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ASTRO 2
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CHAPTER 2--USER'S GUIDE TO THE SKY: PATTERNS AND CYCLES

Student: _____

1. Seen from the northern latitudes (mid-northern hemisphere), the star Polaris

   A. is never above the horizon during the day.
   B. always sets directly in the west.
   C. is always above the northern horizon.
   D. is never visible during the winter.
   E. is the brightest star in the sky.

2. An observer on Earth's equator would find _____

   A. the celestial equator passing at 45 degrees above the northern horizon.
   B. The celestial equator passing at 45 degrees above the southern horizon.
   C. that the celestial equator coincides with the horizon.
   D. the celestial equator passing directly overhead.
   E. None of the above are true.

3. The celestial equator is

   A. a line around the sky directly above Earth's equator.
   B. the dividing line between the north and south celestial hemispheres.
   C. the path that the sun appears to follow on the celestial sphere as Earth orbits the sun.
   D. a and b.
   E. a and c.

4. The ____ is the point on the celestial sphere directly above an observer who can be at any point on the Earth..

   A. north celestial pole
   B. south celestial pole
   C. zenith
   D. celestial equator
   E. nadir

5. Constellation names are from _____ translated into _____, the language of science in Europe to the 19th century.

   A. Greek; Latin.
   B. Latin; Greek.
   C. Latin; Arabic.
   D. Greek; English.
   E. Greek; Italian.

6. Most star names, such as Aldebaran and Betelgeuse, are in _____.

   A. Latin.
   B. Greek.
   C. Arabic.
   D. English.
   E. Italian.

7. The magnitude scale

   A. originated just after the telescope was invented.
   B. can be used to indicate the apparent intensity of a celestial object.
   C. was devised by Galileo.
   D. is no longer used today.
   E. was used to determine the rate of precession.

8. The apparent visual magnitude of a star is a measure of the star's

   A. size.
   B. intensity.
   C. distance.
   D. color.
   E. temperature.

9. The apparent visual magnitude of a star is 7.3. This tells us that the star is

   A. one of the brighter stars in the sky.
   B. bright enough that it would be visible even during the day.
   C. not visible with the unaided eye.
   D. very far from Earth.
   E. very close to Earth.

10. The star Vega has an apparent visual magnitude of 0.03 and the star HR 4374 has an apparent visual magnitude of 4.87. It has been determined that both stars are at the same distance from Earth. What does this information tell us about the two stars?

    A. Vega must be closer to Earth than HR 4374.
    B. Vega must be farther from Earth than HR 4374.
    C. Vega must produce less energy/second than HR 4374.
    D. Vega must produce more energy/second than HR 4374.
    E. Vega will appear fainter to us than HR 4374.

11. The ____ of an object depends on the diameter of the object and the distance to the object.

    A. apparent brightness
    B. apparent magnitude
    C. zenith
    D. angular diameter
    E. color

12. An observer's nadir is

    A. the point directly opposite the observer's zenith.
    B. the north point on the observer's horizon.
    C. located at the center of Earth.
    D. always located near a circumpolar constellation.
    E. directly opposite the north celestial pole.

13. A(n) _____ is one-3,600th of a degree.

    A. precession
    B. second of arc
    C. minute of arc
    D. nadir
    E. angular diameter

14. The Big Dipper is

    A. a circumpolar constellation for southern hemisphere observers.
    B. always on an observer’s zenith.
    C. an asterism.
    D. only visible from the southern hemisphere.
    E. a constellation.

15. Precession of the rotation axis of Earth is caused by

    A. the force of gravity from the sun and moon on Earth's equatorial bulge.
    B. the force of gravity from the sun and Jupiter on the Earth-moon system.
    C. the magnetic field of Earth.
    D. the formation and subsequent melting of glaciers during the ice-ages.
    E. the impact of asteroids.

16. An observer in the Northern Hemisphere watches the sky for several hours. Due to the motion of Earth, this observer notices that the stars near the north celestial pole appear to move

    A. counter clockwise around the celestial pole.
    B. clockwise around the celestial pole.
    C. from left to right.
    D. from right to left.
    E. nearly vertically upward.

17. You live at a latitude of 73° N. What is the angle between the northern horizon and the north celestial pole?

    A. 73°
    B. 27°
    C. 17°
    D. $23\frac{1}{2}°$

    E. 5°

18. You live at a latitude of 39° S. What is the angle between the southern horizon and the south celestial pole?

    A. 45°
    B. 23.5°
    C. 39°
    D. 51°
    E. The answer depends on the day of the year.

19. You live at a latitude of 28° N. What is the angle between the northern horizon and the north celestial pole?

    A. 62°
    B. 28°
    C. 40°
    D. $23\frac{1}{2}°$

    E. 5°

20. You live at a latitude of 16° S. What is the angle between the southern horizon and the south celestial pole?

    A. 74°
    B. 164°
    C. 16°
    D. $23\frac{1}{2}°$

    E. 5°

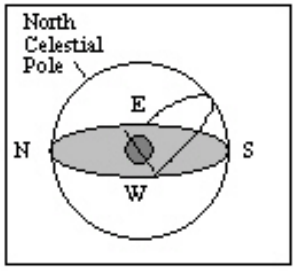
21. You live at a latitude of 39° S. What is the angle between the southern horizon and the south celestial pole?

A. 45°
B. 23.5°
C. 39°
D. 51°
E. The answer depends on the day of the year.

22. If the north celestial pole appears on your horizon, what is your latitude?

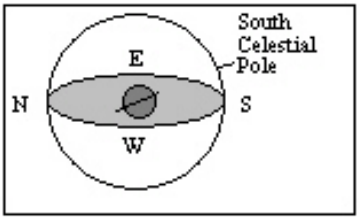
A. 90° N
B. 90° S
C. 0°
D. 45° N
E. The latitude of the observer can not be determined from the information given.

23. What is the approximate latitude of the observer in the diagram below?



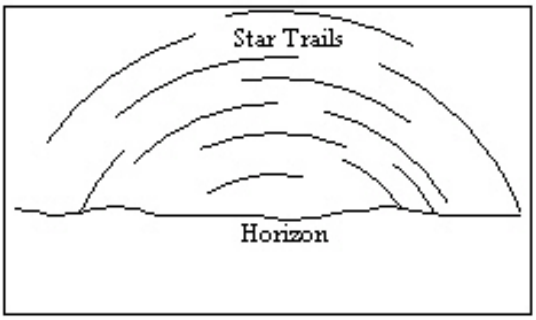
A. 90° N
B. 90° S
C. 50° N
D. 50° S
E. 0°

24. What is the approximate latitude of the observer in the diagram below?



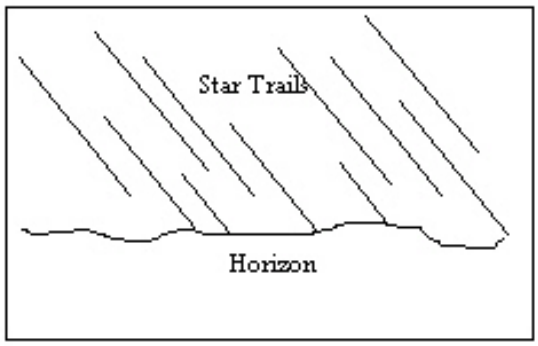
A. 20° N
B. 20° S
C. 70° N
D. 70° S
E. 0°

25. An observer in the Northern Hemisphere takes a time exposure photograph of the night sky. If the illustration below depicts the photograph taken by the observer, which direction was the camera pointing?



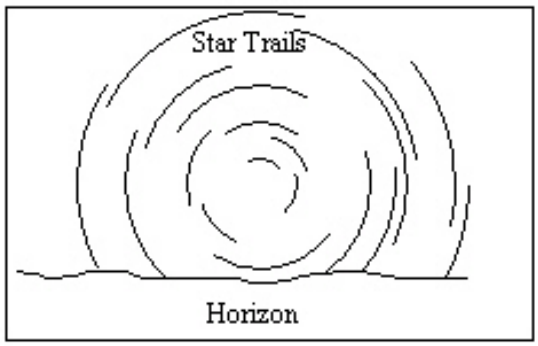
A. straight north
B. straight east
C. straight south
D. straight west
E. straight up, directly overhead

26. An observer in the Northern Hemisphere takes a time exposure photograph of the night sky. If the illustration below depicts the photograph taken by the observer, which direction was the camera pointing?



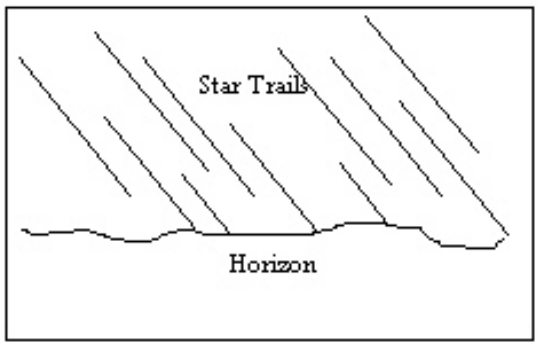
A. straight north
B. straight east
C. straight south
D. straight west
E. straight up, directly overhead

27. An observer in the Southern Hemisphere takes a time exposure photograph of the night sky. If the illustration below depicts the photograph taken by the observer, which direction was the camera pointing?



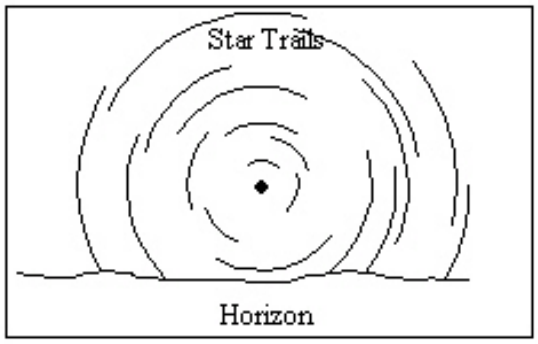
A. straight north
B. straight east
C. straight south
D. straight west
E. straight up, directly overhead

28. An observer in the Southern Hemisphere takes a time exposure photograph of the night sky. If the illustration below depicts the photograph taken by the observer, which direction was the camera pointing?



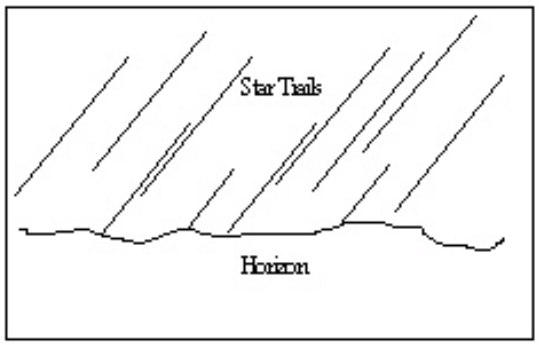
A. straight north
B. straight east
C. straight south
D. straight west
E. straight up, directly overhead

29. An observer in the Northern Hemisphere takes a time exposure photograph of the night sky. If the illustration below depicts the photograph taken by the observer, which direction was the camera pointing?



A. straight north
B. straight east
C. straight south
D. straight west
E. straight up, directly overhead

30. An observer in the Southern Hemisphere takes a time exposure photograph of the night sky. If the illustration below depicts the photograph taken by the observer, which direction was the camera pointing?



A. straight north
B. straight east
C. straight south
D. straight west
E. straight up, directly overhead

31. **Table 2-1**

Star Name	Apparent Visual Magnitude
d Dra	3.07
a Cet	2.53
r Per	3.98
Nim	8.07
a Cma	-1.46

Refer to Table 2-1. Which star in the table would appear the brightest to an observer on Earth?

A. a Cet
B. a CMa
C. Nim
D. r Per
E. d Dra

32. **Table 2-1**

Star Name	Apparent Visual Magnitude
d Dra	3.07
a Cet	2.53
r Per	3.98
Nim	8.07
a Cma	-1.46

Refer to Table 2-1. Based on the information in the table, what is the ratio of the intensity of Dra to that of Nim?

A. 2.512
B. 5
C. 8.07
D. 11.14
E. 100

33. **Table 2-1**

Star Name	Apparent Visual Magnitude
d Dra	3.07
a Cet	2.53
r Per	3.98
Nim	8.07
a Cma	-1.46

Refer to Table 2-1. Which star in the table would not be visible to the unaided eye of an observer on Earth?

A. a Cet
B. a Cma
C. Nim
D. r Per
E. d Dra

34. Star A has an apparent visual magnitude of 13.4 and star B has an apparent visual magnitude of 15.4. Star A is ____ than star B.

A. 2 times fainter
B. 2 times brighter
C. 6.3 times fainter
D. 6.3 times brighter
E. 29.8 times fainter

35. Polaris is a second magnitude star, and Phi Pegasi is about 16 times fainter than Polaris. What is the approximate magnitude of Phi Pegasi?

A. 18
B. -14
C. 3
D. -3
E. 5

36. Do the constellations visible in the sky at a particular time of night (say 9 pm) follow a seasonal pattern?

A. No, the same constellations are visible at 9 pm on any clear night of the year.
B. No. As the year progresses, the constellations visible at 9 pm are the same but their shapes change.
C. Yes, at 9 pm during a clearwinter night ALL of the constellations you can see are different from the ones that appear at the same time during a summer night.
D. Yes, at 9 pm during a summer night most of the constellations you can see are different from those you can see on a winter night. However, there are some constellations that are visible all year long.

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

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

38. How much of the night sky is north of the celestial equator?

A. Less than one-half, because of the tilt of the equator to the ecliptic plane.
B. More than one-half, because of the precession of the poles.
C. Exactly one-half.
D. All of the night sky.

39. If you point toward the zenith right now and then point there again 6 hours later, you will have pointed twice in the same direction relative to

A. your horizon.
B. the Sun.
C. the Moon.
D. the fixed stars.

40. If an observer walks north toward increasing latitude, the number of circumpolar stars would

A. remain constant.
B. decrease.
C. increase.
D. Unknown unless you also state the longitude of the observer.

41. If you were standing on the Earth's equator, which of the following in the sky would pass through your zenith during the entire day (24 hours)?

    A. The north celestial pole
    B. The south celestial pole
    C. The celestial equator
    D. The nadir

42. If the Sun passes directly overhead on at least one day per year, then

    A. you are within $23\frac{1}{2}^{\circ}$ latitude of the equator.

    B. you are within $66\frac{1}{2}^{\circ}$ latitude of the equator.

    C. you must be exactly on the equator.
    D. you could be anywhere because this occurs at least once per year at any location on the Earth.

43. In Brazil, the longest period of daylight occurs during the month of

    A. December.
    B. March.
    C. September.
    D. June.

44. If you are standing at the Earth's North Pole, which of the following would be located at the zenith?

    A. The nadir
    B. The star Vega
    C. The celestial equator
    D. The north celestial pole

45. Stars in the same constellation

    A. probably formed at the same time.
    B. must be part of the same cluster of stars in space.
    C. must have been discovered at about the same time at the same location in space.
    D. may actually be very different distances away from the observer and from each other.

46. During the month of June the north celestial pole points towards Polaris but during the month of December it points

    A. just north of Polaris.
    B. just south of Polaris.
    C. towards the star Vega.
    D. towards the star Thuban.
    E. still towards Polaris.

47. If the Earth's period of rotation doubled, but the period of revolution stayed the same

A. the night would be twice as long.
B. the night would be half as long.
C. the year would be half as long.
D. the year would be twice as long.
E. the length of the day would be unchanged

48. If the Earth's period of rotation doubled, but the period of revolution stayed the same

A. the night would be twice as long.
B. the night would be half as long.
C. the year would be half as long.
D. the year would be twice as long.
E. the length of the day would be unchanged

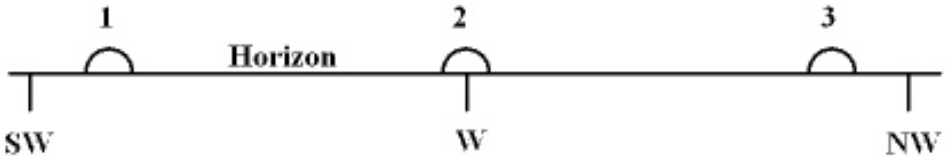
49. The _____ is 18 years and 11 1/3 days long.

A. sidereal period
B. synodic period
C. eclipse season
D. saros cycle
E. eclipse year

50. The sun moves

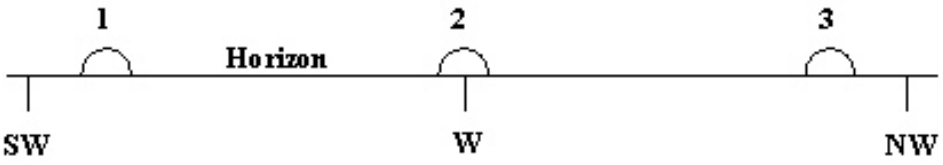
A. about one degree westward each day.
B. about one degree eastward each day.
C. about 360 degrees westward each day.
D. about 360 degrees eastward each day.
E. along the celestial equator.

51. The diagram below shows three approximate locations of the sun along the western horizon. Which number indicates the location of the sun at sunset on December 21st for an observer at latitude 48° N?



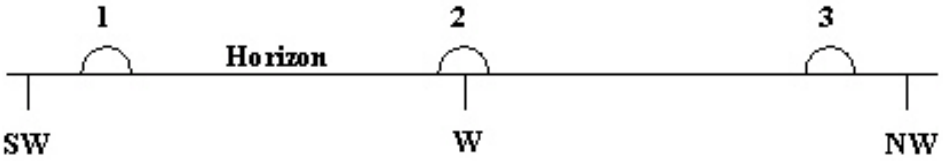
A. 1
B. 2
C. 3
D. The sun will set in the east.
E. The sun will not set on December 21st at this latitude.

52. The diagram below shows three approximate locations of the sun along the western horizon. Which number indicates the location of the sun at sunset on autumnal equinox for an observer at a latitude of 45° N?



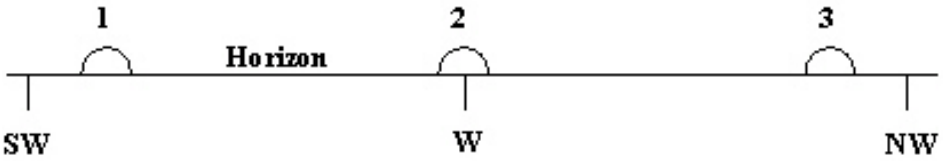
A. 1
B. 2
C. 3
D. The sun will set in the east for an observer in the northern hemisphere.
E. The sun will not set on autumnal equinox at this latitude.

53. The diagram below shows three approximate locations of the sun along the western horizon. Which number indicates the location of the sun at sunset on the vernal equinox for an observer at a latitude of 48° S?



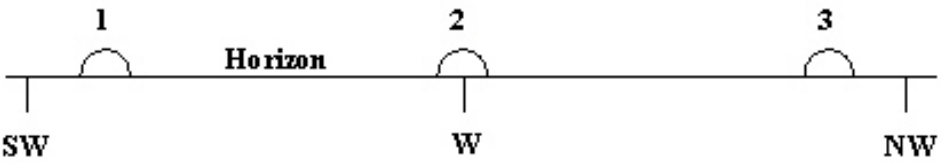
A. 1
B. 2
C. 3
D. The sun will set in the east for an observer in the southern hemisphere.
E. The sun will not set on vernal equinox at this latitude.

54. The diagram below shows three approximate locations of the sun along the western horizon. Which number indicates the location of the sun at sunset on June 21 for an observer at a latitude of 37° N?



A. 1
B. 2
C. 3
D. The sun will not rise for an observer in the northern hemisphere.
E. The sun will not set on June 21 at this latitude.

55. The diagram below shows three approximate locations of the sun along the western horizon. Which number indicates the location of the sun at sunset on June 21 for an observer at a latitude of 77° N?



A. 1
B. 2
C. 3
D. The sun will not rise for an observer in the northern hemisphere.
E. The sun will not set on June 21 at this latitude.

56. Northern Hemisphere winters are colder than Northern Hemisphere summers because

A. Earth is closer to the sun during the summer than it is during the winter.
B. the snow that falls in the northern latitudes cools Earth during the winter.
C. the light from the sun shines more directly on the Northern Hemisphere during the summer.
D. the period of sunlight is longer during the summer than during the winter.
E. c and d

57. The sun is on the celestial equator at the times of the

A. vernal equinox and the summer solstice.
B. autumnal equinox and the vernal equinox.
C. summer solstice and the winter solstice.
D. autumnal equinox and the winter solstice.
E. sun is on the ecliptic and is never on the celestial equator.

58. The ecliptic is

A. the centerline of the zodiac.
B. the projection of Earth's orbit on the sky.
C. the apparent path of the sun around the sky.
D. all of the above
E. none of the above

59. At what two celestial locations do the celestial equator and ecliptic coincide?

A. winter solstice and summer solstice
B. vernal equinox and autumnal equinox
C. they coincide at all points because they are the same.
D. north celestial pole and south celestial pole
E. zenith and east point

60. If perihelion of Earth were noticeably closer to the sun than is currently the case, what would be the probable affect on the climate of the Southern Hemisphere?

A. Their winter season would be much colder than present.
B. Their winter season would be much warmer than present.
C. Their summer season would be much colder than present.
D. Their summer season would be much warmer than present.
E. Their would be no change in any of their seasonal temperatures.

61. A(n) _____ is a set of beliefs that appears to be based on scientific ideas, but which fails to obey the most basic rules of science.

A. theory
B. hypothesis
C. pseudoscience
D. allegory
E. scientific model

62. The point in Earth's orbit where Earth is farthest from the sun is known as

A. aphelion.
B. perihelion.
C. precession.
D. the winter solstice
E. a and d

63. _____ is the point in Earth's orbit where Earth is closest to the sun.

A. Aphelion
B. Perihelion
C. Precession
D. The winter solstice
E. a and d

64. The planet(s) of our solar system that are never visible to the naked eye are

A. Pluto.
B. Mercury, Neptune, and Pluto.
C. Saturn, Uranus, Neptune, and Pluto.
D. Neptune and Pluto.
E. Mercury and Venus.

65. On the vernal equinox the sun is

A. $23\frac{1}{2}^{o}$ north of the celestial equator.

B. $23\frac{1}{2}^{o}$ south of the celestial equator.

C. on the celestial equator and moving north with respect to the equator.
D. on the celestial equator and moving south with respect to the equator.
E. closest to the north celestial pole.

66. On the autumnal equinox the sun is

A. $23\frac{1}{2}^{o}$ north of the celestial equator.

B. $23\frac{1}{2}^{o}$ south of the celestial equator.

C. on the celestial equator and moving north with respect to the equator.
D. on the celestial equator and moving south with respect to the equator.
E. closest to the north celestial pole.

67. A solar or lunar eclipse will occur

A. when the sun is near the line of nodes of the moon and the moon is new or full.
B. any time the moon is new or full.
C. when the sun is near the solstice and the moon is new or full.
D. half way through an eclipse year.
E. when the sun is near the equinox and the moon is new or full.

68. An eclipse season is the period of time during which the

A. moon crosses a node in its orbit.
B. sun crosses a node in the moon's orbit.
C. line of nodes crosses the moon's orbit.
D. the moon is new or full.
E. the moon is visible during the day.

69. The _____ of the moon is the period of time for the moon to complete a cycle of the lunar phases and is approximately 29.5 days long.

A. sidereal period
B. saros cycle
C. synodic period
D. eclipse season
E. umbral period

70. 6The sideral period of the moon

A. is about 27.32 days long.
B. is the period of time for the moon to orbit Earth once with respect to the stars.
C. is the period of time between successive eclipses at a given location on Earth.
D. is the period of time from when the moon rises until the moon rises again the next night.
E. a and b above

71. The synodic period of the moon

A. is about 27.32 days long.
B. is the period of time for the moon to orbit Earth once with respect to the stars.
C. is the period of time between successive eclipses at a given location on Earth.
D. is the period of time from when the moon rises until the moon rises again the next night.
E. none of the above

72. A solar eclipse that occurs when the moon's umbra does not reach Earth's surface is called

A. a total solar eclipse.
B. a partial solar eclipse.
C. an annular solar eclipse.
D. a penumbral solar eclipse.
E. an umbral solar eclipse.

73. A solar eclipse that occurs when the moon's umbra reaches Earth's surface is called

A. a total solar eclipse.
B. a partial solar eclipse.
C. an annular solar eclipse.
D. a penumbral solar eclipse.
E. an umbral solar eclipse.

74. A lunar eclipse that occurs when the moon moves completely into Earth’s umbral shadow is called

A. a total solar eclipse.
B. a partial solar eclipse.
C. an annular solar eclipse.
D. a penumbral lunar eclipse.
E. an umbral lunar eclipse.

75. The saros cycle

A. was used in ancient times to predict eclipses.
B. is 18 years, 11 1/3 days long.
C. comes from a Greek word that means repetition.
D. all of the above
E. none of the above

76. The _____ moon is visible above the western horizon a couple of hours before sunrise.

A. waning gibbous
B. waxing gibbous
C. waxing crescent
D. waning crescent
E. new moon

77. The _____ moon is visible above the eastern horizon a couple of hours before sunrise.

A. waning gibbous
B. waxing gibbous
C. waxing crescent
D. waning crescent
E. new moon

78. A waxing crescent moon is visible

A. near the eastern horizon just before sunrise.
B. near the eastern horizon just after sunset.
C. near the western horizon just before sunrise.
D. near the western horizon just after sunset.
E. from sunset until sunrise.

79. A third quarter moon is visible

A. near the eastern horizon just before sunrise.
B. near the eastern horizon just after sunset.
C. in the southern sky at sunrise.
D. in the southern sky at sunset.
E. from sunset until sunrise.

80. Relative to the stars, the moon moves about _____ eastward in the sky each night.

A. 1°
B. 5°
C. 13°
D. 27.3°
E. 29.5°

81. During a total lunar eclipse,

A. the moon must be new.
B. the observer must be in the path of totality.
C. the moon's color will be affected by Earth's atmosphere.
D. the moon must be at about its greatest distance from Earth.
E. it must be near the time of one of the equinoxes.

82. A totally eclipsed moon glows coppery red because

A. the moon' surface is made of iron ore which is red in color.
B. red light is cooler than blue light.
C. during a lunar eclipse the sun is cooler than normal and its light is more red.
D. only red light is able to pass completely through Earth's atmosphere and reach the moon.
E. the moon appears red during a total solar eclipse, not a total lunar eclipse.

83. On average the moon's umbral shadow is

A. to bright to produce a total solar eclipse.
B. to faint to produce a total solar eclipse.
C. to wide to produce a total solar eclipse.
D. too long to produce a total solar eclipse.
E. to short to produce a total solar eclipse.

84. A total lunar eclipse is

A. visible only from the path of totality.
B. visible only during a new moon.
C. visible to all observers on the side of Earth from which the moon would be visible at that time.
D. an opportunity to study the corona of the sun.
E. none of the above

85. The first quarter moon rises

A. at about noon.
B. at sunset.
C. at sunrise.
D. at about midnight.
E. during the second week of each calendar month.

86. Total lunar eclipses always occur

A. at the time of new moon.
B. at the time of full moon.
C. during either equinox.
D. during either solstice.
E. at the time that the sun is directly overhead.

87. Which of the following is not visible during totality of a total solar eclipse?

A. the corona of the sun.
B. the chromosphere of the sun.
C. prominences.
D. the photosphere of the sun.
E. all of the above

88. During a total lunar eclipse, which of the following are true?
    I. The photosphere of the sun is obscured by the moon.
    II. The moon is in Earth's umbra.
    III. The moon is new.
    IV. The moon is full.

    A. I, III
    B. II, IV
    C. I, II, III
    D. II, III
    E. I, II, III, IV

89. When will the full moon be highest above the southern horizon for an observer in the Northern Hemisphere?

    A. at midnight near the summer solstice
    B. at midnight near the vernal equinox
    C. at midnight near the winter solstice
    D. at midnight near the vernal equinox
    E. The angle between the southern horizon and the full moon at midnight does not change with the seasons.

90. The moon has an angular diameter of 0.5°. What is the moon's angular diameter in minutes of arc?

    A. 0.5
    B. 30
    C. 50
    D. 1800
    E. 60.5

91. A marble has a diameter of 2 cm. At what distance would the marble have an angular diameter of 1 arc second.

    A. 4.1 cm
    B. 4.1 miles
    C. 4.1 m
    D. 4.1 ft
    E. 4.1 km

92. A total solar eclipse occurred in Wolf Point, Montana on Feb. 26, 1979. When was (will) this eclipse again (be) visible in Montana?

    A. August of 1979
    B. March of 2033
    C. March of 1997
    D. March of 1979
    E. January of 2000

93. A dime is 1.8 cm in diameter. At what distance from your eye would you have to hold a dime so that it has the same angular diameter as the full moon.

A. 2 m
B. 2 cm
C. 2 km
D. 2 inches
E. 2 ft

94. For an observer at 30° N latitude, what is the maximum angle between the observer's southern horizon and the moon?

A. 30°
B. 53.5°
C. 58.5°
D. 83.5°
E. 88.5°

95. What is the angle between the noon sun on the winter solstice and the southern horizon for an observer at a latitude of 38° N?

A. 38°
B. 52°
C. 75.5°
D. 28.5°
E. 14.5°

96. If the Earth's rotational axis were to be perpendicular to the ecliptic, seasonal variations on the Earth would

A. be non-existent.
B. remain the same as they are at now.
C. have the same severity but each season would last twice as long.
D. be much more severe.

97. If you lived on the Moon how often would the Earth set below your horizon?

A. Every 24 hours
B. Once a sidereal period (27.3 days)
C. Once a synodic period (29.5 days)
D. Every year
E. Never

98. If the plane of the Earth’s equator were not tilted with respect to the ecliptic plane

A. the daylight period of Earth would be the same year-round.
B. there would be no seasonal changes.
C. Earth’s poles would not experience six month long nights.
D. All of the above

99. The phase of the Moon on a particular night is determined by

A. the season of the year.
B. the speed of the Moon in is orbit.
C. the relative positions of the Sun, Earth, and Moon.
D. how the Earth's shadow hits the Moon.
E. the distance from the Earth to the Moon.

100. On a clear night when an observer in Los Angeles sees a first quarter Moon an observer in London would see

A. a full moon.
B. a first quarter moon.
C. a new moon.
D. a third quarter moon.
E. any of the above, depends on the time

101. If the Moon's orbital plane was aligned with the celestial equator we could

A. have eclipses every month.
B. never have eclipses.
C. have eclipses only at solstice.
D. have eclipses only at the equinoxes.

102. Earth doesn't experience a solar eclipse every month because

A. of unpredictable weather patterns.
B. the moon always keeps its same side toward the Earth.
C. the moon's position is not aligned with the Earth's orbit.
D. its sometimes nighttime when the eclipse occurs.
E. sometimes the moon is too far away.

103. The Moon's angular diameter in our sky is measured to be 0.5°. From this, we can find

A. the mass density of the Moon if we know its distance from the Earth.
B. diameter of the Moon if we know the Moon's distance.
C. diameter of the Moon with no other information about the Moon.
D. distance to the Moon with no other information about the Moon.

104. The ecliptic can be defined as

A. the plane that is perpendicular to the Earth's axis of rotation.
B. the projection of the Earth's equator onto the sky.
C. the path traced out by the Moon in our sky in one month against the background stars.
D. the path traced out by the Sun in our sky over one year against the background stars.

105. The lowest amount of solar energy per square meter is incident upon the surface of Earth in the northern hemisphere on or about

A. December 21, the winter solstice.
B. March 21, the vernal equinox.
C. September 21, the autumnal equinox.
D. June 21, the summer solstice.

106. Full Moon always occurs

A. on the 15^{th} of ever month.
B. when the Moon is at right angles to the direction of the Sun.
C. when the Moon is closer to Sun than the Earth is.
D. when the Moon is directly opposite the position of the Sun.

107. In which direction does the daily motion of the Moon occur in the sky, against the background stars, when viewed from the Earth?

A. Toward the west
B. Toward the east
C. Toward the north celestial pole in the summer and the south celestial pole in the winter
D. No predictable pattern can be discerned

108. _____ is a measure of the light energy that hits one square meter in one second.

_____

109. The _____ is the point on the celestial sphere directly above an observer, regardless of where the observer is located on Earth.

_____

110. Star A has an apparent visual magnitude of 6.3 and star B has an apparent visual magnitude of 5.3. Star A is _____ times _____ than star B.

_____

111. Earth's rotation axis _____ slowly so that in a few thousand years Polaris will no longer be the North Star.

_____

112. The full moon has an angular diameter of approximately _____ arc minutes for an observer located on the surface of Earth.

_____

113. A(n) _____ eclipse occurs when the moon is at its greatest distance from Earth, and the moon is new.

_____

114. The _____ of the sun is not visible during a total solar eclipse.

_____

115. The _____ period of the moon is the time required for one revolution of the moon around Earth with respect to the stars.

_____

116. For a northern Hemisphere observer the _____ _____ moon is visible in the south-eastern sky just after sunset.

_____

117. The planets _____ and _____ are never visible near the eastern horizon at sunset.

_____

118. _____ is the point in Earth's orbit when Earth is closest to the sun.

_____

119. The constellations were created by the Greeks.

True False

120. A second magnitude star in Ursa Major is brighter than a fourth magnitude star in Orion.

True False

121. The Greek letter designation conveys information about a star's location and brightness.

True False

122. The celestial equator always passes directly overhead.

True False

123. The celestial equator always crosses the horizon at the east point and west point.

True False

124. Navigators can find their latitude in the northern hemisphere by measuring the angle from the northern horizon to the north celestial pole.

True False

125. A scientific model is a mental conception that provides a framework that helps us think about some aspect of nature.

True False

126. The constellation of Orion is currently visible in the evenings in January. Precession will not affect this and Orion will still be visible in January 13,000 years from now.

True False

127. A 3^{rd} magnitude star is 3 times brighter than a 1^{st} magnitude star.

True False

128. As Earth rotates, circumpolar stars appear to move counterclockwise around the north celestial pole.

True False

129. The third quarter moon rises at noon.

True False

130. During an annular eclipse of the sun, the corona of the sun is visible.

True False

131. A total solar eclipse will be visible from the same location on Earth one saros cycle later.

True False

132. The path of totality for a solar eclipse is swept out by the tip of the moon's umbra as the umbra moves over Earth.

True False

133. A total lunar eclipse is visible only from the path of totality.

True False

134. If you were on the moon during a total lunar eclipse, the sun would be hidden behind Earth.

True False

135. The totally eclipsed moon glows coppery red because sunlight reaches the moon's surface after passing through Earth's atmosphere.

True False

136. An eclipse season is the interval during which the sun crosses a node of the moon's orbit.

True False

137. The umbra of the moon's shadow is the region from which no part of the photosphere is visible.

True False

138. The moon and visible planets are always within a few degrees of the ecliptic.

True False

139. Precession of Earth's axis causes the date at which perihelion of Earth's orbit occurs to slowly change.

True False

140. Polaris has always been the star nearest the north celestial pole.

True False

141. The seasons are caused by the precession of the Earth's axis.

True False

142. A lunar eclipse can only occur during the full phase.

True False

143. Describe the path that a star on the celestial equator follows from the time it rises until it sets for a person at a latitude of 60° N and a person at the equator.

144. Describe the location of Polaris in the sky relative to the horizon as seen by observers in Alaska (lat. = 60° N), Texas (lat. = 33° N), Ecuador (lat. = 0°), and Australia (lat. = 30° S)

145. What information does a star's Greek-letter designation convey?

146. What advantage is there in referring to a star by its Greek-letter designation and constellation name rather using its traditional name?

147.How are the celestial poles and equator defined by Earth's rotation?

148.How is a constellation different from an asterism?

149.Why does the moon glow coppery red during a total lunar eclipse?

150.Why have more people seen total lunar eclipses than total solar eclipses?

151.Why don't eclipses occur at every new moon and full moon?

152.Why is the eclipse year shorter than 365.25 days?

153. What would you see if you were on the moon and facing Earth when people on Earth saw a total lunar eclipse?

154. Why does one cycle of lunar phases take 29.53 days even though the moon orbits Earth in 27.32 days?

155. How can tidal forces affect the rotation of celestial bodies and their orbital motion?

156. Why are penumbral eclipses less obvious than partial eclipses?

157. Describe how a small change in the relative distance of Earth from the sun at perihelion could effect the formation of glaciers on Earth.

158. Describe the evidence that best supports the Milankovitch hypothesis.

159.Why isn't the winter solstice the coldest day of the year?

160.Give two reasons why summer days are warmer than winter days.

161.Why can neither Venus nor Mercury remain visible throughout the night as the full moon does?

162. What causes precession and why does it move the celestial equator?

163. Explain why people who live close to the equator do not experience major changes in the seasons.

164. The Earth is closest to the Sun during the month of January. Explain then why we do not experience our hottest weather in January.

165. What two pieces of information are needed to determine the diameter of a far away object? Explain how that information is used to determine the diameter.

CHAPTER 2--USER'S GUIDE TO THE SKY: PATTERNS AND CYCLES Key

1. Seen from the northern latitudes (mid-northern hemisphere), the star Polaris

   A. is never above the horizon during the day.
   B. always sets directly in the west.
   C. is always above the northern horizon.
   D. is never visible during the winter.
   E. is the brightest star in the sky.

2. An observer on Earth's equator would find _____

   A. the celestial equator passing at 45 degrees above the northern horizon.
   B. The celestial equator passing at 45 degrees above the southern horizon.
   C. that the celestial equator coincides with the horizon.
   D. the celestial equator passing directly overhead.
   E. None of the above are true.

3. The celestial equator is

   A. a line around the sky directly above Earth's equator.
   B. the dividing line between the north and south celestial hemispheres.
   C. the path that the sun appears to follow on the celestial sphere as Earth orbits the sun.
   D. a and b.
   E. a and c.

4. The ____ is the point on the celestial sphere directly above an observer who can be at any point on the Earth..

   A. north celestial pole
   B. south celestial pole
   C. zenith
   D. celestial equator
   E. nadir

5. Constellation names are from _____ translated into _____, the language of science in Europe to the 19th century.

   A. Greek; Latin.
   B. Latin; Greek.
   C. Latin; Arabic.
   D. Greek; English.
   E. Greek; Italian.

6. Most star names, such as Aldebaran and Betelgeuse, are in _____.

A. Latin.
B. Greek.
C. Arabic.
D. English.
E. Italian.

7. The magnitude scale

A. originated just after the telescope was invented.
B. can be used to indicate the apparent intensity of a celestial object.
C. was devised by Galileo.
D. is no longer used today.
E. was used to determine the rate of precession.

8. The apparent visual magnitude of a star is a measure of the star's

A. size.
B. intensity.
C. distance.
D. color.
E. temperature.

9. The apparent visual magnitude of a star is 7.3. This tells us that the star is

A. one of the brighter stars in the sky.
B. bright enough that it would be visible even during the day.
C. not visible with the unaided eye.
D. very far from Earth.
E. very close to Earth.

10. The star Vega has an apparent visual magnitude of 0.03 and the star HR 4374 has an apparent visual magnitude of 4.87. It has been determined that both stars are at the same distance from Earth. What does this information tell us about the two stars?

A. Vega must be closer to Earth than HR 4374.
B. Vega must be farther from Earth than HR 4374.
C. Vega must produce less energy/second than HR 4374.
D. Vega must produce more energy/second than HR 4374.
E. Vega will appear fainter to us than HR 4374.

11. The ____ of an object depends on the diameter of the object and the distance to the object.

A. apparent brightness
B. apparent magnitude
C. zenith
D. angular diameter
E. color

12. An observer's nadir is

A. the point directly opposite the observer's zenith.
B. the north point on the observer's horizon.
C. located at the center of Earth.
D. always located near a circumpolar constellation.
E. directly opposite the north celestial pole.

13. A(n) _____ is one-3,600th of a degree.

A. precession
B. second of arc
C. minute of arc
D. nadir
E. angular diameter

14. The Big Dipper is

A. a circumpolar constellation for southern hemisphere observers.
B. always on an observer's zenith.
C. an asterism.
D. only visible from the southern hemisphere.
E. a constellation.

15. Precession of the rotation axis of Earth is caused by

A. the force of gravity from the sun and moon on Earth's equatorial bulge.
B. the force of gravity from the sun and Jupiter on the Earth-moon system.
C. the magnetic field of Earth.
D. the formation and subsequent melting of glaciers during the ice-ages.
E. the impact of asteroids.

16. An observer in the Northern Hemisphere watches the sky for several hours. Due to the motion of Earth, this observer notices that the stars near the north celestial pole appear to move

A. counter clockwise around the celestial pole.
B. clockwise around the celestial pole.
C. from left to right.
D. from right to left.
E. nearly vertically upward.

17. You live at a latitude of 73° N. What is the angle between the northern horizon and the north celestial pole?

A. 73°
B. 27°
C. 17°
D. $23\frac{1}{2}$°

E. 5°

18. You live at a latitude of 39° S. What is the angle between the southern horizon and the south celestial pole?

A. 45°
B. 23.5°
C. 39°
D. 51°
E. The answer depends on the day of the year.

19. You live at a latitude of 28° N. What is the angle between the northern horizon and the north celestial pole?

A. 62°
B. 28°
C. 40°
D. $23\frac{1}{2}$°

E. 5°

20. You live at a latitude of 16° S. What is the angle between the southern horizon and the south celestial pole?

A. 74°
B. 164°
C. 16°
D. $23\frac{1}{2}$°

E. 5°

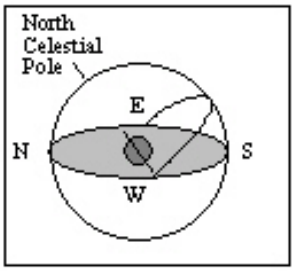
21. You live at a latitude of 39° S. What is the angle between the southern horizon and the south celestial pole?

A. 45°
B. 23.5°
C. 39°
D. 51°
E. The answer depends on the day of the year.

22. If the north celestial pole appears on your horizon, what is your latitude?

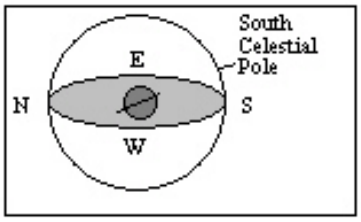
A. 90° N
B. 90° S
C. 0°
D. 45° N
E. The latitude of the observer can not be determined from the information given.

23. What is the approximate latitude of the observer in the diagram below?



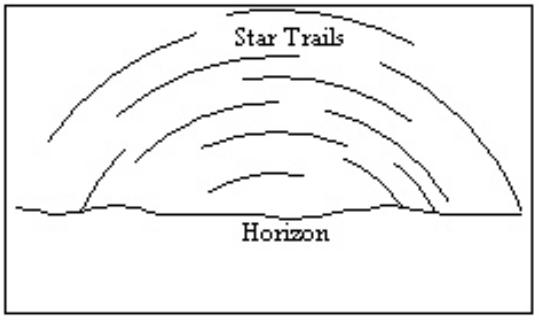
A. 90° N
B. 90° S
C. 50° N
D. 50° S
E. 0°

24. What is the approximate latitude of the observer in the diagram below?



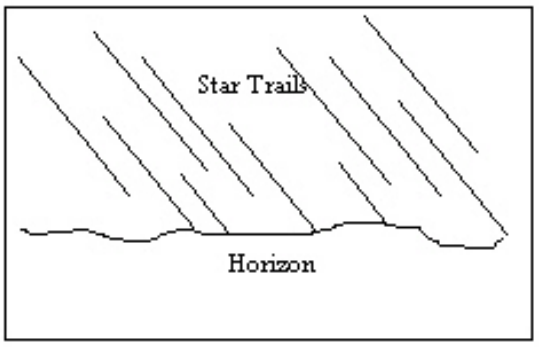
A. 20° N
B. 20° S
C. 70° N
D. 70° S
E. 0°

25. An observer in the Northern Hemisphere takes a time exposure photograph of the night sky. If the illustration below depicts the photograph taken by the observer, which direction was the camera pointing?



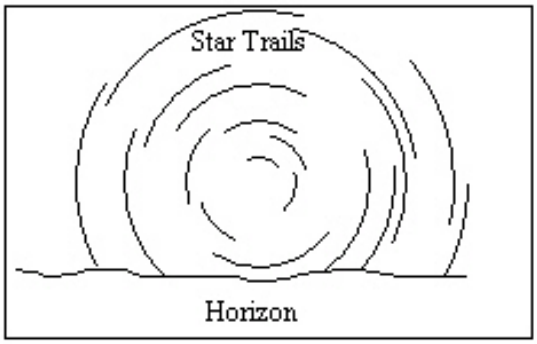
A. straight north
B. straight east
C. straight south
D. straight west
E. straight up, directly overhead

26. An observer in the Northern Hemisphere takes a time exposure photograph of the night sky. If the illustration below depicts the photograph taken by the observer, which direction was the camera pointing?



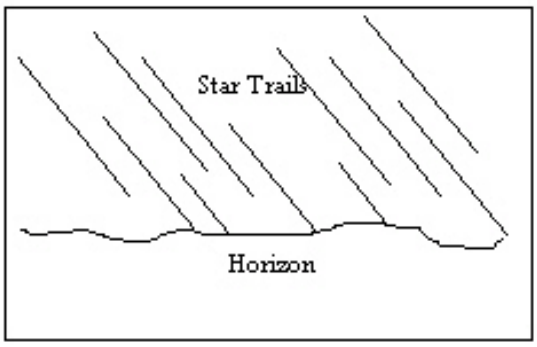
A. straight north
B. straight east
C. straight south
D. straight west
E. straight up, directly overhead

27. An observer in the Southern Hemisphere takes a time exposure photograph of the night sky. If the illustration below depicts the photograph taken by the observer, which direction was the camera pointing?



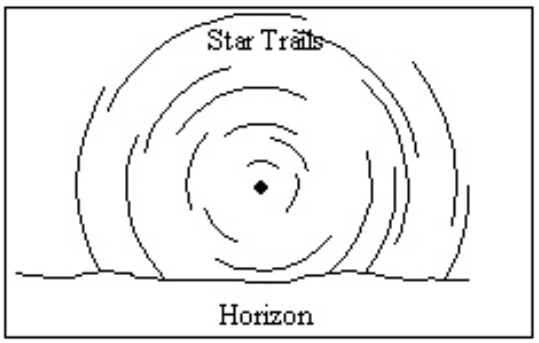
A. straight north
B. straight east
C. straight south
D. straight west
E. straight up, directly overhead

28. An observer in the Southern Hemisphere takes a time exposure photograph of the night sky. If the illustration below depicts the photograph taken by the observer, which direction was the camera pointing?



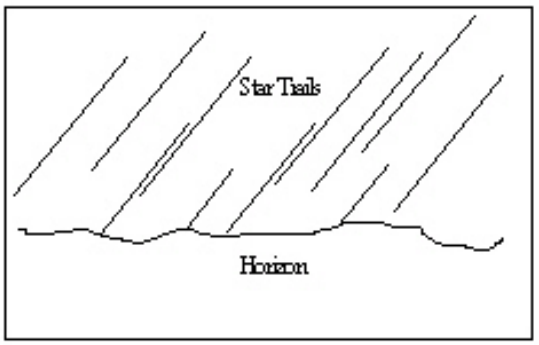
A. straight north
B. straight east
C. straight south
D. straight west
E. straight up, directly overhead

29. An observer in the Northern Hemisphere takes a time exposure photograph of the night sky. If the illustration below depicts the photograph taken by the observer, which direction was the camera pointing?



A. straight north
B. straight east
C. straight south
D. straight west
E. straight up, directly overhead

30. An observer in the Southern Hemisphere takes a time exposure photograph of the night sky. If the illustration below depicts the photograph taken by the observer, which direction was the camera pointing?



A. straight north
B. straight east
C. straight south
D. straight west
E. straight up, directly overhead

31. **Table 2-1**

Star Name	Apparent Visual Magnitude
d Dra	3.07
a Cet	2.53
r Per	3.98
Nim	8.07
a Cma	-1.46

Refer to Table 2-1. Which star in the table would appear the brightest to an observer on Earth?

A. a Cet
B. a CMa
C. Nim
D. r Per
E. d Dra

32. **Table 2-1**

Star Name	Apparent Visual Magnitude
d Dra	3.07
a Cet	2.53
r Per	3.98
Nim	8.07
a Cma	-1.46

Refer to Table 2-1. Based on the information in the table, what is the ratio of the intensity of Dra to that of Nim?

A. 2.512
B. 5
C. 8.07
D. 11.14
E. 100

33. **Table 2-1**

Star Name	Apparent Visual Magnitude
d Dra	3.07
a Cet	2.53
r Per	3.98
Nim	8.07
a Cma	-1.46

Refer to Table 2-1. Which star in the table would not be visible to the unaided eye of an observer on Earth?

A. a Cet
B. a Cma
C. Nim
D. r Per
E. d Dra

34. Star A has an apparent visual magnitude of 13.4 and star B has an apparent visual magnitude of 15.4. Star A is ____ than star B.

A. 2 times fainter
B. 2 times brighter
C. 6.3 times fainter
D. 6.3 times brighter
E. 29.8 times fainter

35. Polaris is a second magnitude star, and Phi Pegasi is about 16 times fainter than Polaris. What is the approximate magnitude of Phi Pegasi?

A. 18
B. -14
C. 3
D. -3
E. 5

36. Do the constellations visible in the sky at a particular time of night (say 9 pm) follow a seasonal pattern?

A. No, the same constellations are visible at 9 pm on any clear night of the year.
B. No. As the year progresses, the constellations visible at 9 pm are the same but their shapes change.
C. Yes, at 9 pm during a clearwinter night ALL of the constellations you can see are different from the ones that appear at the same time during a summer night.
D. Yes, at 9 pm during a summer night most of the constellations you can see are different from those you can see on a winter night. However, there are some constellations that are visible all year long.

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

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

38. How much of the night sky is north of the celestial equator?

A. Less than one-half, because of the tilt of the equator to the ecliptic plane.
B. More than one-half, because of the precession of the poles.
C. Exactly one-half.
D. All of the night sky.

39. If you point toward the zenith right now and then point there again 6 hours later, you will have pointed twice in the same direction relative to

A. your horizon.
B. the Sun.
C. the Moon.
D. the fixed stars.

40. If an observer walks north toward increasing latitude, the number of circumpolar stars would

A. remain constant.
B. decrease.
C. increase.
D. Unknown unless you also state the longitude of the observer.

41. If you were standing on the Earth's equator, which of the following in the sky would pass through your zenith during the entire day (24 hours)?

A. The north celestial pole
B. The south celestial pole
C. The celestial equator
D. The nadir

42. If the Sun passes directly overhead on at least one day per year, then

A. you are within $23\frac{1}{2}^{\circ}$ latitude of the equator.

B. you are within $66\frac{1}{2}^{\circ}$ latitude of the equator.

C. you must be exactly on the equator.
D. you could be anywhere because this occurs at least once per year at any location on the Earth.

43. In Brazil, the longest period of daylight occurs during the month of

A. December.
B. March.
C. September.
D. June.

44. If you are standing at the Earth's North Pole, which of the following would be located at the zenith?

A. The nadir
B. The star Vega
C. The celestial equator
D. The north celestial pole

45. Stars in the same constellation

A. probably formed at the same time.
B. must be part of the same cluster of stars in space.
C. must have been discovered at about the same time at the same location in space.
D. may actually be very different distances away from the observer and from each other.

46. During the month of June the north celestial pole points towards Polaris but during the month of December it points

A. just north of Polaris.
B. just south of Polaris.
C. towards the star Vega.
D. towards the star Thuban.
E. still towards Polaris.

47. If the Earth's period of rotation doubled, but the period of revolution stayed the same

A. the night would be twice as long.
B. the night would be half as long.
C. the year would be half as long.
D. the year would be twice as long.
E. the length of the day would be unchanged

48. If the Earth's period of rotation doubled, but the period of revolution stayed the same

A. the night would be twice as long.
B. the night would be half as long.
C. the year would be half as long.
D. the year would be twice as long.
E. the length of the day would be unchanged

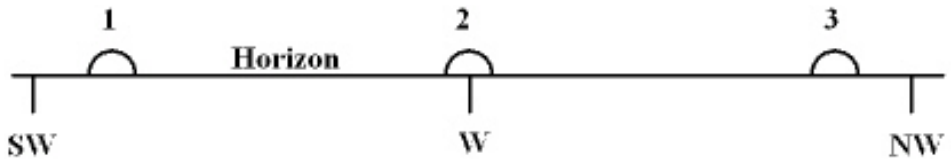
49. The _____ is 18 years and 11 1/3 days long.

A. sidereal period
B. synodic period
C. eclipse season
D. saros cycle
E. eclipse year

50. The sun moves

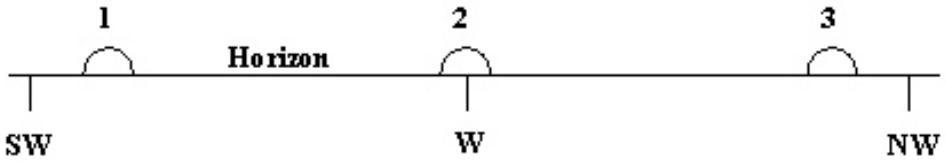
A. about one degree westward each day.
B. about one degree eastward each day.
C. about 360 degrees westward each day.
D. about 360 degrees eastward each day.
E. along the celestial equator.

51. The diagram below shows three approximate locations of the sun along the western horizon. Which number indicates the location of the sun at sunset on December 21st for an observer at latitude 48° N?



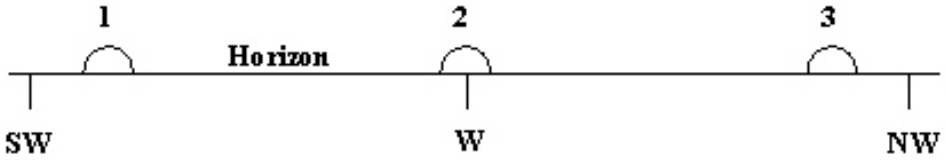
A. 1
B. 2
C. 3
D. The sun will set in the east.
E. The sun will not set on December 21st at this latitude.

52. The diagram below shows three approximate locations of the sun along the western horizon. Which number indicates the location of the sun at sunset on autumnal equinox for an observer at a latitude of 45° N?



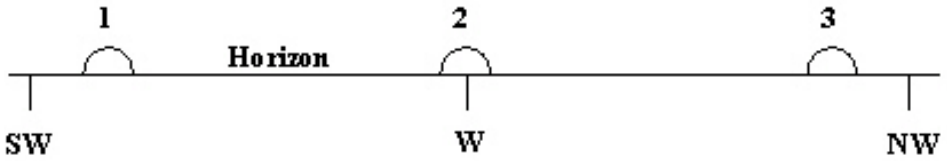
A. 1
B. 2
C. 3
D. The sun will set in the east for an observer in the northern hemisphere.
E. The sun will not set on autumnal equinox at this latitude.

53. The diagram below shows three approximate locations of the sun along the western horizon. Which number indicates the location of the sun at sunset on the vernal equinox for an observer at a latitude of 48° S?



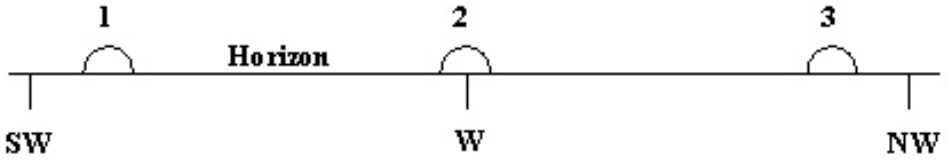
A. 1
B. 2
C. 3
D. The sun will set in the east for an observer in the southern hemisphere.
E. The sun will not set on vernal equinox at this latitude.

54. The diagram below shows three approximate locations of the sun along the western horizon. Which number indicates the location of the sun at sunset on June 21 for an observer at a latitude of 37° N?



A. 1
B. 2
C. 3
D. The sun will not rise for an observer in the northern hemisphere.
E. The sun will not set on June 21 at this latitude.

55. The diagram below shows three approximate locations of the sun along the western horizon. Which number indicates the location of the sun at sunset on June 21 for an observer at a latitude of 77° N?



A. 1
B. 2
C. 3
D. The sun will not rise for an observer in the northern hemisphere.
E. The sun will not set on June 21 at this latitude.

56. Northern Hemisphere winters are colder than Northern Hemisphere summers because

A. Earth is closer to the sun during the summer than it is during the winter.
B. the snow that falls in the northern latitudes cools Earth during the winter.
C. the light from the sun shines more directly on the Northern Hemisphere during the summer.
D. the period of sunlight is longer during the summer than during the winter.
E. c and d

57. The sun is on the celestial equator at the times of the

A. vernal equinox and the summer solstice.
B. autumnal equinox and the vernal equinox.
C. summer solstice and the winter solstice.
D. autumnal equinox and the winter solstice.
E. sun is on the ecliptic and is never on the celestial equator.

58. The ecliptic is

A. the centerline of the zodiac.
B. the projection of Earth's orbit on the sky.
C. the apparent path of the sun around the sky.
D. all of the above
E. none of the above

59. At what two celestial locations do the celestial equator and ecliptic coincide?

A. winter solstice and summer solstice
B. vernal equinox and autumnal equinox
C. they coincide at all points because they are the same.
D. north celestial pole and south celestial pole
E. zenith and east point

60. If perihelion of Earth were noticeably closer to the sun than is currently the case, what would be the probable affect on the climate of the Southern Hemisphere?

A. Their winter season would be much colder than present.
B. Their winter season would be much warmer than present.
C. Their summer season would be much colder than present.
D. Their summer season would be much warmer than present.
E. Their would be no change in any of their seasonal temperatures.

61. A(n) _____ is a set of beliefs that appears to be based on scientific ideas, but which fails to obey the most basic rules of science.

A. theory
B. hypothesis
C. pseudoscience
D. allegory
E. scientific model

62. The point in Earth's orbit where Earth is farthest from the sun is known as

A. aphelion.
B. perihelion.
C. precession.
D. the winter solstice
E. a and d

63. _____ is the point in Earth's orbit where Earth is closest to the sun.

A. Aphelion
B. Perihelion
C. Precession
D. The winter solstice
E. a and d

64. The planet(s) of our solar system that are never visible to the naked eye are

A. Pluto.
B. Mercury, Neptune, and Pluto.
C. Saturn, Uranus, Neptune, and Pluto.
D. Neptune and Pluto.
E. Mercury and Venus.

65. On the vernal equinox the sun is

A. $23\frac{1}{2}^{\circ}$ north of the celestial equator.

B. $23\frac{1}{2}^{\circ}$ south of the celestial equator.

C. on the celestial equator and moving north with respect to the equator.
D. on the celestial equator and moving south with respect to the equator.
E. closest to the north celestial pole.

66. On the autumnal equinox the sun is

A. $23\frac{1}{2}^{\circ}$ north of the celestial equator.

B. $23\frac{1}{2}^{\circ}$ south of the celestial equator.

C. on the celestial equator and moving north with respect to the equator.
D. on the celestial equator and moving south with respect to the equator.
E. closest to the north celestial pole.

67. A solar or lunar eclipse will occur

A. when the sun is near the line of nodes of the moon and the moon is new or full.
B. any time the moon is new or full.
C. when the sun is near the solstice and the moon is new or full.
D. half way through an eclipse year.
E. when the sun is near the equinox and the moon is new or full.

68. An eclipse season is the period of time during which the

A. moon crosses a node in its orbit.
B. sun crosses a node in the moon's orbit.
C. line of nodes crosses the moon's orbit.
D. the moon is new or full.
E. the moon is visible during the day.

69. The _____ of the moon is the period of time for the moon to complete a cycle of the lunar phases and is approximately 29.5 days long.

A. sidereal period
B. saros cycle
C. synodic period
D. eclipse season
E. umbral period

70. 6The sideral period of the moon

A. is about 27.32 days long.
B. is the period of time for the moon to orbit Earth once with respect to the stars.
C. is the period of time between successive eclipses at a given location on Earth.
D. is the period of time from when the moon rises until the moon rises again the next night.
E. a and b above

71. The synodic period of the moon

A. is about 27.32 days long.
B. is the period of time for the moon to orbit Earth once with respect to the stars.
C. is the period of time between successive eclipses at a given location on Earth.
D. is the period of time from when the moon rises until the moon rises again the next night.
E. none of the above

72. A solar eclipse that occurs when the moon's umbra does not reach Earth's surface is called

A. a total solar eclipse.
B. a partial solar eclipse.
C. an annular solar eclipse.
D. a penumbral solar eclipse.
E. an umbral solar eclipse.

73. A solar eclipse that occurs when the moon's umbra reaches Earth's surface is called

A. a total solar eclipse.
B. a partial solar eclipse.
C. an annular solar eclipse.
D. a penumbral solar eclipse.
E. an umbral solar eclipse.

74. A lunar eclipse that occurs when the moon moves completely into Earth's umbral shadow is called

A. a total solar eclipse.
B. a partial solar eclipse.
C. an annular solar eclipse.
D. a penumbral lunar eclipse.
E. an umbral lunar eclipse.

75. The saros cycle

A. was used in ancient times to predict eclipses.
B. is 18 years, 11 1/3 days long.
C. comes from a Greek word that means repetition.
D. all of the above
E. none of the above

76. The _____ moon is visible above the western horizon a couple of hours before sunrise.

A. waning gibbous
B. waxing gibbous
C. waxing crescent
D. waning crescent
E. new moon

77. The _____ moon is visible above the eastern horizon a couple of hours before sunrise.

A. waning gibbous
B. waxing gibbous
C. waxing crescent
D. waning crescent
E. new moon

78. A waxing crescent moon is visible

A. near the eastern horizon just before sunrise.
B. near the eastern horizon just after sunset.
C. near the western horizon just before sunrise.
D. near the western horizon just after sunset.
E. from sunset until sunrise.

79. A third quarter moon is visible

A. near the eastern horizon just before sunrise.
B. near the eastern horizon just after sunset.
C. in the southern sky at sunrise.
D. in the southern sky at sunset.
E. from sunset until sunrise.

80. Relative to the stars, the moon moves about _____ eastward in the sky each night.

A. 1°
B. 5°
C. 13°
D. 27.3°
E. 29.5°

81. During a total lunar eclipse,

A. the moon must be new.
B. the observer must be in the path of totality.
C. the moon's color will be affected by Earth's atmosphere.
D. the moon must be at about its greatest distance from Earth.
E. it must be near the time of one of the equinoxes.

82. A totally eclipsed moon glows coppery red because

A. the moon' surface is made of iron ore which is red in color.
B. red light is cooler than blue light.
C. during a lunar eclipse the sun is cooler than normal and its light is more red.
D. only red light is able to pass completely through Earth's atmosphere and reach the moon.
E. the moon appears red during a total solar eclipse, not a total lunar eclipse.

83. On average the moon's umbral shadow is

A. to bright to produce a total solar eclipse.
B. to faint to produce a total solar eclipse.
C. to wide to produce a total solar eclipse.
D. too long to produce a total solar eclipse.
E. to short to produce a total solar eclipse.

84. A total lunar eclipse is

A. visible only from the path of totality.
B. visible only during a new moon.
C. visible to all observers on the side of Earth from which the moon would be visible at that time.
D. an opportunity to study the corona of the sun.
E. none of the above

85. The first quarter moon rises

A. at about noon.
B. at sunset.
C. at sunrise.
D. at about midnight.
E. during the second week of each calendar month.

86. Total lunar eclipses always occur

A. at the time of new moon.
B. at the time of full moon.
C. during either equinox.
D. during either solstice.
E. at the time that the sun is directly overhead.

87. Which of the following is not visible during totality of a total solar eclipse?

A. the corona of the sun.
B. the chromosphere of the sun.
C. prominences.
D. the photosphere of the sun.
E. all of the above

88. During a total lunar eclipse, which of the following are true?

I. The photosphere of the sun is obscured by the moon.
II. The moon is in Earth's umbra.
III. The moon is new.
IV. The moon is full.

A. I, III
B. II, IV
C. I, II, III
D. II, III
E. I, II, III, IV

89. When will the full moon be highest above the southern horizon for an observer in the Northern Hemisphere?

A. at midnight near the summer solstice
B. at midnight near the vernal equinox
C. at midnight near the winter solstice
D. at midnight near the vernal equinox
E. The angle between the southern horizon and the full moon at midnight does not change with the seasons.

90. The moon has an angular diameter of 0.5°. What is the moon's angular diameter in minutes of arc?

A. 0.5
B. 30
C. 50
D. 1800
E. 60.5

91. A marble has a diameter of 2 cm. At what distance would the marble have an angular diameter of 1 arc second.

A. 4.1 cm
B. 4.1 miles
C. 4.1 m
D. 4.1 ft
E. 4.1 km

92. A total solar eclipse occurred in Wolf Point, Montana on Feb. 26, 1979. When was (will) this eclipse again (be) visible in Montana?

A. August of 1979
B. March of 2033
C. March of 1997
D. March of 1979
E. January of 2000

93. A dime is 1.8 cm in diameter. At what distance from your eye would you have to hold a dime so that it has the same angular diameter as the full moon.

A. 2 m
B. 2 cm
C. 2 km
D. 2 inches
E. 2 ft

94. For an observer at 30° N latitude, what is the maximum angle between the observer's southern horizon and the moon?

A. 30°
B. 53.5°
C. 58.5°
D. 83.5°
E. 88.5°

95. What is the angle between the noon sun on the winter solstice and the southern horizon for an observer at a latitude of 38° N?

A. 38°
B. 52°
C. 75.5°
D. 28.5°
E. 14.5°

96. If the Earth's rotational axis were to be perpendicular to the ecliptic, seasonal variations on the Earth would

A. be non-existent.
B. remain the same as they are at now.
C. have the same severity but each season would last twice as long.
D. be much more severe.

97. If you lived on the Moon how often would the Earth set below your horizon?

A. Every 24 hours
B. Once a sidereal period (27.3 days)
C. Once a synodic period (29.5 days)
D. Every year
E. Never

98. If the plane of the Earth's equator were not tilted with respect to the ecliptic plane

A. the daylight period of Earth would be the same year-round.
B. there would be no seasonal changes.
C. Earth's poles would not experience six month long nights.
D. All of the above

99. The phase of the Moon on a particular night is determined by

A. the season of the year.
B. the speed of the Moon in is orbit.
C. the relative positions of the Sun, Earth, and Moon.
D. how the Earth's shadow hits the Moon.
E. the distance from the Earth to the Moon.

100. On a clear night when an observer in Los Angeles sees a first quarter Moon an observer in London would see

A. a full moon.
B. a first quarter moon.
C. a new moon.
D. a third quarter moon.
E. any of the above, depends on the time

101. If the Moon's orbital plane was aligned with the celestial equator we could

A. have eclipses every month.
B. never have eclipses.
C. have eclipses only at solstice.
D. have eclipses only at the equinoxes.

102. Earth doesn't experience a solar eclipse every month because

A. of unpredictable weather patterns.
B. the moon always keeps its same side toward the Earth.
C. the moon's position is not aligned with the Earth's orbit.
D. its sometimes nighttime when the eclipse occurs.
E. sometimes the moon is too far away.

103. The Moon's angular diameter in our sky is measured to be 0.5°. From this, we can find

A. the mass density of the Moon if we know its distance from the Earth.
B. diameter of the Moon if we know the Moon's distance.
C. diameter of the Moon with no other information about the Moon.
D. distance to the Moon with no other information about the Moon.

104. The ecliptic can be defined as

A. the plane that is perpendicular to the Earth's axis of rotation.
B. the projection of the Earth's equator onto the sky.
C. the path traced out by the Moon in our sky in one month against the background stars.
D. the path traced out by the Sun in our sky over one year against the background stars.

105. The lowest amount of solar energy per square meter is incident upon the surface of Earth in the northern hemisphere on or about

A. December 21, the winter solstice.
B. March 21, the vernal equinox.
C. September 21, the autumnal equinox.
D. June 21, the summer solstice.

106. Full Moon always occurs

A. on the 15^{th} of ever month.
B. when the Moon is at right angles to the direction of the Sun.
C. when the Moon is closer to Sun than the Earth is.
D. when the Moon is directly opposite the position of the Sun.

107. In which direction does the daily motion of the Moon occur in the sky, against the background stars, when viewed from the Earth?

A. Toward the west
B. Toward the east
C. Toward the north celestial pole in the summer and the south celestial pole in the winter
D. No predictable pattern can be discerned

108. _____ is a measure of the light energy that hits one square meter in one second.

Intensity

109. The _____ is the point on the celestial sphere directly above an observer, regardless of where the observer is located on Earth.

Zenith

110. Star A has an apparent visual magnitude of 6.3 and star B has an apparent visual magnitude of 5.3. Star A is _____ times _____ than star B.

2.5, fainter

111. Earth's rotation axis _____ slowly so that in a few thousand years Polaris will no longer be the North Star.

precesses

112. The full moon has an angular diameter of approximately _____ arc minutes for an observer located on the surface of Earth.

30 *or*
thirty

113. A(n) _____ eclipse occurs when the moon is at its greatest distance from Earth, and the moon is new.

annular

114. The _____ of the sun is not visible during a total solar eclipse.

photosphere

115. The _____ period of the moon is the time required for one revolution of the moon around Earth with respect to the stars.

sidereal

116. For a northern Hemisphere observer the _____ _____ moon is visible in the south-eastern sky just after sunset.

waxing gibbous

117. The planets _____ and _____ are never visible near the eastern horizon at sunset.

Mercury, Venus

118. _____ is the point in Earth's orbit when Earth is closest to the sun.

Perihelion

119. The constellations were created by the Greeks.

FALSE

120. A second magnitude star in Ursa Major is brighter than a fourth magnitude star in Orion.

TRUE

121. The Greek letter designation conveys information about a star's location and brightness.

TRUE

122. The celestial equator always passes directly overhead.

FALSE

123. The celestial equator always crosses the horizon at the east point and west point.

TRUE

124. Navigators can find their latitude in the northern hemisphere by measuring the angle from the northern horizon to the north celestial pole.

TRUE

125. A scientific model is a mental conception that provides a framework that helps us think about some aspect of nature.

TRUE

126. The constellation of Orion is currently visible in the evenings in January. Precession will not affect this and Orion will still be visible in January 13,000 years from now.

FALSE

127. A 3rd magnitude star is 3 times brighter than a 1st magnitude star.

FALSE

128. As Earth rotates, circumpolar stars appear to move counterclockwise around the north celestial pole.

TRUE

129. The third quarter moon rises at noon.

FALSE

130. During an annular eclipse of the sun, the corona of the sun is visible.

FALSE

131. A total solar eclipse will be visible from the same location on Earth one saros cycle later.

FALSE

132. The path of totality for a solar eclipse is swept out by the tip of the moon's umbra as the umbra moves over Earth.

TRUE

133. A total lunar eclipse is visible only from the path of totality.

FALSE

134. If you were on the moon during a total lunar eclipse, the sun would be hidden behind Earth.

TRUE

135. The totally eclipsed moon glows coppery red because sunlight reaches the moon's surface after passing through Earth's atmosphere.

TRUE

136. An eclipse season is the interval during which the sun crosses a node of the moon's orbit.

TRUE

137. The umbra of the moon's shadow is the region from which no part of the photosphere is visible.

TRUE

138. The moon and visible planets are always within a few degrees of the ecliptic.

TRUE

139. Precession of Earth's axis causes the date at which perihelion of Earth's orbit occurs to slowly change.

TRUE

140. Polaris has always been the star nearest the north celestial pole.

FALSE

141. The seasons are caused by the precession of the Earth's axis.

FALSE

142. A lunar eclipse can only occur during the full phase.

TRUE

143. Describe the path that a star on the celestial equator follows from the time it rises until it sets for a person at a latitude of 60° N and a person at the equator.

Answer not provided.

144. Describe the location of Polaris in the sky relative to the horizon as seen by observers in Alaska (lat. = 60° N), Texas (lat. = 33° N), Ecuador (lat. = 0°), and Australia (lat. = 30° S)

Answer not provided.

145. What information does a star's Greek-letter designation convey?

Answer not provided.

146. What advantage is there in referring to a star by its Greek-letter designation and constellation name rather using its traditional name?

Answer not provided.

147. How are the celestial poles and equator defined by Earth's rotation?

Answer not provided.

148. How is a constellation different from an asterism?

Answer not provided.

149. Why does the moon glow coppery red during a total lunar eclipse?

Answer not provided.

150. Why have more people seen total lunar eclipses than total solar eclipses?

Answer not provided.

151. Why don't eclipses occur at every new moon and full moon?

Answer not provided.

152. Why is the eclipse year shorter than 365.25 days?

Answer not provided.

153. What would you see if you were on the moon and facing Earth when people on Earth saw a total lunar eclipse?

Answer not provided.

154. Why does one cycle of lunar phases take 29.53 days even though the moon orbits Earth in 27.32 days?

Answer not provided.

155. How can tidal forces affect the rotation of celestial bodies and their orbital motion?

Answer not provided.

156. Why are penumbral eclipses less obvious than partial eclipses?

Answer not provided.

157. Describe how a small change in the relative distance of Earth from the sun at perihelion could effect the formation of glaciers on Earth.

Answer not provided.

158. Describe the evidence that best supports the Milankovitch hypothesis.

Answer not provided.

159. Why isn't the winter solstice the coldest day of the year?

Answer not provided.

160. Give two reasons why summer days are warmer than winter days.

Answer not provided.

161. Why can neither Venus nor Mercury remain visible throughout the night as the full moon does?

Answer not provided.

162. What causes precession and why does it move the celestial equator?

Answer not provided.

163. Explain why people who live close to the equator do not experience major changes in the seasons.

Answer not provided.

164. The Earth is closest to the Sun during the month of January. Explain then why we do not experience our hottest weather in January.

Answer not provided.

165. What two pieces of information are needed to determine the diameter of a far away object? Explain how that information is used to determine the diameter.

Answer not provided.