CHAPTER 2—A USER'S GUIDE TO THE SKY

MULTIPLE CHOICE

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.

   ANS: C PTS: 1

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.

   ANS: D PTS: 1

3. An observer at Earth's geographic north pole 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.

   ANS: C PTS: 1

4. An observer on Earth's geographic north pole would find
   a. Polaris directly overhead.
   b. Polaris 40° above the northern horizon.
   c. that the celestial equator coincides with the horizon.
   d. that the celestial equator passing directly overhead.
   e. that the ecliptic coincides with the horizon.

ANS: A PTS: 1

5. An observer on Earth's equator would find
   a. Polaris directly overhead.
   b. Polaris 40° above the northern horizon.
   c. Polaris on the northern horizon.
   d. that the celestial equator passing directly overhead.
   e. that the ecliptic coincides with the horizon.

   ANS: C PTS: 1

6. 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.

ANS: D PTS: 1

7. 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

   ANS: C PTS: 1

8. 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

   ANS: A PTS: 1

9. Most star names, such as Aldebaran and Betelgeuse, are____in origin.
   a. Latin
   b. Greek
   c. Arabic
   d. English
   e. Italian

   ANS: C PTS: 1

10. 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.

    ANS: B PTS: 1

11. The apparent visual magnitude of a star is a measure of the star's
    a. size.
    b. intensity.
    c. distance.
    d. color.
    e. temperature.

    ANS: B PTS: 1

12. 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.

ANS: C PTS: 1

13. 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 per second than HR 4374.
    d. Vega must produce more energy per second than HR 4374.
    e. Vega will appear fainter to us than HR 4374.

    ANS: D PTS: 1

14. The _____of an object can be measured in degrees.
    a. apparent brightness
    b. apparent magnitude
    c. zenith
    d. angular diameter
    e. color

    ANS: D PTS: 1

15. 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.

    ANS: A PTS: 1

16. A(n) _____is 1/60th of a degree.
    a. precession
    b. second of arc
    c. minute of arc
    d. nadir
    e. angular diameter

    ANS: C PTS: 1

17. A(n) _____is 1/60th of a minute of arc.
    a. precession
    b. second of arc
    c. degree
    d. nadir
    e. angular diameter

    ANS: B PTS: 1

18. In contrast to Ursa Major, the Big Dipper is not a(n) ____but is instead a(n) _____
    a. star; constellation.
    b. asterism; constellation.
    c. a constellation; asterism.
    d. Wrong! Both are asterisms.

e. Wrong! Both are official constellations.

ANS: C PTS: 1

19. 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.

    ANS: A PTS: 1

20. 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.

    ANS: A PTS: 1

21. 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°

    ANS: A PTS: 1

22. 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.

    ANS: C PTS: 1

23. 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°

    ANS: B PTS: 1

24. 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°

ANS: C PTS: 1

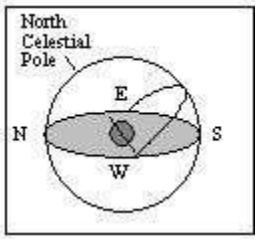
25. You live at a latitude of 39° S. What is the angle between the southern horizon and the south celestial pole?
a. 45°
b. 23.5°
c. 39°
d. 51°
e. The answer depends on the day of the year.

ANS: C PTS: 1

26. 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 cannot be determined from the information given.

ANS: C PTS: 1

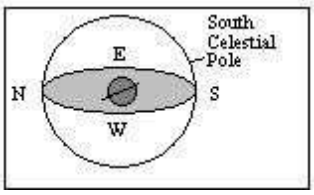
27. What is the approximate latitude of the observer in the diagram below?



a. 90° N
b. 90° S
c. 50° N
d. 50° S
e. 0°

ANS: C PTS: 1

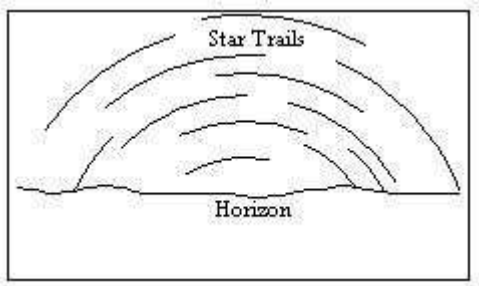
28. What is the approximate latitude of the observer in the diagram below?



a. 20° N
b. 20° S
c. 70° N
d. 70° S
e. 0°

ANS: B PTS: 1

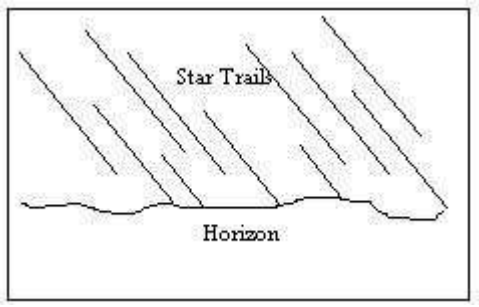
29. An observer in the Northern Hemisphere takes a time exposure photograph of the night sky. If the illustration below depicts the photograph taken by the observer, which direction was the camera pointing?



a. straight north
b. straight east
c. straight south
d. straight west
e. straight up, directly overhead

ANS: C PTS: 1

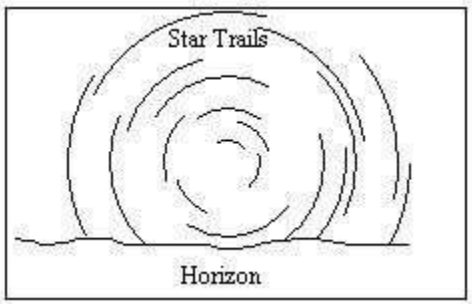
30. An observer in the Northern Hemisphere takes a time exposure photograph of the night sky. If the illustration below depicts the photograph taken by the observer, which direction was the camera pointing?



a. straight north
b. straight east
c. straight south
d. straight west
e. straight up, directly overhead

ANS: D PTS: 1

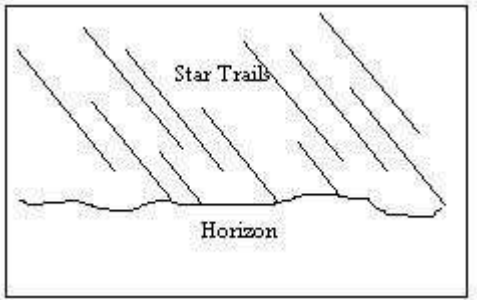
31. An observer in the Southern Hemisphere takes a time exposure photograph of the night sky. If the illustration below depicts the photograph taken by the observer, which direction was the camera pointing?



a. straight north
b. straight east
c. straight south
d. straight west
e. straight up, directly overhead

ANS: C PTS: 1

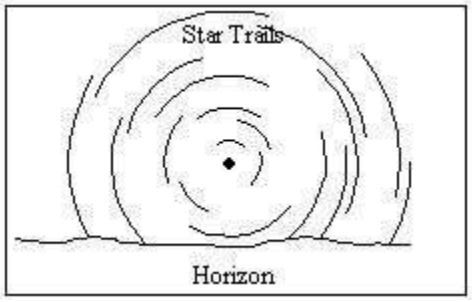
32. An observer in the Southern Hemisphere takes a time exposure photograph of the night sky. If the illustration below depicts the photograph taken by the observer, which direction was the camera pointing?



a. straight north
b. straight east
c. straight south
d. straight west
e. straight up, directly overhead

ANS: B PTS: 1

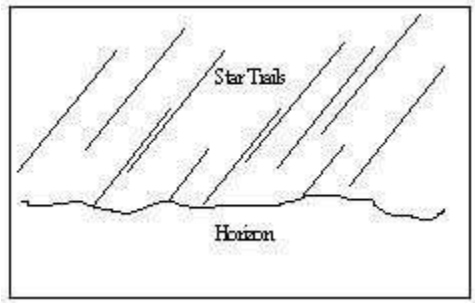
33. An observer in the Northern Hemisphere takes a time exposure photograph of the night sky. If the illustration below depicts the photograph taken by the observer, which direction was the camera pointing?



a. straight north
b. straight east
c. straight south
d. straight west
e. straight up, directly overhead

ANS: A PTS: 1

34. 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

ANS: D PTS: 1

Table 2-1

Star Name	Apparent Visual Magnitude
δ Dra	3.07
α Cet	2.53
ρ Per	3.98
Nim	8.07
α CMa	−1.46

35. Refer to Table 2-1. Which star in the table would appear the brightest to an observer on Earth?
a. α Cet
b. α CMa
c. Nim
d. ρ Per
e. δ Dra

ANS: B PTS: 1

36. 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

ANS: E PTS: 1

37. Refer to Table 2-1. Which star in the table would not be visible to the unaided eye of an observer on Earth?
a. α Cet
b. α Cma
c. Nim
d. ρ Per
e. δ Dra

ANS: C PTS: 1

38. 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

ANS: D PTS: 1

39. 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

ANS: E PTS: 1

40. Do the constellations visible in the sky at a particular time of night (say 9 P.M.) follow a seasonal pattern?
a. No, the same constellations are visible at 9 P.M. on any clear night of the year.
b. No. As the year progresses, the constellations visible at 9 P.M. are the same but their shapes change.
c. Yes, at 9 P.M. during a clear winter 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 P.M. 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.

ANS: D PTS: 1

41. 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.

ANS: B PTS: 1

42. 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

    ANS: C PTS: 1

43. 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.

    ANS: A PTS: 1

44. 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. ANS: C PTS: 1

45. 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

    ANS: C PTS: 1

46. 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

    ANS: D PTS: 1

47. 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. ANS: D PTS: 1

48. 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.

ANS: E PTS: 1

49. In one way of naming stars, a(n) _____letter indicates its brightness relative to the other stars in the constellation.
a. English
b. Arabic
c. Greek
d. Cyrillic

ANS: C PTS: 1

50. _____is the brightest star in the constellation of Ursa Majoris.
a. β Ursa Majoris
b. γ Ursa Majoris
c. α Ursa Majoris
d. Wrong! Ursa Majoris is the name of the brightest star.

ANS: C PTS: 1

51. Seen from the northern latitudes, 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.

ANS: C PTS: 1

52. 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 Neptune 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.

ANS: A PTS: 1

53. Precession of the rotation axis of Earth takes _____to complete a cycle.
a. 24 hours
b. one year
c. 260 years
d. 26,000 years
e. 260,000 years

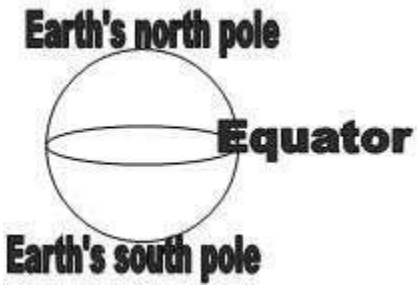
ANS: D PTS: 1

54. 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

ANS: C PTS: 1

55. A sketch of the Earth with its north and south poles and equator is shown. The zenith is located in the sky over your head if you are at



a. Earth's equator.
b. Earth's north pole.
c. Earth's south pole.
d. any of these.

ANS: D PTS: 1

56. During one day and night in the mid-northern hemisphere, the stars near the north celestial pole
a. rise in the east.
b. set in the west.
c. circle the north celestial pole counter-clockwise.
d. circle the north celestial pole clockwise.

ANS: C PTS: 1

57. As seen from the Earth's southern hemisphere, the celestial equator passes
a. north of overhead.
b. south of overhead.
c. through the north celestial pole.
d. through the south celestial pole.

ANS: A PTS: 1

58. At the Earth's north pole, the north celestial pole is directly overhead and stars near the horizon travel in straight lines
a. straight up from the horizon.
b. straight up from the horizon slanting toward the right.
c. straight up from the horizon slanting toward the left.
d. parallel to the horizon.

ANS: D PTS: 1

COMPLETION

1. _____is a measure of the light energy that hits one square meter in one second. ANS: Intensity or Flux

PTS: 1

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

   ANS: Zenith

   PTS: 1

3. 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.

   ANS: 2.5; fainter

   PTS: 1

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

   ANS: precesses

   PTS: 1

TRUE/FALSE

1. All the constellations in the sky were created by the Greeks.

   ANS: F PTS: 1

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

   ANS: T PTS: 1

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

   ANS: T PTS: 1

4. The celestial equator always passes directly overhead.

   ANS: F PTS: 1

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

   ANS: T PTS: 1

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

   ANS: T PTS: 1

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

ANS: T PTS: 1

8. 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.

   ANS: F PTS: 1

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

   ANS: F PTS: 1

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

    ANS: T PTS: 1

11. Hipparchus devised the magnitude system in the late 1700's.

    ANS: F PTS: 1

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

    ANS: F PTS: 1

ESSAY

1. 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.

   ANS:
   Answer not

   provided. PTS: 1

2. 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).

   ANS:
   Answer not

   provided. PTS: 1

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

   ANS:
   Answer not

   provided. PTS: 1

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

   ANS:
   Answer not provided.

PTS: 1

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

   ANS:
   Answer not

   provided. PTS: 1

6. How is a constellation different from an asterism?

   ANS:
   Answer not

   provided. PTS: 1

7. What causes precession and why does it “move” the celestial equator among the stars?

   ANS:
   Answer not

   provided. PTS: 1