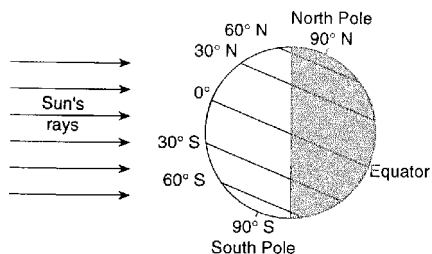


Unit 6: Astronomy Practice Problems

Name: _____

Date: _____

- The hottest climates on Earth are located near the Equator because this region
 - is usually closest to the Sun
 - reflects the greatest amount of insolation
 - receives the most hours of daylight
 - receives the most nearly perpendicular insolation
- At which latitude and on which date does the surface of Earth receive the greatest intensity of insolation?
 - the Tropic of Cancer ($23\frac{1}{2}^{\circ}$ N) on December 21
 - the Equator (0°) on September 23
 - the Antarctic Circle ($66\frac{1}{2}^{\circ}$ S) on June 21
 - the South Pole (90° S) on March 21
- The diagram below shows Earth as viewed from space on December 21.



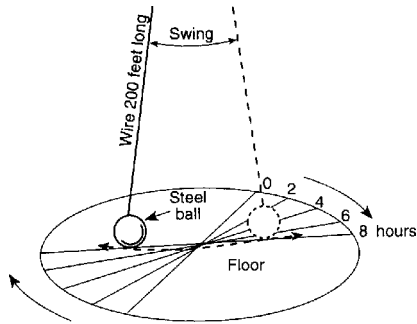
The longest duration of insolation on December 21 will occur at

- A. 90° N B. 30° N C. 30° S D. 90° S
- Which statement best explains why the angle of insolation received at any Earth location changes in a cyclic pattern throughout the year?
 - The Sun's orbit around Earth is an ellipse.
 - Earth's orbit around the Sun is an ellipse.
 - The Sun rotates on a tilted axis while revolving around Earth.
 - Earth rotates on a tilted axis while revolving around the Sun.

- On which day of the year would the intensity of insolation at Kingston, New York, most likely be greatest?

A. March 21	B. June 21
C. September 23	D. December 21
- The coldest climates on Earth are located at or near the poles primarily because Earth's polar regions
 - receive mostly low-angle insolation
 - receive less total yearly hours of daylight
 - absorb the greatest amount of insolation
 - are usually farthest from the Sun
- The deflection of planetary winds (the Coriolis effect) is a direct result of the
 - rotation of Earth
 - revolution of Earth
 - gravitational forces within Earth
 - convection currents within the asthenosphere

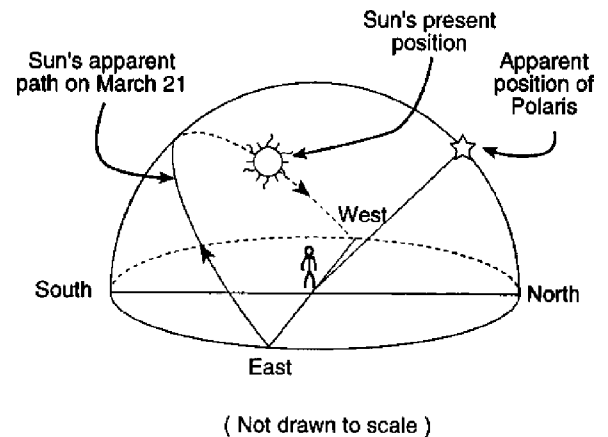
8. The diagram below represents a Foucault pendulum swinging freely for 8 hours.



The pendulum appears to change its direction of swing because of Earth's

- A. tectonic plate movement
 B. force of gravity
 C. rotation
 D. revolution
9. A Foucault pendulum appears to change its direction of swing due to the
- A. tilt of Earth's axis
 B. spin of Earth on its axis
 C. deflection of Earth's planetary winds
 D. movement of Earth in its orbit around the Sun
10. The apparent change in direction of a Foucault pendulum is caused by
- A. star motions
 B. Earth's rotation
 C. the Moon's gravitational attraction
 D. density differences within the mantle
11. The Coriolis effect provides evidence that Earth
- A. rotates
 B. has a tilted axis
 C. has seasons
 D. revolves

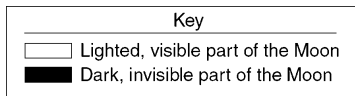
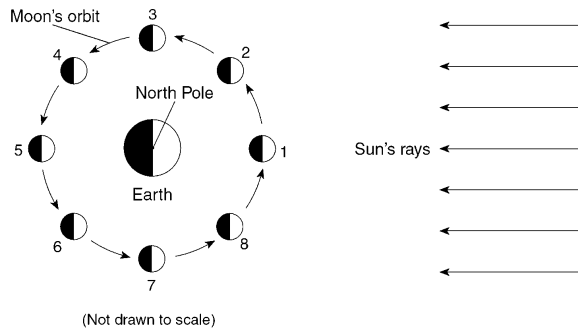
12. The Coriolis effect causes winds in New York State to generally curve
- A. to the right of the direction of travel
 B. to the left of the direction of travel
 C. upward away from Earth's surface
 D. downward toward Earth's surface
13. Planetary winds and ocean currents are deflected to the right in the Northern Hemisphere and to the left in the Southern Hemisphere due to
- A. seasonal changes
 B. plate tectonics
 C. the Doppler effect
 D. the Coriolis effect
14. Base your answer(s) to the following question(s) on the diagram below, which shows the Sun's apparent path as viewed by an observer in New York State on March 21.



State how the apparent position of Polaris is related to the latitude of the observer.

15. The North Star (Polaris) can be used for navigation in Earth's Northern Hemisphere because
- A. Polaris is located directly over the Tropic of Cancer
 B. Polaris is the brightest and most easily located star
 C. the altitude of Polaris is equal to the observer's latitude
 D. the position of Polaris changes with the seasons

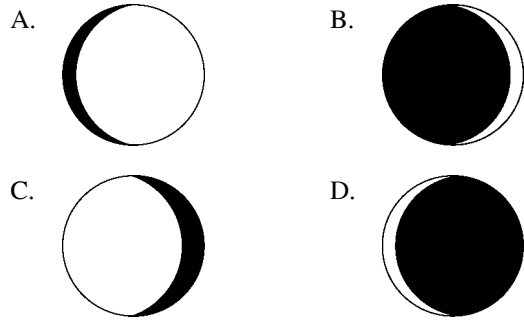
16. Base your answer(s) to the following question(s) on the diagram below, which represents the Moon orbiting Earth as viewed from space above the North Pole. The Moon is shown at eight different positions in its orbit.



The approximate time required for the Moon to move from position 3 to position 7 is

- A. 1 hour B. 2 weeks
 C. 3 months D. 4 days
17. As the Moon changes location from position 2 to position 6, the visible portion of the Moon as observed from Earth
- A. decreases, only
 B. increases, only
 C. decreases, then increases
 D. increases, then decreases
18. Which motion causes the Moon to show phases when viewed from Earth?
- A. rotation of Earth
 B. rotation of the Sun
 C. revolution of Earth
 D. revolution of the Moon

19. When the Moon is in position 2, which phase would be visible to an observer in New York State?



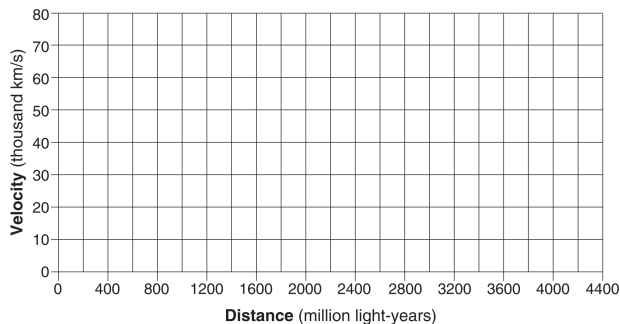
20. The time required for the Moon to show a complete cycle of phases when viewed from Earth is approximately
- A. 1 day B. 1 week
 C. 1 month D. 1 year
21. On June 21, where will the Sun appear to rise for an observer located in New York State?
- A. due west B. due east
 C. north of due east D. south of due east

22. Base your answer(s) to the following question(s) on the data table below, which shows some galaxies, their distances from Earth, and the velocities at which they are moving away from Earth.

Name of Galaxy	Distance (million light-years)	Velocity (thousand km/s)
Virgo	70	1.2
Ursa Major	1	900
Leo	1100	19
Bootes	2300	40
Hydra	3600	61

One light-year = distance light travels in one year

On the grid, use an **X** to plot the distance and velocity for each galaxy from the data table to show the relationship between each galaxy's distance from Earth and the velocity at which it is moving away from Earth. Connect the **Xs** with a smooth line.



23. State the general relationship between a galaxy's distance from Earth and the velocity at which the galaxy is moving away from Earth.
24. Another galaxy is traveling away from Earth at a velocity of 70 thousand kilometers per second. Estimate that galaxy's distance from Earth in million light-years.

25. The diagram below represents the bright-line spectrum for an element.



The spectrum of the same element observed in the light from a distant star is shown below.

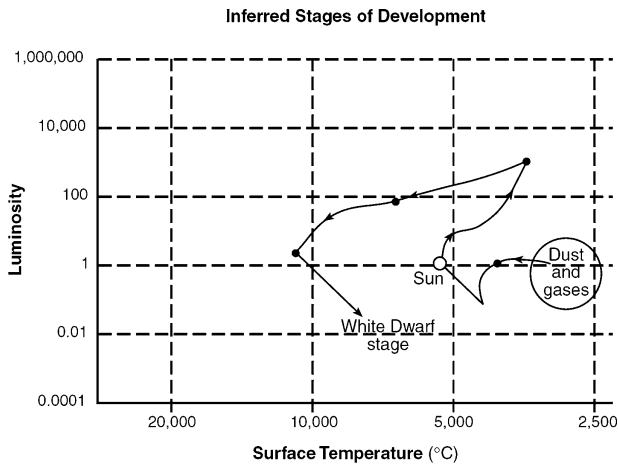


The shift in the spectral lines indicates that the star is moving

- A. toward Earth
 B. away from Earth
 C. in an elliptical orbit around the Sun
 D. in a circular orbit around the Sun
26. Which event is cyclic and predictable?
- A. a volcano erupting above a subducting tectonic plate
 B. an earthquake occurring at the San Andreas Fault
 C. Jupiter's apparent movement across the night sky
 D. an asteroid striking Earth's surface
27. To an observer on Earth, the Sun appears brighter than the star *Rigel* because the Sun is
- A. hotter than *Rigel*
 B. more luminous than *Rigel*
 C. closer than *Rigel*
 D. larger than *Rigel*
28. Which description of change is most closely associated with ocean tides and moon phases?
- A. cyclic and predictable
 B. cyclic and unpredictable
 C. noncyclic and predictable
 D. noncyclic and unpredictable

29. The cyclic rise and fall of ocean tides on Earth is primarily caused by Earth's rotation and the
- A. temperature differences in ocean currents
 - B. revolution of Earth around the Sun
 - C. direction of Earth's planetary winds
 - D. gravitational attraction of the Moon and the Sun
30. Based on the red-shift data on galaxies, most astronomers infer that the universe is currently
- A. expanding
 - B. contracting
 - C. moving randomly
 - D. fixed and stationary
31. The Milky Way galaxy is best described as
- A. a type of solar system
 - B. a constellation visible to everyone on Earth
 - C. a region in space between the orbits of Mars and Jupiter
 - D. a spiral-shaped formation composed of billions of stars
32. Compared to Earth's solar system, the universe is inferred to be
- A. younger and larger
 - B. younger and smaller
 - C. older and larger
 - D. older and smaller
33. Which information best supports the inference that the universe began with an explosion?
- A. measurements of rates of decay using carbon-14
 - B. measurements of cosmic background radiation
 - C. calculations of the distance from the Sun to each asteroid in the asteroid belt
 - D. calculations of the temperature and luminosity of stars
34. Which procedure is an example of classifying observed data?
- A. grouping stars by brightness
 - B. graphing temperature versus time for a particular date
 - C. photographing the cloud cover for a location throughout 1 week
 - D. measuring the angle of Polaris from two different locations
35. The Sun's position in space is best described as the approximate center of
- A. a constellation
 - B. the universe
 - C. the Milky Way galaxy
 - D. our solar system
36. Which star is cooler and many times brighter than Earth's Sun?
- A. *Barnard's Star*
 - B. *Betelgeuse*
 - C. *Rigel*
 - D. *Sirius*

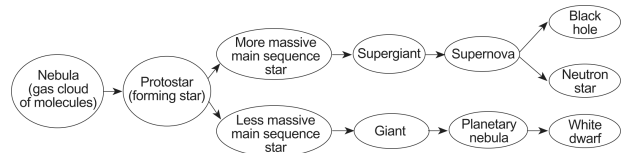
37. Base your answer(s) to the following question(s) on the graph below and on the “Luminosity and Temperature of Stars” graph in the *Earth Science Reference Tables*. The graph below shows the inferred stages of development of the Sun, showing luminosity and surface temperature at various stages.



Describe the changes in luminosity of the Sun that will occur from its current Main Sequence stage to its final White Dwarf stage.

38. Which star shown on the “Luminosity and Temperature of Stars” graph in the *Earth Science Reference Tables* is currently at the Sun’s final predicted stage of development?
39. Which two stars have the most similar luminosity and temperature?
- A. *Betelgeuse* and *Barnard’s Star*
 B. *Rigel* and *Betelgeuse*
 C. *Alpha Centauri* and the Sun
 D. *Sirius* and *Procyon B*
40. Compared to other groups of stars, the group that has relatively low luminosities and relatively low temperatures is the
- A. Red Dwarfs B. White Dwarfs
 C. Red Giants D. Blue Supergiants

41. Which list shows stars in order of increasing temperature?
- A. *Barnard’s Star*, *Polaris*, *Sirius*, *Rigel*
 B. *Aldebaran*, *the Sun*, *Rigel*, *Procyon B*
 C. *Rigel*, *Polaris*, *Aldebaran*, *Barnard’s Star*
 D. *Procyon B*, *Alpha Centauri*, *Polaris*, *Betelgeuse*
42. Which process produces the energy that allows the stars of the universe to radiate visible light?
- A. convection B. nuclear fusion
 C. insolation D. radioactive decay
43. Which object forms by the contraction of a large sphere of gases causing the nuclear fusion of lighter elements into heavier elements?
- A. comet B. planet C. star D. moon
44. Base your answer(s) to the following question(s) on the flowchart below and on your knowledge of Earth science. The flowchart shows the evolution of stars.



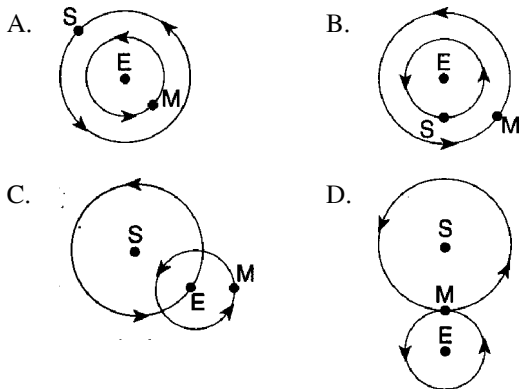
Identify the force responsible for the contraction of a nebula (a gas cloud of molecules) to form a protostar.

45. Describe how the diameter and luminosity of a main sequence star change as the star becomes either a giant or a supergiant.
46. Geologists have used information about the composition of meteorites to make inferences about Earth’s
- A. core properties
 B. atmospheric structure
 C. asthenosphere location
 D. continental-crust thickness

47. A major belt of asteroids is located between Mars and Jupiter. What is the approximate average distance between the Sun and this major asteroid belt?
- A. 110 million kilometers
 - B. 220 million kilometers
 - C. 390 million kilometers
 - D. 850 million kilometers

48. Why is the surface of Mercury covered with meteor impact craters, while Earth's surface has relatively few craters?
- A. Mercury is larger than Earth, so it gets hit with more meteors.
 - B. Mercury is an older planet, so it has a longer history of meteor impacts.
 - C. Earth's less dense water surface attracts fewer meteors.
 - D. Earth's hydrosphere and atmosphere destroyed or buried most meteor impact sites.

49. Which graph best represents a portion of the heliocentric model of the solar system? [S=Sun, E=Earth, and M=Moon.]



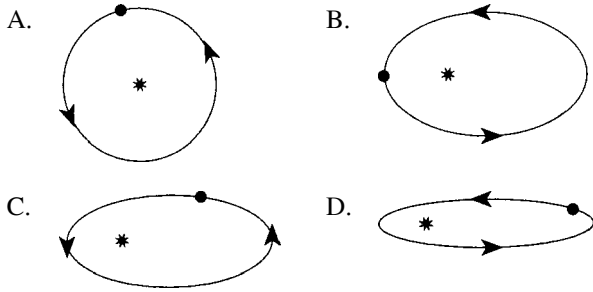
50. The planets known as "gas giants" include Jupiter, Uranus, and
- A. Pluto
 - B. Saturn
 - C. Mars
 - D. Earth

51. Base your answer(s) to the following question(s) on the *Earth Science Reference Tables* and your knowledge of Earth science.

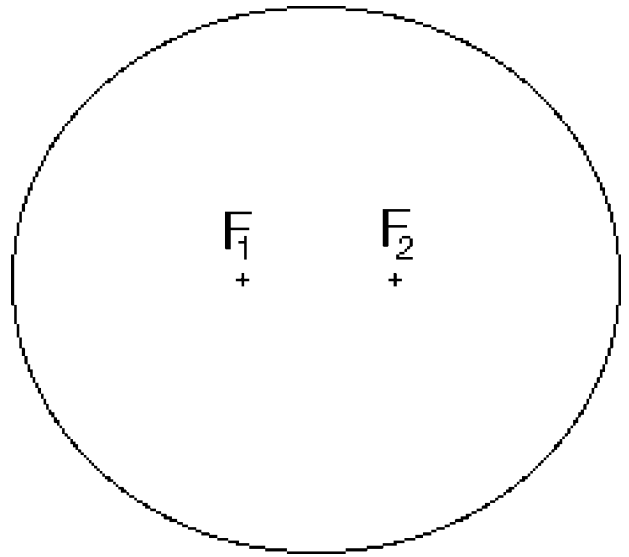
Which list shows four planets of the solar system in order from smallest to largest?

- A. Jupiter, Saturn, Uranus, Neptune
 - B. Neptune, Uranus, Saturn, Jupiter
 - C. Saturn, Jupiter, Neptune, Uranus
 - D. Uranus, Neptune, Saturn, Jupiter
52. Which object is located at one foci of the elliptical orbit of Mars?
- A. the Sun
 - B. *Betelgeuse*
 - C. Earth
 - D. Jupiter
53. Which planet would float if it could be placed in water?
- A. Mercury
 - B. Earth
 - C. Saturn
 - D. Pluto
54. Which event takes the most time?
- A. one revolution of Earth around the Sun
 - B. one revolution of Venus around the Sun
 - C. one rotation of the Moon on its axis
 - D. one rotation of Venus on its axis
55. Which object is closest to Earth?
- A. the Sun
 - B. Venus
 - C. the Moon
 - D. Mars

56. Which diagram shows a planet with the least eccentric orbit?



57. Base your answer(s) to the following question(s) on the diagram of an ellipse below.



Calculate the eccentricity of the ellipse, following the directions below.

- Write the equation used to determine eccentricity.
- Based on measurements of the diagram, substitute values into the equation.
- Calculate the eccentricity of the ellipse.

58. Which planet has an orbit with an eccentricity most similar to the eccentricity of the Moon's orbit around Earth?

- A. Earth B. Jupiter C. Pluto D. Saturn