

Name:

Answer Key

Student ID:

White Version

Section:

Magnitude/Distance Equations:

$$\begin{aligned} m_1 - m_2 &= 2.5 \log(L_2/L_1) \\ m - M &= 5 \log(d/10\text{pc}) \\ d(\text{pc}) &= 10^{1+(m-M)/5} \end{aligned} \quad (1)$$

Stefan-Boltzmann Equation:

$$L = \text{const.} \times R^2 T^4 \quad (2)$$

Be sure to read all instructions carefully, and check to see if problems are continued in the next column. Circle the letter in the multiple choice questions. Write the answer in the single-letter format requested in the matching questions.

1. [1pt] Which of the following star types is most like the Sun? (Select one.)

- A) G9 supergiant
- B) white dwarf
- C) O
- D) F9 dwarf

2. [1pt] Object 1 has an apparent magnitude of -6 ; object 2 has an apparent magnitude of -1 . Which object is brighter, and by how much? (Select one)

- A) object 1 by a factor of 10
- B) object 1 by a factor of 100
- C) object 1 by a factor of 3
- D) object 1 by a factor of 2.5
- E) object 2 by a factor of 100

3. [1pt] Which of the following spectral classifications corresponds to the highest surface temperature? (Select one)

- A) A3
- B) M6
- C) U2
- D) B4
- E) G2

4. [1pt] If enough measurements can be made in a binary star system, the masses of the stars can be determined by using _____? (Select one)

- A) Newton's 1st law
- B) Kepler's 1st law
- C) the Stefan-Boltzmann law
- D) Kepler's 3rd law
- E) the theory of special relativity

5. [5pt] How would the properties of the Sun change if we made the following modifications. Fill in the blank with the best answer. (For each statement select H = Half, T = Twice, F = Four times, Q = One quarter, or S = The same).

F If the Sun were twice as close as it is now, it would have the apparent brightness.

S If the Sun were twice as close, but had only half its current radius the apparent brightness would be compared to what it is now.

T If the Sun had a 1.4 times larger radius, it would have the apparent brightness.

Q If the Sun were twice as far away, it would have the apparent brightness.

F If the Sun were an M-type star and had only half the photosphere temperature of what it has now, it would have to be larger in radius for the Earth to receive the same amount of light.

6. [1pt] A binary system in which the binary nature of the system is inferred from periodic doubling of absorption lines is called _____? (Select one)

- A) a visual binary
- B) an eclipsing binary
- C) a period doubling binary
- D) a spectroscopic binary
- E) a close binary

7. [1pt] Solar surface granulation is caused by (Select one.)

- A) convection.
- B) thermal flux.
- C) radiation.
- D) conduction.
- E) radioactivity.

8. [1pt] Algol (the 'Winking Demon Star') varies its light output because _____? (Select one)

- A) its surface temperature fluctuates periodically
- B) it is an eclipsing binary
- C) it has several large planets around it that eclipse its light
- D) it is a nova
- E) it is a pulsating variable

9. [1pt] A binary for which the presence of an unseen companion to the primary star is inferred from its motion on the celestial sphere is called _____ ? (Select one)

- A) a type-I binary
- B) a visual binary
- C) an astrometric binary
- D) an eclipsing binary
- E) a spectroscopic binary

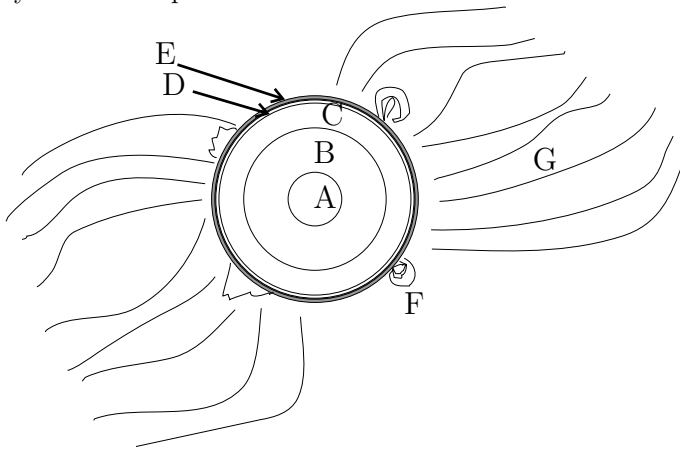
10. [1pt] The parallax angle of a star is measured to be 0.33 seconds of arc. The distance to this star is (Select one)

- A) 33 parsecs
- B) 3 parsecs
- C) 10 parsecs
- D) 1/9 light year
- E) 1/3 parsec

11. [1pt] The distance to a star is measured to be 100 parsecs and the apparent magnitude of this star is $m = +2$. What is this star's Absolute Magnitude, M ? (Select one)

- A) -3
- B) +3
- C) -5
- D) +7
- E) -7

12. [7pt] The figure shows a very simplified version of the structure of the Sun. For each statement below, select the symbol in the picture.



- G Corona
- E Chromosphere and Spicules
- A Core
- B Radiative Zone
- D Photosphere
- C Convective Zone
- F Prominence

13. [1pt] Which of the following stars is at the greatest distance from Earth ? A star with parallax angle equal to (Select one)

- A) 0.5 arcseconds
- B) 0.2 arcseconds
- C) 0.02 arcseconds
- D) 0.05 arcseconds
- E) 0.1 arcseconds

14. [1pt] Which of the following pieces of information is not directly indicated by the location of a star in a Hertzsprung-Russell diagram? (Select one)

- A) Absolute Magnitude
- B) Color Index
- C) Luminosity
- D) Space Velocity
- E) Surface Temperature

15. [5pt] Determine the type of spectrum you would expect for the following. (Select E for Emission, A for Absorption, C for Continuous.)

- E A gas cloud in space that is excited by high energy photons.
- E A spectrum produced from electrons making transitions from higher-energy states to lower-energy states.
- C Light coming from a hot piece of metal.
- A Star light passing directly through a cold hydrogen gas cloud
- A Light coming from the Sun.

16. [1pt] Spectral classes, surface temperatures, and _____ contain almost the same information? (Select one)

- A) spectroscopic parallax
- B) apparent magnitudes
- C) absolute magnitudes
- D) color indices
- E) luminosities

17. [1pt] What color would you expect a spectral class K star to be? (Select one)

- A) green
- B) yellow-red
- C) blue-white
- D) white
- E) blue

18. [1pt] The spectral sequence for stars is now known to be primarily a sequence in ____? (Select one)

- A) core density
- B) mass
- C) surface temperature
- D) surface density
- E) elemental composition

19. [1pt] The study of the positions of stars and their motions across the sky is (Select one.)

- A) color indexing.
- B) speckle interferometry.
- C) spectroscopic parallax.
- D) astrometry.
- E) trigonometric parallax.

20. [1pt] A temperature-luminosity diagram of stars usually includes a diagonal band called the (Select one.)

- A) color index.
- B) main sequence.
- C) main line.
- D) star diagonal.
- E) H-R line.

21. [1pt] When a solid body is heated to high temperatures the result is a(n) (Select one.)

- A) emission spectrum.
- B) emission line.
- C) absorption spectrum.
- D) absorption line.
- E) continuous spectrum.

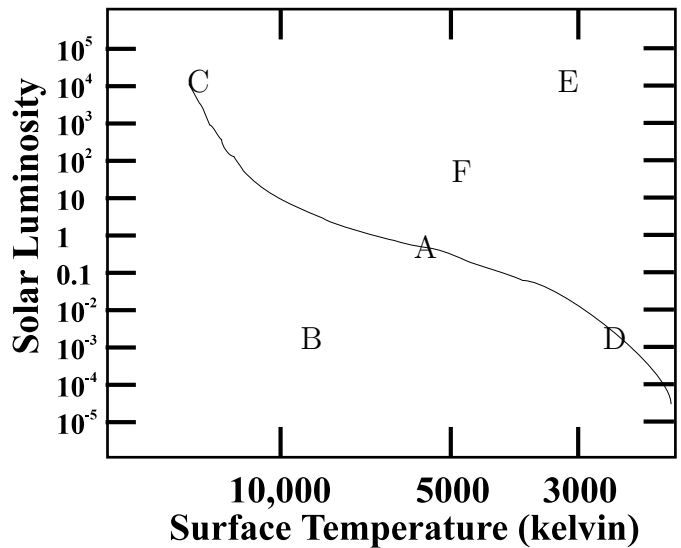
22. [1pt] Which of the following stars has the highest photospheric temperature? (Select one.)

- A) brown dwarf
- B) A
- C) G
- D) O

23. [1pt] Tremendous explosions in regions around sunspots, which eject particles and emit radiation, are called (Select one.)

- A) prominences.
- B) coronal holes.
- C) filaments.
- D) plagues.
- E) solar flares.

24. [6pt] Using the Hertzsprung-Russell diagram match the letter with the type of star that is located at that position.



D A class M main sequence star

B A white dwarf star

C A class O main sequence star

A Our Sun

E A supergiant star

F A red giant star

25. [1pt] The orientation of the Sun's magnetic field changes, repeating a full cycle every (Select one.)

- A) 33 years.
- B) 22 years.
- C) 11 years.
- D) year.

26. [6pt] Enter the spectral class described by each statement. Select from O, B, A, F, G, K, M, R, N, L, T. Do not use any class more than once.

M These are the warmest stars with significant molecular spectra.

K These stars have many lines from neutral metals, but are too hot to have many molecular lines.

O These stars have weak atomic absorption lines, because most of their atoms are ionized.

G The Sun's spectral class.

T This spectral class is the coolest, and includes methane lines, typical of planets.

A These stars have the strongest neutral Hydrogen lines.