Exam

Name_____

MULTIPLE CHOICE. Choose the one alternative that best completes the statement or answers the question. (25 points)

1) The light we see from the Sun comes from which layer? 1) _____
   A) chromosphere
   B) ionosphere
   C) corona
   D) troposphere
   E) photosphere

2) The temperature of the layer of gas that produces the visible light of the Sun is: 2) _____
   A) 300,000 K.
   B) 12,300 K.
   C) 15 million K.
   D) 3,500 K.
   E) 5,800 K.

3) How many planet Earths could fit inside the Sun? 3) _____
   A) almost ten million
   B) close to a billion
   C) 110
   D) about a thousand
   E) a little over a million

4) The density of the Sun is most similar to which object? 4) _____
   A) Halley's Comet's nucleus
   B) Jupiter
   C) the Moon
   D) Mercury
   E) the Earth

5) From inside out, which is in the correct order for the structure of the Sun? 5) _____
   A) convective zone, radiative zone, granulation
   B) radiative zone, convective zone, chromosphere
   C) core, chromosphere, photosphere
   D) photosphere, radiative zone, corona
   E) core, convective zone, radiative zone

6) Hydrostatic equilibrium in our Sun is the balance between: 6) _____
   A) pressure and radiation.
   B) convection and radiation.
   C) gravitation and pressure.
   D) convection and gravitation.
   E) radiation and gravitation.

7) By what mechanism does solar energy reach the Sun's photosphere from the layer just underneath it? 7) _____
A) convection
B) ionization
C) conduction
D) differentiation
E) radiation

8) The percentage (by mass) of the Sun that is Hydrogen is about: 8) _____
A) 91%.
B) 71%.
C) 27%.
D) 9%.
E) less than 1%.

9) How long does the sunspot cycle last, on average? 9) _____
A) 365.25 days
B) about 76 years
C) about 11 years
D) between 25 and 35 days
E) about seven years

10) Sunspots: 10) _____
A) come in pairs, representing the north and south magnetic fields.
B) were most numerous during the Maunder Minimum.
C) are relatively constant in number every year.
D) are always found close to the Sun's poles.
E) travel over the surface of the Sun from pole to pole.

11) The critical temperature the core must reach for a star to shine by fusion is: 11) _____
A) 5,800 K.
B) 10 million K.
C) 100 million K.
D) 11,000 K.
E) 127,000 K.

12) The primary source of the Sun's energy is: 12) _____
A) dark energy.
B) the strong force fusing hydrogen into helium.
C) oxidation of carbon in the core.
D) the weak force creating energy from uranium decay.
E) gravitational collapse of the helium coreward.

13) What natural barrier tries to prevent two protons from combining? 13) _____
A) electromagnetic repulsion
B) antigravity
C) the strong nuclear force
D) dark energy
E) the weak nuclear force

14) The speed of light is 3.00×10^8 m/s. If 2.00 kg of mass is converted to energy, how much energy will be produced? 14) _____

A) 6.00×10^8 J
B) 9.00×10^{16} J
C) 1.80×10^{17} J
D) 1.50×10^8 J
E) 6.00×10^4 J

15) Which is the net result of the proton–proton chain? 15) _____

A) 4 protons = 2 heliums 2 + 2 positrons + ultraviolet radiation
B) 4 protons = 1 helium 4 + a positron + a neutrino + gamma rays
C) 6 protons = 2 heliums + 3 positrons + 3 neutrinos + gamma rays
D) 2 protons = deuterium + a positron + an antineutrino + X–rays
E) 4 protons = 1 helium 4 + 2 neutrinos + gamma rays

16) A nearby star has a parallax of 0.2 arc seconds. What is its distance? 16) _____

A) 5 parsecs
B) .5 parsec
C) 50 parsecs
D) .2 parsec
E) .1 parsec

17) Which of the following best describes the size and distance relationship of our Sun and the nearest star? 17) _____

A) two grains of sand separated by 100 light years
B) a tennis ball here, another on the Moon
C) two baseballs separated by 100 yards
D) two marbles separated by 300 kilometers
E) two beach balls separated by 100 city blocks

18) If a star appears to move back and forth relative to other stars over a six–month period, this motion is due to the star's: 18) _____

A) transverse motion.
B) true space motion.
C) radial motion.
D) Doppler shift.
E) parallax shift.

19) What is the absolute magnitude of our Sun? 19) _____

A) –4.6 B) –23.0 C) +4.8 D) –1.4 E) +9.4

20) Perhaps the greatest of the Greek astronomers, _____ compiled the first catalog of stars, accurately measured their positions, and defined the basic system of stellar brightnesses. 20) _____

A) Aristotle
B) Hipparchus
C) Erastothenes
D) Ptolemy
E) Aristarchus

21) At the distance of Jupiter (6 times further away from the Sun than Earth) the amount of sunlight received per square centimeter different by what factor? 21) _____

A) 6 times more
B) 12 times more
C) 36 times less
D) 12 times less
E) 6 times less

22) What physical property of a star does the spectral type measure? 22) _____

A) density
B) luminosity
C) composition
D) temperature
E) mass

23) Star A is a main sequence star of spectral type F2 and star B is a white dwarf of spectral type B4. Which statement below is correct? 23) _____

A) Star B appears brighter than star A.
B) Star A appears brighter than star B.
C) Star B is hotter than star A.
D) Star A is hotter than star B.
E) None of the above can be said about these two stars.

24) Compared to the size of the Sun, in what range of sizes are nearly all stars found? 24) _____

A) 0.1 to 1.0 solar radii
B) 0.5 to 50 solar radii
C) 1 to 100 solar radii
D) .5 to 2 solar radii
E) 0.01 to 100 solar radii

25) The Hertzsprung–Russell Diagram plots _____ against the spectral type or temperature. 25) _____

A) distance
B) mass
C) brightness or apparent magnitude
D) size or density
E) luminosity or absolute magnitude

ESSAY. Write your answer in the space provided or on a separate sheet of paper. (15 points)

26) Describe how we know where stars and galaxies are located in three dimensional space, despite the fact that we only have their two dimensional location on the celestial sphere. That is, describe how each rung of the cosmic distance ladder works and how earlier rungs are used to calibrate later ones. USE YOUR OWN WORDS. If you're copy and pasting from the slides, you'll receive no credit.