Multiple Choice

1. The distance to nearby stars can be determined from:
   A. Fluorescence.     D. Stellar parallax.
   B. Stellar mass.     E. Emission nebulae.
   C. Stellar distances cannot be measured directly

2. Hubble's law states that galaxies are receding from us at a speed that is proportional to their:

3. The measure of a star's brightness is called its:

4. The discovery that the universe appears to be expanding led to a widely accepted theory called:
   A. The Big Bang Theory.  C. Hubble's Law.  D. Solar Nebular Theory

5. Based on the observed red shifts in the spectral lines of distant galaxies, astronomers conclude that:
   A. Earth is in the center of the universe.  D. The universe is contracting.
   B. The universe is expanding.  E. The universe is in a steady state.
   C. New galaxies are continually being added to the universe.

6. During a red shift the wavelengths of light become:
   A. Shorter  B. Longer  C. Remains the same  D. All of these  E. None of these

7. In relation to the red shift and the electromagnetic spectrum, stars that are moving away from us will appear more _______ in color.
   A. Red  B. Blue  C. Yellow  D. Orange  E. Purple

8. In relation to the red shift and the electromagnetic spectrum, stars that are moving toward us will appear more _______ in color.
   A. Red  B. Blue  C. Yellow  D. Orange  E. Purple

9. One of the most common units used to express stellar distances is the:

10. One of the most common units used to express planetary distances is the:

11. Our galaxy is called the:
    A. Milky Way galaxy.  D. Panorama galaxy.
    B. Orion galaxy.  E. Pleiades galaxy.
    C. Great Galaxy in Andromeda.

12. Which one of the objects listed below has the largest size?

13. Which one of the objects listed below has the smallest size?

14. The magnitude of a star as seen from Earth is called:
    A. Absolute magnitude  C. Astronomical magnitude
    B. Apparent magnitude  D. None of these

15. The true magnitude of a star, which takes into account the distance between the distant star and the Earth by using a standard distance, is called:
    A. Absolute magnitude  C. Astronomical magnitude
    B. Apparent magnitude  D. None of these

16. This property of a star can be determined from its color:
    A. Mass  C. Stellar distance  D. Velocity
    B. Surface temperature  E. Volume

17. A 1st (first) magnitude star is approximately _______ times brighter than a 4th (fourth) magnitude star.
    A. 100  B. 40  C. 16  D. 10  E. 6
18. The Sun belongs to this class of stars.
   A. Black hole  
   B. Red giant  
   C. Black dwarf  
   D. Main-sequence star  
   E. White dwarf

19. Which main-sequence stars are the least massive?
   A. Red  
   B. Orange  
   C. Yellow  
   D. Green  
   E. Blue

20. Which color stars have the highest surface temperatures?
   A. Red  
   B. Orange  
   C. Yellow  
   D. White  
   E. Blue

21. Which color stars have the lowest surface temperatures?
   A. Red  
   B. Orange  
   C. Yellow  
   D. White  
   E. Blue

22. Most stars are in this stage of evolution.
   A. Black hole  
   B. Red giant  
   C. Black dwarf  
   D. Main-sequence star  
   E. White dwarf

23. The final stage in the evolution of only the most massive stars is a:
   A. Black hole  
   B. Red giant  
   C. Black dwarf  
   D. Main-sequence star  
   E. White dwarf

24. A star that spins rapidly and emits pulsating radio waves is called a:
   A. Black hole  
   B. Red giant  
   C. Black dwarf  
   D. Red giant  
   E. Pulsar

25. The point in stellar evolution when a star has used up all of its fuel and has radiated away all of its light is a:
   A. Black hole  
   B. Red giant  
   C. Black dwarf  
   D. Main-sequence star  
   E. White dwarf

26. The point in stellar evolution when a star has used up all its fuel but is still radiating away its remaining thermal energy as light is the _______ stage.
   A. Black hole  
   B. Red giant  
   C. Black dwarf  
   D. Main-sequence star  
   E. White dwarf

27. A star in which light cannot escape because of the immense gravitational pull at its surface is the
   A. Black hole  
   B. Red giant  
   C. Black dwarf  
   D. Main-sequence star  
   E. White dwarf

28. The very final stage for a star which is as massive as the Sun is the:
   A. Black hole  
   B. Red giant  
   C. Black dwarf  
   D. Main-sequence star  
   E. White dwarf

29. Once a main-sequence star has exhausted the fuel in the inner region, the star will begin to collapse, which in turn heats up the interior and may trigger nuclear fusion of additional fuels, thus causing the star to expand once again and become a:
   A. Black hole  
   B. Red giant  
   C. Black dwarf  
   D. Neutron star  
   E. White dwarf

30. These stars can be produced following a supernova event.
   A. Black hole  
   B. Red giant  
   C. Black dwarf  
   D. Main-sequence star  
   E. White dwarf

31. Stars that are composed of matter in which electrons have combined with protons are called:
   A. Black holes  
   B. Red giants  
   C. Black dwarfs  
   D. Neutron stars  
   E. White dwarfs

32. Possibly the most cataclysmic event to occur in nature is
   A. Electron degeneration.  
   B. A supernova.  
   C. Hydrogen burning.  
   D. A nova.  
   E. The collision of two galaxies.

True = A / False = B

33. The most massive main sequence stars are red in color.

34. Our galaxy belongs to a group of galaxies known as the Local Group.

35. Most galaxies in the universe are moving toward the center of the Universe.

36. Using stellar parallax, astronomers are able to determine the distance to nearby stars.

37. The red shift refers to the tendency of distance stars that are moving away us to appear more in the blue end of the electromagnetic spectrum.

38. Regions of space in which there are numerous galaxies grouped together are called Galactic Clusters.
39. The Milky Way is classified as an elliptical galaxy.
40. The Sun is considered to be a brighter than average star (based upon absolute magnitude).
41. The hottest main-sequence stars are also the most massive main-sequence stars.
42. The measure of a star’s brightness is called its magnitude.
43. A star’s color is based upon the surface temperature of the star.
44. Although most dwarf stars are called white dwarfs, black dwarfs, or even brown dwarfs, these small stars can be additional colors as well, depending upon their surface temperatures.
45. Large stars evolve much more slowly than do small stars.
46. Only the most massive stars evolve to become black holes.
47. Hot stars evolve much more quickly than do cool stars.
48. Degenerate matter is highly condensed material, where even the electrons of atoms are pushed in, towards the center or nucleus of the atoms.
49. Pulsars are a type of neutron star that spins rapidly and emits pulsating radio waves.
50. A star’s color is based upon the temperature of the star’s interior.
51. Although most giant stars are called red giants or even red super-giants, these stars can be additional colors as well, depending upon their surface temperatures.
52. The more negative the magnitude number, the dimmer the star will be.
53. The Hertzsprung-Russell diagram is used to describe and classify the planets.
54. A star with a magnitude of +5 is brighter than a star with a magnitude of -5.
55. If a red star appears to be just as bright as a blue star (they are different temperatures, but appear equally bright), the red star may be larger than the blue star.
56. The Sun is a red star with a surface temperature of about 6000 K.

Place your answers to the following questions on the answer sheet provided by your instructor.

Fill-ins, essays:
57. The Milky Way and the Great Galaxy in Andromeda are examples of which type of galaxies? (hint: what type of shape do they exhibit?)
58. What type of star is our Sun?
59. The brightness of a star when viewed from Earth is called its __________ magnitude.
60. The true brightness of a star, which takes into account the distance from the Earth by using a standard distance, is called its __________ magnitude.
61. A 1st (first) magnitude star is approximately _____ times brighter than a 6th (sixth) magnitude star.
62. The discovery that the universe appears to be expanding led to a widely accepted theory called the __________ theory.
63. The units used to describe the interplanetary distances, which is also based upon the average distance between the Earth and the Sun is referred to as:
64. The distance light travels in a year, called a __________, and is used by astronomers to measure stellar distances.
65. A large, red, gaseous body that is about to become a star but is not hot enough to engage in nuclear fusion is called a ____________.
66. What property of a star can be determined from its color? ____________ ____________.
67. When matter is very condensed and electrons are pushed inward toward the nucleus of atoms, this type of matter is called ____________ matter.
68. Possibly the most cataclysmic event associated with the death of a star is the ____________ ____________.
69. Very large red stars, such as Betelgeuse in the constellation Orion, are called:
70. The red shift refers to the tendency of distance stars that are moving ___________ us to appear more in the red end of the electromagnetic spectrum.
71. The red shift refers to the tendency of distance stars that are moving ___________ us to appear more in the blue end of the electromagnetic spectrum.
72. Stars that radiate short pulses of radio energy are called ____________.
73. Very small dead stars that have radiated away some, but not all of their remaining light, are called:
74. Very small, dense, dark stars that have used up all of their fuel and are no longer radiating any light are called __________ __________.
75. Very dense stars that contain atoms in which the electrons are pushed into the nucleus and combine with protons to produce neutrons are called ____________ stars.
76. A star in which light cannot escape because of the immense gravitational pull is called _____________.
77. Which color stars have the lowest surface temperature?
78. A supernova may result in a neutron star or a:

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**GEOLOGY 305: BEYOND THE SOLAR SYSTEM CROSSWORD PUZZLE - WORD LIST**

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<thead>
<tr>
<th>BIG BANG</th>
<th>GALACTIC CLUSTER</th>
<th>MAIN SEQUENCE</th>
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<tr>
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<td>GALAXY</td>
<td>NEBULA</td>
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<td>GLOBULAR</td>
<td>PROTO STAR</td>
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<tr>
<td>BRIGHT</td>
<td>HERTZSPRUNG RUSSELL</td>
<td>RED SUPER GIANT</td>
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<tr>
<td>DARK</td>
<td>HUBBLE</td>
<td>STELLAR PARALLAX</td>
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<td>DEGENERATE</td>
<td>LIGHT YEAR</td>
<td>SUPER GIANT</td>
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<td>RED GIANT</td>
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**GEOLOGY 305: BEYOND THE SOLAR SYSTEM – CLUES**

**ACROSS**

3. This type of diagram is a plot of stars according to their absolute magnitudes and spectral types.
7. A sequence of stars on and (H-R) diagram, containing the majority of stars, which runs diagonally from the upper left to the lower right.
8. This type of nebula is a cloud of interstellar dust that obscures the light of more distant stars and appears as an opaque curtain.
9. A star that has exhausted most or all of its nuclear fuel and has collapsed to a very small size; believed to be near its final stage of evolution.
15. A cloud of interstellar gas and/or dust.
17. A very large star of high luminosity.
19. A massive star that has collapsed to such a small volume that its gravity prevents the escape of all radiation.
20. A collection or cluster of stars and solar systems such as the Milky Way or Andromeda.
21. This type of nebula is a cloud of glowing gas excited by ultraviolet radiation from hot stars.

**DOWN**

1. A collapsing cloud of gas and dust destined to become a star.
2. A rounded cluster of stars.
3. This law relates the distance to a galaxy and its velocity.
4. A measure of stellar distance that uses the “apparent shift” of the stars when photographed 6 months apart.
5. A system of galaxies containing from several to thousands of member galaxies.
6. An exploding star that increases in brightness many thousands of times.
10. The apparent change in wavelength of radiation caused by the relative motions of the source and the observer.
11. A number given to a celestial object to express its relative brightness.
12. The cluster of 20 or so galaxies to which our galaxy belongs.
13. The distance light travels in a year, about 6 trillion miles.
14. This type of matter is incomprehensibly dense material formed when stars collapse and form a white dwarf.
16. This theory proposes that the universe originated as a single mass, which subsequently exploded.
18. This type of nuclear reaction combines smaller nuclei to form larger nuclei and heat. This reaction occurs in the interior of stars and internal temperatures must first reach approximately 1,000,000 degrees.
The Solar System is the gravitationally bound planetary system of the Sun and the objects that orbit it, either directly or indirectly. Of the objects that orbit the Sun directly, the largest are the eight planets, with the remainder being smaller objects, such as the five dwarf planets and small Solar System bodies. Of the objects that orbit the Sun indirectly—the moons—two are larger than the smallest planet, Mercury. The Solar System Beyond Neptune brings the reader to the forefront of our current understanding and points the way to further advancement in the field, making it an indispensable resource for researchers and students in planetary science. PROSE award winner (Cosmology/Astronomy). This research is the astronomical equivalent to sequencing dinosaur DNA. Meteoritics and Planetary Science. Offers the most up-to-date picture of our solar system's farthest regions. The Solar System Beyond Neptune brings the reader to the forefront of our current understanding and points the way to further advance Beyond our Solar System is interstellar medium and more stars along with their star systems. Interstellar medium is the vacuum of space between different star systems, although the space is not actually an empty vacuum. It has dust and other particles in it in addition to cosmic rays and magnetic fields. Astronomers have already discovered many extrasolar planets—planets beyond our Solar System that orbit stars other than our own. The first extrasolar planet's existence was not confirmed until 1995, because technology was not advanced enough to detect these distant planets. Since then, 357 e