Chapter 02 - A Users Guide to the Sky

True / False

1. The constellations are an ancient heritage handed down for thousands of years as ways to tell stories of mythical heroes and monsters.
   a. True
   b. False

ANSWER: True
REFERENCES: Stars and Constellations
LEARNING OBJECTIVES: ASTR.SEED.16.2-1 - How are stars and constellations named?
OTHER: Bloom's: Remember

2. In ancient times, constellation boundaries were well defined.
   a. True
   b. False

ANSWER: False
REFERENCES: Stars and Constellations
LEARNING OBJECTIVES: ASTR.SEED.16.2-1 - How are stars and constellations named?
OTHER: Bloom's: Remember

3. The International Astronomical Union established 88 constellations that represent a defined area of the sky.
   a. True
   b. False

ANSWER: True
REFERENCES: Stars and Constellations
LEARNING OBJECTIVES: ASTR.SEED.16.2-1 - How are stars and constellations named?
OTHER: Bloom's: Remember

4. Most individual star names come from Latin and have been altered through passing centuries.
   a. True
   b. False

ANSWER: False
REFERENCES: Stars and Constellations
LEARNING OBJECTIVES: ASTR.SEED.16.2-1 - How are stars and constellations named?
OTHER: Bloom’s: Remember

5. Astronomers describe the brightness of stars using the brilliance scale.
   a. True
   b. False

ANSWER: False
REFERENCES: Stars and Constellations
LEARNING OBJECTIVES: ASTR.SEED.16.2-2 - How is the brightness of stars measured and compared?
OTHER: Bloom's: Remember

6. The scale of apparent visual magnitudes extends into negative numbers to represent the faintest objects in the sky.
   a. True

b. False

ANSWER: False
REFERENCES: Stars and Constellations
LEARNING OBJECTIVES: ASTR.SEED.16.2-2 - How is the brightness of stars measured and compared?
OTHER: Bloom's: Remember

7. Flux is a measure of the light energy from a star that hits a collecting area of one square meter in one second.
a. True
b. False

ANSWER: True
REFERENCES: Stars and Constellations
LEARNING OBJECTIVES: ASTR.SEED.16.2-2 - How is the brightness of stars measured and compared?
OTHER: Bloom's: Remember

8. The sky appears to rotate eastward around Earth each day, but that is a consequence of the westward rotation of Earth.
a. True
b. False

ANSWER: False
REFERENCES: The Sky and Celestial Motions
LEARNING OBJECTIVES: ASTR.SEED.16.2-3 - How does the sky appear to change and move in daily and annual cycles?
OTHER: Bloom's: Remember

9. Earth spins completely upright like a giant top.
a. True
b. False

ANSWER: False
REFERENCES: The Sky and Celestial Motions
LEARNING OBJECTIVES: ASTR.SEED.16.2-3 - How does the sky appear to change and move in daily and annual cycles?
OTHER: Bloom's: Remember

10. The nadir marks the point of the celestial sphere directly above your head.
a. True
b. False

ANSWER: False
REFERENCES: The Sky and Celestial Motions
LEARNING OBJECTIVES: ASTR.SEED.16.2-3 - How does the sky appear to change and move in daily and annual cycles?
OTHER: Bloom's: Remember

11. Because Earth’s axis of rotation is inclined 23.4 degrees from vertical, the Sun moves into the northern sky in the spring and into the southern sky in the fall.
a. True
b. False

ANSWER: True

REFERENCES: Sun and Planets
LEARNING OBJECTIVES: ASTR.SEED.16.2-3 - How does the sky appear to change and move in daily and annual cycles?
OTHER: Bloom's: Remember

12. The seasons are caused by Earth's orbit moving closer to or farther from the Sun.
    a. True
    b. False
ANSWER: False
REFERENCES: Sun and Planets
LEARNING OBJECTIVES: ASTR.SEED.16.2-4 - What causes seasons?
OTHER: Bloom's: Remember

Multiple Choice

13. What was the purpose of the IAU establishing 88 official constellations?
    a. To allow ancient stories of each constellation to be preserved
    b. To name all constellations the same across any culture
    c. To identify which constellation was created by which culture
    d. To define boundaries for constellations including every part of the sky
    e. To include additional, fainter stars within a constellation
ANSWER: d
REFERENCES: Stars and Constellations
LEARNING OBJECTIVES: ASTR.SEED.16.2-1 - How are stars and constellations named?
OTHER: Bloom's: Understand

14. Which is an example of an asterism?
    a. Andromeda
    b. Canis Major
    c. Ursa Major
    d. Big Dipper
    e. Pegasus
ANSWER: d
REFERENCES: Stars and Constellations
LEARNING OBJECTIVES: ASTR.SEED.16.2-1 - How are stars and constellations named?
OTHER: Bloom's: Apply

15. Which is an asterism of Pegasus?
    a. Great Square
    b. Orion
    c. Andromeda
    d. Scorpio
    e. Cassiopeia
ANSWER: a
REFERENCES: Stars and Constellations

LEARNING OBJECTIVES: ASTR.SEED.16.2-1 - How are stars and constellations named?
OTHER: Bloom's: Understand

16. What is an asterism?
    a. A legend or folklore association to a grouping of stars
    b. Less formally defined group of stars outside the official 88 constellations
    c. The council of astronomers who defined the 88 constellations
    d. The northern pivot point of the celestial sphere
    e. Constellations close enough to a celestial pole that they do not appear to rise from the east and set in the west

ANSWER: b
REFERENCES: Stars and Constellations
LEARNING OBJECTIVES: ASTR.SEED.16.2-1 - How are stars and constellations named?
OTHER: Bloom's: Understand

17. What did the IAU establish in 1928?
    a. The IAU classified Pluto as a dwarf planet.
    b. The IAU published official names of all constellations.
    c. The IAU recorded 88 constellations with defined boundaries.
    d. The IAU recognized additional orbiting bodies in the Kuiper Belt.
    e. The IAU recorded all the mythologies associated with 88 constellations.

ANSWER: c
REFERENCES: Stars and Constellations
LEARNING OBJECTIVES: ASTR.SEED.16.2-1 - How are stars and constellations named?
OTHER: Bloom's: Understand

18. From which language did the majority of star names originate?
    a. Arabic
    b. Latin
    c. Greek
    d. Spanish
    e. Italian

ANSWER: a
REFERENCES: Stars and Constellations
LEARNING OBJECTIVES: ASTR.SEED.16.2-1 - How are stars and constellations named?
OTHER: Bloom's: Understand

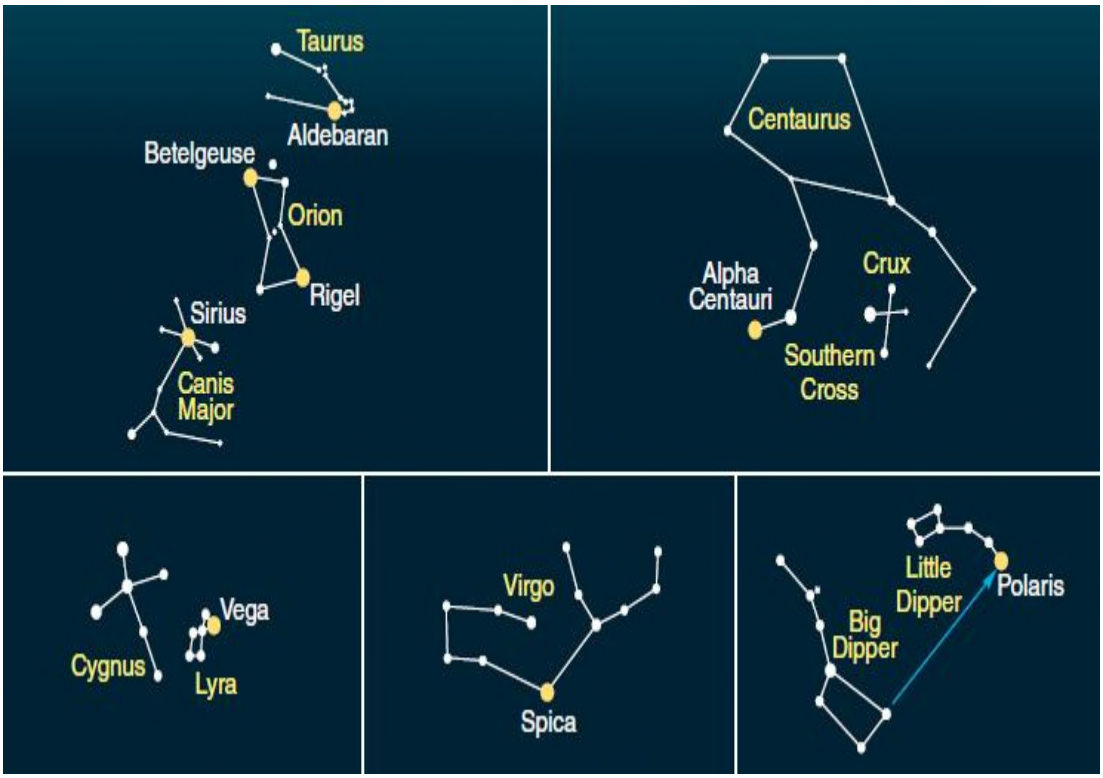


Figure 2-5

19. Examine the accompanying figure. Which term would be the correct scientific designation for Polaris in Ursa Minoris?

a. North Star
b. α Ursa Major
c. -0.3 Ursa Minoris
d. α Ursae Minoris
e. β Ursae Minoris

ANSWER: d
REFERENCES: Stars and Constellations
PREFACE NAME: Figure 2-5
LEARNING OBJECTIVES: ASTR.SEED.16.2-1 - How are stars and constellations named?
OTHER: Bloom's: Understand

20. Which ancient astronomer recorded the magnitude of stars in his star catalog and was used successfully by astronomers for generations?

a. Ptolemy
b. Copernicus
c. Galileo
d. Kepler
e. Aristotle

ANSWER: a
REFERENCES: Stars and Constellations
LEARNING OBJECTIVES: ASTR.SEED.16.2-2 - How is the brightness of stars measured and compared?
OTHER: Bloom's: Understand

21. If two stars have a magnitude difference of 5, what is their flux ratio?
    a. 10.0
    b. 12.6
    c. 100.0
    d. 250.0
    e. 625.3

ANSWER: c
REFERENCES: Stars and Constellations
LEARNING OBJECTIVES: ASTR.SEED.16.2-2 - How is the brightness of stars measured and compared?
OTHER: Bloom's: Apply

22. Betelgeuse is the brightest star of which constellation?
    a. Orion
    b. Ursa Minor
    c. Ursa Major
    d. Southern Cross
    e. Cassiopeia

ANSWER: a
REFERENCES: Stars and Constellations
LEARNING OBJECTIVES: ASTR.SEED.16.2-2 - How is the brightness of stars measured and compared?
OTHER: Bloom's: Remember

23. When can Sirius, a favorite star of the Northern Hemisphere, be observed?
    a. during summer
    b. during spring
    c. all year long
    d. during winter
    e. during fall

ANSWER: d
REFERENCES: Stars and Constellations
LEARNING OBJECTIVES: ASTR.SEED.16.2-2 - How is the brightness of stars measured and compared?
OTHER: Bloom's: Understand

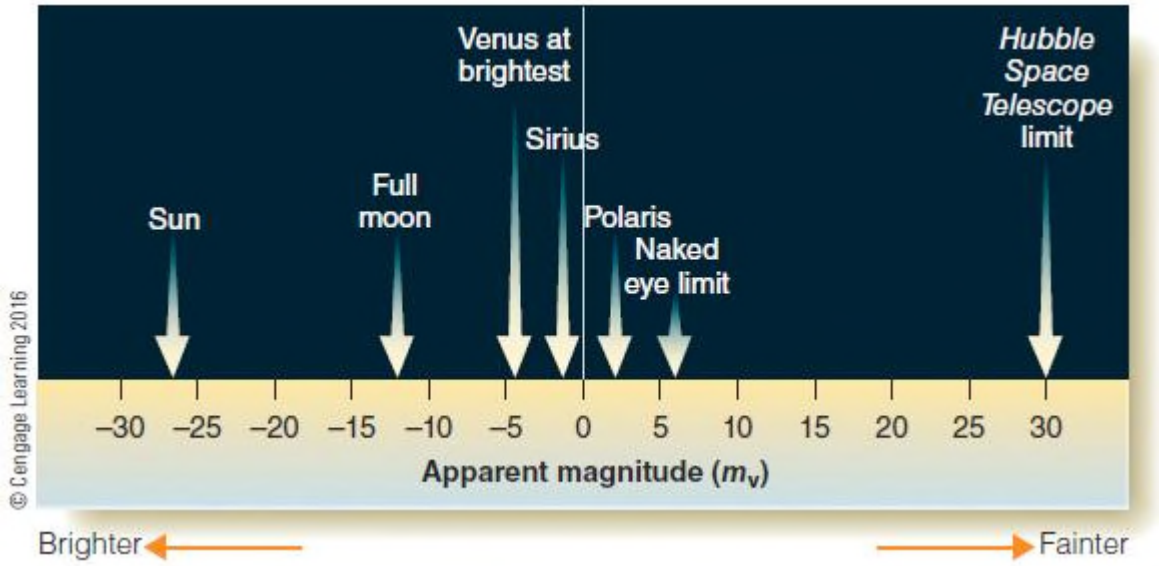


Figure 2-6

24. The star Vega has a magnitude of 0.03. Using the accompanying figure, which object is brighter than Vega?
    a. Sun
    b. Venus
    c. Sirius
    d. Polaris
    e. full moon

ANSWER: d
REFERENCES: Stars and Constellations
PREFACE NAME: Figure 2-6
LEARNING OBJECTIVES: ASTR.SEED.16.2-2 - How is the brightness of stars measured and compared?
OTHER: Bloom's: Apply

25. What is the flux ratio of two stars whose difference in magnitude is 2.6?
    a. 6.3
    b. 10.8
    c. 21.3
    d. 632
    e. 1090

ANSWER: b
REFERENCES: Stars and Constellations
LEARNING OBJECTIVES: ASTR.SEED.16.2-2 - How is the brightness of stars measured and compared?
OTHER: Bloom's: Apply

26. If star A is 14.5 times brighter than star B, then what is their magnitude difference?
    a. 1.2
    b. 2.9
    c. 63.1
    d. 800

e. 6.2×10^5

ANSWER: b
REFERENCES: Stars and Constellations
LEARNING OBJECTIVES: ASTR.SEED.16.2-2 - How is the brightness of stars measured and compared?
OTHER: Bloom's: Apply

27. Even though modern astronomers know that stars are scattered through space at different distances, they still use what scientific model to describe celestial locations in the sky?

a. apparent visual magnitude
b. Copernican revolution
c. celestial sphere
d. scientific orb
e. planetarium dome

ANSWER: c
REFERENCES: The Sky and Celestial Motions
LEARNING OBJECTIVES: ASTR.SEED.16.2-3 - How does the sky appear to change and move in daily and annual cycles?
OTHER: Bloom's: Understand

28. Which is a unit used to measure angular distance?

a. seconds
b. minutes
c. arc seconds
d. feet
e. kilometers

ANSWER: d
REFERENCES: The Sky and Celestial Motions
LEARNING OBJECTIVES: ASTR.SEED.16.2-3 - How does the sky appear to change and move in daily and annual cycles?
OTHER: Bloom's: Understand

29. Why is the term "arc" used to describe units of measure for angular distance?

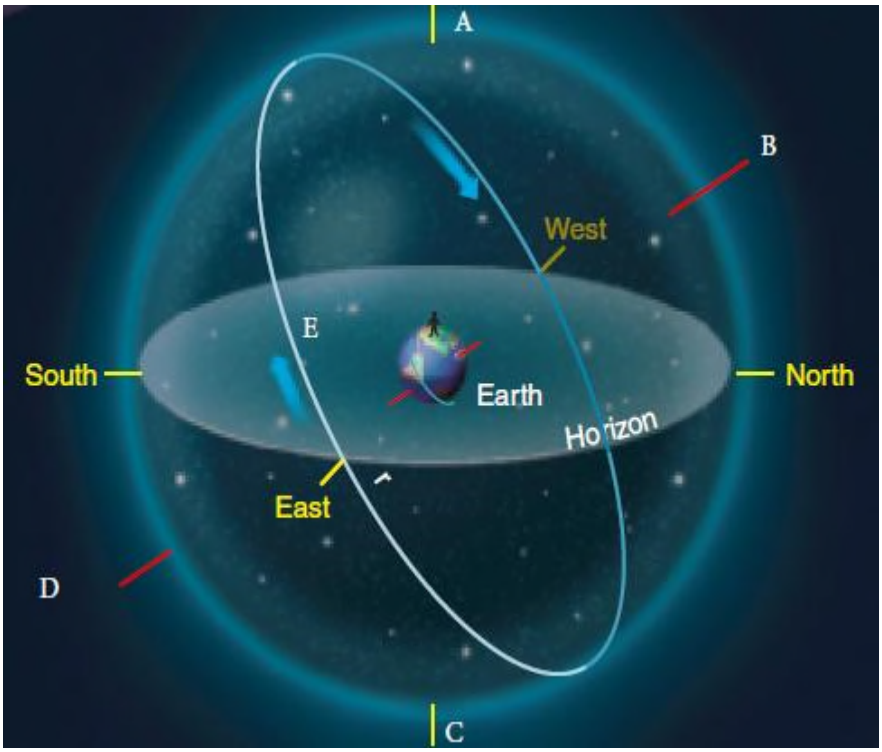
a. To avoid confusion with the minutes and seconds of time
b. To describe the arc-shaped distance between the stars
c. To distinguish the base unit of 10 per degree
d. To distinguish the difference between northern and southern spheres
e. To describe the placement of the stars within each hemisphere

ANSWER: a
REFERENCES: The Sky and Celestial Motions
LEARNING OBJECTIVES: ASTR.SEED.16.2-3 - How does the sky appear to change and move in daily and annual cycles?
OTHER: Bloom's: Understand

The Sky Around You – Page 19

30. In the above image, what is the observer measuring?
    a. angle
    b. arc
    c. distance
    d. angular distance
    e. angular momentum

ANSWER:	d
REFERENCES:	he Sky and Celestial Motions
PREFACE NAME:	Page 19
LEARNING OBJECTIVES:	ASTR.SEED.16.2-3 - How does the sky appear to change and move in daily and annual cycles?
OTHER:	Bloom's: Understand



The Sky Around You – Page 18 (For the following questions)

31. Review the accompanying figure and identify point C.
    a. celestial equator
    b. north celestial pole
    c. south celestial pole
    d. zenith
    e. nadir

ANSWER: e
REFERENCES: The Sky and Celestial Motions
PREFACE NAME: Page 18
LEARNING OBJECTIVES: ASTR.SEED.16.2-3 - How does the sky appear to change and move in daily and annual cycles?
OTHER: Bloom's: Analyze

32. Review the accompanying figure and identify point B.
    a. zenith
    b. north point
    c. celestial equator
    d. south celestial pole
    e. north celestial pole

ANSWER: e
REFERENCES: The Sky and Celestial Motions
PREFACE NAME: Page 18
LEARNING OBJECTIVES: ASTR.SEED.16.2-3 - How does the sky appear to change and move in daily and annual cycles?
OTHER: Bloom's: Analyze

33. Review the accompanying figure and identify point A.
    a. south point
    b. nadir
    c. zenith
    d. north celestial pole
    e. south celestial pole

ANSWER: c
REFERENCES: The Sky and Celestial Motions
PREFACE NAME: Page 18
LEARNING OBJECTIVES: ASTR.SEED.16.2-3 - How does the sky appear to change and move in daily and annual cycles?
OTHER: Bloom's: Analyze

34. Review the accompanying figure. Where does the celestial equator always meet the horizon?
    a. at the north and south celestial poles
    b. at the north and south poles
    c. at the east and west points
    d. at the zenith and nadir
    e. at the equinox

ANSWER: c
REFERENCES: The Sky and Celestial Motions
PREFACE NAME: Page 18
LEARNING OBJECTIVES: ASTR.SEED.16.2-3 - How does the sky appear to change and move in daily and annual cycles?
OTHER: Bloom's: Analyze

35. What is the name of constellations that appear to never rise or set?
    a. polar constellations
    b. circumference constellations
    c. circular constellations
    d. celestial polar constellations
    e. circumpolar constellations

ANSWER: e
REFERENCES: The Sky and Celestial Motions
LEARNING OBJECTIVES: ASTR.SEED.16.2-3 - How does the sky appear to change and move in daily and annual cycles?
OTHER: Bloom's: Remember

36. Earth’s rotation is connected with a very slow celestial motion that can be detected only over _____
    a. centuries
    b. decades
    c. a year
    d. a few months
    e. short brief periods

ANSWER: a
REFERENCES: The Sky and Celestial Motions
LEARNING OBJECTIVES: ASTR.SEED.16.2-3 - How does the sky appear to change and move in daily and annual cycles?
OTHER: Bloom's: Understand

37. Earth's rapid rotation makes its axis sweep out the shape of a cone, like a heavy top slowing down. This motion is known as ____.
    a. momentum
    b. precession
    c. revolution
    d. precision
    e. recession

ANSWER: b
REFERENCES: The Sky and Celestial Motions
LEARNING OBJECTIVES: ASTR.SEED.16.2-3 - How does the sky appear to change and move in daily and annual cycles?
OTHER: Bloom's: Understand

38. What is the cause for the slow movement of reference marks, such as the celestial poles and equator, to move across the sky?
    a. precession
    b. evolution
    c. climate change
    d. continental drift
    e. angular revolution

ANSWER: a
REFERENCES: The Sky and Celestial Motion
LEARNING OBJECTIVES: ASTR.SEED.16.2-3 - How does the sky appear to change and move in daily and annual cycles?
OTHER: Bloom's: Understand

39. Due to the cycle of precession, in 12,000 years, which star will replace Polaris as the guiding North Star?
    a. Betelgeuse
    b. Sirius
    c. Vega
    d. Rigel
    e. Spica

ANSWER: c
REFERENCES: The Sky and Celestial Motions
LEARNING OBJECTIVES: ASTR.SEED.16.2-3 - How does the sky appear to change and move in daily and annual cycles?
OTHER: Bloom's: Remember

40. Within the Northern Hemisphere, the vernal equinox marks the start of ____.
    a. winter

b. fall
c. summer
d. spring
e. a new year

ANSWER: d
REFERENCES: Sun and Planets
LEARNING OBJECTIVES: ASTR.SEED.16.2-4 - What causes seasons?
OTHER: Bloom's: Understand

41. Day and night cycles are caused by the ____ of Earth.
a. revolution
b. location
c. axis tilt
d. rotation
e. boundaries

ANSWER: d
REFERENCES: Sun and Planets
LEARNING OBJECTIVES: ASTR.SEED.16.2-3 - How does the sky appear to change and move in daily and annual cycles?
OTHER: Bloom's: Understand

42. What is the apparent path of the Sun against the background of stars?
a. ecliptic
b. zenith
c. nadir
d. elliptic
e. shadow

ANSWER: a
REFERENCES: Sun and Planets
LEARNING OBJECTIVES: ASTR.SEED.16.2-3 - How does the sky appear to change and move in daily and annual cycles?
OTHER: Bloom's: Understand

43. Which planet is often called our most brilliant “morning star”?
a. Venus
b. Jupiter
c. Mars
d. Mercury
e. Saturn

ANSWER: a
REFERENCES: Sun and Planets
LEARNING OBJECTIVES: ASTR.SEED.16.2-4 - What causes seasons?
OTHER: Bloom's: Remember

44. If Earth rotated about its axis completely upright, what would we fail to experience?

a. holidays
b. seasons
c. weather
d. day and night
e. a 365 day year

ANSWER: b
REFERENCES: Sun and Planets
LEARNING OBJECTIVES: ASTR.SEED.16.2-4 - What causes seasons?
OTHER: Bloom's: Understand

45. What date is the autumnal equinox for the Southern hemisphere?
a. December 21
b. September 22
c. June 22
d. March 20
e. December 25

ANSWER: d
REFERENCES: Sun and Planets
LEARNING OBJECTIVES: ASTR.SEED.16.2-4 - What causes seasons?
OTHER: Bloom's: Understand

46. During which event does the Sun reach its most southern point in the celestial sphere within the Northern hemisphere?
a. nadir
b. summer solstice
c. vernal equinox
d. autumnal equinox
e. winter solstice

ANSWER: e
REFERENCES: Sun and Planets
LEARNING OBJECTIVES: ASTR.SEED.16.2-4 - What causes seasons?
OTHER: Bloom's: Understand

47. The Milankovitch hypothesis suggests that the shape of Earth’s orbit, its precession, and tilted axis can influence climatic changes and thus cause _____.
a. hurricanes
b. ice ages
c. season shift
d. longer days
e. warmer weather

ANSWER: b
REFERENCES: Astronomical Influences on Earth's Climate
LEARNING OBJECTIVES: ASTR.SEED.16.2-5 - How do astronomical cycles affect Earth's climate?
OTHER: Bloom's: Understand

Matching

Match the astronomical term to its definition.

a. nadir
b. asterism
c. angular distance
d. magnitude scale
e. constellation
f. flux
g. zenith
h. angular diameter
i. ecliptic
j. celestial sphere

REFERENCES: Stars and Constellations
Sun and Planets
The Sky and Celestial Motions

LEARNING OBJECTIVES: ASTR.SEED.16.2-1 - How are stars and constellations named?
ASTR.SEED.16.2-2 - How is the brightness of stars measured and compared?
ASTR.SEED.16.2-3 - How does the sky appear to change and move in daily and annual cycles?
ASTR.SEED.16.2-4 - What causes seasons?

OTHER: Bloom's: Remember

48. the apparent path of the Sun against the background of stars
ANSWER: i

49. the measure of light energy striking one square meter per second
ANSWER: f

50. named group of stars with finite boundaries in the sky
ANSWER: e

51. provides a measurement range for the brightness of stars
ANSWER: d

52. the point of the celestial sphere directly under your feet
ANSWER: a

53. the angular distance across an object, from one edge to another
ANSWER: h

54. a less formally defined grouping of stars
ANSWER: b

55. the point of the celestial sphere directly above your head
ANSWER: g

56. a scientific model of the sky
ANSWER: j

57. the angle between two lines extending from your eye to two objects in the sky
ANSWER: c

Completion

58. In 1928, the International Astronomical Union (IAU) established _____ official constellations with carefully defined boundaries that together include every part of the sky.
ANSWER: 88
REFERENCES: Stars and Constellations
LEARNING OBJECTIVES: ASTR.SEED.16.2-1 - How are stars and constellations named?
OTHER: Bloom's: Remember

59. Astronomers use the _____ alphabet to identify the bright stars in a constellation in approximate order of brightness.
ANSWER: Greek
REFERENCES: Stars and Constellations
LEARNING OBJECTIVES: ASTR.SEED.16.2-2 - How is the brightness of stars measured and compared?
OTHER: Bloom's: Remember

60. Earth’s axis is tilted at an angle of _____ degrees.
ANSWER: 23.4
REFERENCES: Sun and Planets
LEARNING OBJECTIVES: ASTR.SEED.16.2-4 - What causes seasons?
OTHER: Bloom's: Remember

61. The eastward rotation of Earth causes the Sun, Moon, planets, and stars to move _____ in the sky.
ANSWER: westward
REFERENCES: The Sky and Celestial Motions
LEARNING OBJECTIVES: ASTR.SEED.16.2-3 - How does the sky appear to change and move in daily and annual cycles?
OTHER: Bloom's: Understand

62. Arc seconds are _____th of an arc minute.
ANSWER: 1/60
REFERENCES: The Sky and Celestial Motions
LEARNING OBJECTIVES: ASTR.SEED.16.2-3 - How does the sky appear to change and move in daily and annual cycles?
OTHER: Bloom's: Understand

63. Earth _____ once a year around the Sun.
ANSWER: revolves
REFERENCES: Sun and Planets
LEARNING OBJECTIVES: ASTR.SEED.16.2-3 - How does the sky appear to change and move in daily and annual cycles?
OTHER: Bloom's: Understand

64. The ecliptic is often called the _____ of Earth's orbit on the sky.
ANSWER: projection
REFERENCES: Sun and Planets
LEARNING OBJECTIVES: ASTR.SEED.16.2-3 - How does the sky appear to change and move in daily and annual cycles?
OTHER: Bloom's: Understand

65. On the day of the _____ in late June, Earth's Northern Hemisphere is inclined toward the Sun.
ANSWER: summer solstice
REFERENCES: Sun and Planets
LEARNING OBJECTIVES: ASTR.SEED.16.2-4 - What causes seasons?
OTHER: Bloom's: Understand

66. Astrology is an example of _____.
ANSWER: pseudoscience
REFERENCES: Sun and Planets
LEARNING OBJECTIVES: ASTR.SEED.16.2-4 - What causes seasons?
OTHER: Bloom's: Remember

67. Scientists constructed a history of ocean temperatures using deep ocean cores that convincingly matched the predictions of the _____, describing the cause of multiple ice ages on Earth.
ANSWER: Milankovitch hypothesis
REFERENCES: Astronomical Influences on Earth's Climate
LEARNING OBJECTIVES: ASTR.SEED.16.2-5 - How do astronomical cycles affect Earth's climate?
OTHER: Bloom's: Understand

Subjective Short Answer

68. Explain why it is difficult to see Mercury in the night sky.
ANSWER: Mercury stays near the ecliptic because it has an orbit inside Earth's orbit. To find Mercury, you need to look above the western horizon just after sunset or above the eastern horizon just before sunrise. However, Mercury is hard to see against the glare of the sky near the Sun, and also it is often hidden in the clouds and haze near the horizon.
REFERENCES: The Sky and Celestial Motions
LEARNING OBJECTIVES: ASTR.SEED.16.2-3 - How does the sky appear to change and move in daily and annual cycles?
OTHER: Bloom's: Apply

69. Describe the process of precession.
ANSWER: If you have ever played with a gyroscope or top, you have seen how the spinning mass resists any sudden change in the direction of its axis of rotation. The more massive the top and the more rapidly it spins, the more it resists your efforts to twist it out of position. You may recall that even the most rapidly spinning top slowly swings its axis around in a circle. The weight of the top tends to make it tip over, and this combines with its rapid rotation to make its axis sweep out the shape of a cone. That motion is precession.
REFERENCES: The Sky and Celestial Motions
LEARNING OBJECTIVES: ASTR.SEED.16.2-3 - How does the sky appear to change and move in daily and annual cycles?

OTHER: Bloom's: Understand

70. Why can someone in the United States almost always be able to observe the constellations such as Ursa Major, Cassiopeia, and Perseus?

ANSWER: These constellations are considered circumpolar constellations. From mid-northern latitude, you see a number of familiar constellations circling Polaris and never dipping below the horizon. As Earth turns and the sky appears to rotate, the pointer stars at the front of the Big Dipper (Ursa Major) always point approximately toward Polaris.

REFERENCES: The Sky and Celestial Motions

LEARNING OBJECTIVES: ASTR.SEED.16.2-3 - How does the sky appear to change and move in daily and annual cycles?

OTHER: Bloom's: Understand

71. Why do many people think stars are not in the sky during the daytime?

ANSWER: Many people, without thinking about it much, assume that stars are not in the sky during the daytime. The stars are actually there day and night; they are just invisible during the day because the sky is lit by the Sun.

REFERENCES: Stars and Constellations

LEARNING OBJECTIVES: ASTR.SEED.16.2-2 - How is the brightness of stars measured and compared?

OTHER: Bloom's: Understand

72. On the day of summer solstice, explain the position of Earth and the light received by each of the hemispheres.

ANSWER: On the day of the summer solstice in late June, Earth’s Northern Hemisphere is inclined toward the Sun, and sunlight shines almost straight down at northern latitudes. At southern latitudes, sunlight strikes the ground at an angle and spreads out. North America has warm weather, and South America has cool weather.

REFERENCES: Sun and Planets

LEARNING OBJECTIVES: ASTR.SEED.16.2-4 - What causes seasons?

OTHER: Bloom's: Understand

73. Why is Earth’s orbit often referred to be a “nearly perfect circle” and not a true ellipse?

ANSWER: Earth’s orbit is only very slightly elliptical. Around January 3, Earth is at perihelion, its closest point to the Sun, when it is only 1.7 percent closer than average. Around July 5, Earth is at aphelion, its most distant point from the Sun, when it is only 1.7 percent farther than average.

REFERENCES: Sun and Planets

LEARNING OBJECTIVES: ASTR.SEED.16.2-4 - What causes seasons?

OTHER: Bloom's: Analyze

Essay

74. Many of the ancient astronomers applied astrology alongside astronomy, but that no longer holds true for modern astronomers. Explain why astrology is no longer considered useful to the modern scientist.

ANSWER: A pseudoscience is a set of beliefs that appears to include scientific ideas but fails to follow the most basic rules of science. A key characteristic of science is that its claims can be tested and verified. Astrology is probably the best-known pseudoscience. It has been tested over and over for centuries, and it simply does not work: It has been proven beyond any reasonable doubt that there is no connection between the positions of the Sun, Moon, and planets with people’s personalities or events in their lives. Nevertheless, many people believe

in astrology despite contradictory evidence. Many pseudosciences appeal to our need to understand and control the world around us.

REFERENCES: Sun and Planets

LEARNING OBJECTIVES: ASTR.SEED.16.2-4 - What causes seasons?

OTHER: Bloom's: Analyze

75. What is the Milankovitch hypothesis and what evidence is there to support this hypothesis?

ANSWER: The Milankovitch hypothesis, which states that small changes in the shape of Earth's orbit and axis inclination, along with a subtle effect of precession, could combine to influence Earth's climate and cause ice ages.

Oceanographers drilled deep into the seafloor to collect long cores of sediment. In the laboratory, geologists could take samples from different depths in the cores and determine the age of the samples and the temperature of the oceans when they were deposited on the seafloor. From this, scientists constructed a history of ocean temperatures that convincingly matched the predictions of the Milankovitch hypothesis.

In 1997, a new study of the ages of the samples confirmed that those from the ocean floor were correctly dated. But the same study found that the ages of the Devils Hole samples were also correct. Evidently the temperatures at Devils Hole record local climate changes in the region that is now the southwestern United States. The ocean floor samples record global climate changes, and they fit well with the Milankovitch hypothesis.

REFERENCES: Astronomical Influences on Earth's Climate

LEARNING OBJECTIVES: ASTR.SEED.16.2-5 - How do astronomical cycles affect Earth's climate?

OTHER: Bloom's: Evaluate

76. Explain why we have seasons and compare/contrast the cycle of seasons for both hemispheres.

ANSWER: Because Earth's axis of rotation is inclined 23.4 degrees, the Sun moves into the northern sky in the spring and into the southern sky in the fall. This is what causes the cycle of seasons. The vernal equinox, the summer solstice, the autumnal equinox, and the winter solstice mark the beginnings of the seasons.

Both of Earth's hemispheres go through cycles of seasons because of changes in the amount of solar energy they receive at different times of the year. During the spring and summer months, the Northern Hemisphere receives direct sunlight and longer daytime hours resulting in warmer weather; whereas, the Southern Hemisphere receives indirect (angled) sunlight and shorter daytime hours resulting in cooler weather. The opposite is true during the fall and winter months where the Southern Hemisphere receives direct sunlight and longer daytime hours. Global atmospheric circulation patterns keep the Northern and Southern Hemispheres mostly isolated from each other, and they exchange little heat.

REFERENCES: Sun and Planets

LEARNING OBJECTIVES: ASTR.SEED.16.2-4 - What causes seasons?

OTHER: Bloom's: Analyze

77. Describe the magnitude scale and compare the ancient method to the current methodology used today.

ANSWER: Astronomers describe the brightness of stars using the magnitude scale, a system that first appeared in the writings of the astronomer Claudius Ptolemy about the year 140. Those early astronomers divided the stars into six classes. The brightest stars were called first-magnitude stars and the next brightest set, second-magnitude stars. The scale continued downward to sixth-magnitude stars, the faintest visible to the human eye. Thus, the larger the magnitude number, the fainter the star. This might make sense if you think of the brightest stars as first-

Chapter 02 - A Users Guide to the Sky

class stars and the faintest visible stars as sixth-class stars. Ancient astronomers could only estimate magnitudes by eye, but modern astronomers can use scientific instruments to measure the brightness of stars to high precision; so they have carefully redefined the magnitude scale. These numbers are known as apparent visual magnitudes (m_V) because they describe how the stars look to human eyes observing from Earth.

Student should give some comparative values of star magnitudes. (see Figure 2-6)

REFERENCES: Stars and Constellations

LEARNING OBJECTIVES: ASTR.SEED.16.2-2 - How is the brightness of stars measured and compared?

OTHER: Bloom's: Analyze