1 The HR diagram of a young, open cluster typically shows
   a. the entire main sequence still present.
   b. only the lower part of the main sequence still present.
   c. only the middle part of the main sequence still present.
   d. only the upper part of the main sequence still present.

2 In a Hertzsprung-Russell diagram, the brightest stars are found
   a. on the left side.
   b. on the right side.
   c. at the bottom.
   d. at the top.

3 The idea that a supernova is preceded by a huge burst of neutrinos is
   a. a prediction that has not yet been observed.
   b. a purely theoretical idea that cannot be tested.
   c. a prediction that has now been observed.
   d. no longer believed to be correct.

4 Which of the following spectral classes corresponds to the lowest surface temperature (on this list)?
   a. B
   b. A
   c. G
   d. K
   e. F

5 A star is observed to have an apparent brightness which is 10^{-6} times its absolute brightness. How far away is it?
   a. 10 parsecs.
   b. 1000 parsecs.
   c. 10,000 parsecs.
   d. 10^6 parsecs.
   e. 100 parsecs.

6 The final core collapse that leads to a supernova is ended when
   a. the neutrons are gone.
   b. all of the electrons are gone.
   c. the neutrons touch each other.
   d. the electrons in the core touch each other.
   e. all of the iron has been broken up.

7 A neutron star in orbit near a normal star is expected to emit
   a. both a constant X-ray signal and X-ray bursts.
   b. no X-rays at all.
   c. a constant X-ray signal with no bursts.
   d. bursts of X-rays but no constant signal.

8 On a HR diagram, a visible white dwarf star is in the
   a. upper left corner.
   b. upper right corner.
   c. main sequence.
   d. lower left corner.
   e. lower right corner.

9 Stars usually come in clusters, all born at about the same time, because
   a. supergiant stars often explode into pieces.
   b. that is statistically the most probable situation.
   c. collapsing interstellar clouds usually fragment.
   d. the formation of one star triggers others.

10 When the iron nuclei in the core of an evolved high-mass star start to come apart, they
   a. release energy and raise the core temperature.
   b. absorb energy and limit the core temperature.
   c. trigger a new round of nuclear fusion.
   d. cause the core to expand.

11 A main-sequence star with less mass than our sun will be
   a. hotter and brighter.
   b. cooler and brighter.
   c. hotter and dimmer.
   d. cooler and dimmer.

12 Suppose that the color and behavior of a star identify it as a type that we know has absolute magnitude –3. If the star's apparent magnitude is found to be 2, how far away is it?
   a. 10 parsecs.
   b. 50 parsecs.
   c. 5 parsecs.
   d. 100 parsecs.
   e. 1000 parsecs.

13 A nova occurs when
   a. the core of a star suddenly collapses.
   b. a white dwarf steals fuel from a neighbor.
   c. a star runs out of fuel.
   d. a star blows off its outer envelope.
   e. a red giant begins to burn helium.

14 Cepheid variable stars with the same period
   a. have similar apparent magnitudes.
   b. are at similar distances from us.
   c. usually belong to the same star cluster.
   d. have similar luminosities.

15 Stars with more than 15 times the mass of our Sun usually evolve from the main sequence to red giants
   a. without pausing while getting brighter at almost constant temperature.
   b. in several stages, but none with almost constant temperature.
   c. without pausing while getting cooler at almost constant brightness.
   d. in several stages, some with almost constant temperature.

16 The formation of electron-degenerate matter in the carbon core of a solar-mass red super giant
   a. prevents carbon-burning from starting.
   b. leads to further core collapse.
   c. causes the core to explode.
   d. returns the star to the horizontal branch.
   e. triggers a flash of carbon-burning.

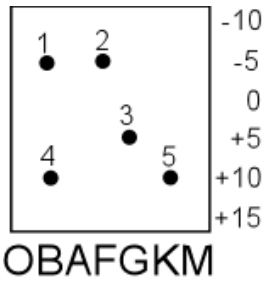
17 A star with a distance modulus of zero is at a distance of
   a. 1 parsec.
   b. 1000 parsecs.
   c. 10,000 parsecs.
   d. 100 parsecs.
   e. 10 parsecs.

18 A brown dwarf shines primarily with
   a. energy left over from its formation.
   b. energy generated by nuclear fusion.
   c. energy generated by radioactive decay.
   d. light reflected from nearby stars.

19 One conclusion that was drawn from the gradual slowing of the radio signals from the Crab Nebula was that they were probably
   a. from a source moving away from us.
   b. of artificial origin.
   c. an obvious hoax.
   d. from a source moving toward us.
   e. of natural origin.

20 A star that forms an iron core most likely has a mass of
   a. between 15 and 20 solar masses.
   b. less than one solar mass.
   c. between 1 and 4 solar masses.
   d. more than 20 solar masses.

21 In the Hertzsprung-Russell diagram shown, point number 3 could be a



a. B0 star of absolute magnitude -5.
b. B0 star of absolute magnitude 10.
c. F0 star of absolute magnitude -5.
d. K2 star of absolute magnitude 10.
e. F9 star of absolute magnitude 5.

22 Which of the following spectral types corresponds to the star with the lowest surface temperature?

a. G0
b. K5
c. K0
d. G5

23 Which of the following magnitudes corresponds to the brightest star?

a. $+3.4$.
b. $+2.1$.
c. $+5.6$.
d. $+1.2$
e. -1.5.

24 The part of a protostar where the density first becomes low enough for photons to escape is called the

a. outer boundary.
b. central core.
c. fragmentation point.
d. core boundary.
e. photosphere.

25 A globular cluster usually consists of

a. Billions of stars together.
b. Glowing gas and newborn stars.
c. A single dead star surrounded by glowing gas.
d. Millions of stars together.

26 The red supergiant phase of a star is caused by

a. the exhaustion of helium at its core.
b. the ignition of hydrogen at its core.
c. the ignition of helium at its core.
d. the collapse of its core.
e. the exhaustion of hydrogen at its core.

27 The first observed source to fit the predicted emmissions from a black hole was
   a. Eridanus X-3.
   b. Scorpius X-1.
   c. Taurus N6.
   d. Cygnus X-1.
   e. Orion K-45.

28 The reason that the Crab Pulsar is slowing down is
   a. its magnetic field is dragging through nearby gas.
   b. that it is getting older.
   c. tidal friction due to the gravity of a nearby star.
   d. that it is running out of nuclear fuel.
   e. that it is losing electric charge.

29 The star alpha-Centauri C has moved across the sky by 3853 seconds of arc during the last thousand years - slightly more than one full degree of arc. Its proper motion is
   a. $1.9265''$/yr.
   b. $3853''$/yr.
   c. $0.26''$/yr.
   d. $3.853''$/yr.
   e. $38.53''$/yr.

30 For a given nearby star, the parallax shift
   a. increases when the baseline is larger.
   b. does not depend on the baseline.
   c. increases when the baseline is shorter.

31 Which of the following spectral types corresponds to a star on the main sequence?
   a. G2IV
   b. O2Ia
   c. A2Ib
   d. B4V
   e. K2III

32 The Earth's motion around the Sun causes
   a. nearby stars to shift back and forth once a year.
   b. nearby stars to shift steadily in the same direction.
   c. all stars to move away from a point in the constellation Hercules.
   d. all stars to jump randomly around.

33 The constellation Sagittarius is where the Milky Way
   a. is thinnest.
   b. splits into two bands.
   c. cannot be found.
   d. has its most northern point.
   e. is thickest.

34 The event horizon of a black hole is the point at which
   a. inwardly directed light rays escape from the hole.
   b. light rays are bent into circular orbits.
   c. outwardly directed light rays are pulled into the hole.
   d. all light rays escape from the hole.

35 Your starship is pulled in to what appears to be a black hole. It is really a wormhole if you
   a. can no longer get signals out.
   b. emerge into a different part of space.
   c. immediately crash onto the surface of a collapsing star.
   d. achieve a stable orbit around it.
   e. cannot escape without exceeding the speed of light.

36 A star that is cooling and swelling just enough to keep the same total brightness could be a
   a. white dwarf.
   b. red subgiant.
   c. protostar.
   d. red giant.
   e. main sequence star.

37 Our sun is roughly at the center of
   a. the visible part of the Milky Way.
   b. a globular cluster.
   c. the entire Milky Way Galaxy.

38 The position of a protostar on an HR diagram changes because
   a. the protostar moves.
   b. the mass of the protostar changes.
   c. the size and temperature of the protostar change.
   d. the protostar gets older.

39 Type II supernovas have the following properties:
   a. a spectrum with no hydrogen lines and a standard maximum brightness.
   b. a spectrum with hydrogen lines and a standard maximum brightness.
   c. a spectrum with no hydrogen lines and a variable maximum brightness.
   d. a spectrum with hydrogen lines and a variable maximum brightness.

40 The star Kruger 60 shows a heliocentric stellar parallax of almost exactly 0.25 seconds of arc. The distance from our Sun to Kruger 60 is
   a. 0.75 parsecs.
   b. 2 parsecs.
   c. 8 parsecs.
   d. 0.25 parsecs.
   e. 4 parsecs.

41 Which of the following colors indicates the hottest star?

a. red.

b. yellow.

c. peach.

d. blue.

e. orange.

42 Our Sun is a G2V star with absolute magnitude 4.8. Suppose that a star of spectral type G2V is observed to have apparent magnitude -0.2. How far away is it?

a. 10 parsecs.

b. 1000 parsecs.

c. 5 parsecs.

d. 100 parsecs.

e. 1 parsec.

43 The 'helium flash' refers to

a. the explosive ignition of a star's helium core.

b. the end of hydrogen burning in a star's core.

c. the onset of the red giant stage.

d. the end of helium burning in a star's core.

e. the onset of the red subgiant stage.

Answer Key Exam 3 Preview 1

1 Choice a. (the entire main sequence still present.)
2 Choice d. (at the top.)
3 Choice c. (a prediction that has now been observed.)
4 Choice d. (K)
5 Choice c. (10,000 parsecs.)
6 Choice c. (the neutrons touch each other.)
7 Choice a. (both a constant X-ray signal and X-ray bursts.)
8 Choice d. (lower left corner.)
9 Choice c. (collapsing interstellar clouds usually fragment.)
10 Choice b. (absorb energy and limit the core temperature.)
11 Choice d. (cooler and dimmer.)
12 Choice d. (100 parsecs.)
13 Choice b. (a white dwarf steals fuel from a neighbor.)
14 Choice d. (have similar luminosities.)
15 Choice c. (without pausing while getting cooler at almost constant brightness.)
16 Choice a. (prevents carbon-burning from starting.)
17 Choice e. (10 parsecs.)
18 Choice a. (energy left over from its formation.)
19 Choice e. (of natural origin.)
20 Choice a. (between 15 and 20 solar masses.)
21 Choice e. (F9 star of absolute magnitude 5.)
22 Choice b. (K5)
23 Choice e. (-1.5.)
24 Choice e. (photosphere.)
25 Choice d. (Millions of stars together.)
26 Choice a. (the exhaustion of helium at its core.)
27 Choice d. (Cygnus X-1.)
28 Choice a. (its magnetic field is dragging through nearby gas.)
29 Choice d. ($3.853''$/yr.)
30 Choice a. (increases when the baseline is larger.)
31 Choice d. (B4V)
32 Choice a. (nearby stars to shift back and forth once a year.)
33 Choice e. (is thickest.)
34 Choice c. (outwardly directed light rays are pulled into the hole.)
35 Choice b. (emerge into a different part of space.)
36 Choice b. (red subgiant.)

37 Choice a. (the visible part of the Milky Way.)

38 Choice c. (the size and temperature of the protostar change.)

39 Choice d. (a spectrum with hydrogen lines and a variable maximum brightness.)

40 Choice e. (4 parsecs.)

41 Choice d. (blue.)

42 Choice e. (1 parsec.)

43 Choice a. (the explosive ignition of a star's helium core.)

Solutions

1 Module 047: Star Formation Question 047.53
2 Module 046: The Hertzsprung-Russell Diagram Question 046.23
3 Module 049: Supernova Explosions Question 049.43
4 Module 045: Star Colors and Classes Question 045.22
5 Module 044: Stellar Magnitudes 044.13
6 Module 049: Supernova Explosions Question 049.51
7 Module 050: Neutron Stars Question 050.31
8 Module 048: The Quiet Deaths of Ordinary Stars Question 048.54
9 Module 047: Star Formation Question 047.14
10 Module 049: Supernova Explosions Question 049.32
11 Module 046: The Hertzsprung-Russel Diagram Question 046.34
12 Module 044: Stellar Magnitudes Question 044.42
13 Module 048: The Quiet Deaths of Ordinary Stars Question 048.61
14 Module 052: The Milky Way Question 052.31
15 Module 049: Supernova Explosions Question 049.21
16 Module 048: The Quiet Deaths of Ordinary Stars Question 048.42
17 Module 044: Stellar Magnitudes 044.31
18 Module 047: Star Formation Question 047.43
19 Module 050: Neutron Stars Question 050.12
20 Module 049: Supernova Explosions Question 049.12
21 Module 046: The Hertzsprung-Russell Diagram Question 046.14
22 Module 045: Star Colors and Classes Question 045.32
23 Module 044: Stellar Magnitudes 044.21
24 Module 047: Star Formation Question 047.24
25 Module 052: The Milky Way Question 052.22
26 Module 048: The Quiet Deaths of Ordinary Stars Question 048.31
27 Module 051: Black Holes Question 051.23
28 Module 050: Neutron Stars Question 050.23
29 Module 043: Stellar Parallax Question 043.42
30 Module 043: Stellar Parallax Question 043.26
31 Module 046: The Hertzsprung-Russell Diagram Question 046.43
32 Module 043: Stellar Parallax Question 043.12
33 Module 052: The Milky Way Question 052.14
34 Module 051: Black Holes Question 051.11
35 Module 051: Black Holes Question 051.32
36 Module 048: The Quiet Deaths of Ordinary Stars Question 048.14

37 Module 052: The Milky Way Question 052.42

38 Module 047: Star Formation Question 047.34

39 Module 049: Supernova Explosions Question 049.64

40 Module 043: Stellar Parallax Question 043.31

41 Module 045: Star Colors and Classes 045.11

42 Module 046: The Hertzsprung-Russell Diagram Question 046.54

43 Module 048: The Quiet Deaths of Ordinary Stars Question 048.24