

Astronomy Part 1

Regents Questions

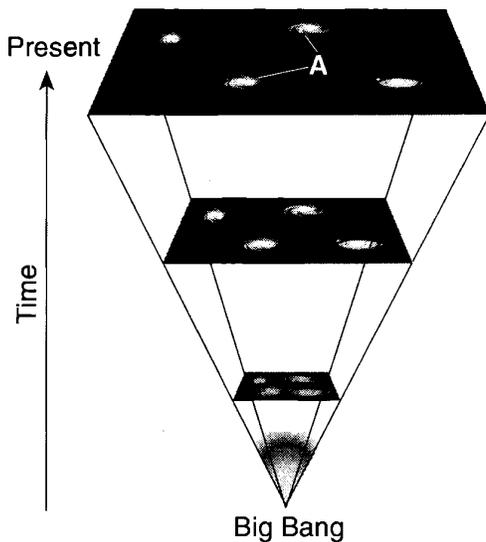
1. The Sun revolves around the center of

- A) *Polaris*
- B) *Aldebaran*
- C) Earth
- D) the Milky Way Galaxy**

2. Cosmic background radiation provides direct evidence for the origin of

- A) the universe**
- B) our solar system
- C) Earth's ozone layer
- D) Earth's earliest atmosphere

3. The diagram below represents the development of our universe from the time of the Big Bang until the present. Letter *A* indicates two celestial objects.



The present-day celestial objects labeled *A* are best identified as

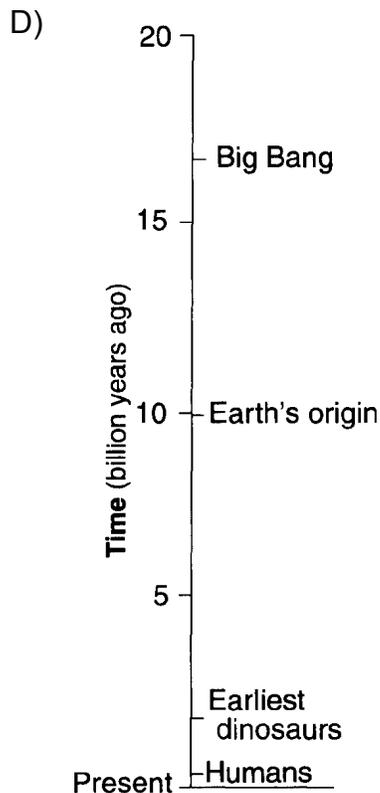
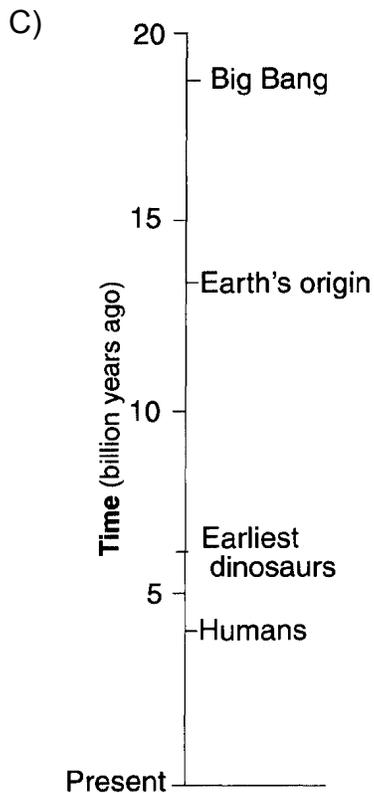
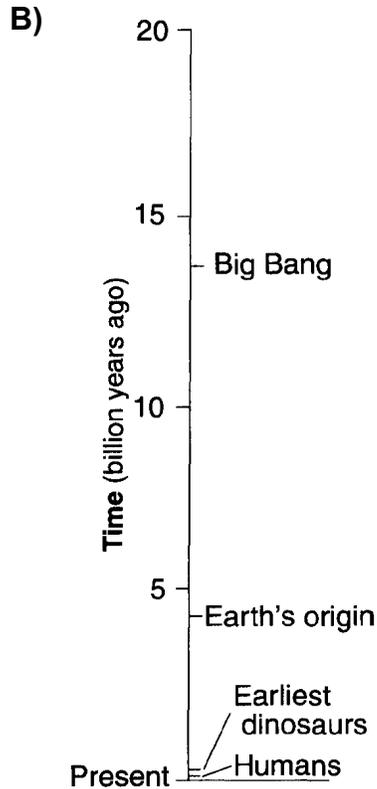
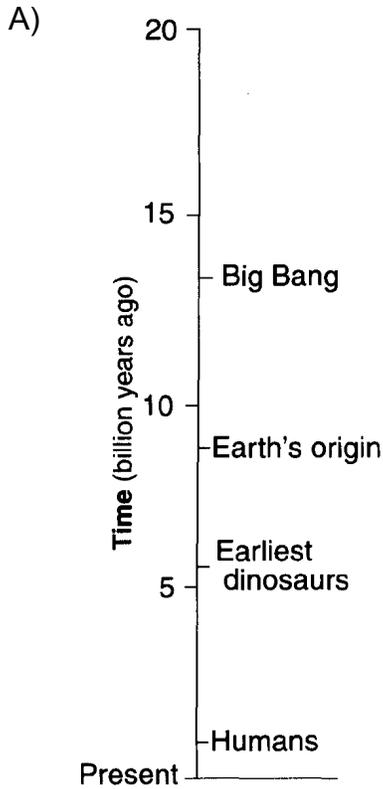
- A) asteroid belts
- B) terrestrial planets
- C) spiral galaxies**
- D) eccentric comets

4. In which sequence are the items listed from least total mass to greatest total mass?

- A) solar system, Milky Way, universe**
- B) Milky Way, solar system, universe
- C) universe, Milky Way, solar system
- D) Milky Way, universe, solar system

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5. Which time line most accurately indicates when this sequence of events in earth's history occurred?



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6. Which statement best describes the age of our solar system and the universe?

- A) **The universe is at least twice as old as our solar system.**
- B) Our solar system is at least twice as old as the universe.
- C) Our solar system and the universe are estimated to be 5 billion years old.
- D) Our solar system and the universe are estimated to be 10 billion years old.

7. The explosion associated with the theory and the formation of the universe inferred to have occurred how many billion ago?

- A) less than 1
- B) 2.5
- C) 4.6
- D) **over 10**

Base your answers to questions 8 through 11 on the table below, which shows eight inferred stages describing the formation of the universe from its beginning to the present time.

Data Table

Stage	Description of the Universe	Average Temperature of the Universe (°C)	Time From the Beginning of Universe
1	the size of an atom	?	0 second
2	the size of a grapefruit	?	10^{-43} second
3	“hot soup” of electrons	10^{27}	10^{-32} second
4	Cooling allows protons and neutrons to form.	10^{13}	10^{-6} second
5	still too hot to allow the forming of atoms	10^8	3 minutes
6	Electrons combine with protons and neutrons, forming hydrogen and helium atoms. Light emission begins.	10,000	300,000 years
7	Hydrogen and helium form giant clouds (nebulae) that will become galaxies. First stars form.	-200	1 billion years
8	Galaxy clusters form and first stars die. Heavy elements are thrown into space, forming new stars and planets.	-270	13.7 billion years

8. Between which two stages did our solar system form?

- A) 1 and 3
 - B) 3 and 5
 - C) 6 and 7
 - D) **7 and 8**
-

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9. According to this table, the average temperature of the universe since stage 3 has

- A) **decreased, only**
- B) increased, only
- C) remained the same
- D) increased, then decreased

10. What is the most appropriate title for this table?

- A) **The Big Bang Theory**
- B) The Theory of Plate Tectonics
- C) The Law of Superposition
- D) The Laws of Planetary Motion

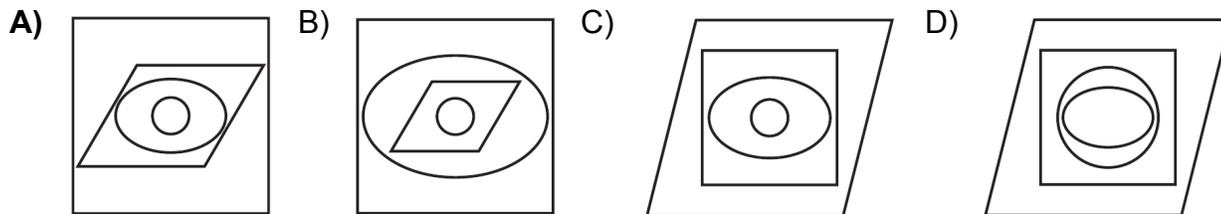
11. How soon did protons and neutrons form after the beginning of the universe?

- A) 10^{-43} second
 - B) 10^{-32} second
 - C) **10^{-6} second**
 - D) 13.7 billion years
-

12. The symbols below are used to represent different regions of space.

Universe =  Earth =  Galaxy =  Solar system = 

Which diagram shows the correct relationship between these four regions? [If one symbol is within another symbol, that means it is part of, or included in, that symbol.]



13. Most scientists believe the Milky Way Galaxy is

- A) spherical in shape
- B) 4.6 billion years old
- C) composed of stars revolving around Earth
- D) **one of billions of galaxies in the universe**

14. Which sequence correctly lists the relative sizes from smallest to largest?

- A) our solar system, universe, Milky Way Galaxy
 - B) **our solar system, Milky Way Galaxy, universe**
 - C) Milky Way Galaxy, our solar system, universe
 - D) Milky Way Galaxy, universe, our solar system
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15. The diagram below represents the shape of the Milky Way Galaxy.

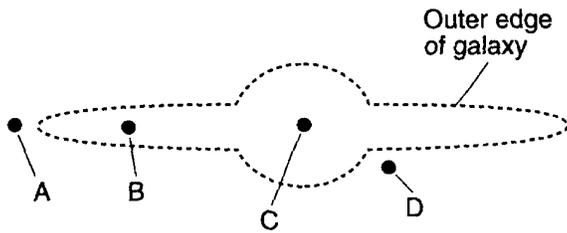


The Milky Way Galaxy is best described as

- A) elliptical B) irregular
C) circular D) **spiral**
16. Compared to Earth's solar system, the universe is inferred to be
- A) younger and larger
B) younger and smaller
C) **older and larger**
D) older and smaller
17. Which celestial feature is largest in actual size?
- A) the Moon B) Jupiter
C) the Sun D) **the Milky Way**
18. The Milky Way galaxy is best described as
- A) a type of solar system
B) a constellation visible to everyone on Earth
C) a region in space between the orbits of Mars and Jupiter
D) **a spiral-shaped formation composed of billions of stars**
19. The Sun's position in space is best described as the approximate center of
- A) a constellation
B) the universe
C) the Milky Way galaxy
D) **our solar system**
20. A light year is
- A) **the distance traveled by light in one year**
B) the distance the Earth moves in one year
C) the time it takes light to go once around the Earth's orbit
D) the time it takes light to travel one year
21. What is the name usually given to the group of objects consisting of a sun and any planets, comets, and other objects that orbit it?
- A) **a solar system** B) a universe
C) a galaxy D) an ecosystem
22. The unit most used by astronomers to express the distances to other galaxies is
- A) miles
B) kilometers
C) astronomical unit (AU)
D) **Lightyears (LY)**
23. In which list are celestial features correctly shown in order of increasing size?
- A) galaxy → solar system → universe → planet
B) solar system → galaxy → planet → universe
C) **planet → solar system → galaxy → universe**
D) universe → galaxy → solar system → planet

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24. The diagram below represents a side view of the Milky Way Galaxy.



(Not drawn to scale)

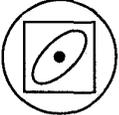
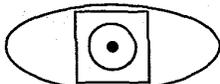
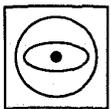
At approximately which position is Earth's solar system located?

- A) A **B) B** C) C D) D

25. The symbols below represent the Milky Way galaxy, the solar system, the Sun, and the universe.

-  = Milky Way Galaxy
-  = Solar System
-  = Sun
-  = Universe

Which arrangement of symbols is most accurate?

- A) 
- B) 
- C) 
- D) 

26. Billions of stars in the same region of the universe are called

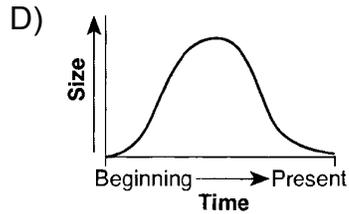
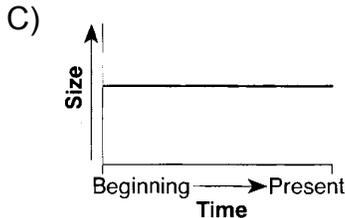
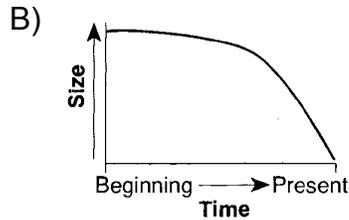
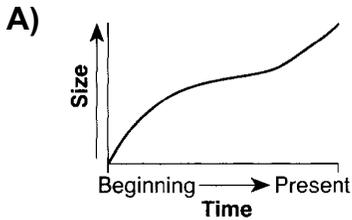
- A) solar systems B) asteroid belts
C) constellations **D) galaxies**

27. Which statement best describes galaxies?

- A) They are similar in size to the solar system.
- B) They contain only one star but hundreds of planets.
- C) They may contain a few hundred stars in a space slightly larger than the solar system.
- D) They may contain billions of stars in a space much larger than our solar system.**

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28. According to the Big Bang theory, which graph best represents the relationship between time and the size of the universe from the beginning of the universe to the present?



29. The theory that the universe is expanding is supported by the

- A) blue shift of light from distant galaxies
- B) red shift of light from distant galaxies**
- C) nuclear fusion occurring in the Sun
- D) radioactive decay occurring in the Sun

30. Base your answer to the following question on The diagram below represents the bright-line spectrum for an element.



The spectrum of the same element observed in the light from a distant star is shown below.



The shift in the spectral lines indicates that the star is moving

- A) toward Earth
- B) away from Earth**
- C) in an elliptical orbit around the Sun
- D) in a circular orbit around the Sun

31. The red shift of visible light waves that is observed by astronomers on Earth is used to determine the

- A) sizes of nearby galaxies
- B) relative motions of distant galaxies**
- C) densities of the planets
- D) rotation periods of the planets

32. What does a red shift in light from distant celestial objects indicate to a scientist on Earth?

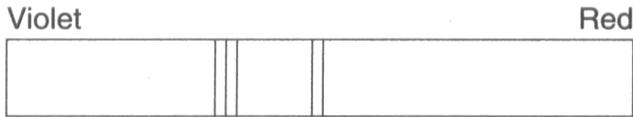
- A) The gravitational force on Earth changes.
- B) The universe appears to be expanding.**
- C) The Jovian planets are aligned with the Sun.
- D) Galaxies are becoming more numerous.

33. Evidence that the universe is expanding is best provided by the

- A) red shift in the light from distant galaxies**
- B) change in the swing direction of a Foucault pendulum on Earth
- C) parallelism of Earth's axis in orbit
- D) spiral shape of the Milky Way Galaxy

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34. The diagram below shows the spectral lines for an element.



Which diagram best represents the spectral lines of this element when its light is observed coming from a star that is moving away from Earth?

- A) 
- B) 
- C) 
- D) 

35. Astronomers viewing light from distant galaxies observe a shift of spectral lines toward the red end of the visible spectrum. This shift provides evidence that

- A) orbital velocities of stars are decreasing
 B) Earth's atmosphere is warming
 C) the Sun is cooling
D) the universe is expanding

36. When viewed from Earth, the light from very distant galaxies shows a red shift. This is evidence that these distant galaxies are

- A) revolving around the Sun
 B) revolving around the Milky Way
C) moving away from Earth
 D) moving toward Earth

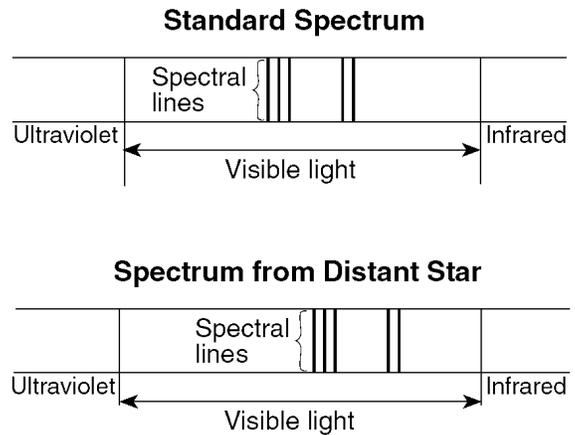
37. The Big Bang Theory, describing the creation of the universe, is most directly supported by the

- A) redshift of light from distant galaxies**
 B) presence of volcanoes on Earth
 C) apparent shape of star constellations
 D) presence of craters on Earth's Moon

38. Starlight from distant galaxies provides evidence that the universe is expanding because this starlight shows a shift in wavelength toward the

- A) red-light end of the visible spectrum**
 B) blue-light end of the visible spectrum
 C) ultraviolet-ray end of the electromagnetic spectrum
 D) gamma-ray end of the electromagnetic spectrum

39. The diagram below shows a standard spectrum compared to a spectrum produced from a distant star.

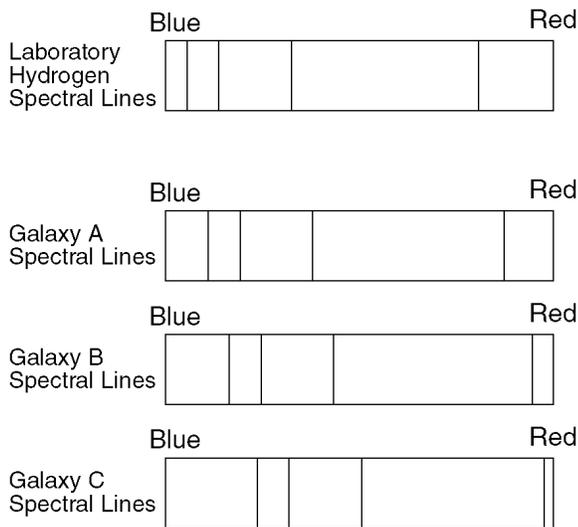


Which conclusion can be made by comparing the standard spectrum to the spectrum produced from this distant star?

- A) The star's spectral lines have shifted toward the ultraviolet end of the spectrum and the star is moving toward Earth.
 B) The star's spectral lines have shifted toward the ultraviolet end of the spectrum and the star is moving away from Earth.
 C) The star's spectral lines have shifted toward the infrared end of the spectrum and the star is moving toward Earth.
D) The star's spectral lines have shifted toward the infrared end of the spectrum and the star is moving away from Earth.

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40. The redshift of light from distant galaxies provides evidence that the universe is
- A) shrinking, only
 - B) expanding, only**
 - C) shrinking and expanding in a cyclic pattern
 - D) remaining the same size
41. In the diagram below, the spectral lines of hydrogen gas from three galaxies, *A*, *B*, and *C*, are compared to the spectral lines of hydrogen gas observed in a laboratory.

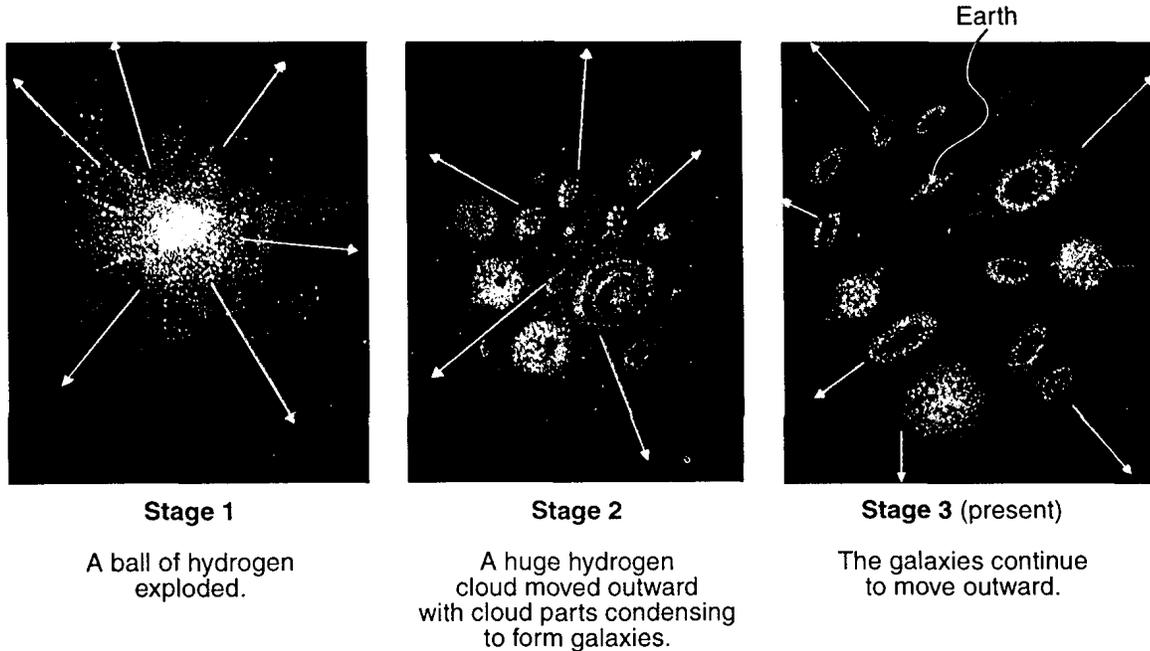


What is the best inference that can be made concerning the movement of galaxies *A*, *B*, and *C*?

- A) Galaxy *A* is moving away from Earth, but galaxies *B* and *C* are moving toward Earth.
 - B) Galaxy *B* is moving away from Earth, but galaxies *A* and *C* are moving toward Earth.
 - C) Galaxies *A*, *B*, and *C* are all moving toward Earth.
 - D) Galaxies *A*, *B*, and *C* are all moving away from Earth.**
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42. The diagram below illustrates three stages of a current theory of the formation of the universe.



A major piece of scientific evidence supporting this theory is the fact that wavelengths of light from galaxies moving away from Earth in stage 3 are observed to be

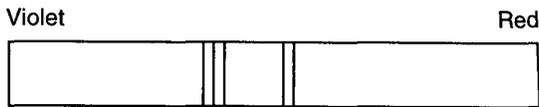
- A) shorter than normal (a red shift) B) shorter than normal (a blue shift)
C) **longer than normal (a red shift)** D) longer than normal (a blue shift)

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43. In a Doppler red shift, the observed wavelengths of light from distant celestial objects appear closer to the red end of the spectrum than light from similar nearby celestial objects. The explanation for the red shift is that the universe is presently

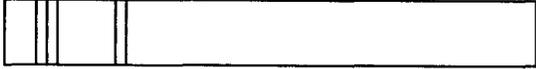
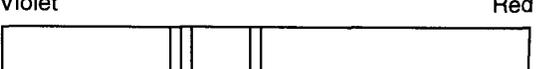
- A) contracting, only
B) **expanding, only**
C) remaining constant in size
D) alternating between contracting and expanding
-

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44. The diagram below represents a standard dark-line spectrum for an element.



The spectral lines of this element are observed in light from a distant galaxy. Which diagram represents these spectral lines?

- A) 
- B) 
- C) 
- D) 

45. The more that the spectral lines of a star are shifted to the red end of the spectrum

- A) the larger it is.
B) the faster it is rotating
C) the hotter it is
D) the faster it is moving away from us

46. The velocity of a star toward or away from the Earth can be determined by measuring the

- A) color of the star
B) shift of its spectral lines
C) brightness of the star
D) its change in apparent size

47. If we observe a Doppler blue shift from a star, the star must be

- A) relatively cool in temperature
B) moving away from us
C) moving toward us
D) a blue star

48. A star moving away from the Earth will have a spectrum containing

- A) red shifted lines**
B) blue shifted lines
C) unshifted lines
D) dim lines

49. Compared to light from a stationary source at the same point, light from an object moving toward you is

- A) brighter
B) bluer
C) redder
D) unchanged in both color and brightness

50. The Doppler effect predicts that light from a source moving away from Earth will be

- A) shifted to shorter wavelengths.
B) shifted to longer wavelengths.
C) appear blue.
D) appear red.

51. Most astronomers agree that at the present time universe is

- A) contracting
B) expanding
C) staying the same size
D) expanding and contracting regularly

52. The major evidence supporting the "Big Bang" theory is

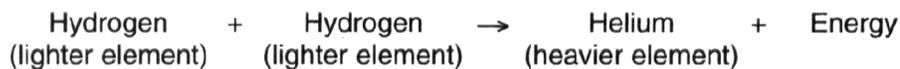
- A) observations of supernova explosions.
B) the discovery of black holes.
C) observations that the Doppler red shift becomes greater as we look at more distant galaxies.
D) observations that most galaxies are rotating

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53. According to Hubble's law more rapidly moving galaxies are now
- A) further away from us**
 - B) closer to us
 - C) accelerating rapidly
 - D) already contracting toward another big bang
54. According to the big bang theory, the universe began as an explosion and is still expanding. This theory is supported by observations that the stellar spectra of distant galaxies show a
- A) concentration in the yellow portion of the spectrum
 - B) concentration in the green portion of the spectrum
 - C) shift toward the blue end of the spectrum
 - D) shift toward the red end of the spectrum**
55. To an observer on Earth, the Sun appears brighter than the star *Rigel* because the Sun is
- A) hotter than *Rigel*
 - B) more luminous than *Rigel*
 - C) closer than *Rigel***
 - D) larger than *Rigel*
56. Light and other forms of electromagnetic radiation are given off by stars using energy released during
- A) nuclear fusion**
 - B) conduction
 - C) convection
 - D) radioactive decay
-

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57. Base your answer to the following question on The reaction below represents an energy-producing process.



The reaction represents how energy is produced

- A) in the Sun by fusion
- B) when water condenses in Earth's atmosphere
- C) from the movement of crustal plates
- D) during nuclear decay

58. The reaction below represents an energy-producing process.

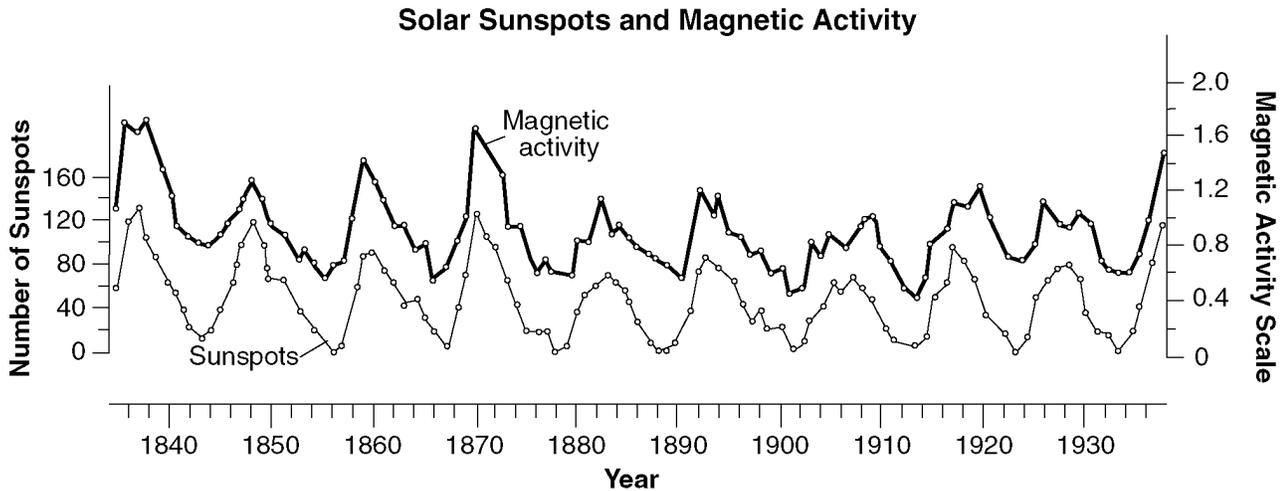


The reaction represents how energy is produced

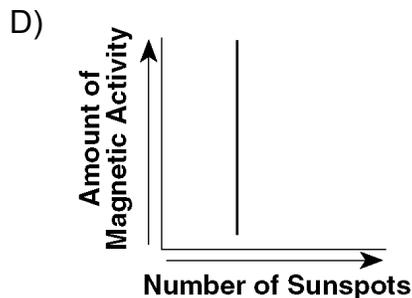
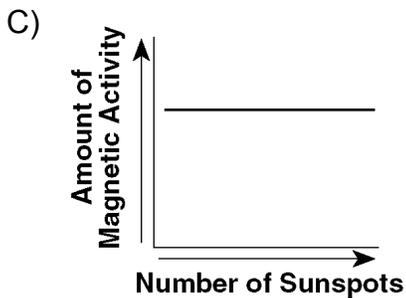
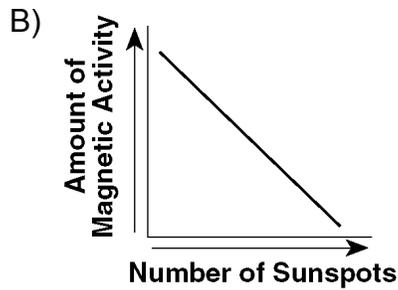
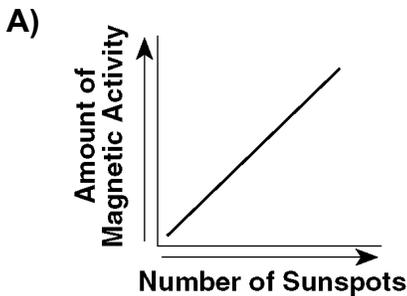
- A) in the Sun by fusion
 - B) when water condenses in Earth's atmosphere
 - C) from the movement of crustal plates
 - D) during nuclear decay
-

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Base your answers to questions 59 and 60 on the graph below, which shows changes in the Sun's magnetic activity and changes in the number of sunspots over a period of approximately 100 years. Sunspots are dark, cooler areas within the Sun's photosphere that can be seen from Earth.



59. Which graph best represents the relationship between the number of sunspots and the amount of magnetic activity in the Sun?



60. The graph indicates that years having the greatest number of sunspots occur

- A) randomly and unpredictably
- B) precisely at the beginning of each decade
- C) in a cyclic pattern, repeating approximately every 6 years
- D) in a cyclic pattern, repeating approximately every 11 years**

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61. During a total solar eclipse one might view
- A) sun spots
 - B) the sun's corona**
 - C) the sun's solar winds
 - D) nothing of the sun, since it is totally blocked by the moon
62. What celestial phenomenon most affects radio communication and other electrical atmospheric changes for us on earth?
- A) solar eclipses
 - B) solar flares**
 - C) meteorites entering the atmosphere
 - D) lunar eclipses
63. As the sun ages it will be composed of
- A) more hydrogen and less helium
 - B) more helium and less hydrogen**
 - C) more oxygen and less carbon
 - D) less oxygen and more carbon
64. The "fuel" of the sun is
- A) hydrogen**
 - B) helium
 - C) oil and various hydrocarbons
 - D) oxygen
65. The most observable phenomena in the "Solar Cycle" is the appearance of
- A) solar eclipses **B) sun spots**
 - C) solar storms D) black holes
66. Sun spots are believed to be most closely related to the sun's
- A) corona
 - B) period of rotation
 - C) magnetic field**
 - D) changing size
67. Most of the radiant energy released by the sun results from the process of
- A) nuclear fission
 - B) nuclear fusion**
 - C) combustion
 - D) electrical generation
68. Approximately how many times larger is the diameter of the sun compared to the earth?
- A) 10 times
 - B) 100 times**
 - C) 1000 times
 - D) 10,000 times
69. The most abundant element on the sun is
- A) hydrogen**
 - B) helium
 - C) carbon
 - D) oxygen
70. Which star is cooler and less luminous than the Sun?
- A) Proxima Centauri**
 - B) Pollux
 - C) Rigel
 - D) 40 Eridani B
71. Which two stars are most similar in luminosity?
- A) Betelgeuse and Barnard's Star
 - B) Procyon B and Proxima Centauri**
 - C) Polaris and the Sun
 - D) Alpha Centauri and Sirius
72. Which statement describes the general relationship between the temperature and the luminosity of main sequence stars?
- A) As temperature decreases, luminosity increases.
 - B) As temperature decreases, luminosity remains the same.
 - C) As temperature increases, luminosity increases.**
 - D) As temperature increases, luminosity remains the same.

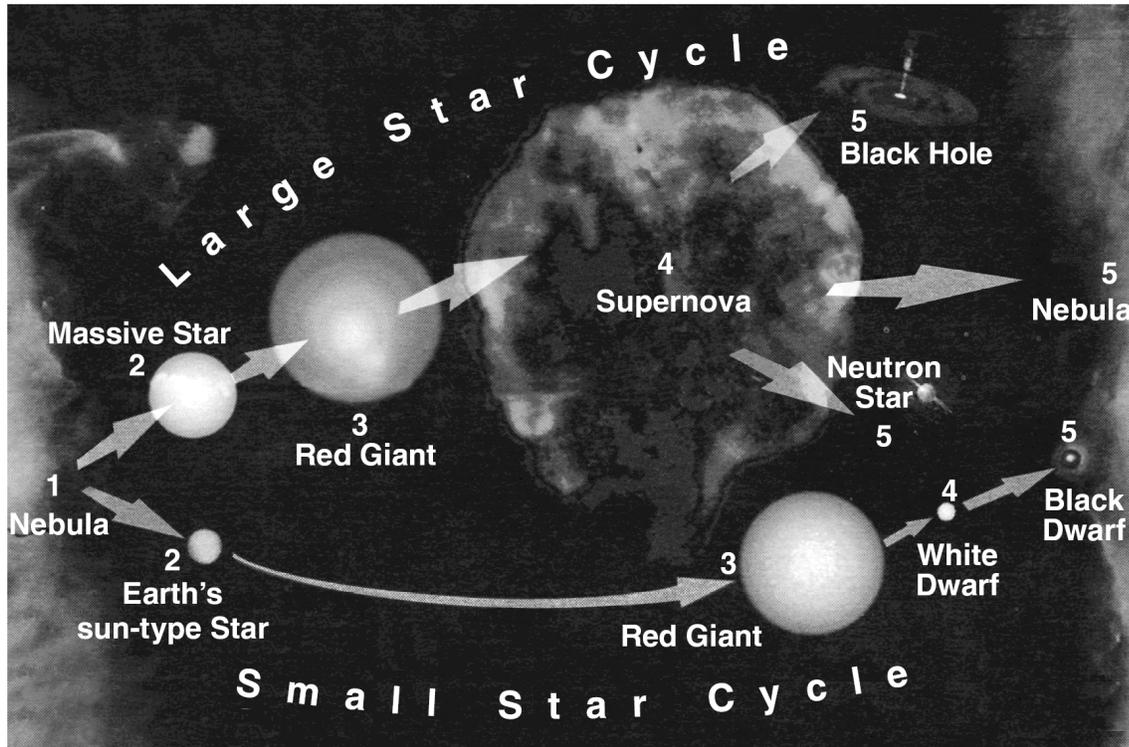
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73. The star *Algol* is estimated to have approximately the same luminosity as the star *Aldebaran* approximately the same temperature as the *Rigel*. *Algol* is best classified as a
- A) **main sequence star**
 - B) red giant star
 - C) white dwarf star
 - D) red dwarf star
74. Compared with our Sun, the star *Betelgeuse* is
- A) smaller, hotter, and less luminous
 - B) smaller, cooler, and more luminous
 - C) larger, hotter, and less luminous
 - D) **larger, cooler, and more luminous**
75. Which list shows stars in order of increasing temperature?
- A) ***Barnard's Star, Polaris, Sirius, Rigel***
 - B) *Aldebaran, the Sun, Rigel, Procyon B*
 - C) *Rigel, Polaris, Aldebaran, Barnard's Star*
 - D) *Procyon B, Alpha Centauri, Polaris, Betelgeuse*
76. Compared to the temperature and luminosity of the star *Polaris*, the star *Sirius* is
- A) hotter and more luminous
 - B) **hotter and less luminous**
 - C) cooler and more luminous
 - D) cooler and less luminous
77. Which star has a higher luminosity and a lower temperature than the Sun?
- A) *Rigel*
 - B) *Barnard's Star*
 - C) *Alpha Centauri*
 - D) ***Aldebaran***
78. Which star's surface temperature is closest to the temperature at the boundary between Earth's mantle and core?
- A) *Sirius*
 - B) *Rigel*
 - C) **the Sun**
 - D) *Betelgeuse*
79. Which two stars have the most similar luminosity and temperature?
- A) *Betelgeuse* and *Barnard's Star*
 - B) *Rigel* and *Betelgeuse*
 - C) ***Alpha Centauri* and the Sun**
 - D) *Sirius* and *Procyon B*
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Base your answers to questions 80 through 82 on the diagram below, which shows two possible sequences in the life cycle of stars, beginning with their formation from nebular gas clouds in space.

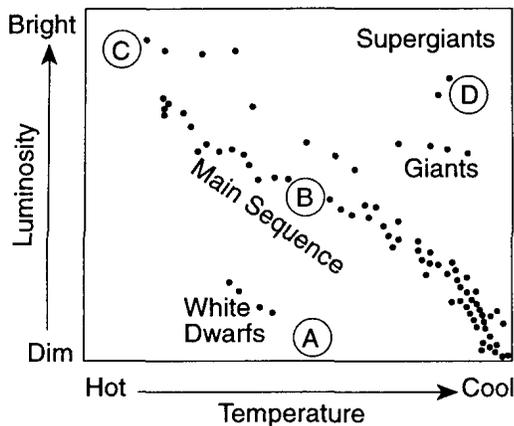
The Life Cycles of Stars



80. According to the diagram, a star like Earth's Sun will eventually
- A) explode in a supernova B) become a black hole
C) **change into a white dwarf** D) become a neutron star
81. Stars like Earth's Sun most likely formed directly from a
- A) **nebula** B) supernova C) red giant D) black dwarf
82. According to the diagram, the life-cycle path followed by a star is determined by the star's initial
- A) **mass and size** B) temperature and origin
C) luminosity and color D) luminosity and structure
-
83. Which star color indicates the hottest star surface temperature?
- A) **blue** B) white
C) yellow D) red

Astronomy Part 1

84. The graph below represents the brightness and temperature of stars visible from Earth.



Which location on the graph best represents a star with average brightness and temperature?

- A) A **B) B** C) C D) D

85. Measurements indicate that a certain star has a very high luminosity (100,000 times that of our sun) and yet has a temperature that is cooler than the sun. What can you conclude about this observation?

- A) It could be a main sequence star.
B) It may be quite large.
 C) This is a typical characteristic of stars.
 D) There must be an error in measurement.

86. Compared to other stars, the sun is

- A) among the hottest stars
 B) among the smallest stars
 C) very unique
D) about average in all respects

87. Which of the following stars is least bright?

- A) the sun
 B) a blue supergiant
C) a white dwarf
 D) a red giant

88. Compared to the sun a white dwarf star is

- A) hotter and larger
B) hotter and smaller
 C) cooler and larger
 D) cooler and smaller

89. The apparent brightness of an object such as a star does not depend on

- A) how fast the star is moving**
 B) the strength of the light emanating from the star
 C) the distance from us to the star
 D) the amount and kind of obstacles between us and the star

90. Compared to our sun, the star Polaris is

- A) brighter** B) smaller
 C) cooler D) hotter

91. If we plot many stars on an H-R diagram, all with the same luminosity but different temperatures, they

- A) would all lie on the main sequence
 B) would be all over the diagram
C) would form a horizontal line
 D) would form a vertical line

92. Compared to the sun, stars near the top of the H-R diagram are always

- A) about the same brightness
B) over 10,000 times brighter
 C) much redder
 D) much hotter

93. Which of the following is the same for all stars along a horizontal line on an H-R diagram?

- A) temperature B) diameter
 C) mass **D) luminosity**

Astronomy Part 1

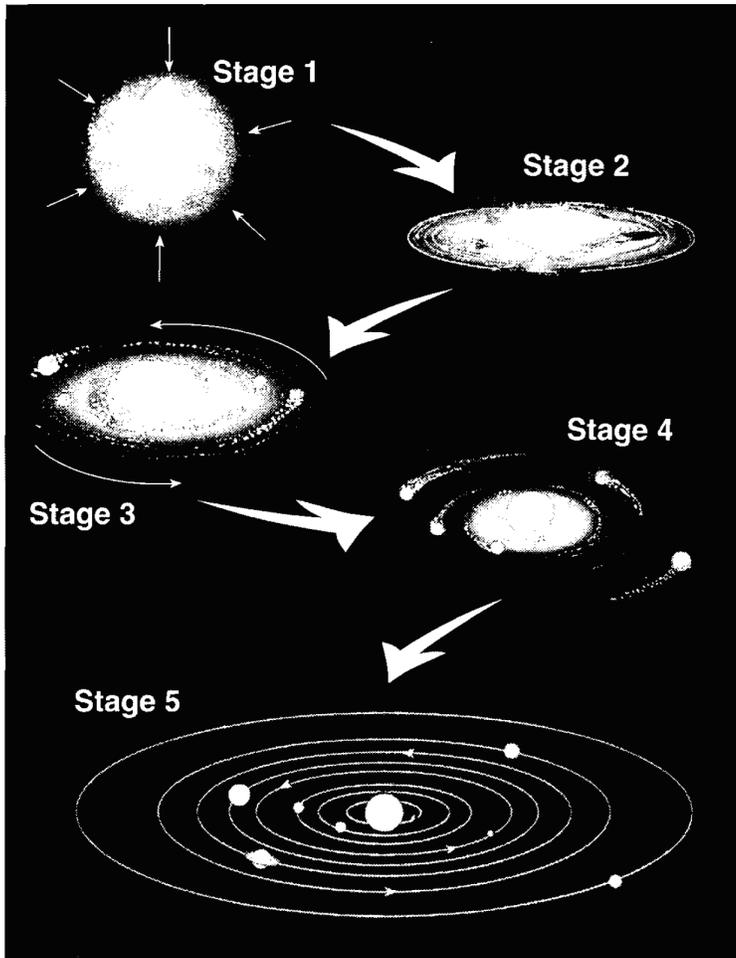
94. *Barnard's Star* has a surface temperature of about
- A) 300 °C **B) 3000 °C**
C) 5000 °C D) 10,000 °C
95. In the H-R diagram, 90 percent of all stars fall
- A) in the Red Dwarf region.
B) in the Supergiant region.
C) among the White Dwarfs.
D) on the Main Sequence.
96. Two stars of the same color are plotted on an H-R diagram. Star *A* is more luminous than star *B*. Which one of the following statements could explain this?
- A) Star *A* is hotter than star *B*.
B) Star *A* is more distant than star *B*.
C) Star *A* appears brighter in the sky than star *B*.
D) Star *A* is larger than star *B*.
97. What factor below usually determines whether a star will be on the main sequence?
- A) age**
B) mass
C) size
D) distance from our sun.
98. We know that red giant stars are larger in diameter than the sun because
- A) they are more luminous but have the same temperature**
B) they are less luminous but have the same temperature
C) they are hotter but have the same luminosity
D) they are cooler but have the same luminosity
99. In order to position a star on an H-R diagram you must know at least the star's
- A) color and apparent brightness**
B) color, apparent brightness and distance
C) apparent brightness and age
D) color and distance
100. The region of the H-R diagram occupied by most stars is the
- A) main sequence region**
B) red giant region
C) white dwarf region
D) quasar region
101. The vertical axis of an H-R diagram relates to the
- A) the color of the star
B) the actual visual brightness of the star
C) the apparent brightness of the star compared to our sun
D) the speed of the star
102. The smallest stars on a H-R diagram are found
- A) at the upper left end of the main sequence
B) at the lower right end of the main sequence
C) at the upper right corner of the H-R diagram
D) at the lower left corner of the H-R diagram
103. Red giant stars have greater luminosity than our sun mainly because they are
- A) hotter B) farther away
C) larger D) older
104. Which of the following stars is hottest?
- A) a red giant **B) a white dwarf**
C) the sun D) a red dwarf

Astronomy Part 1

105. What type of star is *Polaris*?
- A) White Dwarf B) Supergiant
C) **Red Giant** D) Main Sequence
106. Small cool stars would most likely appear to be
- A) blue B) **red**
C) yellow D) white
107. Which star has the greatest size?
- A) Sun B) *Alpha Centauri*
C) ***Betelgeuse*** D) *Procyon*
108. Which star has the greatest luminosity?
- A) *Barnard's star* B) *Procyon*
C) *Alpha Centauri* D) ***Rigel***
109. Which factor does not affect a star's absolute magnitude (Luminosity)?
- A) The star's temperature.
B) The star's size.
C) **The star's distance.**
D) The star's shape.
110. A Red giant star would most likely have a temperature of
- A) **5,000°C** B) 10,000°C
C) 20,000°C D) 30,000°C
111. The coolest stars appear
- A) white B) **red**
C) yellow D) blue
112. An astronomer can estimate the temperature of a star by observing its
- A) size B) shape
C) **color** D) brightness
113. According to the graph, the Sun is classified as a
- A) main sequence star with a temperature of approximately 4,000°C and a luminosity of 100
B) **main sequence star with a temperature of approximately 6,000°C and a luminosity of 1**
C) white dwarf star with a temperature of approximately 10,000°C and a luminosity of 0.01
D) blue supergiant star with a temperature of approximately 20,000°C and a luminosity of 700,000

Astronomy Part 1

Base your answers to questions 114 through 116 on the diagram below. The diagram represents the inferred stages in the formation of our solar system. Stage 1 shows a contracting gas cloud. The remaining stages show the gas cloud flattening into a spinning disk as planets formed around our Sun.

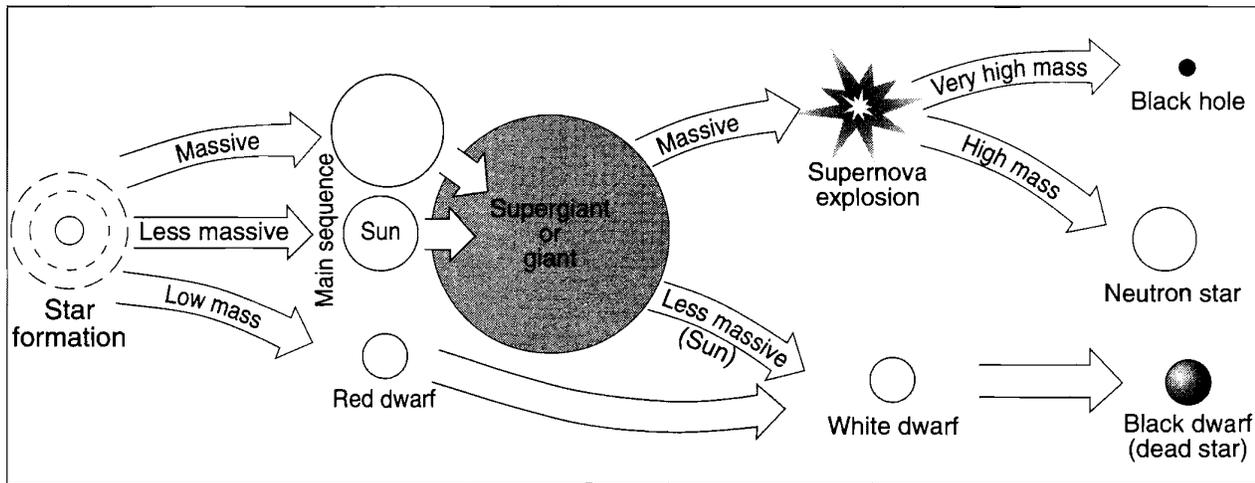


(Not drawn to scale)

114. Compared to the terrestrial planets, the Jovian planets in stage 5 have
- | | |
|----------------------------------|-------------------------------|
| A) larger diameters | B) higher densities |
| C) shorter periods of revolution | D) longer periods of rotation |
115. Approximately how long ago did stage 4 end and stage 5 begin?
- | | |
|---------------------|----------------------|
| A) 1 billion years | B) 5 billion years |
| C) 20 billion years | D) 100 billion years |
116. Which process was occurring during some of these stages that resulted in the formation of heavier elements from lighter elements?
- | | |
|----------------------|-------------------|
| A) conduction | B) radiation |
| C) radioactive decay | D) nuclear fusion |

Astronomy Part 1

117. Base your answer to the following question on The diagram below represents possible stages in the life cycle of stars.



(Not drawn to scale)

Which star has the greatest probability of producing a supernova explosion?

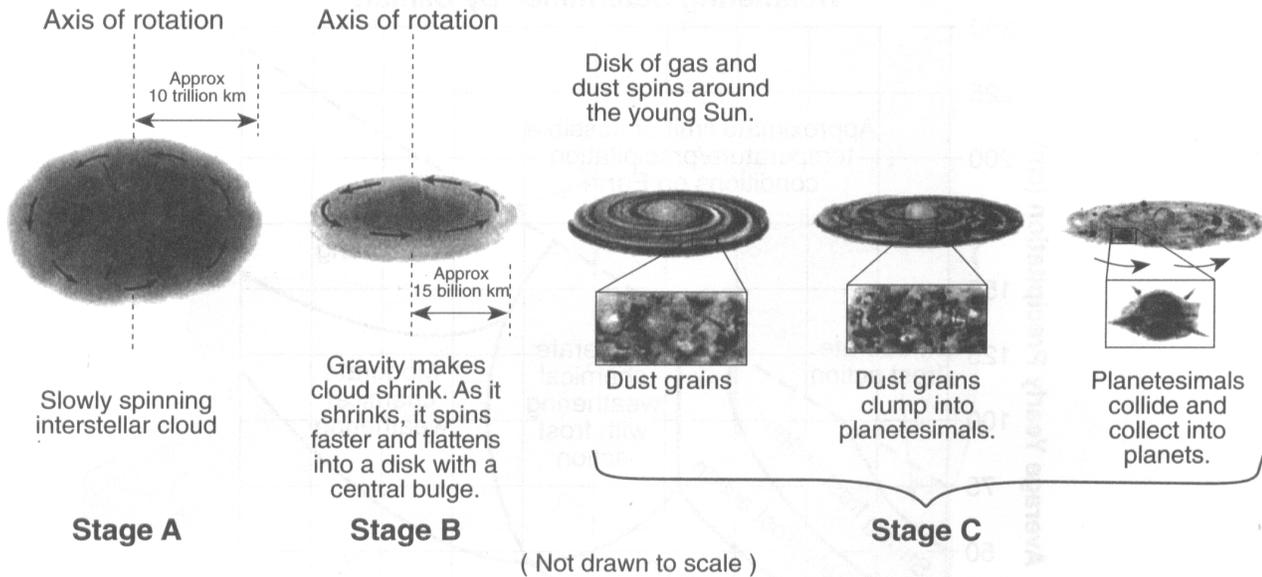
- A) *Barnard's Star* B) **Betelgeuse**
C) *Procyon B* D) *Sun*
118. By which process do stars convert mass into great amounts of energy?
- A) **nuclear fusion**
B) heat transfer
C) gravitational pull
D) radioactive decay

119. Which object forms by the contraction of a large sphere of gases causing the nuclear fusion of lighter elements into heavier elements?

- A) comet B) planet
C) **star** D) moon

Astronomy Part 1

120. Base your answer to the following question on the diagram below, which shows an inferred sequence in which our solar system formed from a giant interstellar cloud of gas and debris. Stage *A* shows the collapse of the gas cloud, stage *B* shows its flattening, and stage *C* shows the sequence that led to the formation of planets.



From stage *B* to stage *C*, the young Sun was created

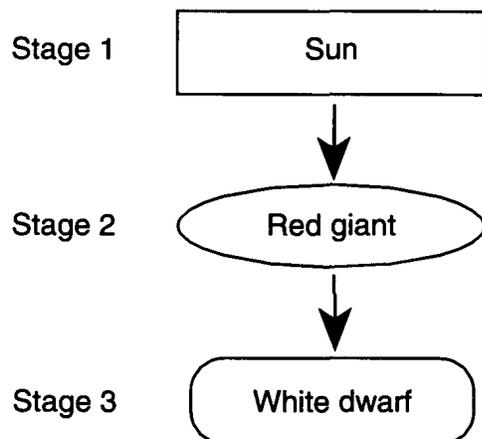
- A) when gravity caused the center of the cloud to contract**
B) when gravity caused heavy dust particles to split apart
C) by outgassing from the spinning interstellar cloud
D) by outgassing from Earth's interior
-
121. Compared to other groups of stars, the group that has relatively low luminosities and relatively low temperatures is the
- A) Red Dwarfs**
B) White Dwarfs
C) Red Giants
D) Blue Supergiants
122. Compared to the surface temperature and luminosity of massive stars in the Main Sequence, the smaller stars in the Main Sequence are
- A) hotter and less luminous
B) hotter and more luminous
C) cooler and less luminous
D) cooler and more luminous
123. Which star is cooler and many times brighter than Earth's Sun?
- A) *Barnard's Star* **B) *Betelgeuse***
C) *Rigel* D) *Sirius*
124. Compared to the sun, Polaris is
- A) hotter and less luminous
B) cooler and more luminous
C) the same temperature and larger
D) hotter and larger

Astronomy Part 1

125. At which phase of its evolutionary life is a white dwarf star?
- A) the late phase for small mass star
 - B) the remains of a larger star's explosion**
 - C) in the main sequence phase
 - D) early phases, soon after a star's formation
126. The probable fate of our sun is
- A) to expand as a red giant, undergo a nova outburst and end as a white dwarf**
 - B) to shrink to a white dwarf then eventually expand to a red giant
 - C) become hotter and expand into a blue supergiant
 - D) to become a black hole
127. What factor from the choices below determines whether a star will evolve into a white dwarf, a neutron star, or a black hole?
- A) mass**
 - B) percentage of helium
 - C) percentage of carbon
 - D) apparent brightness
128. When a star less massive than our sun consumes all of its nuclear fuel it will then become a
- A) white dwarf**
 - B) nova
 - C) supernova
 - D) black hole
129. According to our present theories of stellar evolution, our sun will change next into
- A) a white dwarf
 - B) a black hole
 - C) a supernova
 - D) a red giant**
130. What are the two most abundant elements in a main sequence star?
- A) carbon and hydrogen
 - B) hydrogen and helium**
 - C) helium and carbon
 - D) carbon and heavy metals
131. Which stars are the youngest?
- A) Supergiant
 - B) White dwarf
 - C) Blue star**
 - D) Red Dwarfs
132. The explosion of a massive star near the end of its life is known as a
- A) nova
 - B) pulsar
 - C) supernova**
 - D) nebula
133. By using a spectroscope an astronomer can
- A) measure the size of a star
 - B) measure the altitude of a star
 - C) identify elements in the atmosphere of a star**
 - D) measure the diameter of a star

Astronomy Part 1

134. Stars are believed to undergo evolutionary changes over millions of years. The flowchart below shows stages of predicted changes in the Sun.



According to this flowchart, the Sun will become

- A) hotter and brighter in stage 2, then cooler and dimmer in stage 3
 - B) cooler and dimmer in stage 2, then hotter and brighter in stage 3
 - C) hotter and dimmer in stage 2, then cooler and brighter in stage 3
 - D) cooler and brighter in stage 2, then hotter and dimmer in stage 3**
-

Answer Key Astronomy Part 1

1.	<u>D</u>	36.	<u>C</u>	71.	<u>B</u>	106.	<u>B</u>
2.	<u>A</u>	37.	<u>A</u>	72.	<u>C</u>	107.	<u>C</u>
3.	<u>C</u>	38.	<u>A</u>	73.	<u>A</u>	108.	<u>D</u>
4.	<u>A</u>	39.	<u>D</u>	74.	<u>D</u>	109.	<u>C</u>
5.	<u>B</u>	40.	<u>B</u>	75.	<u>A</u>	110.	<u>A</u>
6.	<u>A</u>	41.	<u>D</u>	76.	<u>B</u>	111.	<u>B</u>
7.	<u>D</u>	42.	<u>C</u>	77.	<u>D</u>	112.	<u>C</u>
8.	<u>D</u>	43.	<u>B</u>	78.	<u>C</u>	113.	<u>B</u>
9.	<u>A</u>	44.	<u>B</u>	79.	<u>C</u>	114.	<u>A</u>
10.	<u>A</u>	45.	<u>D</u>	80.	<u>C</u>	115.	<u>B</u>
11.	<u>C</u>	46.	<u>B</u>	81.	<u>A</u>	116.	<u>D</u>
12.	<u>A</u>	47.	<u>C</u>	82.	<u>A</u>	117.	<u>B</u>
13.	<u>D</u>	48.	<u>A</u>	83.	<u>A</u>	118.	<u>A</u>
14.	<u>B</u>	49.	<u>B</u>	84.	<u>B</u>	119.	<u>C</u>
15.	<u>D</u>	50.	<u>B</u>	85.	<u>B</u>	120.	<u>A</u>
16.	<u>C</u>	51.	<u>B</u>	86.	<u>D</u>	121.	<u>A</u>
17.	<u>D</u>	52.	<u>C</u>	87.	<u>C</u>	122.	<u>C</u>
18.	<u>D</u>	53.	<u>A</u>	88.	<u>B</u>	123.	<u>B</u>
19.	<u>D</u>	54.	<u>D</u>	89.	<u>A</u>	124.	<u>C</u>
20.	<u>A</u>	55.	<u>C</u>	90.	<u>A</u>	125.	<u>B</u>
21.	<u>A</u>	56.	<u>A</u>	91.	<u>C</u>	126.	<u>A</u>
22.	<u>D</u>	57.	<u>A</u>	92.	<u>B</u>	127.	<u>A</u>
23.	<u>C</u>	58.	<u>J</u>	93.	<u>D</u>	128.	<u>A</u>
24.	<u>B</u>	59.	<u>A</u>	94.	<u>B</u>	129.	<u>D</u>
25.	<u>D</u>	60.	<u>D</u>	95.	<u>D</u>	130.	<u>B</u>
26.	<u>D</u>	61.	<u>B</u>	96.	<u>D</u>	131.	<u>C</u>
27.	<u>D</u>	62.	<u>B</u>	97.	<u>A</u>	132.	<u>C</u>
28.	<u>A</u>	63.	<u>B</u>	98.	<u>A</u>	133.	<u>C</u>
29.	<u>B</u>	64.	<u>A</u>	99.	<u>A</u>	134.	<u>D</u>
30.	<u>B</u>	65.	<u>B</u>	100.	<u>A</u>		
31.	<u>B</u>	66.	<u>C</u>	101.	<u>B</u>		
32.	<u>B</u>	67.	<u>B</u>	102.	<u>B</u>		
33.	<u>A</u>	68.	<u>B</u>	103.	<u>C</u>		
34.	<u>B</u>	69.	<u>A</u>	104.	<u>B</u>		
35.	<u>D</u>	70.	<u>A</u>	105.	<u>C</u>		
