Name: _____ Date: _____

1. A body of related and rigorously tested theories can be pieced together into a much larger description of nature called a hypothesis.

A) True
B) False

2. An important part of a scientific theory is its ability to make predictions that can be verified by other scientists.

A) True
B) False

3. All of the stars in a given constellation are about the same distance away from Earth.

A) True
B) False

4. The summer triangle is an asterism that connects the brightest stars in three different constellations.

A) True
B) False

5. If you use a commercial firm to name a star for a fee, professional astronomers will recognize that star by your given name.

A) True
B) False

6. There are 60 arcseconds in 1 degree.

A) True
B) False

7. If you stand at the North Pole, all of the visible stars, except the North Star, appear to move parallel to the horizon.

A) True
B) False

8. Circumpolar stars are near the north or south celestial pole and do not appear to rise or set from the perspective of people in the northern or southern hemispheres, respectively.

A) True
B) False

9. Seasons are caused by variations in the distance from Earth to the Sun.

A) True
B) False

10. The Sun follows the path of the celestial equator.

A) True
B) False

11. We can see only one side of the Moon from Earth because the Moon does not rotate.

A) True
B) False

12. The Sun moves in the sky along the path of the ecliptic.

A) True
B) False

13. The phases of the Moon are caused by Earth's shadow falling on the surface of the Moon.

A) True
B) False

14. A lunar eclipse occurs when the Moon passes through Earth's shadow.

A) True
B) False

15. Totality for a lunar eclipse lasts longer than totality for a solar eclipse.

A) True
B) False

16. Most of the stars in a constellation are nowhere near one other.
A) True
B) False

17. There is a single scientific method with specific steps that every scientist follows.
A) True
B) False

18. The Sun, the planets, all of their moons, and smaller bodies such as dwarf planets, asteroids, and comets make up the Milky Way Galaxy.
A) True
B) False

19. Without binoculars or a telescope, the unaided human eye can see millions of stars in the night sky.
A) True
B) False

20. A scientific theory is the same as a universal law.
A) True
B) False

21. The intellectual foundation of science is
A) rejection of all observations that disagree with theory.
B) observation, faith, and acceptance.
C) logical derivation entirely from fundamental principles.
D) observation, logic, and skepticism.

22. Which of the following statements best represents the overall rationale for scientific investigation?
A) Reality is comprehensible, and a limited number of fundamental principles governs the nature and behavior of the universe.
B) There are certain patterns in nature from which future events can be predicted, but there are no underlying basic principles or laws.
C) The universe is a hodgepodge of unrelated things behaving in unpredictable ways, but we must continue to observe it in case this behavior threatens Earth.
D) The behavior of the whole universe is governed by our observation of it in such a way as to hide the fundamental truth.

23. One important characteristic of a scientific theory is that it
A) is mathematical.
B) consists of at least three separate hypotheses.
C) can be tested by observation.
D) need not have a connection with physical reality.

24. In science, if new observations disagree with a well-established theory, then
A) the new observations should be accepted as part of the overall incomprehensibility of the universe, and both the observations and the theory should be retained.
B) the theory must be discarded immediately.
C) the theory must be modified.
D) the observations must be discarded.

25. A scientist observes a new phenomenon that disagrees with the scientist's own explanation or hypothesis. Following the scientific method, the correct procedure is to
A) accept the disagreement as part of the fundamental incomprehensibility of the universe.
B) modify the hypothesis.
C) wait until someone develops an adequate explanation before announcing the new observation.
D) discard the observation as erroneous.

26. Modern science is founded
A) in part on the myths and legends of antiquity.
B) in part on the philosophical approach of the ancient Greeks.
C) only upon developments since Isaac Newton and his contemporaries.
D) only upon developments during the past hundred years.

27. Forms of radiation that are not visible
A) are, by definition, not part of scientific theories because they cannot be seen.
B) have been detected only since the 1970s.
C) probably hold great promise for the future, but we have not been able to make any scientific use of them with present technologies.
D) have allowed us to determine much of what we now know about the universe.

28. New stars appear to be formed in
A) nebulae.
B) supernovae.
C) black holes.
D) pulsars.

29. Astronomers sometimes announce that they have discovered a new solar system beyond our own, or a new galaxy beyond our own. Which choice correctly describes the terms "solar system" and "galaxy"?
A) A solar system is a large assemblage of stars similar to the Sun, whereas a galaxy is much larger and consists of all different types of stars.
B) A solar system consists of an immense number of stars (i.e., suns), and a galaxy is a cluster of many such systems.
C) A galaxy consists of planets and other objects orbiting around a single star, whereas a solar system is a system consisting of an immense number of stars (i.e., suns).
D) A solar system consists of planets and other objects orbiting around a star, whereas a galaxy is a system consisting of an immense number of stars.

30. In modern astronomy, the constellations are
A) clusters of stars that are held together by the mutual gravitational attractions of the individual stars in the cluster.
B) nearby galaxies to which astronomers have given specific names.
C) 12 regions of sky through which the Sun, Moon, and planets move as seen from Earth.
D) 88 regions of sky, covering the entire sky.

31. The constellation whose stars are used as pointers to the north celestial pole in the northern hemisphere is
A) Leo, the lion, containing the bright star Regulus.
B) Ursa Major, the Big Dipper.
C) Ursa Minor, the Little Bear, containing the bright star Polaris.
D) Boes, the Shepherd, containing the bright star Arcturus.

32. Describing a star as being in the constellation Cygnus (the Swan) tells a modern astronomer that the star is
A) in a distant galaxy located in a particular direction from Earth.
B) inside our solar system.
C) somewhere in a particular region of sky having definite boundaries.
D) one of a set of bright stars that make up a particular "picture" in the sky.

33. Which of the following statements correctly describes the relationship between stars and constellations?

A) Only those stars that were visible to the ancient Greeks are located in constellations.
B) Only the brighter stars are in constellations.
C) Only stars within the zodiac close to the ecliptic, Earth's orbital plane, are located in constellations.
D) Every star is located in a constellation.

34. Which one of the following statements about constellations is correct?

A) If you point randomly to some direction in the sky, you are pointing at some constellation.
B) Only if you point in the vicinity of one of the brighter stars are you pointing at a constellation.
C) Astronomers are seeking to discover new constellations.
D) Astronomers are constantly inventing new constellations.

35. The winter triangle, a group of three bright stars in the winter sky, consists of Sirius, Procyon, and

A) Betelgeuse.
B) Vega.
C) Castor.
D) Polaris.

36. The summer triangle, a group of three bright stars in the summer sky, consists of Deneb, Altair, and

A) Betelgeuse.
B) Vega.
C) Pollux.
D) Polaris.

37. The nightly motion of objects across our sky is caused by the

A) revolution of Earth around the Sun.
B) rotation of the whole celestial sphere of stars around the fixed Earth.
C) rotation of Earth on its axis.
D) motion of the solar system around the Galaxy.

38. What basic pattern do stars seem to trace out in our sky if you watch (or photograph) stars near the north celestial pole for a period of several hours?

A) Circles, with the north celestial pole at the center
B) Spirals, as the stars move while Earth rotates
C) Almost straight lines, rising from the horizon toward the zenith
D) Ellipses, with the north pole at one focus

39. One arcminute is equal to

A) 1/60 of a full circle.
B) 60 degrees.
C) 1/60 degree.
D) 1/60 arcsecond.

40. Which one of the following statements about angle is correct?

A) 50 arcseconds is half of a degree.
B) 50 arcminutes is half of a degree.
C) 30 arcminutes is half of a degree.
D) 30 arcseconds is half of a degree.

41. On a particular night, Jupiter subtends an angle of 42 arcseconds as seen from Earth. This angle is

A) roughly three-quarters of an arcminute.
B) less than half an arcminute.
C) more than an arcminute, but less than a degree.
D) more than a degree.

42. How many arcseconds are there in a full circle?

A) 60
B) 360
C) 3600
D) 360 × 3600

43. From the North Pole,

A) only stars within 66.5° of the north celestial pole can be seen.
B) only half the celestial sphere can be seen on every clear night.
C) only stars 23.5° above the celestial equator can be seen.
D) the whole celestial sphere is visible at some time during the year.

44. During one complete year, an observer at the south pole would be able to see what fraction of the overall sky?
A) 50%
B) A variable amount, depending on the year
C) 100%
D) A variable amount, depending on the observer's longitude

45. Where would you have to be to see the south celestial pole on your horizon?
A) At the north pole
B) About 1° away from the south pole, to allow for precession
C) At the south pole
D) On the equator

46. The apparent path of the Sun across our sky, day-by-day, throughout the year, is known as the
A) celestial meridian.
B) zenith.
C) ecliptic.
D) celestial equator.

47. The ecliptic crosses the celestial equator at
A) two points, known as solstices.
B) one point only, known as the vernal equinox.
C) the meridian.
D) two points, known as equinoxes.

48. The equinoxes are located at the intersections of the
A) ecliptic and the horizon.
B) ecliptic and the celestial equator.
C) ecliptic and the Moon's orbit.
D) horizon and the celestial equator.

49. When the Sun is at one of the equinoxes,
A) day and night are of equal length only for people on the equator.
B) the day is longer than the night in one hemisphere of Earth and shorter in the other hemisphere.
C) people on the equator have perpetual daylight.
D) day and night are of equal length everywhere on Earth.

50. It is warmer in summer than winter because
A) the Sun is higher in the sky and the days are shorter.
B) the Sun is lower in the sky and sunlight passes through more atmosphere, thereby warming it more during summer.
C) Earth is closer to the Sun in summer.
D) the Sun is higher in the sky and the days are longer.

51. One required condition for seasons to occur is that a planet's
A) spin axis be tilted with respect to the perpendicular to its orbital plane.
B) axis be perpendicular to its orbital plane.
C) atmosphere be thick.
D) distance from the Sun vary.

52. Astronomers living north of the Arctic Circle around the time of summer solstice will experience which of the following?
A) 24 hours of sunlight
B) Continuous observation of the full moon for several weeks
C) A period of several weeks during which the Moon does not appear, allowing uninterrupted views of faint objects in the background sky
D) 24 hours of continuous darkness

53. What is the one major difference between the Sun and the Moon in our sky?
A) Their apparent motion across the sky with respect to the horizon in one day is very different.
B) Their diameters subtend at very different angles.
C) The spectrum of their light is very different.
D) The Sun emits light whereas the Moon merely reflects it.

54. If you were going to send a spacecraft to circle the Moon and photograph the entire far side (the side not visible from Earth), during which lunar phase (as seen from Earth) would you do the photography?
A) New moon
B) First or third quarter
C) Full moon
D) It really doesn't make any difference.

55. In the northern hemisphere, where can you see the true astronomical new moon?
A) Always in the south
B) In a direction opposite to that of the Sun
C) The Moon is not visible at new moon.
D) In a direction at right angles to that of the Sun

56. When the Moon is between the Sun and Earth and the Sun and Moon are almost in line, we call its phase
A) new moon.
B) full moon.
C) The Moon can never get between the Sun and Earth.
D) gibbous.

57. At what approximate time will the new Moon rise?
A) Midday
B) Sunset
C) Sunrise
D) Midnight

58. Which of the following phases of the Moon is most easily seen during the daytime (mid-morning or mid-afternoon, not near sunrise or sunset)?
A) The Moon is never visible in daylight.
B) New
C) Full
D) Quarter

59. How much of the total surface of the Moon is illuminated by the Sun when it is at quarter phase?
A) One-quarter
B) Very little
C) All of it
D) One-half

60. Earth's shadow falling on the Moon is the reason we see
A) solar eclipses.
B) Earth's shadow cannot fall on the Moon.
C) lunar eclipses.
D) the phases of the Moon.

61. At what approximate time does a full moon rise?
A) Midnight
B) Sunrise
C) Noon
D) Sunset

62. A full moon always occurs
A) on the first of every month.
B) when the Moon is at right angles to the direction of the Sun.
C) when the Moon is closer to the Sun than is Earth.
D) when the Moon is farther from the Sun than is Earth.

63. A full moon is always at its highest in our sky at
A) midnight.
B) sunset.
C) midday.
D) sunrise.

64. The Moon is visible in the sky in the daytime from most places on Earth
A) almost never: only during solar eclipses when the sky is dark.
B) some time every day, but it is difficult to see because of the blue sky.
C) only at full moon phases, when it is very bright.
D) about half the time, or for 2 weeks in every month.

65. The Moon rotates around its own axis in the same length of time that it takes to orbit once around Earth. This equality of rotation period and orbital period, which results in the same side of the Moon facing Earth at all times, is called
A) coincidental rotation.
B) precession.
C) synchronous rotation.
D) relative motion.

66. To observers on Earth, the Moon shows
A) its whole surface once per year as Earth moves around the Sun.
B) its whole surface once per month as it rotates.
C) only one side to Earth at all times.
D) only the sunlit side at all times.

67. You are standing in the middle of the far side of the Moon. Which one of the following statements about what you can and cannot see would be true?

A) You could never see the Sun from that location.
B) You could never see Earth from that location.
C) The stars visible from that location would be very different from the stars visible from Earth at that time of year.
D) Earth would set about 14 days after rising.

68. The time for the Moon to rotate around its own axis, relative to the stars, is about

A) 1 year.
B) 1 month.
C) 1 day.
D) infinite, because the Moon never rotates.

69. The term "synodic month" refers to the

A) time from one lunar eclipse to the next.
B) time from new moon to new moon.
C) month containing Easter, as defined by the ecclesiastical calendar.
D) time over which the Moon completes one orbit around Earth, relative to the stars.

70. The term "sidereal month" refers to the

A) time from new moon to new moon.
B) time over which the Moon completes one orbit around Earth, relative to the stars.
C) time from one lunar eclipse to the next.
D) month containing Easter, as defined by the ecclesiastical calendar.

71. One synodic month is longer than one sidereal month by about

A) 1 week.
B) 1 hour.
C) 4 minutes.
D) 2.2 days.

72. When viewed from a point directly above the plane of the planetary system, the Moon would appear to rotate on its axis

A) once per day to maintain its direction toward Earth.
B) once per year as Earth and Moon orbit the Sun together.
C) once per month, or once per revolution about Earth.
D) not at all, because on Earth we always see the same face.

73. Why is the period between two successive full moons not equal to the Moon's orbital period, or sidereal month?

A) The Moon's orbit is elliptical, and the Moon therefore moves irregularly around Earth.
B) The Moon's orbit is inclined at about 5° to Earth's orbital plane.
C) The two time intervals are not related because full moon time depends on the Moon's rotation period about its own axis.
D) The Earth–Moon system is also orbiting the Sun.

74. During a lunar eclipse the

A) Sun goes below the horizon.
B) Earth comes between the Sun and the Moon.
C) Sun comes between Earth and the Moon.
D) Moon comes between Earth and the Sun.

75. A lunar eclipse is caused by the

A) Sun passing behind the Moon.
B) Moon passing into the shadow of Earth.
C) Moon passing behind the Sun.
D) Earth moving into the Moon's shadow.

76. What is the phase of the Moon during a total lunar eclipse?

A) New
B) Gibbous
C) Full
D) First quarter

77. Which of the following statements is correct for eclipses in the Sun–Earth–Moon system?

A) An eclipse of the Moon occurs only at new moon.
B) An eclipse of the Sun occurs only at first quarter moon.
C) An eclipse of the Sun occurs only at full moon.
D) An eclipse of the Sun occurs only at new moon.

78. Which of the following statements is NOT correct for eclipses in the Sun–Earth–Moon system?

A) Eclipses of Moon and Sun do not occur at quarter moon phases.
B) An eclipse of the Sun occurs only at new moon.
C) An eclipse of the Moon occurs only at full moon.
D) An eclipse of the Sun occurs only at full moon.

79. During a solar eclipse, the
A) Sun comes between Earth and the Moon.
B) Moon comes between Earth and the Sun.
C) Sun goes below the horizon.
D) Earth comes between the Sun and the Moon.

80. A solar eclipse occurs on Earth when the
A) Sun passes in front of the Moon.
B) Moon passes behind the Sun.
C) Moon casts a shadow on Earth.
D) Earth casts a shadow on the Moon.

81. The phase of the Moon at the time of solar eclipse is
A) third quarter.
B) any phase: new, quarter, or full.
C) full.
D) new.

82. What is the approximate inclination of the Moon's orbit to the ecliptic plane?
A) 5°
B) 23.5°
C) 17°
D) 0°

83. Which of the following is a necessary condition for lunar or solar eclipses?
A) Earth must be on the celestial equator.
B) The Sun must be on the celestial equator.
C) The Sun must be close to or crossing the ecliptic plane.
D) The Moon must be close to or crossing the ecliptic plane.

84. A lunar eclipse does not occur at every full moon because
A) a lunar eclipse cannot occur after sunset.
B) the orbit of the Moon is not a perfect circle.
C) the plane of the Moon's orbit is at an angle to the plane of Earth's orbit.
D) the path of the Sun is inclined at an angle of 5° to the ecliptic plane.

85. If the plane of the Moon's orbit were to be the same as the ecliptic plane, there would be a lunar eclipse

A) twice per month.
B) once a month.
C) twice per year.
D) once a day.

86. The direction of the line of nodes

A) is fixed in space and does not change.
B) rotates along with the Moon and thus makes a complete circle every sidereal month.
C) revolves along with Earth and thus makes a complete revolution every 365 1/4 days.
D) rotates slowly because of the gravitational pull of the Sun on the Moon.

87. Eclipses of the Moon can occur

A) twice per month.
B) only once per year.
C) once every month.
D) only during two specific periods in any year.

88. The maximum number of eclipses (both solar and lunar) that can occur in one calendar year is

A) one.
B) two.
C) five.
D) seven.

89. To witness an eclipse we must wait until which one of the following conditions is met?

A) Earth must be on the ecliptic plain.
B) The Sun must be on the ecliptic plain.
C) The Moon must be on the ecliptic plain.
D) The Moon must be on the ecliptic plain and the line of nodes must point in the general direction of the Sun.

90. A total lunar eclipse is visible in principle (assuming clear skies everywhere)
A) only to people in a long, narrow, and very specific path, much smaller than a hemisphere.
B) only to people in a circular area on Earth having a diameter equal to that of the Moon.
C) to everyone on Earth.
D) to everyone in one hemisphere of Earth.

91. For someone on Earth who is watching a total lunar eclipse, the
A) Sun is hidden below the horizon.
B) Sun is relatively high in the sky because Earth–Moon line is at right angles to Earth–Sun line.
C) Sun is hidden behind the Moon.
D) Moon is hidden behind the Sun.

92. When in total lunar eclipse, the Moon shows a reddish color because
A) light from the northern and southern lights, the aurora, on Earth, which is predominantly red, illuminates the Moon.
B) most of the sunlight that passes through the atmosphere is scattered, especially the blue wavelengths, and what passes through is mainly red in color and falls onto the Moon.
C) the Moon is illuminated only by the residual glow from the dark side of Earth, which is predominantly red.
D) this is the color of the residual thermal glow from a still-warm Moon after the abrupt removal of the heat of the Sun.

93. Which of the following factors makes it far more likely that a person will have seen a total lunar eclipse than a total solar eclipse?
A) The Moon appears brighter during a total lunar eclipse than does the Sun during a total solar eclipse.
B) A total lunar eclipse occurs at full Moon when the Moon is bright and high in the sky, whereas a total solar eclipse occurs at new moon when the Moon is dark and low in the sky.
C) Most people on the nighttime side of Earth can see a total lunar eclipse, whereas only people within a narrow strip of Earth's surface can see a specific total solar eclipse.
D) Total solar eclipses occur much less frequently than total lunar eclipses.

94. Assuming clear skies everywhere, a total solar eclipse is visible
A) to people anywhere in the sunlit hemisphere of Earth.
B) to everyone on Earth.
C) only to people in a circular area on Earth having a diameter equal to that of the Moon.
D) only to people in a long narrow path much smaller than a hemisphere.

95. What is the cause of an annular eclipse?
A) Earth's position in its orbit is near aphelion, its farthest point from the Sun.
B) Earth's position in its orbit is near perihelion, its nearest point to the Sun.
C) The Moon's position in its orbit is near apogee, its farthest point from Earth.
D) The Moon's position in its orbit is near perigee, its nearest point to Earth.

96. You can find the north direction if you draw a line from this star straight down to the horizon.
A) Vega
B) Deneb
C) Polaris
D) Spica

97. People in which of the following cities in North America experience sunset first each day?
A) Chicago
B) Denver
C) Los Angeles
D) New York

98. If Earth rotated twice as fast on its axis as it does now, what would change?
A) There would be half as many days in a year.
B) There would be the same number of days in a year.
C) There would be twice as many days in a year.
D) There would be four times as many days in a year.

99. If you are standing at the North Pole, your zenith is the same point as the
A) winter solstice.
B) north celestial pole.
C) vernal equinox.
D) south celestial pole.

100. The angular diameter of the full moon in the sky is about ½ of a degree. How many full moons would stretch from the horizon due east to the horizon due west?

A) 90 full moons
B) 180 full moons
C) 360 full moons
D) 720 full moons

101. In summer, increased heating occurs because sunlight is

A) more concentrated and the days are longer.
B) more concentrated and the days are shorter.
C) less concentrated and the days are longer.
D) less concentrated and the days are shorter

102. If Earth's axis were not tilted, but rather was straight up and down compared with the path of Earth's orbit, what would occur?

A) The Earth would not experience seasons.
B) Observers at the poles would not experience 6 months of darkness each year.
C) The Sun would rise and set every 12 hours all year long.
D) All of the above

103. If Earth's axis were tilted at 90 degrees rather than the current 23.5 degrees, parallel to the path of Earth's orbit, what would occur?

A) The Earth would not experience seasons.
B) All places on Earth would experience 6 months of darkness each year.
C) The Sun would rise and set every 12 hours all year long.
D) All of the above

104. In the southern hemisphere, where can you find a full moon?

A) Always in the south
B) In a direction opposite to that of the Sun
C) The Moon is not visible at full moon in the south
D) In a direction at right angles to that of the Sun

105. How much of the total surface of the Moon is illuminated by the Sun when it is at crescent phase?

A) One-quarter
B) Very little
C) All of it
D) One-half

106. A new moon is always at its highest in our sky at
A) midnight.
B) sunset.
C) midday.
D) sunrise.

107. How much of the surface of the Moon visible from Earth is illuminated by the Sun when it is at crescent phase?
A) One-quarter
B) Very little
C) All of it
D) One-half

108. The ecliptic and the celestial equator intersect at how many points?
A) Zero
B) One
C) Two
D) Three

109. The time of year when the ecliptic crosses the celestial equator is called a(n)
A) solstice.
B) equinox.
C) meridian.
D) perihelion.

110. How long does it take for the Moon to complete its cycle of phases?
A) 24 hours
B) About 14 days
C) About 4 weeks
D) 364.25 days

111. If the Moon appears in its first quarter phase, how will it appear in two weeks?
A) New
B) Full
C) Third quarter
D) Waxing gibbous

112. If the Moon appears in its waxing gibbous phase, how will it appear in two weeks?

A) Waning gibbous
B) Waning crescent
C) Waxing gibbous
D) First quarter

113. How many solar eclipses are there each year?

A) One
B) Two
C) Three
D) At least two, but never more than five

114. Astronomers living south of the Antarctic Circle around the time of summer solstice (in June) will experience which of the following?

A) 24 hours of sunlight
B) Continuous observation of the full moon for several weeks
C) A period of several weeks during which the Moon does not appear, allowing uninterrupted views of faint objects in the background sky
D) 24 hours of continuous darkness

115. Solar totality usually lasts

A) a few seconds.
B) a few minutes.
C) about an hour.
D) several hours.

116. What is the difference between the way the word “theory” is often used in everyday language and how it is used in science?

117. What is the difference between a constellation and an asterism?

118. Even though astronomers know that the celestial sphere model is not correct, why is it still used?

119. Draw the celestial sphere including the north and south celestial poles, the celestial equator, and the ecliptic.

120. What is the reason why we have seasons on Earth?

121. Why does the Moon go through phases?

122. Why do we only see one side of the Moon?

123. What is the difference between a sidereal and a synodic month?

124. Why do we not see a solar eclipse during each new moon and a lunar eclipse during each full moon?

125. Why are you much more likely to see a total lunar eclipse over a total solar eclipse?

Answer Key

1. B
2. A
3. B
4. A
5. B
6. B
7. A
8. A
9. B
10. B
11. B
12. A
13. B
14. A
15. A
16. A
17. B
18. B
19. B
20. B
21. D
22. A
23. C
24. C
25. B
26. B
27. D
28. A
29. D
30. D
31. B
32. C
33. D
34. A
35. A
36. B
37. C
38. A
39. C
40. C
41. A
42. D
43. B
44. A

45. D
46. C
47. D
48. B
49. D
50. D
51. A
52. A
53. D
54. A
55. C
56. A
57. C
58. D
59. D
60. C
61. D
62. D
63. A
64. D
65. C
66. C
67. B
68. B
69. B
70. B
71. D
72. C
73. D
74. B
75. B
76. C
77. D
78. D
79. B
80. C
81. D
82. A
83. D
84. C
85. B
86. D
87. D
88. D
89. D
90. D

91. A
92. B
93. C
94. D
95. C
96. C
97. D
98. C
99. B
100. C
101. A
102. D
103. B
104. B
105. D
106. C
107. B
108. C
109. B
110. C
111. C
112. A
113. D
114. D
115. B
116. In everyday language, the word “theory” is often used to mean an idea that looks good on paper, but has little to do with reality. In science, however, a good theory is one that explains reality and that can be applied to explain new observations.
117. Groupings of stars that make up recognizable shapes are called asterisms. Constellations are semi-rectangular regions of the sky that contain all objects within it. There are 88 official constellations on modern sky charts.
118. The celestial sphere is still a useful framework for the study of objects in the sky. It can be used to specify the directions to different objects in the sky and to visualize the motions of these objects.
119. See Figure 1-17 of Investigating Astronomy by Slater.
120. Earth's axis of rotation is not perpendicular to the plane of Earth's orbit around the Sun. This means that the sunlight is more direct and more concentrated in the summertime and more indirect and spread out in the wintertime.
121. The changes in phase occur because light from the Sun illuminates one half of the Moon, and as the Moon orbits Earth we see varying amounts of the Moon's illuminated half.
122. It takes exactly as long to rotate on its axis as it does to make one orbit around Earth. This situation is called synchronous rotation and is why we always see the same face of the Moon.
123. The sidereal month is the time it takes the Moon to complete one full orbit of Earth, as measured with respect to the stars. The synodic month, or lunar month, is the time it

takes the Moon to complete one cycle of phases and is measured with respect to the Sun rather than the stars.

124. Solar and lunar eclipses are so infrequent because the plane of the Moon's orbit and the plane of Earth's orbit are not exactly aligned. The angle between the plane of Earth's orbit and the plane of the Moon's orbit is about 5°.
125. A total lunar eclipse can be seen by anyone who can view the Moon at that time, but to see a total solar eclipse, one must be in the narrow eclipse path on the surface of Earth.