University of Mississippi
ASTR 101, Spring 2013

Name: _____

Midterm Test 3

Circle the letter next to your choice of answer for each multiple-choice question (do not write the letter next to the question).

(1) How far is the Sun from the Earth?
a. 11 billion km.
b. 150 million km.
c. 700,000 km.
d. 6,400 km.

(2) What do you need to know about a star to place it in the HR diagram?
a. Velocity and temperature.
b. Temperature and luminosity.
c. Luminosity and distance.
d. Distance and velocity.

(3) In a star cluster, why do massive stars leave the main sequence before low-mass stars?
a. Because gravity affects them more, and they end up being ejected from the cluster.
b. Because they tend to move less, and are disrupted by more frequent collisions.
c. Because they are much brighter, and burn the hydrogen in their cores more quickly.
d. Because they develop a black hole in their core, which eats them up.

~~(4) Which of these could possibly be the radius of a neutron star?~~
a. 15 km.
b. 15,000 km.
c. 15 million km.
d. 15 million light years.

(5) If we say that a star is among the "cooler" ones, what is its surface temperature, approximately?
a. 10 K.
b. 3000 K.
c. 30,000 K.
d. 10 million K.

~~(6) How can we find neutron stars?~~
a. They can often be seen as pulsars, from which we get pulses of radio waves.
b. We recognize them because they shine more brightly than any other regular star.
c. We look for stars whose brightness changes over a period of a few days.
d. If they are not surrounded by glowing matter there is no way for us to find them.

(7) What is stellar parallax used for in astronomy today?
a. To align the axis of a telescope with the Earth's rotation.
b. To locate the point representing a star on an HR diagram.
c. To find the distance to a star from its apparent displacement.
d. To find the mass of a star from the rate at which it rotates.

(8) Which of these is <u>not</u> a good method to check if a certain star is actually a binary?
a. Look for periodic changes in its brightness.
b. Locate a second, fainter star on a telescope image.
c. See what part of the HR diagram the star is located in.
d. Look for small changes in the wavelength of its light.

(9) How large are the clouds that collapse to form stars, initially?
a. Tens of millions of km.
b. Several astronomical units.
c. Tens of light years.
d. Several millions of parsecs.

(10) If star A appears larger than star B in a photograph of the night sky, you can conclude that
a. Star A is closer to us than star B.
b. Star A appears brighter than star B, as seen from Earth.
c. Star A is younger than star B.
d. Star A is actually larger in size than star B.

(11) When can an object in space be called a star?
a. When it has a clearly defined surface and spherical shape.
b. When it starts shining because it emits light and radiation.
c. When energy is produced in its core by nuclear reactions.
d. When we can see it with our telescopes from Earth.

(12) Which is hotter, a supergiant star or a main sequence star?
a. The supergiant star.
b. The main sequence star.
c. They have the same temperature.
d. It could be either one, we need more information to answer this question.

(13) For how long does a star like the Sun lead a normal life?
a. 10 billion years.
b. 150 million years.
c. 40 million years.
d. 4 million light years.

(14) What kinds of stars are more common in our neighborhood?
a. Large, bright, supergiant stars.
b. Small but very bright white dwarf stars.
c. Colder and dimmer stars than the Sun.
d. Neutron stars.

(15) What are the sunspots we see on the surface of the Sun?
a. Dark holes in the surface of the Sun, through which we can see deep inside it.
b. Places on the Sun's surface that are so hot that they emit X-rays rather than visible light.
c. Clouds hovering over the Sun, which prevent us from seeing the surface.
d. Places that appear dark because cooler gas from the Sun's surface is plunging inwards.

(16) What are the letters O B A F G K M most directly related to?
a. The distance to a star.
b. The size of a star.
c. The brightness of a star.
d. The temperature of a star.

(17) What is the main factor that makes interstellar matter collapse and form new stars?
a. Gravity.
b. Heat.
c. Rotation.
d. Magnetic fields.

(18) Which stars live longer?
a. All stars last about the same amount of time.
b. More massive stars, because they have more fuel available.
c. Less massive stars, because they burn more slowly.
d. Stars which can burn elements heavier than hydrogen in their cores.

(19) Is it common for two stars to be so close that they orbit around each other?
a. No, only about 1% of stars are sufficiently close to each other.
b. Yes, possibly about half of all stars are that close to each other.
c. Yes, every star we know revolves around one or more other stars.
d. No, stars never orbit around each other, only planets orbit around stars.

(20) What is interesting about the middle star of the handle in the Big Dipper, Mizar?
a. It is a binary star.
b. It is a supergiant star.
c. It is the fastest moving star.
d. It is the brightest star in the sky.

(21) What is Omega Centauri?
a. A dark nebula in the Orion constellation.
b. An open cluster of galaxies in Centaurus.
c. A globular cluster of stars in Centaurus.
d. Two stars in a very close, tight binary system.

(22) What is a visual binary star system?
a. One in which we can actually see two stars.
b. One in which the visual brightness changes periodically in time.
c. One whose spectrum of visible light changes in time.
d. One in whose spectrum we can see both emission and absorption lines.

(23) How many stars do open clusters usually have?
a. Between 2 and 5.
b. A few dozen or so.
c. Hundreds or possibly thousands.
d. Hundreds of thousands or more.

(24) Which of these contains more stars?
a. The Solar System.
b. An open cluster.
c. A globular cluster.
d. The Alpha Centauri system.

(25) What is the chromosphere?
a. The layer just below the surface of the Sun, hidden from view.
b. The thin, faint, reddish layer just above the surface of the Sun.
c. The extensive, hot atmosphere of the Sun, extending out to millions of km.
d. The part of the Sun's interior that surrounds the core.

(26) What is the first element produced from hydrogen fusion inside stars?
a. Helium. b. Carbon. c. Iron. d. Plutonium.

~~(27) Why can't neutron stars be more massive than about 3 solar masses?~~
a. Because the heavier stars that would form them have not exploded yet.
b. Because even the heaviest stars only leave behind a core of 3 solar masses.
c. Because the ones that would be heavier collapse to form black holes instead.
d. Because there are no stars whose mass is more than 3 solar masses.

(28) Why are the apparent and absolute magnitudes of a star usually different?
a. Because the apparent magnitude depends on how far the star is.
b. Because we use different types of telescopes to measure them.
c. Because the two magnitudes have the same value only for main sequence stars.
d. Because the two magnitudes have the same value only if the star is not moving.

(29) When does a star like the Sun become a red giant in the late stages of its life?
a. When all of the nuclear fuel in the core has been spent, gravity weakens, and the outher layers of the star drift away.
b. When another star that had previously been orbiting it is drawn in and the two stars merge into a more massive one.
c. When the core cools and shrinks and the material around it contracts and heats up, pushing the outer layers outwards.
d. When the core starts burning helium into heavier elements like carbon, producing more heat than in earlier stages.

~~(30) What is a black hole?~~
a. A star made of dark matter, which annihilates ordinary matter on contact.
b. A star which looks black because it is too cold to emit any radiation.
c. A region of space where gravity is so strong that light cannot come out.
d. A cloud of gas and dust so thick that it hides any star that is inside it.

(31) Can the same star explode as a supernova more than once?
a. No, because afterwards the star stays on the main sequence.
b. No, because most or all of the star is blown away.
c. Yes, several times over a few weeks or months.
d. Yes, about once every 100 years.

(32) Which of these stars is brightest in our sky?
a. Betelgeuse.
b. Alpha centauri.
c. Sirius.
d. Polaris.

(33) What is the difference between type Ia and type II supernovas?
a. Type Ia supernovas are 100 times as bright as type II supernovas.
b. Type Ia are produced by binary stars, type II by single massive stars.
c. Type Ia supernovas emit visible light, type II only radio waves.
d. Type Ia explosions produce interstellar gas, type II produce dust.

~~(34) Would you be able to land on the surface of a black hole?~~
a. No, there is no hard surface to stand on, you would just fall inward.
b. No, because black holes spin so fast you would be thrown outward.
c. Yes, but you would be permanently stuck on the black hole's surface.
d. For a moment, but then you would be flattened by its strong gravity.

(35) Vega is a main-sequence star of spectral type A0 and apparent magnitude 0.04, about 25 light years away. Can we see its parallax?
a. No, because it is too far away.
b. Yes, because it is close enough to us.
c. No, because it is not bright enough.
d. Yes, because its spectrum has enough lines.

(36) How often do we expect supernovae to occur inside our galaxy, on average?
a. We see several every year.
b. We expect to see one every 100 years or so on average.
c. Only one every 30-40 million years.
d. Never; supernovas only occur in young, distant galaxies.

~~(37) Which stars can become black holes?~~
a. Only small stars; the big ones are blown away by supernova explosions.
b. Very massive stars; smaller ones become white dwarfs or neutron stars.
c. Stars which get too close to other black holes turn into new black holes.
d. All stars; a small one forms in their core, and then grows.

(38) What is the temperature at the Sun's core?
a. 6000 K.
b. One million K.
c. 15 million K.
d. One billion K.

~~(39) How many black holes do we think are in the Solar System?~~
a. 0.
b. 1.
c. 200 or so.
d. 100 billion or so.

(40) Can the Sun become a supernova?
a. Yes, if we wait another 5 billion years.
b. Yes, if it is hit by a large asteroid.
c. No, it is not massive enough.
d. No, it has already been through that stage.