

Quiz # 3

At the end of the quiz hand in *all* pages of the booklet.

Materials permitted: Calculator and one 8½" x 11" sheet of paper

Table of Values:

Gravitational Constant, G	6.7	$\times 10^{-11}$	N m ² kg ⁻²
Astronomical Unit, A.U.	1.5	$\times 10^{11}$	m
Mass of the Sun, M _☉	2	$\times 10^{30}$	kg
Radius of the Sun, R _☉	7	$\times 10^8$	m
Boltzmann's constant, k	1.4	$\times 10^{-23}$	J K ⁻¹
Mass of proton, m _p	1.7	$\times 10^{-27}$	kg

Section A: Multiple choice (25%)

10 questions worth 2 points each

Circle the letter corresponding to the most appropriate answer to each

A1) The temperature of the surface of the Sun:

- a) 4 500 K b) 5 800 K c) 10⁶ K d) 1.5 x 10⁷ K /2

A2) For how many years can the Sun continue to generate energy by nuclear reactions in its core?

- a) 5 x 10⁵ y b) 5 x 10⁶ y c) 5 x 10⁸ y d) 5 x 10⁹ y /2

A3) In ${}^7_7\text{N}^{13}$ the number of neutrons is:

- a) 6 b) 7 c) 8 d) 20 /2

A4) The apparent angular movement of a nearby star against the background stars is called:

- a) radial velocity b) tangential velocity c) proper motion d) retrograde motion /2

A5) A star has $M = +2.2$ and $m = +5.2$. How far away is it?

- a) 40 pc b) 130 pc c) 1000 pc d) 4 pc /2

A6) A particular star is equally bright in B and V. What is its surface temperature?

- a) 3000 K b) 9000 K c) 15 000 K d) [Not possible] /2

A7) Where are protostars most likely to form?

- a) Emission Nebulae b) Dark Nebulae c) Planetary Nebulae d) Reflection Nebulae /2

A8) What fraction of the measured mass of the universe is hydrogen?

- a) 1% b) 25% c) 75% d) 98% /2

A9) Which of the following stars are metal-poor?

- a) Very young b) Population I c) Population II d) Open cluster /2

A10) The temperature at which a star begins to convert helium into carbon (triple α process) is

- a) 1 MK b) 15 MK c) 100 MK d) 1000 MK /2

Section B (25%)

10 questions worth 2 points each

Answer each question in the space provided

What *name* describes each of the following?

B1) An image of the Sun that shows regions of different magnetic polarity _____ /2

B2) The outward flow of particles (electrons, protons etc) from the Sun _____ /2

B3) A grouping of stars on the Hertzsprung-Russell diagram extending diagonally from upper left to lower right _____ /2

B4) A double star system in which the line of sight from Earth lies in their orbital plane _____ /2

B5) The standardized measure of the intrinsic brightness of a star _____ /2

B6) The gradual accumulation of matter in a location, due to the action of gravity _____ /2

B7) The stage of a star's evolution just before it reaches the Main Sequence _____ /2

B8) A glowing cloud of gas which shows bright lines in its spectrum _____ /2

B9) The nearly explosive beginning of helium fusion in the dense core of a red giant star _____ /2

B10) A type of pulsating star at the bottom of the instability strip _____ /2

Section C (25%)

Answer each question in the space provided

C1) A certain type of star is known to have absolute magnitude 0.0
If one of these is observed to have an apparent magnitude of +15.0, how far away is it?

_____ pc /5

C2) A one stage the protosun had a luminosity of $1000 L_{\odot}$ and a surface temperature of 1000 K.
What was its radius at the time?

_____ R_{\odot} /5

C3a) The two stars that comprise the binary W UMa have masses of $0.99 M_{\odot}$ and $0.62 M_{\odot}$.
Calculate the separation between the two components, if their orbital period is 8.0 hours.

_____ R_{\odot} /5

C3b) The radii of the stars are $1.14 R_{\odot}$ & $0.83 R_{\odot}$. Show that W UMa is an over-contact binary.

/5

Section D (25%)

5 questions worth 4 points each

Answer each question in the space provided

In a *few sentences*, with a *diagram* if useful, explain what is meant by **each** of the following terms

D1) Sunspot Cycle _____

/4

D2) Luminosity Class _____

_____ /4

D3) H-R Diagram _____

_____ /4

D4) Giant Molecular Cloud _____

_____ /4

D5) Cepheid _____

_____ /4

PHYC 2452: **Please do NOT turn over the paper until told to begin.** /16

Total: /80