

Name \_\_\_\_\_

**MULTIPLE CHOICE. Choose the one alternative that best completes the statement or answers the question.**

- 1) If you had something the size of a sugar cube that was made of neutron star matter, it would weigh \_\_\_\_\_. 1) \_\_\_\_\_  
A) about 50 pounds B) as much as the entire Earth  
C) about as much as a large mountain D) about as much as a truck
- 2) Pulsars are thought to be \_\_\_\_\_. 2) \_\_\_\_\_  
A) accreting black holes B) rapidly rotating neutron stars  
C) unstable high-mass stars D) accreting white dwarfs
- 3) What is an *accretion disk*? 3) \_\_\_\_\_  
A) a disk of hot gas swirling rapidly around a white dwarf, neutron star, or black hole  
B) a stream of gas flowing from one star to its binary companion star  
C) any flattened disk in space, such as the disk of the Milky Way Galaxy  
D) a disk of material found around every white dwarf in the Milky Way Galaxy
- 4) What do we mean by the *singularity* of a black hole? 4) \_\_\_\_\_  
A) It is the center of the black hole, a place of infinite density where the known laws of physics cannot describe the conditions.  
B) The term is intended to emphasize the fact that an object can become a black hole only once, and a black hole cannot evolve into anything else.  
C) It is the edge of the black hole, where one could leave the observable universe.  
D) It is the "point of no return" of the black hole; anything closer than this point will not be able to escape the gravitational force of the black hole.
- 5) What is the basic definition of a *black hole*? 5) \_\_\_\_\_  
A) an object with gravity so strong that not even light can escape  
B) any object made from dark matter  
C) a dead star that has faded from view  
D) a compact mass that emits no visible light
- 6) According to our modern understanding, what is a *nova*? 6) \_\_\_\_\_  
A) the sudden formation of a new star in the sky  
B) a rapidly spinning neutron star  
C) the explosion of a massive star at the end of its life  
D) an explosion on the surface of a white dwarf in a close binary system
- 7) What do we call the bright, sphere-shaped region of stars that occupies the central few thousand light-years of the Milky Way Galaxy? 7) \_\_\_\_\_  
A) the galaxy's disk B) the galaxy's halo  
C) a globular cluster D) the galaxy's bulge

- 8) What do halo stars do differently from disk stars? 8) \_\_\_\_\_  
 A) They orbit the center of the galaxy at much lower speeds than disk star.  
 B) They remain stationary, quite unlike disk stars that orbit the galactic center.  
 C) Halo stars explode as supernovae much more frequently than disk stars.  
 D) They orbit the galactic center with many different inclinations, while disk stars all orbit in nearly the same plane.
- 9) What kind of object do we think lies in the center of the Milky Way Galaxy? 9) \_\_\_\_\_  
 A) a 3- to 4-million-solar-mass black hole  
 B) a gigantic X-ray binary system  
 C) an enormous collection of dark matter, which explains why we detect no light at all from the galactic center  
 D) a dense cluster of young, hot stars
- 10) What do we mean by the *star-gas-star cycle*? 10) \_\_\_\_\_  
 A) It describes the orbits of the stars and interstellar medium around the center of the galaxy.  
 B) It is the set of nuclear reactions by which heavy elements are produced in the cores of massive stars.  
 C) It is the idea that stars in close binary systems can exchange gas with one another.  
 D) It is the continuous recycling of gas in the galactic disk between stars and the interstellar medium.
- 11) A typical neutron star is more massive than our Sun and about the size (radius) of \_\_\_\_\_. 11) \_\_\_\_\_  
 A) a small asteroid (10 km in diameter)                      B) Jupiter  
 C) the Moon    D) Earth
- 12) If you had something the size of a sugar cube that was made of white dwarf matter, it would weigh \_\_\_\_\_. 12) \_\_\_\_\_  
 A) as much as a truck    B) as much as an average person  
 C) as much as the entire Earth                                      D) about 5 pounds
- 13) If we could see our own galaxy from 2 million light-years away, it would appear \_\_\_\_\_. 13) \_\_\_\_\_  
 A) to fill the sky with widely spaced stars  
 B) as a faintly glowing band of light stretching all the way around the sky  
 C) like a single, dim star  
 D) as a flattened disk with a central bulge and spiral arms
- 14) Imagine that our Sun were magically and suddenly replaced by a black hole of the same mass (1 solar mass). What would happen to Earth in its orbit? 14) \_\_\_\_\_  
 A) Earth would orbit faster, but at the same distance.  
 B) Earth would slowly spiral inward until it settled into an orbit about the size of Mercury's current orbit.  
 C) Earth would almost instantly be sucked into oblivion in the black hole.  
 D) Nothing—Earth's orbit would remain the same.
- 15) How do *disk stars* orbit the center of the galaxy? 15) \_\_\_\_\_  
 A) They follow spiral paths along the spiral arms.  
 B) They have orbits randomly inclined and in different directions relative to the galactic center.  
 C) They follow orbits that move up and down through the disk, typically taking them about 50,000 light-years above and below the disk on each orbit.  
 D) They all orbit in roughly the same plane and in the same direction.

- 16) Based on current understanding, the *minimum* mass of a black hole that forms during a massive star supernova is roughly \_\_\_\_\_. 16) \_\_\_\_\_
- A) 10 solar masses  
B) 3 solar masses  
C) 0.5 solar masses  
D) 1.4 solar masses
- 17) A white dwarf is \_\_\_\_\_. 17) \_\_\_\_\_
- A) a brown dwarf that has exhausted its fuel for nuclear fusion  
B) an early stage of a neutron star  
C) what most stars become when they die  
D) a precursor to a black hole
- 18) What do we mean by the *event horizon* of a black hole? 18) \_\_\_\_\_
- A) It is the place where X rays are emitted from black holes.  
B) It is the very center of the black hole.  
C) It is the point beyond which neither light nor anything else can escape.  
D) It is the distance from the black hole at which stable orbits are possible.
- 19) A neutron star is \_\_\_\_\_. 19) \_\_\_\_\_
- A) a star made mostly of elements with high atomic mass numbers, so that they have lots of neutrons  
B) the remains of a star that died in a massive star supernova (if no black hole was created)  
C) an object that will ultimately become a black hole  
D) the remains of a star that died by expelling its outer layers in a planetary nebula
- 20) What are the *Magellanic Clouds*? 20) \_\_\_\_\_
- A) two nebulae located in the disk of the Milky Way Galaxy and visible only from the Southern Hemisphere  
B) the clouds of dust and gas found interspersed in many places throughout the Milky Way Galaxy  
C) two small galaxies that probably orbit the Milky Way Galaxy  
D) star-forming clouds found in the constellation Orion