

ASTR 1504/1514: Astronomy: Exploring the Universe Midterm Exam 3

1. A 10 Solar-mass star will evolve through the same phases as a 1 Solar-mass star.
 - A: True
 - B: False

2. Stars evolve primarily because they run out of fuel in their cores.
 - A: True
 - B: False

3. The more massive a star, the more hydrogen it has to burn, and the longer its main-sequence lifetime will be.
 - A: True
 - B: False

4. What factor is most important in determining a star's position on the main sequence and subsequent evolution?
 - A: Temperature
 - B: Pressure
 - C: Mass
 - D: Radius

5. A star like the Sun will eventually become an electron degenerate white dwarf star.
 - A: True
 - B: False

6. What is a planetary nebula?
 - A: A planet surrounded by a glowing shell of gas
 - B: The disk of gas and dust surrounding a young star that will soon form a star system
 - C: The ejected envelope of a giant star surrounding the remains of a star
 - D: A type of young, medium-mass star

7. In a white dwarf, what is the source of pressure that halts its contraction as it cools?
- A: Thermal pressure of the extremely hot gas
 - B: Electrons packed so closely that they become incompressible
 - C: Neutrons that resist being pressed further together
 - D: Carbon nuclei that repulse each other strongly because they each contain six protons
8. A Type Ia supernova occurs when a white dwarf exceeds a mass of
- A: 0.8 Solar Masses
 - B: 1.4 Solar Masses
 - C: 2.3 Solar Masses
 - D: 5.5 Solar Masses
9. Special relativity says that moving clocks run slower.
- A: True
 - B: False
10. Gravity is nothing more than a curvature in the fabric of spacetime.
- A: True
 - B: False
11. Gravitational lensing allows us to see distant objects that would otherwise be blocked by a star or galaxy.
- A: True
 - B: False
12. We can identify only a small fraction of all the pulsars that exist in our galaxy because:
- A: gas and dust efficiently block radio photons
 - B: few swing their beam of synchrotron emission in our direction
 - C: most have evolved to become black holes, which emit no light
 - D: massive stars are very rare

13. What would happen if mass were continually added to a 2 Solar-mass neutron star?
- A: The star's radius would increase.
 - B: The star would eventually become a black hole.
 - C: The star would erupt as a nova.
 - D: All of the above would occur.
14. The event horizon of a black hole is defined as:
- A: the point of maximum gravity
 - B: the radius of the original neutron star before it became a black hole
 - C: the point at which shock waves emanate from the strong gravitational distortion the black hole creates in the fabric of spacetime
 - D: the radius at which the escape speed equals the speed of light
15. If the Sun were to be instantly replaced by a 1 Solar mass black hole, the gravitational pull of the black hole on Earth would be:
- A: much greater than it is now
 - B: the same as it is now
 - C: much smaller than it is now
 - D: irrelevant because Earth would be quickly obliterated by the strong tidal force of the black hole
16. The Cosmological Principle says that physical laws that are true in one part of the universe must be true in every part of the universe.
- A: True
 - B: False
17. Edwin Hubble revolutionized astronomy when he made an accurate calculation of the distance to the Andromeda Nebula by spotting a rare Type Ia supernova.
- A: True
 - B: False
18. In the Great Debate of 1920, Curtis and Shapley argued over whether or not:
- A: the Big Bang occurred
 - B: the age of the universe was 14 billion years
 - C: the spiral nebulae were located outside the Milky Way
 - D: life existed outside of Earth