X3.0a **1060**

PHYS-1060 (1) (Kaldon-40837) **Name** _____

WMU - Fall 2008 Section: 1a (A to D) 1b (E to H) 1c (I to L) 1d (M to P) 1e (Q to S) 1f (T to Z)

Exam 3 - 150,000 points

Rev. 11/20/08 Th.1

Do Not Open This Test Until Told To Do So
Select the Answer Which BEST Completes the Statement (30 questions – 5,000 points each)
Unless Stated Otherwise, All Observational Questions Are From West Michigan

Bubble Sheets – Fill in Your NAME

Use Your 5-digit PID Number Instead of Your Student ID Number (Fill in at RIGHT)

EXAM 3 [FORM - A]

PHYS-1060 (KALDON-1)

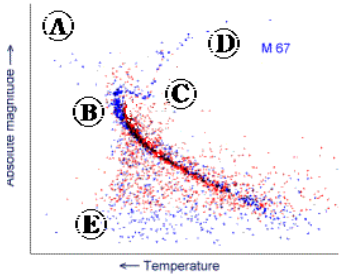
FALL 2008

WMU

Happy Thanksgiving…

Heading Home For Thanksgiving? (150,000 points) *Multiple-Guess-Fill-In-The-Bubbles*

Using the following labels A-E on this Hertzsprung-Russell Diagram for the open cluster M67:



1.) White Dwarfs would be located here.

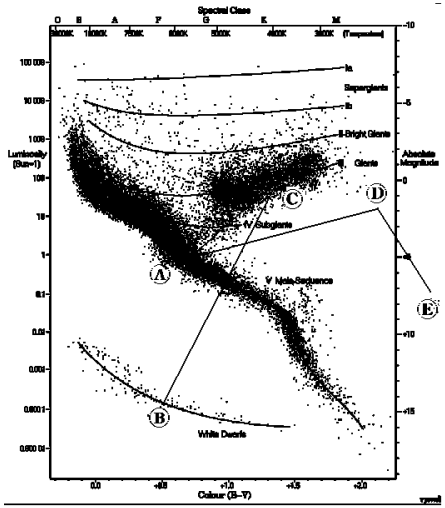
2.) The main sequence stars which would've been here, were probably few in number.

3.) These stars have "recently" left the main sequence.

4.) These stars show the "end" of the cluster's main sequence, allowing us to date how old the cluster is.

5.) These multiple-shell burning stars might soon become neutron stars.

Using the following labels A-E on this Hertzsprung-Russell Diagram of a possible stellar evolution path for our Sun:



6.) Our Sun on the Main Sequence…

7.) Our Sun at the end of its life...

8.) Our Sun as a protostar…

9.) Our Sun when it is at its largest size…

Select the Best Answer from the choices given:

10.) A protostar of about 1 solar mass will take about _____ to ignite and become a stable hydrogen burning star.

A – 100,000 years.
B – 1,000,000 years.
C – 10,000,000 years.
D – 100,000,000 years.
E – None of the above

11.) Why are the masses of all main sequence stars more than about 8% (0.08) times the mass of our Sun?

A – the core temperature of lower mass objects never reaches 10 million K.
B – all such lower mass objects are called planets.
C – lower mass objects never form in nature.
D – lower mass objects contract to become white dwarfs instead.
E – None of the above

12.) Protostar A will form a Sun-like main sequence star, while Protostar B formed at the same time will become a 10 solar mass main sequence star, so…

A – A and B will become stars simultaneously.
B – A will become a star first.
C – B will become a star first.
D – mass has no effect on the time scale.
E – None of the above

13.) To support itself against its own weight, a star's pressure, density and temperature all must be highest in the…
A – photosphere.
B – envelope.
C – star's outer atmosphere.
D – center.
E – None of the above

14.) The conversion of matter to energy is shown in the Einstein relation…
A – $E = ma^2$.
B – $E = mb^2$.
C – $E = mc^2$.
D – $E = md^2$.
E – None of the above

15.) High mass main sequence stars have ____ core temperatures compared to low mass main sequence stars to establish pressure-gravity equilibrium. Therefore, high mass main sequence stars have _____ fusion energy generation rates than low mass main sequence stars.
A – lower, much less.
B – lower, much greater.
C – higher, much less.
D – higher, much greater.
E – None of the above

16.) A star's _____ is the *most* crucial quantity in determining a star's appearance and evolution from its formation to its death?
A – its overall elemental composition.
B – its distance from the Sun.
C – its mass.
D – its size.
E – None of the above

17.) Brown dwarfs…
A – have surface temperatures less than 2000 K.
B – cannot support hydrogen fusion in their cores.
C – may be more numerous than all the stars.
D – All of the above.
E – None of the above

18.) While on the main sequence as a G2 star, our Sun…
A – never changes.
B – will gradually shrink over time.
C – will gradually expand over time.
D – will end in a fiery supernova explosion.
E – None of the above

19.) Two stars have the same spectral type. Star A is 1000 LY away, while Star B is 100 LY away. Therefore…
A – Star A appears 10 times brighter than Star B.
B – Star A appears 100 times brighter than Star B.
C – Star A appears $1/10^{th}$ as bright as Star B.
D – Star A appears $1/100^{th}$ as bright as Star B.
E – None of the above

20.) A white dwarf star contains about as much matter as our Sun, packed into a sphere whose size is approximately that of…
A – our Sun.
B – the planet Jupiter.
C – the planet Earth.
D – Kalamazoo County.
E – None of the above

21.) In a main sequence star similar to our present Sun, the energy from fusion in the core comes from the fact that…
A – the sum of the masses of 4 protons is *less* than the mass of the helium nucleus formed.
B – the sum of the masses of 3 helium nuclei is *less* than the mass of the carbon nucleus formed.
C – the sum of the masses of 4 protons is *more* than the mass of the helium nucleus formed.
D – the sum of the masses of 3 helium nuclei is *more* than the mass of the carbon nucleus formed.
E – None of the above

22.) The gravitational collapse of a main sequence star in equilibrium is balanced by the…
A – pressure generated from the fusion in the core.
B – matter generated from the fusion in the core.
C – degenerate neutron matter in the core.
D – cannot be balanced, the gravitational collapse cannot be stopped.
E – None of the above

23.) Because high mass main sequence stars have _____ density, their luminosity is _____ than lower mass main sequence stars.
A – lower, less.
B – lower, greater.
C – higher, less.
D – higher, greater.
E – None of the above

24.) High mass main sequence stars can support multiple burning shells later in their life off the main sequence because…
A – the inert carbon core can serve multiple reactions.
B – higher core temperatures create multiple layers of higher mass fusion reactions.
C – iron catalyses the silicon fusion reaction.
D – one fusion reaction always results in another fusion reaction.
E – None of the above

25.) Fusion requires that nuclei collide with sufficient energy to overcome the electromagnetic repulsion of the protons…
A – by gravity.
B – by the weak nuclear force.
C – by the strong nuclear force.
D – by magic.
E – None of the above

26.) Stars like our Sun eject their envelopes in ____ and stars with 40 Solar masses eject their envelopes in_____.
A – gentle planetary nebulae; explosive supernovae.
B – novae; carbon fusion detonations.
C – violent supernovae, gentle planetary nebulae.
D – carbon fusion detonations; novae.
E – None of the above

27.) Neutron stars have masses of at least 1.4 times the mass of our Sun packed into a sphere about the size of…
A – the planet Earth.
B – the planet Jupiter.
C – our Sun.
D – Kalamazoo County.
E – None of the above

28.) During a star's lifetime, its elemental composition…
A – maintains a steady-state equilibrium.
B – changes with fusion products.
C – changes with fission products.
D – becomes more ghostly.
E – None of the above

29.) In a particular open star cluster we don't see a lot of large mass O, B or A main sequence stars because…
A – high mass stars are uncommon to begin with.
B – high mass stars burn through their mass sequence lifetimes faster than low mass stars.
C – the supergiant stars that O, B and A main sequence stars evolve into have very short lifetimes.
D – All of the above.
E – None of the above

30.) The Iron Minimum occurs because Iron-56 (^{56}Fe) …
A – cannot undergo fusion into any higher elements.
B – cannot undergo fusion into any higher elements and release energy.
C – cannot exist in any great quantity inside a star.
D – All of the above.
E – None of the above