

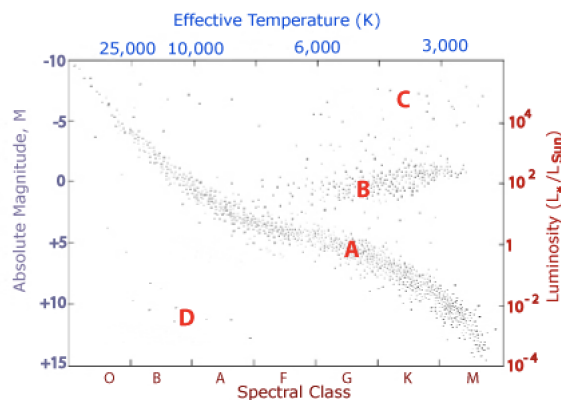
AST1002 Spring 2019 Exam 2

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1. The evolution of a star is determined entirely by:
 - (a) Mass
 - (b) Mass and radius
 - (c) Temperature
 - (d) Mass and temperature
2. A star with a mass too low to undergo hydrogen fusion is known as:
 - (a) A red dwarf
 - (b) A red giant
 - (c) A brown dwarf
 - (d) A white dwarf
3. The Chandrasekhar limit is defined as:
 - (a) The maximum mass of a white dwarf
 - (b) The maximum mass of a neutron star
 - (c) The maximum mass of a black hole
 - (d) The maximum mass of a main sequence star
4. The Tolman–Oppenheimer–Volkoff (TOV) limit is defined as:
 - (a) The maximum mass of a white dwarf
 - (b) The maximum mass of a neutron star
 - (c) The maximum mass of a black hole
 - (d) The maximum mass of a main sequence star
5. Some regions along the plane of the Milky Way appear dark because
 - (a) Stars in that region are hidden by interstellar gas
 - (b) Stars in that region are hidden by dark dust particles
 - (c) Many brown dwarfs in those areas absorb light which they turn into heat
 - (d) Many black holes absorb all light from those directions

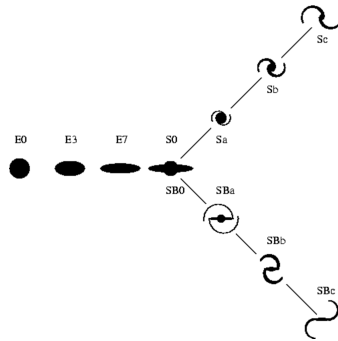
6. Which of the following correctly lists the stages of the birth of a star:
- (a) Gas fragments \rightarrow Pre-main sequence star \rightarrow Red Giant \rightarrow Main sequence star
 - (b) Protostar \rightarrow Red dwarf \rightarrow Pre-main sequence star \rightarrow Main sequence star
 - (c) Gas fragments \rightarrow Protostar \rightarrow Pre-main sequence star \rightarrow Main sequence star
 - (d) Protostar \rightarrow Gas fragments \rightarrow Pre-main sequence star \rightarrow Main sequence star
7. The end product of the Sun will be:
- (a) A brown dwarf
 - (b) A white dwarf
 - (c) A neutron star
 - (d) A black hole
8. The lifetime of a star on the main sequence:
- (a) Increases with the mass of the star
 - (b) Is independent of the mass of the star
 - (c) Decreases with the mass of the star
 - (d) None of the above
9. A solar mass star will evolve off the main sequence when
- (a) It completely runs out of hydrogen
 - (b) It expels a planetary nebula to cool off and release radiation
 - (c) It explodes as a violent nova
 - (d) It builds up a core of inert helium
10. Identify the regions of the HR diagram:



- (a) A: White dwarfs, B: Main sequence, C: Giants, D: Supergiants
- (b) A: Main sequence, B: Giants, C: Supergiants, D: White dwarfs
- (c) A: Main sequence, B: White dwarfs, C: Red dwarfs, D: Giants
- (d) A: Main sequence, B: Giants, C: Red dwarfs, D: White dwarfs

11. A red dwarf, which is fully convective, burns hydrogen:
 - (a) In its core first, before fusion moves to outer layers as the star expands
 - (b) Evenly throughout the star, since convection takes helium outward and hydrogen inward
 - (c) It doesn't burn hydrogen; it initially burns helium
 - (d) It doesn't burn hydrogen, because it's not technically a star
12. Which type of stellar explosion leads to the production of a neutron star?
 - (a) Nova
 - (b) Recurrent nova
 - (c) Type I supernova
 - (d) Type II supernova
13. Novae can occur only for stars in a binary system:
 - (a) True
 - (b) False
14. What is left behind after a type I supernova?
 - (a) A white dwarf
 - (b) A neutron star
 - (c) A black hole
 - (d) No remnant is left behind
15. The vast majority of elements in the periodic table were produced by:
 - (a) The big bang
 - (b) Supernovae
 - (c) Stellar fusion
 - (d) Chemical reactions
16. White dwarfs form when:
 - (a) The gravitational pressure is matched by thermal pressure
 - (b) The gravitational pressure is matched by electron degeneracy pressure
 - (c) The gravitational pressure is matched by neutron degeneracy pressure
 - (d) The gravitational pressure isn't matched by any outward pressure
17. A black hole forms when:
 - (a) The gravitational pressure is matched by thermal pressure
 - (b) The gravitational pressure is matched by electron degeneracy pressure
 - (c) The gravitational pressure is matched by neutron degeneracy pressure
 - (d) The gravitational pressure isn't matched by any outward pressure

18. The event horizon of a black hole is defined as:
- (a) The point at which the escape velocity is equal to the speed of light
 - (b) The point at which you need to move at the speed of light just to stay still
 - (c) The center of the black hole
 - (d) The point at which the density of the black hole becomes infinite
19. Which of the following particles can escape from within the event horizon of a black hole?
- (a) Neutrinos
 - (b) Electrons
 - (c) Protons
 - (d) None of the above
20. Why do physicists describe the theory of gravity as "incomplete"?
- (a) It does not explain why light bends near a dense object
 - (b) It does not incorporate a description of gravity on a very small scale
 - (c) It does not agree with the expansion of the universe
 - (d) The gravity waves it predicts have not been observed
21. The Hubble Tuning Fork diagram is given below. Which of the following galaxies are consider "young" galaxies on the Tuning Fork diagram?



- (a) Elliptical galaxies
 - (b) Spiral galaxies
 - (c) Barred spiral galaxies
 - (d) The diagram has nothing to do with galaxy age
22. The spectra of interstellar gas clouds show that they are mostly composed of:
- (a) Hydrogen
 - (b) Helium
 - (c) Oxygen
 - (d) Nitrogen

23. The feature that distinguishes a spiral galaxy from an elliptical galaxy is:
- (a) A central bar
 - (b) A galactic core
 - (c) Spiral arms
 - (d) A galactic disk
24. Which of the following options describe the star content of the three different types of galaxies?
- (a) Elliptical: many stars, Spiral: no stars, Barred Spiral: many stars
 - (b) Elliptical: no stars, Spiral: no stars, Barred Spiral: many stars
 - (c) Elliptical: no stars, Spiral: many stars, Barred Spiral: many stars
 - (d) Elliptical: many stars, Spiral: many stars, Barred Spiral: no stars
25. What provides the majority of the gravitational pressure needed to hold a galaxy together?
- (a) Stars near the galactic center
 - (b) A supermassive black hole at the center
 - (c) A solar mass black hole at the center
 - (d) Stars on the spiral arms of the galaxy
26. What is dark matter?
- (a) Neutrinos
 - (b) An unknown source of the “missing mass” in galaxies
 - (c) Brown dwarfs
 - (d) Interstellar dust
27. Where in a spiral galaxy does stellar evolution occur?
- (a) Near the galactic center
 - (b) On the spiral arms
 - (c) In front of the spiral arms
 - (d) Behind the spiral arms
28. Hubble’s law was used to demonstrate:
- (a) The universe was static
 - (b) The universe was expanding
 - (c) The universe was contracting
 - (d) None of the above

29. Where is the center of the universe?
- (a) There is no center
 - (b) Near the Earth, which is why everything is moving away from us
 - (c) Near the center of the Milky Way, which is why everything is moving away from us
 - (d) None of the above
30. The Copernican Principle states, essentially:
- (a) The Earth is at the center of the universe
 - (b) The Sun is at the center of the universe
 - (c) Human beings are not special in the eyes of the universe
 - (d) Human beings are special in the eyes of the universe