1 The heat formed when an interstellar cloud collapses is carried away by
   a. electromagnetic waves from large molecules.
   b. sound waves caused by turbulence.
   c. melting ice on dust particles.
   d. outward flowing gas ejected by magnetic fields.
   e. the ejection of hot dust particles.

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

3 Spectroscopic parallax uses
   a. annual position shifts of stars to calculate distance.
   b. timing variations in brightness to estimate mass.
   c. the doppler shift to find star velocities.
   d. stellar spectra to locate stars in the HR diagram.

4 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. 1000 parsecs.
   b. 100 parsecs.
   c. 10 parsecs.
   d. 5 parsecs.
   e. 50 parsecs.

5 Relative to the Milky Way family of stars, our sun is
   a. at the center.
   b. neither at the center nor at the edge.
   c. at the extreme edge.

6 A star with an absolute magnitude of 5.7 and an apparent magnitude of -1.2 would appear in our sky as a star
   a. of average naked-eye brightness.
   b. visible only with a telescope.
   c. of dazzling brightness.
   d. barely visible to the naked eye.

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

8 A steady X-ray signal with sudden bursts lasting a few seconds each is probably caused by
   a. a white dwarf in a binary system.
   b. an isolated neutron star.
   c. a supermassive star.
   d. a main sequence star.
   e. a neutron star in a binary system.

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

10 The star 36-Ophiuchus is six parsecs from our Sun. The light from this star in the "serpent holder" constellation has been traveling for approximately
   a. 1.8 years.
   b. 6 years.
   c. 20 years.
   d. 12 years.
   e. 0.55 years.

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

12 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 cooler at almost constant brightness.
   b. without pausing while getting brighter at almost constant temperature.
   c. in several stages, some with almost constant temperature.
   d. in several stages, but none with almost constant temperature.

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

14 The formation of a new white dwarf is usually accompanied by a
   a. helium flash.
   b. planetary nebula.
   c. dust cloud.
   d. nova.
   e. supernova explosion.

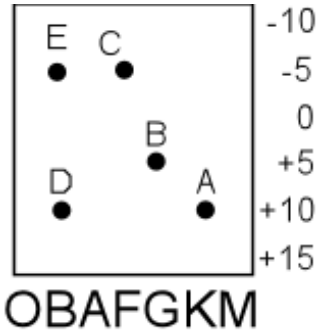
15 A star of spectral type O should look
- a. blue.
- b. yellow.
- c. white.
- d. red.
- e. orange.

16 When the hydrogen fuel runs out at the center of a main sequence star, the star
- a. begins to collapse to a white dwarf star.
- b. continues as a main sequence star.
- c. explodes as a supernova.
- d. stops burning and becomes a brown dwarf.
- e. swells up and becomes a red giant.

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

18 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. 100 parsecs.
- c. 1000 parsecs.
- d. 10,000 parsecs.
- e. 10^6 parsecs.

19 In the Hertzsprung-Russell Diagram shown, which point represents a star of type F with absolute magnitude -5?



20 Which of the following spectral types corresponds to the star with the highest surface temperature?
- a. K5
- b. G5
- c. G0
- d. K0

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

22 The photosphere of a protostar
   a. is where the temperature is a maximum.
   b. is the outer boundary of the collapsing cloud.
   c. is where the pressure drops to zero.
   d. does not exist since only stars have photospheres.
   e. is where photons are last scattered.

23 A star whose apparent brightness is 10^{-6} times that of a first magnitude star would have magnitude
   a. 1.
   b. 6.
   c. 21.
   d. 11.
   e. 16.

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

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

26 Which of the following objects is usually found among the stars that make up the Milky Way?
   a. Globular Clusters.
   b. Emission Nebulae.
   c. Extragalactic Nebulae.

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

28 The red supergiant phase of a star is caused by
a. the exhaustion of hydrogen at its core.
b. the ignition of hydrogen at its core.
c. the exhaustion of helium at its core.
d. the collapse of its core.
e. the ignition of helium at its core.

29 In a star with 15 to 20 times the mass of our Sun nuclear burning at the center stops
a. only when a carbon core develops.
b. several times during successive stages.
c. only when an oxygen core develops.
d. only when an iron core develops.
e. only when a silicon core develops.

30 Which of the following strategies would yield the largest parallax shift of a nearby star? Observe the star from
a. two different locations on Earth at the same time.
b. the Earth at times a half year apart.
c. both the Earth and the Moon.
d. Mars at times a half Martian year apart.

31 Barnard's star shows a proper motion of 10.36 arc seconds per year. In 100 years, its position in the sky changes by
a. 518 seconds of arc.
b. 10.36 seconds of arc.
c. 103.6 seconds of arc.
d. 0 seconds of arc.
e. 1036 seconds of arc.

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

33 In comparison to Cepheid variables, RR Lyra variable stars are
a. less luminous and more common.
b. more luminous and more common.
c. less luminous and less common.
d. more luminous and less common.

34 Stars on the horizontal branch of the HR diagram are burning
a. helium at their centers.
b. helium in a shell around a carbon core.
c. hydrogen around a helium core.
d. hydrogen at their centers.

35 A black hole that has formed from the collapse of a star is expected to be
   a. less than 1/10 the size of a neutron star.
   b. similar in size to a neutron star.
   c. 100 times the size of a neutron star.

36 A type I supernova occurs when
   a. the core of a star collapses.
   b. two neutron stars merge.
   c. a white-dwarf flares briefly.
   d. material falls onto a neutron star.
   e. a white-dwarf collapses.

37 Black holes
   a. have been detected because infalling matter emits X-rays.
   b. have been detected as pulsing radio sources.
   c. have been detected because they block starlight.
   d. cannot be detected because they emit no radiation.

38 Neutron stars are often observed as
   a. novas.
   b. asteroids.
   c. pulsars.
   d. quasars.
   e. Tau Tauri stars.

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

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

41 Stellar Parallax is caused by
   a. the motion of the Earth around the Sun.
   b. turbulence in the Earth's atmosphere.
   c. the motion of our Sun relative to its neighbors.
   d. the actual motion of stars relative to their neighbors.
   e. the finite speed of light.

42 The stars of the Milky Way are all near a great circle on the Celestial Sphere. This great circle

a. is the Ecliptic.
b. is the Celestial Equator.
c. is none of the other things listed here.
d. passes through the Celestial Poles.

43 Which of the following colors indicates the hottest star?

a. yellow.
b. orange.
c. red.
d. blue.
e. peach.

Answer Key: Fall 2007 AHX3M

1 Choice a. (electromagnetic waves from large molecules.)
2 Choice b. (the entire main sequence still present.)
3 Choice d. (stellar spectra to locate stars in the HR diagram.)
4 Choice b. (100 parsecs.)
5 Choice b. (neither at the center nor at the edge.)
6 Choice c. (of dazzling brightness.)
7 Choice a. (absorb energy and limit the core temperature.)
8 Choice e. (a neutron star in a binary system.)
9 Choice b. (of natural origin.)
10 Choice c. (20 years.)
11 Choice c. (lower left corner.)
12 Choice a. (without pausing while getting cooler at almost constant brightness.)
13 Choice c. (the neutrons touch each other.)
14 Choice b. (planetary nebula.)
15 Choice a. (blue.)
16 Choice e. (swells up and becomes a red giant.)
17 Choice b. (the size and temperature of the protostar change.)
18 Choice d. (10,000 parsecs.)
19 Choice c. (C)
20 Choice c. (G0)
21 Choice b. (hotter and brighter.)
22 Choice e. (is where photons are last scattered.)
23 Choice e. (16.)
24 Choice b. (a white dwarf steals fuel from a neighbor.)
25 Choice b. (B4V)
26 Choice b. (Emission Nebulae.)
27 Choice b. (a prediction that has now been observed.)
28 Choice c. (the exhaustion of helium at its core.)
29 Choice d. (only when an iron core develops.)
30 Choice d. (Mars at times a half Martian year apart.)
31 Choice e. (1036 seconds of arc.)
32 Choice d. (emerge into a different part of space.)
33 Choice a. (less luminous and more common.)
34 Choice a. (helium at their centers.)
35 Choice b. (similar in size to a neutron star.)
36 Choice e. (a white-dwarf collapses.)

37 Choice a. (have been detected because infalling matter emits X-rays.)

38 Choice c. (pulsars.)

39 Choice a. (on the left side.)

40 Choice c. (energy left over from its formation.)

41 Choice a. (the motion of the Earth around the Sun.)

42 Choice c. (is none of the other things listed here.)

43 Choice d. (blue.)

Solutions

1 Module 047: Star Formation Question 047.11
2 Module 047: Star Formation Question 047.53
3 Module 046: The Hertzsprung-Russell Diagram Question 046.51
4 Module 044: Stellar Magnitudes Question 044.42
5 Module 052: The Milky Way Question 052.41
6 Module 044: Stellar Magnitudes Question 044.34
7 Module 049: Supernova Explosions Question 049.32
8 Module 050: Neutron Stars Question 050.32
9 Module 050: Neutron Stars Question 050.12
10 Module 043: Stellar Parallax Question 043.34
11 Module 048: The Quiet Deaths of Ordinary Stars Question 048.54
12 Module 049: Supernova Explosions Question 049.21
13 Module 049: Supernova Explosions Question 049.51
14 Module 048: The Quiet Deaths of Ordinary Stars Question 048.44
15 Module 045: Star Colors and Classes Question 045.24
16 Module 048: The Quiet Deaths of Ordinary Stars Question 048.12
17 Module 047: Star Formation Question 047.34
18 Module 044: Stellar Magnitudes 044.13
19 Module 046: The Hertzsprung-Russell Diagram Question 046.12
20 Module 045: Star Colors and Classes 045.31
21 Module 046: The Hertzsprung-Russell Diagram Question 046.33
22 Module 047: Star Formation Question 047.23
23 Module 044: Stellar Magnitudes 044.23
24 Module 048: The Quiet Deaths of Ordinary Stars Question 048.61
25 Module 046: The Hertzsprung-Russell Diagram Question 046.43
26 Module 052: The Milky Way Question 052.24
27 Module 049: Supernova Explosions Question 049.43
28 Module 048: The Quiet Deaths of Ordinary Stars Question 048.31
29 Module 049: Supernova Explosions Question 049.11
30 Module 043: Stellar Parallax Question 043.25
31 Module 043: Stellar Parallax Question 043.41
32 Module 051: Black Holes Question 051.32
33 Module 052: The Milky Way Question 052.33
34 Module 048: The Quiet Deaths of Ordinary Stars Question 048.22
35 Module 051: Black Holes Question 051.13
36 Module 049: Supernova Explosions Question 049.62

37 Module 051: Black Holes Question 051.21

38 Module 050: Neutron Stars Question 050.22

39 Module 046: The Hertzsprung-Russell Diagram Question 046.24

40 Module 047: Star Formation Question 047.43

41 Module 043: Stellar Parallax Question 043.11

42 Module 052: The Milky Way Question 052.11

43 Module 045: Star Colors and Classes 045.11