**Astronomy chapter 1 test bank**

**Multiple Choice**

*Identify the letter of the choice that best completes the statement or answers the question.*

\_\_\_\_ 1. The length of a day is based on

|  |  |  |  |
| --- | --- | --- | --- |
| a. | the Earth orbiting the sun. | c. | the moon orbiting the Earth. |
| b. | the rotation of the Earth on its axis. | d. | the rotation of the moon on its axis. |

\_\_\_\_ 2. Which of the following civilizations directly affected the development of our modern calendar?

|  |  |  |  |
| --- | --- | --- | --- |
| a. | The Chinese | c. | The Romans |
| b. | The Maya | d. | The Polynesians |

\_\_\_\_ 3. According to \_\_\_\_, the Earth is at the center of the universe.

|  |  |  |  |
| --- | --- | --- | --- |
| a. | the Ptolomaic theory | c. | Galileo's theory |
| b. | Copernicus's theory | d. | None of the above |

\_\_\_\_ 4. The first scientist to successfully use a telescope to observe the night sky was

|  |  |  |  |
| --- | --- | --- | --- |
| a. | Tycho. | c. | Herschel. |
| b. | Galileo. | d. | Kepler. |

\_\_\_\_ 5. Astronomers divide the sky into

|  |  |  |  |
| --- | --- | --- | --- |
| a. | galaxies. | c. | zeniths. |
| b. | constellations. | d. | phases. |

\_\_\_\_ 6. The stars that you see in the sky depend on

|  |  |  |  |
| --- | --- | --- | --- |
| a. | your latitude. | c. | the time of night. |
| b. | the time of year. | d. | All of the above |

\_\_\_\_ 7. The altitude of an object in the sky is its angular distance

|  |  |  |  |
| --- | --- | --- | --- |
| a. | above the horizon. | c. | from the zenith. |
| b. | from the north celestial pole. | d. | from the prime meridian. |

\_\_\_\_ 8. Right ascension is a measure of how far east an object in the sky is from

|  |  |  |  |
| --- | --- | --- | --- |
| a. | the observer. | c. | the moon. |
| b. | the vernal equinox. | d. | Venus. |

\_\_\_\_ 9. Telescopes that work grounded on the Earth include all of the following EXCEPT

|  |  |  |  |
| --- | --- | --- | --- |
| a. | radio telescopes. | c. | X-ray telescopes. |
| b. | refracting telescopes. | d. | reflecting telescopes. |

\_\_\_\_ 10. Which of the following is true about X ray and radio radiation from objects in space?

|  |  |
| --- | --- |
| a. | Both types of radiation can be observed with the same telescope. |
| b. | Separate telescopes are needed to observe each type of radiation, and both telescopes can be on Earth. |
| c. | Separate telescopes are needed to observe each type of radiation, and both telescopes must be in space. |
| d. | Separate telescopes are needed to observe each type of radiation, but only one of the telescopes must be in space. |

\_\_\_\_ 11. An advantage of reflecting telescopes over refracting telescopes is that

|  |  |
| --- | --- |
| a. | flaws in the glass do not affect the incoming light. |
| b. | mirrors only reflect certain colors of light for better focus. |
| c. | mirror sizes are all the same for ease of use. |
| d. | they use lenses to focus light. |

\_\_\_\_ 12. Circumpolar stars can be seen all night long during the entire year because they are

|  |  |  |  |
| --- | --- | --- | --- |
| a. | the brightest stars. | c. | magnetically polar. |
| b. | above the Earth's axes. | d. | circular in appearance. |

\_\_\_\_ 13. Which of these would be shorter if Earth rotated faster?

|  |  |  |  |
| --- | --- | --- | --- |
| a. | years | c. | weeks |
| b. | months | d. | days |

\_\_\_\_ 14. Copernicus’s theory was unpopular when he first proposed it because he stated that the sun was

|  |  |  |  |
| --- | --- | --- | --- |
| a. | the center of the solar system. | c. | a source of energy. |
| b. | an average star. | d. | about 93 million miles away. |

\_\_\_\_ 15. The first scientist to explain why planets orbit the sun was

|  |  |  |  |
| --- | --- | --- | --- |
| a. | Newton. | c. | Copernicus. |
| b. | Galileo. | d. | Kepler. |

\_\_\_\_ 16. The vernal equinox is used to establish a star’s

|  |  |  |  |
| --- | --- | --- | --- |
| a. | zenith. | c. | declination. |
| b. | distance from Earth. | d. | right ascension. |

\_\_\_\_ 17. The calendar used most widely today was first developed by the

|  |  |  |  |
| --- | --- | --- | --- |
| a. | Arabs. | c. | Chinese. |
| b. | Romans. | d. | Mayans. |

\_\_\_\_ 18. An X-ray telescope is NOT used on Earth because X rays are

|  |  |
| --- | --- |
| a. | blocked by the Earth’s atmosphere. |
| b. | destroyed by the Earth’s magnetic field. |
| c. | very dangerous to humans. |
| d. | distorted by the Earth’s winds. |

\_\_\_\_ 19. The time required for the Earth to orbit the sun once is called a

|  |  |  |  |
| --- | --- | --- | --- |
| a. | day. | c. | month. |
| b. | week. | d. | year. |

\_\_\_\_ 20. Most calendars organize time within a single unit called a

|  |  |  |  |
| --- | --- | --- | --- |
| a. | day. | c. | month. |
| b. | week. | d. | year. |

\_\_\_\_ 21. A \_\_\_\_ is roughly the amount of time required for the moon to orbit the Earth once.

|  |  |  |  |
| --- | --- | --- | --- |
| a. | day | c. | month |
| b. | week | d. | year |

\_\_\_\_ 22. Ancient \_\_\_\_ cultures had a very complex calendar system that linked cycles of the sun, the moon, and Venus.

|  |  |  |  |
| --- | --- | --- | --- |
| a. | Mayan | c. | Chinese |
| b. | Egyptian | d. | Hebrew |

\_\_\_\_ 23. Ancient \_\_\_\_ cultures based their calendar on the moon and the sun. The number of months in their calendar alternated each year between 12 and 13 months.

|  |  |  |  |
| --- | --- | --- | --- |
| a. | Chinese | c. | Mayan |
| b. | Egyptian | d. | Hebrew |

\_\_\_\_ 24. Ancient \_\_\_\_ cultures based their calendar on the sun, with twelve 30-day months and one 5-day month at the end of the year.

|  |  |  |  |
| --- | --- | --- | --- |
| a. | Hebrew | c. | Chinese |
| b. | Egyptian | d. | Mayan |

\_\_\_\_ 25. Ancient \_\_\_\_ cultures made calendars as early as the fourteenth century B.C. based on the moon's phases and positions in the sky.

|  |  |  |  |
| --- | --- | --- | --- |
| a. | Mayan | c. | Chinese |
| b. | Egyptian | d. | Hebrew |

\_\_\_\_ 26. Our modern calendar began with the early \_\_\_\_ calendar, which had exactly 365 days in a year and 7 days in a week.

|  |  |  |  |
| --- | --- | --- | --- |
| a. | Roman | c. | Hebrew |
| b. | Greek | d. | Chinese |

\_\_\_\_ 27. When astronomers determined that there are about 365.25 days in a year, Julius Caesar corrected this by

|  |  |  |  |
| --- | --- | --- | --- |
| a. | creating the Julian calendar. | c. | adding an extra day every four years. |
| b. | adding 90 days to the year 45 B.C. | d. | All of the above |

\_\_\_\_ 28. When people noticed that the Julian calendar was incorrect, astronomers then determined that there are actually 365.242 days in a year. Pope Gregory XIII solved the problem by

|  |  |
| --- | --- |
| a. | creating the Gregorian calendar. |
| b. | dropping 10 days from the year 1582. |
| c. | restricting when leap years would occur. |
| d. | All of the above |

\_\_\_\_ 29. If the Julian calendar began in 45 B.C., and the Gregorian calendar modified the Julian calendar in the year 1582, how long was the original Julian calendar used?

|  |  |  |  |
| --- | --- | --- | --- |
| a. | 1627 years | c. | 1537 years |
| b. | 1582 years | d. | 45 years |

\_\_\_\_ 30. The earliest record of astronomical observations is a 6,000 to 7,000-year-old group of stones near Nabta, in southern Egypt. Some of these stones would have lined up with the sun during the

|  |  |  |  |
| --- | --- | --- | --- |
| a. | vernal equinox. | c. | summer solstice. |
| b. | autumn equinox. | d. | winter solstice. |

\_\_\_\_ 31. The longest day of the year occurs on the day of the

|  |  |  |  |
| --- | --- | --- | --- |
| a. | vernal equinox. | c. | summer solstice. |
| b. | autumnal equinox. | d. | winter solstice. |

\_\_\_\_ 32. Some of the stones at \_\_\_\_ are aligned with the sunrise during the winter and summer solstices.

|  |  |  |  |
| --- | --- | --- | --- |
| a. | Caracól at Chichén Itzá | c. | Silbury Hill |
| b. | Stonehenge | d. | Athens |

\_\_\_\_ 33. Ancient \_\_\_\_ cultures could predict eclipses as early as 1000 B.C.

|  |  |  |  |
| --- | --- | --- | --- |
| a. | Babylonian  | c. | Greek |
| b. | Chinese | d. | Arab |

\_\_\_\_ 34. Ancient \_\_\_\_ cultures precisely tracked and could forecast the positions of the planets and the moon, which enabled them to make an accurate calendar.

|  |  |  |  |
| --- | --- | --- | --- |
| a. | Babylonian  | c. | Greek |
| b. | Arab | d. | Chinese |

\_\_\_\_ 35. Ancient \_\_\_\_ cultures tried to understand the place of Earth and humans in the universe using philosophy, logic, and mathematics.

|  |  |  |  |
| --- | --- | --- | --- |
| a. | Babylonian  | c. | Greek |
| b. | Chinese | d. | Arab |

\_\_\_\_ 36. \_\_\_\_ successfully explained why the phases of the moon and eclipses occur, and correctly argued that Earth is a sphere.

|  |  |  |  |
| --- | --- | --- | --- |
| a. | Aristotle | c. | Newton |
| b. | Copernicus | d. | Ptolemy |

\_\_\_\_ 37. Ancient \_\_\_\_ cultures had complex systems of mathematics and astronomy, which enabled them to erect buildings that aligned with celestial bodies.

|  |  |  |  |
| --- | --- | --- | --- |
| a. | Mayan | c. | Chinese |
| b. | Greek | d. | Arab |

\_\_\_\_ 38. Ancient \_\_\_\_ cultures invented the astrolabe, algebra, and the number system that we use today.

|  |  |  |  |
| --- | --- | --- | --- |
| a. | Chinese | c. | Greek |
| b. | Babylonian | d. | Arab |

\_\_\_\_ 39. Although \_\_\_\_ incorrectly thought that the Earth is at the center of the universe, his theory predicted the motions of the planets better than any known method at that time.

|  |  |  |  |
| --- | --- | --- | --- |
| a. | Claudius Ptolemy | c. | Tycho Brahe |
| b. | Nicolaus Copernicus | d. | Johannes Kepler |

\_\_\_\_ 40. \_\_\_\_ was the first to publish a theory that eventually revolutionized astronomy—that the sun is at the center of the universe and the planets orbit the sun.

|  |  |  |  |
| --- | --- | --- | --- |
| a. | Aristotle | c. | Tycho Brahe |
| b. | Nicolaus Copernicus | d. | Isaac Newton |

\_\_\_\_ 41. \_\_\_\_ recorded very precise observations of the planets and stars using a mural quadrant.

|  |  |  |  |
| --- | --- | --- | --- |
| a. | Galileo Galilei | c. | Tycho Brahe |
| b. | Isaac Newton | d. | Johannes Kepler |

\_\_\_\_ 42. \_\_\_\_, Tycho Brahe's assistant, studied Tycho's data and used them to formulate the laws of planetary motion.

|  |  |  |  |
| --- | --- | --- | --- |
| a. | Isaac Newton | c. | Galileo Galilei |
| b. | Nicolaus Copernicus | d. | Johannes Kepler |

\_\_\_\_ 43. \_\_\_\_ stated that all the planets revolve around the sun in elliptical orbits and that the sun is not in the exact center of the orbits.

|  |  |  |  |
| --- | --- | --- | --- |
| a. | Isaac Newton | c. | Johannes Kepler |
| b. | Tycho Brahe | d. | Galileo Galilei |

\_\_\_\_ 44. \_\_\_\_ explained why moons orbit planets—gravity.

|  |  |  |  |
| --- | --- | --- | --- |
| a. | Isaac Newton | c. | Johannes Kepler |
| b. | Nicolaus Copernicus | d. | Tycho Brahe |

\_\_\_\_ 45. \_\_\_\_ was the first person to see craters and mountains on the moon and sunspots on the sun.

|  |  |  |  |
| --- | --- | --- | --- |
| a. | Tycho Brahe | c. | Johannes Kepler |
| b. | Galileo Galilei | d. | Isaac Newton |

\_\_\_\_ 46. \_\_\_\_ discovered the phases of Venus and four moons orbiting Jupiter.

|  |  |  |  |
| --- | --- | --- | --- |
| a. | Isaac Newton | c. | Galileo Galilei |
| b. | Johannes Kepler | d. | Tycho Brahe |

\_\_\_\_ 47. Why do the constellations change from season to season?

|  |  |  |  |
| --- | --- | --- | --- |
| a. | because the stars are moving | c. | because Earth orbits the sun |
| b. | because Earth rotates on its axis | d. | all of the above |

\_\_\_\_ 48. A(n) \_\_\_\_ shows some of the constellations during each season and can be used to observe constellations in the night sky.

|  |  |  |  |
| --- | --- | --- | --- |
| a. | mural quadrant | c. | astrolabe |
| b. | sky map | d. | cross staff |

\_\_\_\_ 49. In astronomy, \_\_\_\_ is the angle between an object in the sky and the horizon.

|  |  |  |  |
| --- | --- | --- | --- |
| a. | zenith | c. | declination |
| b. | altitude | d. | right ascension |

\_\_\_\_ 50. Which of the following always has an altitude of 90°?

|  |  |  |  |
| --- | --- | --- | --- |
| a. | horizon | c. | declination |
| b. | zenith | d. | right ascension |

\_\_\_\_ 51. The \_\_\_\_ is an imaginary point in the sky directly above an observer on Earth.

|  |  |  |  |
| --- | --- | --- | --- |
| a. | zenith | c. | declination |
| b. | altitude | d. | right ascension |

\_\_\_\_ 52. The \_\_\_\_ is the line where the sky and the Earth appear to meet.

|  |  |  |  |
| --- | --- | --- | --- |
| a. | declination | c. | horizon |
| b. | zenith | d. | right ascension |

\_\_\_\_ 53. You can measure the altitude of a star by measuring the angle between your horizon and the star using a(n)

|  |  |  |  |
| --- | --- | --- | --- |
| a. | mural quadrant. | c. | astrolabe. |
| b. | sky map. | d. | cross staff. |

\_\_\_\_ 54. Which of the following depends on where you are and when you look?

|  |  |  |  |
| --- | --- | --- | --- |
| a. | celestial sphere | c. | celestial equator |
| b. | right ascension | d. | altitude |

\_\_\_\_ 55. \_\_\_\_ is a measure of how far east an object is from the point at which the sun appears on the first day of spring.

|  |  |  |  |
| --- | --- | --- | --- |
| a. | Horizon | c. | Declination |
| b. | Right ascension | d. | Altitude |

\_\_\_\_ 56. Which of the following does NOT depend on where you are and when you look?

|  |  |  |  |
| --- | --- | --- | --- |
| a. | celestial sphere | c. | altitude |
| b. | horizon | d. | constellation positions |

\_\_\_\_ 57. The \_\_\_\_ surrounds the Earth and is what we look through when we observe the sky.

|  |  |  |  |
| --- | --- | --- | --- |
| a. | ecliptic | c. | altitude |
| b. | horizon | d. | celestial sphere |

\_\_\_\_ 58. The \_\_\_\_ is an imaginary circle created by extending the Earth's equator into space.

|  |  |  |  |
| --- | --- | --- | --- |
| a. | celestial equator | c. | right ascension |
| b. | declination | d. | celestial sphere |

\_\_\_\_ 59. \_\_\_\_ is a measure of how north or south an object is from the celestial equator.

|  |  |  |  |
| --- | --- | --- | --- |
| a. | Altitude | c. | Right ascension |
| b. | Declination | d. | Ecliptic |

\_\_\_\_ 60. The \_\_\_\_ is the apparent path the sun takes across the celestial sphere each year, as seen from Earth.

|  |  |  |  |
| --- | --- | --- | --- |
| a. | zenith | c. | altitude |
| b. | horizon | d. | ecliptic |

\_\_\_\_ 61. Which of the of the following is measured in degrees north or south of the equator?

|  |  |  |  |
| --- | --- | --- | --- |
| a. | altitude | c. | right ascension |
| b. | declination | d. | zenith |

\_\_\_\_ 62. Which of the of the following is measured in hours east of the vernal equinox?

|  |  |  |  |
| --- | --- | --- | --- |
| a. | celestial equator | c. | right ascension |
| b. | declination | d. | celestial sphere |

\_\_\_\_ 63. The point at which the sun appears on the first day of spring is called the

|  |  |  |  |
| --- | --- | --- | --- |
| a. | winter solstice. | c. | vernal equinox. |
| b. | summer solstice. | d. | autumnal equinox. |

Examine the diagram of the stars in the constellation Orion and answer the questions that follow.



\_\_\_\_ 64. Star **1** is approximately \_\_\_\_ from Earth.

|  |  |  |  |
| --- | --- | --- | --- |
| a. | 200 light years | c. | 600 light years |
| b. | 400 light years | d. | 800 light years |

\_\_\_\_ 65. Star **2** is approximately \_\_\_\_ from Earth.

|  |  |  |  |
| --- | --- | --- | --- |
| a. | 200 light years | c. | 600 light years |
| b. | 400 light years | d. | 800 light years |

\_\_\_\_ 66. The two closest stars in Orion's belt are approximately \_\_\_\_ from Earth.

|  |  |  |  |
| --- | --- | --- | --- |
| a. | 900 light years | c. | 1,200 light years |
| b. | 1,100 light years | d. | 1,300 light years |

\_\_\_\_ 67. The farthest star in Orion's belt is approximately \_\_\_\_ from Earth.

|  |  |  |  |
| --- | --- | --- | --- |
| a. | 600 light years | c. | 1,300 light years |
| b. | 800 light years | d. | 1,500 light years |

\_\_\_\_ 68. The closer stars and the farthest star in Orion's belt are about \_\_\_\_ apart.

|  |  |  |  |
| --- | --- | --- | --- |
| a. | 300 light years | c. | 500 light years |
| b. | 400 light years | d. | 600 light years |

\_\_\_\_ 69. The stars in Orion's belt appear in one line because

|  |  |  |  |
| --- | --- | --- | --- |
| a. | they are aligned in our line of sight. | c. | they are close together. |
| b. | they always lie in a straight line. | d. | they orbit one another. |

\_\_\_\_ 70. A(n) \_\_\_\_ telescope's size is limited by the objective lens.

|  |  |  |  |
| --- | --- | --- | --- |
| a. | X ray | c. | reflecting |
| b. | gamma ray | d. | refracting |

\_\_\_\_ 71. Which statement describes why most astronomers use reflecting telescopes instead of refracting telescopes?

|  |  |  |  |
| --- | --- | --- | --- |
| a. | They can be made very large. | c. | They prevent light from entering.  |
| b. | They do not distort images. | d. | all of the above |

\_\_\_\_ 72. Which place would be best for an astronomer to observe the sky and take measurements?

|  |  |  |  |
| --- | --- | --- | --- |
| a. | Los Angeles | c. | Chicago |
| b. | New York City | d. | a mountaintop |

\_\_\_\_ 73. Why do astronomers often place telescopes in dry areas?

|  |  |  |  |
| --- | --- | --- | --- |
| a. | These areas have less atmosphere. | c. | These areas have more city lights. |
| b. | These areas have less water vapor. | d. | These areas have thinner air. |

\_\_\_\_ 74. Why do astronomers often place telescopes on mountaintops?

|  |  |  |  |
| --- | --- | --- | --- |
| a. | These areas have less atmosphere. | c. | These areas have fewer city lights. |
| b. | These areas have thinner air. | d. | all of the above |

\_\_\_\_ 75. What have astronomers done to avoid light pollution, water vapor, and atmospheric interference?

|  |  |
| --- | --- |
| a. | They put telescopes in space. |
| b. | They put telescopes along coastlines. |
| c. | They turn out city lights at 10:00 P.M.  |
| d. | They change the data to account for this. |

\_\_\_\_ 76. Which of the following always has an altitude of 0°?

|  |  |  |  |
| --- | --- | --- | --- |
| a. | zenith | c. | horizon |
| b. | ecliptic | d. | right ascension |

\_\_\_\_ 77. Which telescope uses a set of lenses to gather and focus light?

|  |  |  |  |
| --- | --- | --- | --- |
| a. | refracting telescope | c. | diffracting telescope |
| b. | reflecting telescope | d. | compound telescope |

Suppose a star is located at point **X** in the diagram below. Examine the diagram and answer the questions that follow.



\_\_\_\_ 78. What does **A** represent?

|  |  |  |  |
| --- | --- | --- | --- |
| a. | celestial equator | c. | declination |
| b. | right ascension | d. | ecliptic |

\_\_\_\_ 79. What does **B** represent?

|  |  |  |  |
| --- | --- | --- | --- |
| a. | North celestial pole | c. | declination |
| b. | right ascension | d. | altitude |

\_\_\_\_ 80. What does **C** represent?

|  |  |  |  |
| --- | --- | --- | --- |
| a. | summer solstice | c. | vernal equinox |
| b. | winter solstice | d. | autumn equinox |

\_\_\_\_ 81. What does **D** represent?

|  |  |  |  |
| --- | --- | --- | --- |
| a. | declination | c. | zenith |
| b. | right ascension | d. | ecliptic |

\_\_\_\_ 82. What does **E** represent?

|  |  |  |  |
| --- | --- | --- | --- |
| a. | celestial equator | c. | zenith |
| b. | horizon | d. | altitude |

\_\_\_\_ 83. What does **F** represent?

|  |  |  |  |
| --- | --- | --- | --- |
| a. | celestial sphere | c. | zenith |
| b. | altitude | d. | horizon |

\_\_\_\_ 84. What does **G** represent?

|  |  |  |  |
| --- | --- | --- | --- |
| a. | celestial equator | c. | zenith |
| b. | North celestial pole | d. | ecliptic |

**Completion**

*Complete each sentence or statement.*

 85. Mirrors are used to focus light in a \_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_. (refracting telescope or reflecting telescope)

 86. The angular distance between a star and the horizon is the star’s \_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_. (altitude or right ascension)

 87. Each time Earth orbits the sun, another \_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_ has passed. (year or day)

 88. The \_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_ is the apparent path of the sun across the celestial sphere as seen from Earth. (celestial equator or ecliptic)

 89. Ursa Minor and Microscopium are examples of \_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_. (constellations or telescopes)

 90. \_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_ is the measure of how far north or south an object is from the celestial equator. (Right ascension or Declination)

 91. \_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_ is the study of all physical objects beyond Earth.

 92. A \_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_ is a system for organizing time.

 93. A year in which an extra day is added to the calendar is called a \_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_.

 94. \_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_ are sections of the sky that contain recognizable star patterns.

 95. A \_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_ is a unit of distance equal to the distance that light travels through space in one year.

 96. A \_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_ is an instrument that collects electromagnetic radiation from the sky and concentrates it for better observation.

 97. A \_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_ telescope uses curved mirrors to gather and focus light.

 98. The \_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_ is made of all of the wavelengths of electromagnetic radiation.

 99. In 1852, James Clerk Maxwell showed that visible light is a form of electromagnetic \_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_.

 100. We sense \_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_ radiation as heat.

**Short Answer**

For each set of terms, explain the similarities and differences in their meanings.

 101. right ascension/declination

 102. X rays/microwaves

 103. celestial equator/horizon

 104. reflecting telescope/refracting telescope

 105. leap year/light-year

 106. Which ancient civilization's calendar gave rise to our modern calendar?

 107. a. What advantage did Galileo have over the astronomers that went before him?

b. How did it help him?

 108. a. Is Copernicus's theory completely correct? Why or why not?

b. How does his theory relate to what we know today about the sun's position in our solar system and in the universe?

 109. a. How do constellations relate to patterns of stars?

b. How are constellations like states?

 110. How do astronomers plot a star's exact position?

 111. There are faraway objects that we can see only with telescopes. There are also objects in the universe that are too small for our unaided eyes to see. How do we detect these small objects?

 112. Name one way in which refracting telescopes and reflecting telescopes are similar and one way they are different.

 113. a. Name two ways the atmosphere limits what astronomers can detect.

b. What single method do astronomers use to solve both problems?

 114.

a. Make two lists—one for electromagnetic wavelengths that commonly penetrate Earth's atmosphere and one for other wavelengths.

b. Which wavelengths can astronomers detect from Earth?

c. How do astronomers detect each wavelength?

 115. What are most calendars based on?

 116. What was Copernicus's theory about the structure of the universe?

 117. How did Newton's theories explain why planets orbit the sun and why moons orbit planets?

 118. What is the celestial equator?

 119. What is a circumpolar star?

 120. How did Edwin Hubble's discovery that the Andromeda galaxy was far away and outside of our own galaxy contribute to astronomers' knowledge about the size of the universe?

 121. What limits the size and magnification of a refracting telescope?

 122. What is the advantage of linking radio telescopes?

 123. Explain how right ascension and declination are similar to latitude and longitude.

 124. How does a reflecting telescope work?

 125. Use the following terms to create a concept map: *celestial sphere, hours, celestial equator, declination, degrees, vernal equinox, right ascension.*

 126. Why is it easier for people in ancient cultures to see celestial objects in the sky than it is for most people today?

 127. Many forms of radiation do not penetrate Earth's atmosphere. While this limits astronomer's activities, how does it benefit humans in general?

 128. How many kilometers away is an object whose distance is 8 light-years?

Examine the sky map below, and answer the questions that follow. (Hint: the star Aldebaran is located at about 4 hr 30 min right ascension, 16 degrees declination.)



 129. What object is located at 5 hr 55 min, right ascension, and 7 degrees declination?

 130. What are the celestial coordinates for the Andromeda galaxy (M31)? (Round off right ascension to the nearest half-hour.)

 131. How do modern-day astronomers use the constellations?

 132. What was the major error in Ptolemy’s theory about the structure of the universe?

 133. The celestial sphere is divided into 24 equal north-south lines called hour lines. How many degrees does the space between two adjacent hour lines represent? Show your work.

(Hint: A sphere is 360º.)

 134. Use the following terms to complete the concept map below: *Earth, moon, month, revolution, rotation, year.*



 135. If you were trying to describe a star’s position in the sky to a friend living in a different country, would you use declination and right ascension or altitude? Explain your answer.

 136. Examine the picture below, which shows a person looking at the night sky. Then answer the question that follows.



Explain what would happen to the altitude of the North Star and star B as the night progresses.