Minimum was _____

7. The apparent gradual change in a star's position is its _____.
8. The magnitude in which all wavelengths of light are included is the _____.

9. The spectral classes in order from hottest to coolest are _____.
10. A binary which is detected by alternating redshifts and blueshifts of spectral lines is a(n) _____.
11. _____ is the magnitude a star would have if it were at the standard distance of 10 parsecs.
12. A star's rotational velocity may be determined by the _____ of its spectral lines.
13. _____ is the most important property in determining a star's evolution.
14. For most stars, there are two different energy transport mechanisms: _____, and _____.
15. The point on the H-R diagram of _____ can be used to determine the age of a star cluster.
16. When the gas in a stellar core is prevented from further collapse by the pressure from free electrons, the gas is said to be _____.
17. Type II supernova show the presence of _____ in their spectra, whereas Type I supernova do not.
18. _____ is a star that flares up in brightness most likely as the result of the deposition of new nuclear fuel on the surface of a white dwarf.
19. A neutron star with a strong magnetic field may have a rapid rate of spin and, through synchrotron radiation, may produce a _____.
20. The Schwarzschild radius of a star is _____.
21. The "surface" of a black hole is its _____. An outside observer cannot see anything that happens beyond this surface.

Section IV. DISCUSSION (10 points each)

1. What is the difference between fission and fusion?

2. Draw an H-R diagram. Point out the major features, the Sun's position, and where the hot stars and the cool stars are.

3. Describe (a) what one would see as he fell into a black hole and (b) what an outsider would see happen to the victim.