Sample Test

Equations: $T = 2.9x10^6/\lambda_{max}$ $L_{ap} = 4\pi R^2\sigma T^4/(d^2)$ $L_{MS} = M^{3.5} = \sqrt{MxMxMxM}$

$t_{MS} = 1x10^{10}yrs / (M^{2.5}) = 1x10^{10}yrs / (\sqrt{MxMxM})$ $R_{sch} = 3M$ (M in solar units, R in km)
Drake Equation: $N=R\cdot f_s\cdot f_p\cdot n_e\cdot f_l\cdot f_i\cdot f_c\cdot L$ Seager Equation: $N=N_*\cdot F_Q\cdot F_{HZ}\cdot F_o\cdot F_L\cdot F_S$
$H_o = v/D$ $\Delta\lambda = \lambda v/c \rightarrow v = c\Delta\lambda/\lambda$

Use the following information from the Big Bang theory:
A) Protons and Neutrons freeze out (stop forming).
B) Nucleosynthesis begins
C) Recombination
D) Inflation
E) Gravity separates from the other forces.
F) Nucleosynthesis ends.
G) Electrons freeze out (stop forming).

1) What is the age of the Universe?
b) 14 billion years

2) What type of galaxy is 2 in the figure?
a) Elliptical

3) Which step in the big bang theory is the first one?
e) E, gravity separates from the other forces. This happens at the highest energy.

4) Which of the following variables in the Drake equation need to be solved by biologists?
b) f_l (the fraction of planets that develop life).

5) What is located in the center of our Galaxy?
c) a black hole.

6) According to astronomical clues, what is the most likely ending for our Universe?
b) It will expand forever.

7) What are the characteristics of stars in an elliptical galaxy?
a) Population II with random orbits.

8) Which is the most massive?
e) A neutron star.

10) Which statement about the Milky Way Galaxy is correct?
e) Our Galaxy is but one of many galaxies.

13) What type of galaxy is 3 in the Figure?
#1 is a spiral galaxy, #2 is an elliptical, #3 is an irregular, and #4 is a barred spiral.

14) Why is it not possible for the Universe to be ``forever and unchanging'', as once thought?
a) Because stars process H into heavier elements.
b) Because the gas within galaxies forms stars and is used up.
c) Because stars evolve into white dwarfs, neutron stars, or black holes.
d) Because gravity is a force that tries to pull massive objects together.
e) All of the above. Is the correct answer.

15) What makes up most of our Universe? (Not just in mass.)
d) Dark Energy.

16) If you could travel at the speed of light, which of these journeys would be the longest?
d) A trip to the center of the galaxy.

22) Which is the most massive?
d) Uranus.

23) What is the distance to a galaxy with a redshift velocity of 95,000\,km/s?
(Use H_o = 72 km/s/Mpc).
b) 1320 Mpc.

24) Which of the following statements best describes the overall motion in the Universe?
a) The universe is expanding faster and faster.

26) In one short sentence each, describe a planet, a star, and a galaxy.
A planet directly orbits a star and is not massive enough to do H fusion but is massive enough to be the most massive thing near its orbit (so not asteroids or comets).
A star: A massive object made mostly of H and He that, at the main energy-producing stage, undergoes nuclear fusion of H into He.
A galaxy: a congomeration of billions of stars, and possibly gas and dust, which is at least thousands of light years across.

29) Draw a Hubble Tuning fork diagram and label the following types of galaxies: Spiral, S0, Elliptical, Barred spiral.
See Section 3, Lecture 4.

9) What is the smallest (in size) part of a spiral galaxy?
c) Bulge

13) What is dark matter?
c) Exotic particles that don't interact with light.

18) Which sequence of Big Bang events is in the correct chronological order?
B) E, D, A, G, B

21) Which of the following is *not* evidence confirming the Big Bang Theory?
a) The amount of H and He observed in the Universe.
b) All galaxies are moving away from us (expansion).
c) The cosmic microwave background.
d) 90\% of the Universe is Dark Matter.
e) All of the above confirm the theory***.***

22) What is most of the matter in our Universe made of?
A) H and He gas.

23) What is the main difference between the N (left hand side) values for the Drake and Seager equation?
In the Drake equation, we listen only, in the Seager equation, we are actively doing the looking.

24) Which factor(s) in the Drake Equation needs to be solved by sociologists?
F_c and L