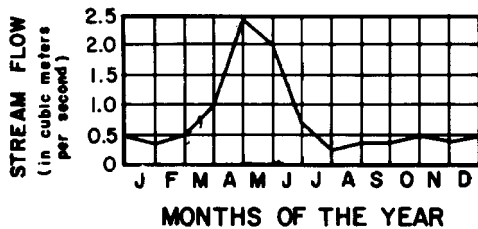


- In order to make observations, an observer must always use
 - experiments
 - the senses
 - proportions
 - mathematical calculations

- Using a ruler to measure the length of a stick is an example of
 - extending the sense of sight by using an instrument
 - calculating the percent of error by using a proportion
 - measuring the rate of change of the stick by making inferences
 - predicting the length of the stick by guessing

- Which statement made by a student after examining a rock specimen is an inference?
 - The rock is of igneous origin.
 - The rock has rounded edges.
 - The rock is light-colored.
 - The rock contains large crystals.

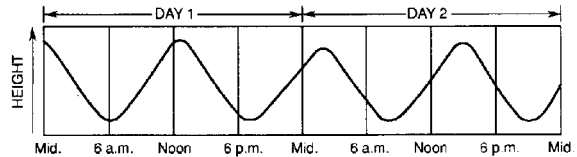
- The graph below shows the discharge measured at a point in a stream during a period of one year.



The greatest change in stream flow occurs between

- January 1 and March 1
 - March 1 and May 1
 - May 1 and July 1
 - October 1 and December 1
- Two geologic surveys of the same area, made 50 years apart, showed that the area had been uplifted 5 centimeters during the interval. If the rate of uplift remains constant, how many years will it take for this area to be uplifted a total of 70 centimeters?
 - 250 years
 - 350 years
 - 500 years
 - 700 years
 - Which factor can be predicted most accurately from day to day?
 - chance of precipitation
 - direction of the wind
 - time of an earthquake occurring
 - altitude of the Sun at noon

- The graph below shows the changes in height of ocean water over the course of 2 days at one Earth location.

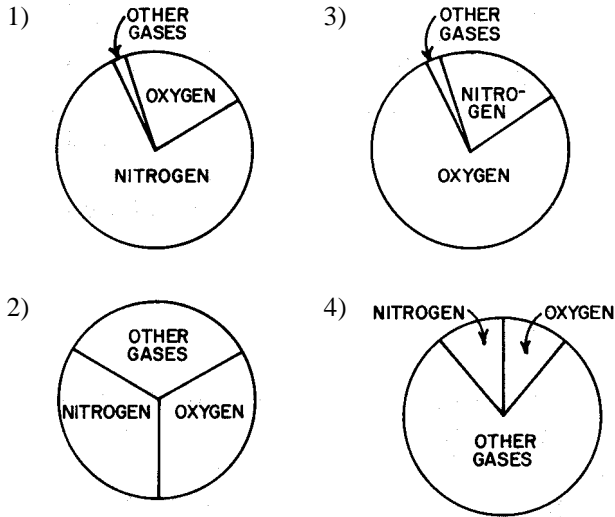


Which statement concerning these changes is best supported by the graph?

- The changes are cyclic and occur at predictable time intervals.
 - The changes are cyclic and occur at the same time every day.
 - The changes are noncyclic and occur at sunrise and sunset.
 - The changes are noncyclic and may occur at any time.
- Which diagram most accurately shows the cross-sectional shape of the Earth drawn to scale?
 -
 -
 -
 -

- Which statement most accurately describes the Earth's atmosphere?
 - The atmosphere is layered, with each layer possessing distinct characteristics.
 - The atmosphere is a shell of gases surrounding most of the Earth.
 - The atmosphere's altitude is less than the depth of the ocean.
 - The atmosphere is more dense than the hydrosphere but less dense than the lithosphere.
- As altitude within the troposphere increases, the amount of water vapor generally
 - decreases, only
 - increases, only
 - remains the same
 - decreases, then increases

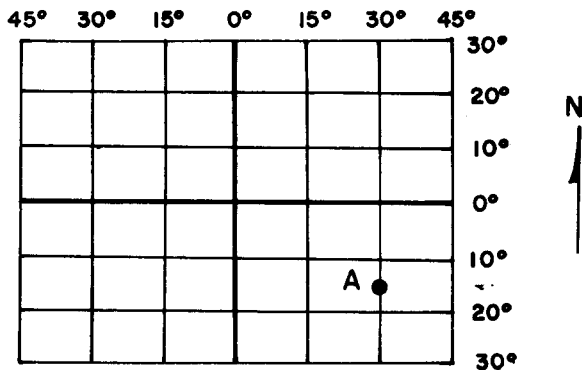
11. Which circle graph best represents the volume of gases in the troposphere?



12. At which latitude will *Polaris* be overhead?

- 1) 0°
- 2) 23 1/2°N.
- 3) 90° S.
- 4) 90° N.

13. The diagram below represents a portion of a map of the Earth's grid system. What is the approximate latitude and longitude of point A?



- 1) 15°N. 30°W.
- 2) 15°S. 30°W.
- 3) 15°N. 30°E.
- 4) 15°S. 30°E.

14. Cities located on the same meridian (longitude) must have the same

- 1) altitude
- 2) latitude
- 3) length of daylight
- 4) solar time

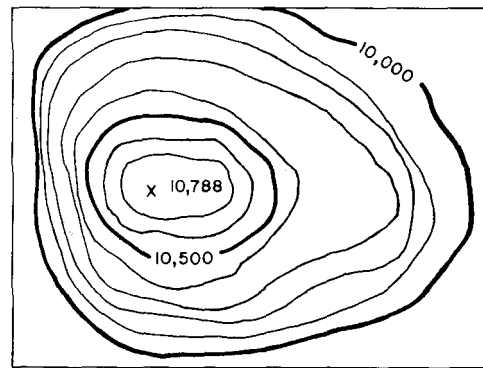
15. A stream has a source at an elevation of 1,000. meters. It ends in a lake that has an elevation of 300. meters. If the lake is 200. kilometers away from the source, what is the average gradient of the stream?

- 1) 1.5 m/km
- 2) 3.5 m/km
- 3) 10. m/km
- 4) 15 m/km

16. The time required for one Earth rotation is about

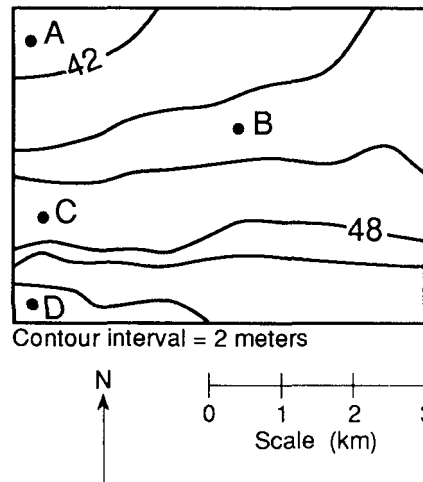
- 1) one hour
- 2) one day
- 3) one month
- 4) one year

17. What is the elevation of the highest contour line shown on the map below?



- 1) 10,000 feet
- 2) 10,688 feet
- 3) 10,700 feet
- 4) 10,788 feet

18. Base your answer to the following question on the topographic map below. A, B, C, and D are locations on the map.



Which location most likely has an elevation of 45 meters?

- 1) A
- 2) B
- 3) C
- 4) D

19. During which season in the Northern Hemisphere is the Earth closest to the Sun?

- 1) spring
- 2) summer
- 3) fall
- 4) winter

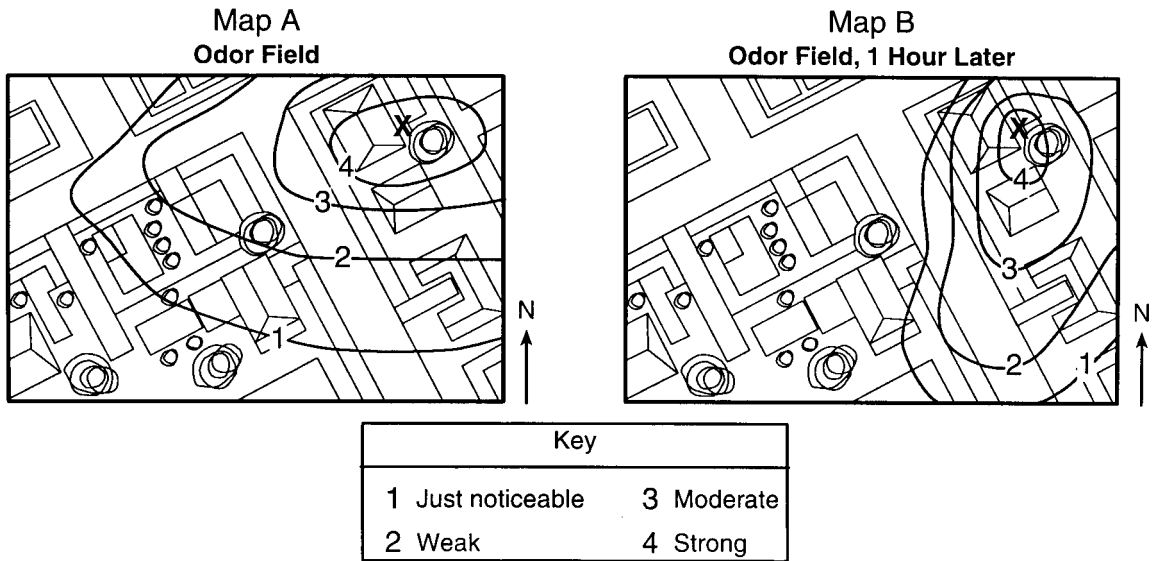
20. In New York State, how do the points of sunrise and sunset change during the course of 1 year?

- 1) They vary with each season in a cyclic manner.
- 2) They move toward the north in the autumn months.
- 3) They move toward the south in the spring months.
- 4) They remain the same during the four seasons.

21. The planetary winds in Earth's Northern Hemisphere generally curve to the right due to Earth's

- 1) orbit around the Sun
- 2) spin on its axis
- 3) magnetic field
- 4) force of gravity

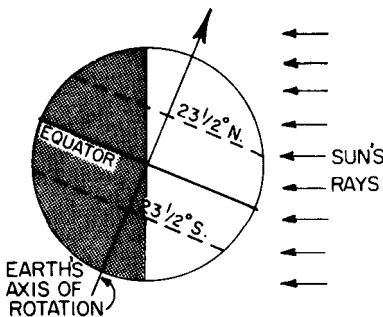
22. The maps below show the odor fields from a neighborhood hamburger barbecue. An *X* marks the exact location of the barbecue grill. The wind was blowing from the northeast when map *A* was drawn. Map *B* represents the same area drawn 1 hour after map *A* was drawn.



Which conclusion about what happened during the hour is best supported by comparing these two maps?

- 1) The field values changed at many places.
- 2) The wind direction remained constant.
- 3) The odor became stronger in the western section of the map area.
- 4) The size of the field grew.

23. In the diagram below, the direct rays of the Sun are striking the Earth's surface at $23\frac{1}{2}^{\circ}$ N. What is the date shown in the diagram?

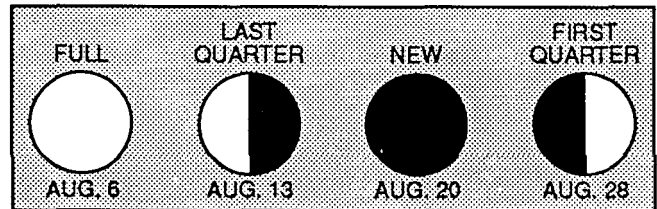


- 1) March 21
- 2) June 21
- 3) September 23
- 4) December 21

24. Which statement best explains why different phases of the Moon can be observed from the Earth?

- 1) The size of the Earth's shadow falling on the Moon changes.
- 2) The Moon moves into different parts of the Earth's shadow.
- 3) Differing amounts of the Moon's sunlit surface are seen because the Moon revolves around the Sun.
- 4) Differing amounts of the Moon's sunlit surface are seen because the Moon revolves around the Earth.

25. The diagrams below show the phases of the Moon as viewed by an observer in New York State at different times in August.



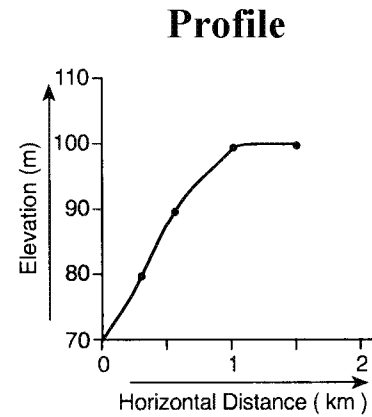
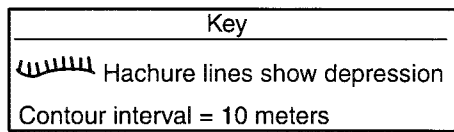
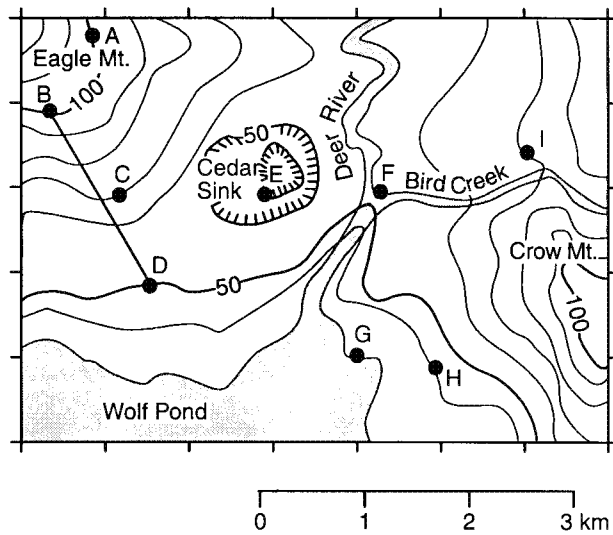
Which phase could have been observed on August 17?

- | | |
|--|--|
| <p>1) </p> <p style="text-align: center;">NEW
CRESCENT</p> | <p>3) </p> <p style="text-align: center;">OLD
GIBBOUS</p> |
| <p>2) </p> <p style="text-align: center;">NEW
MOON</p> | <p>4) </p> <p style="text-align: center;">OLD
CRESCENT</p> |

26. What is the approximate average density of the Earth?

- 1) 2.80 g/cm^3
- 2) 5.52 g/cm^3
- 3) 9.55 g/cm^3
- 4) 12.0 g/cm^3

27. Base your answer to the following question on the topographic map below. Points A through I are locations on the map. Elevations are shown in meters.



In which section of the map is the highest elevation located?

- 1) northeast 2) northwest 3) southeast 4) southwest

28. Why do stars appear to move through the night sky at the rate of 15 degrees per hour?

- 1) The Earth actually moves around the Sun at a rate of 15° per hour.
- 2) The stars actually move around the center of the galaxy at a rate of 15° per hour.
- 3) The Earth actually rotates at a rate of 15° per hour.
- 4) The stars actually revolve around the Earth at a rate of 15° per hour.

29. Based on observations made in the Northern Hemisphere, which statement is the best supporting evidence that the Earth rotates on its axis?

- 1) The stars appear to follow daily circular paths around Polaris.
- 2) The apparent solar diameter varies throughout the year.
- 3) The length of the daylight period varies throughout the year.
- 4) The seasons (spring, summer, fall, and winter) repeat in a cyclic pattern.

30. The day and the year, as units of time, are based upon motions of

- 1) the Earth 3) the Sun
- 2) the Moon 4) distant stars

31. If the distance between the Earth and the Sun were increased, which change would occur?

- 1) The apparent diameter of the Sun would decrease.
- 2) The amount of insolation received by the Earth would increase.
- 3) The time for one Earth rotation (rotation period) would double.
- 4) The time for one Earth revolution (orbital period) would decrease.

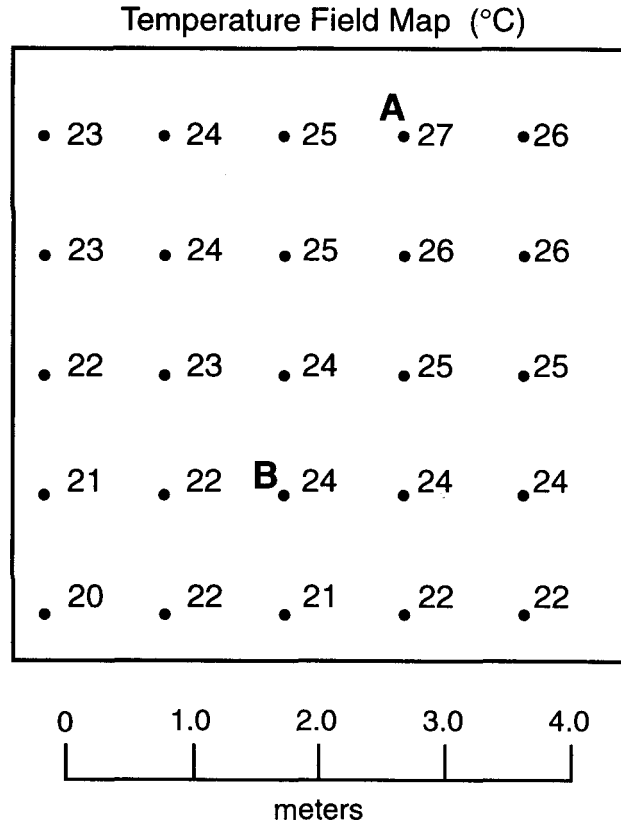
32. In 1851, the French physicist Jean Foucault constructed a large pendulum that always changed its direction of swing at the same rate in a clockwise direction. According to Foucault, this change in direction of swing was caused by the

- 1) Moon's rotation on its axis
- 2) Moon's revolution around the Earth
- 3) Earth's rotation on its axis
- 4) Earth's revolution around the Sun

33. Ocean currents exhibit the Coriolis effect as a result of the

- 1) rotation of the Earth
- 2) revolution of the Earth
- 3) unequal heating of the Earth
- 4) variations in salinity of the Earth's oceans

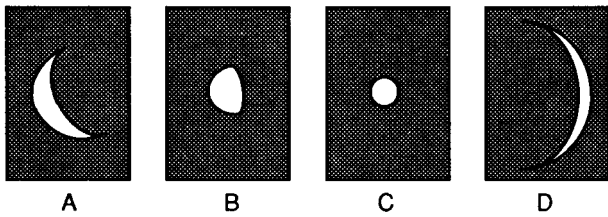
34. Base your answer to the following question on the temperature field map below. The map shows 25 measurements (in °C) that were made in a temperature field and recorded as shown. The dots represent the exact location of the measurements. *A* and *B* are locations within the field.



Calculate the temperature gradient between locations *A* and *B* on the temperature field map, following the directions below.

- a* Write the equation for the gradient.
- b* Substitute data from the map into the equation.
- c* Calculate the gradient and label it with the

35. Diagrams *A* through *D* below represent phases of a planet as seen by an observer on Earth using a telescope. The diagram is drawn to scale.



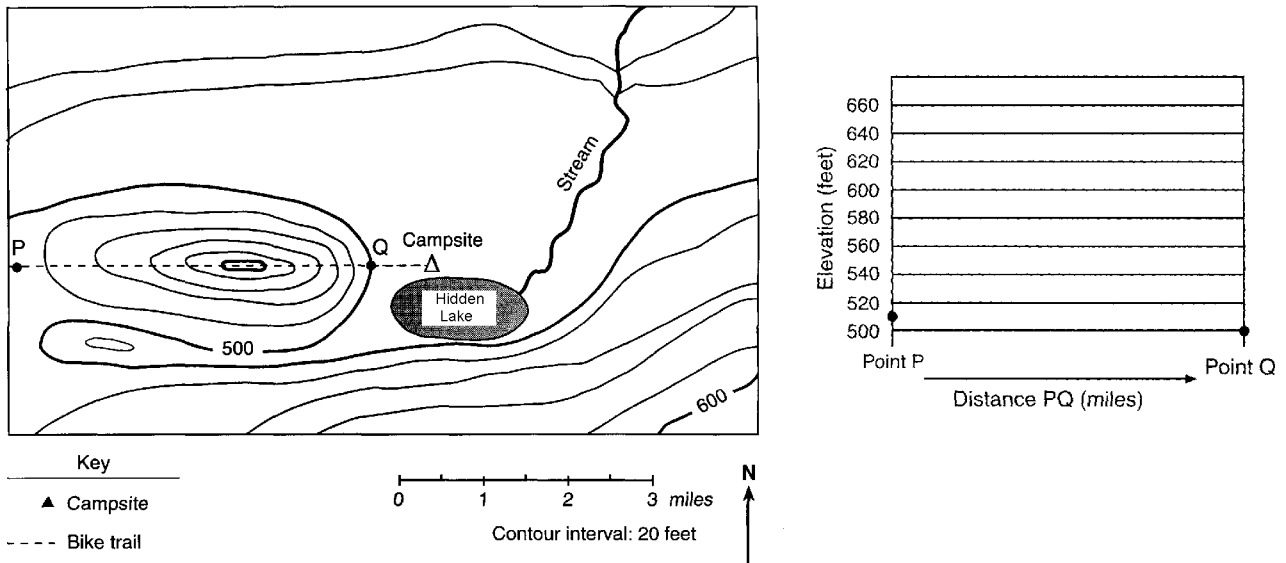
Which is the most logical conclusion about this planet?

- 1) The planet has a slower orbital velocity than the Earth.
 - 2) The planet is closest to the Earth at position *C*.
 - 3) The apparent diameter of the planet varies throughout the year.
 - 4) The planet does not rotate on its axis.
36. If the Earth's rate of rotation decreased, there would be an increase in the
- 1) length of the seasons
 - 2) Sun's angle of insolation at noon
 - 3) number of observable stars at night
 - 4) length of time for one Earth day
37. In the geocentric model (the Earth at the center of the universe), which motion would occur?
- 1) The Earth would revolve around the Sun.
 - 2) The Earth would rotate on its axis.
 - 3) The Moon would revolve around the Sun.
 - 4) The Sun would revolve around the Earth.
38. The elliptical shape of the Earth's orbit results in
- 1) changes in the orbital velocity of the Earth
 - 2) tilting of the Earth's axis
 - 3) the oblate spheroid shape of the Earth
 - 4) the phases of the Moon

39. Base your answer to the following question on the reading passage and topographic map below.

A group of Earth science students decided to take an adventurous camping trip, so they rode bicycles to a state park that was located in an isolated area. They traveled up a steep hill. When they reached the top, they looked at the landscape and noticed a lake at the bottom of the hill. They named it Hidden Lake. To the left of Hidden Lake was a large field with a small stream. They decided to set up their campsite in the field near Hidden Lake. To get to the field, they cycled down a very steep slope.

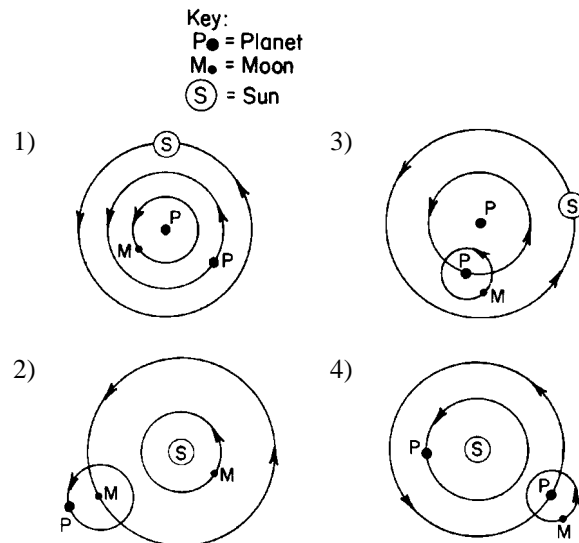
The map below shows the location of the bicycle trail and the students' campsite. Points *P* and *Q* are reference points on the map.



State the evidence shown on the map that indicates that the area directly north of Hidden Lake is relatively flat.

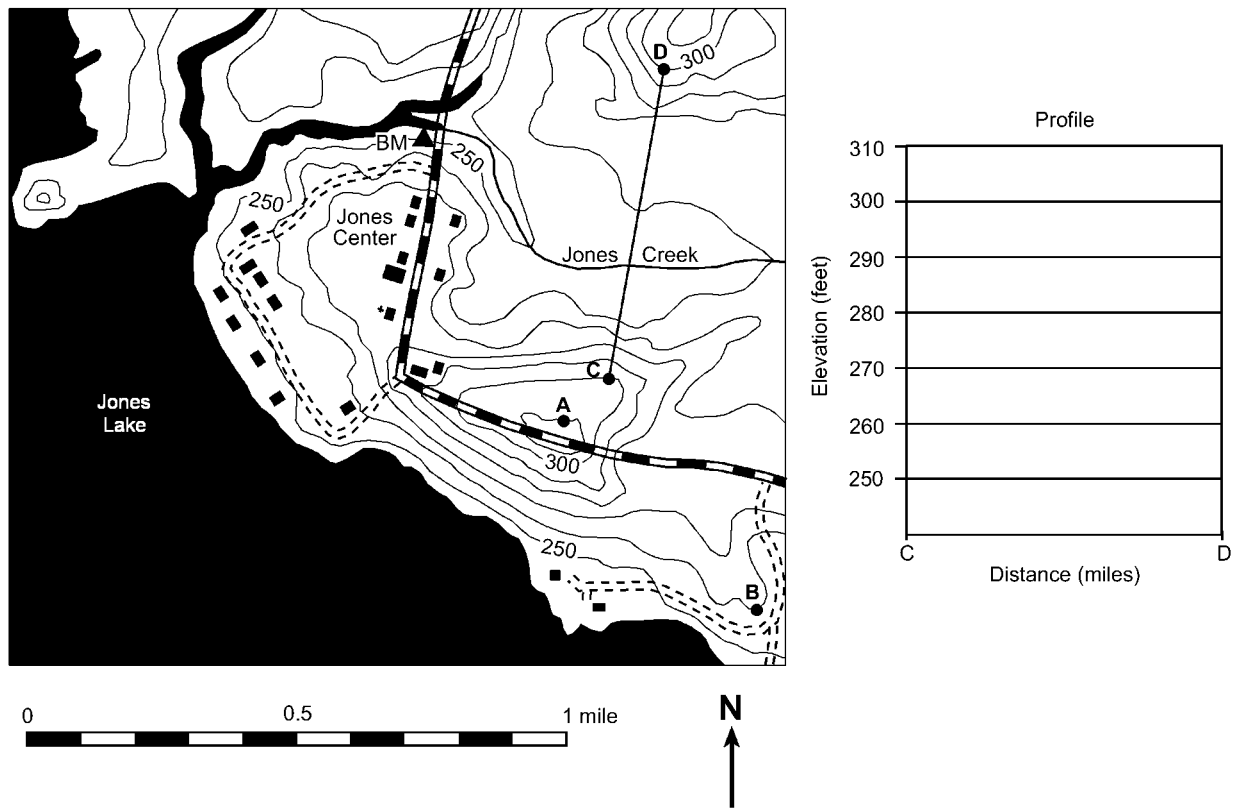
40. Which statement best describes the geocentric model of our solar system?
- 1) The Earth is located at the center of the model.
 - 2) All planets revolve around the Sun.
 - 3) The Sun is located at the center of the model.
 - 4) All planets *except* the Earth revolve around the Sun.
41. For what reason did the heliocentric model of the universe replace the geocentric model of the universe?
- 1) The geocentric model no longer predicted the positions of the constellations.
 - 2) The geocentric model did not predict the phases of the Moon.
 - 3) The heliocentric model provided a simpler explanation of the motions of the planets.
 - 4) The heliocentric model proved that the Earth rotates.
42. When the distance between the foci of an ellipse is increased, the eccentricity of the ellipse will
- 1) decrease
 - 2) increase
 - 3) remain the same

43. Which diagram best represents the motions of celestial objects in a heliocentric model?



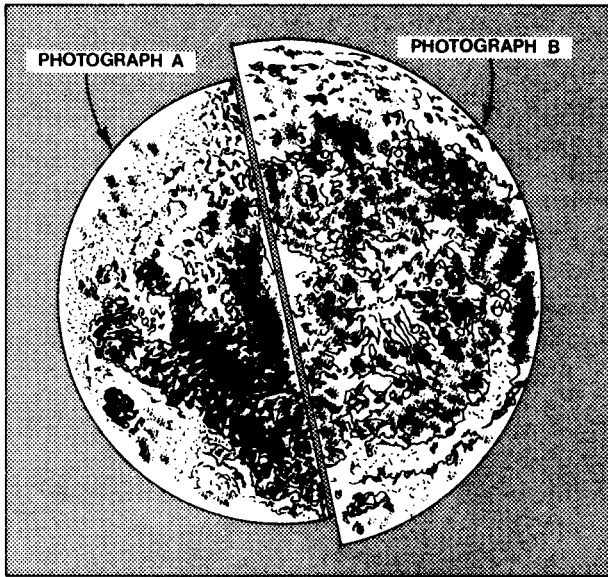
44. The force of gravity between two objects will be greatest if their masses are
- 1) small and they are far apart
 - 2) small and they are close together
 - 3) large and they are far apart
 - 4) large and they are close together

45. Base your answer to the following question on the topographic map below. Points A through D are locations on the map. Elevations are in feet.



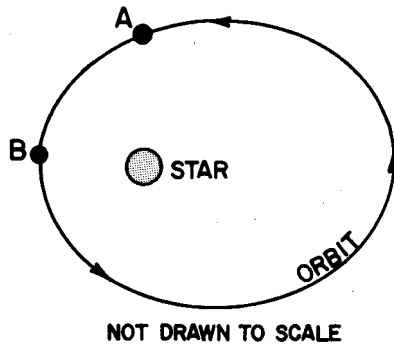
Explain briefly how the map can be used to determine that Jones Creek is flowing westward into Jones Lake.

55. The diagram below represents two photographs of the Moon, *A* and *B*, taken at full moon phase several months apart. The photographs were taken using the same magnification. Each photograph was cut in half and the halves placed next to each other.



What most likely caused the difference in the apparent size of the Moon in photographs *A* and *B*?

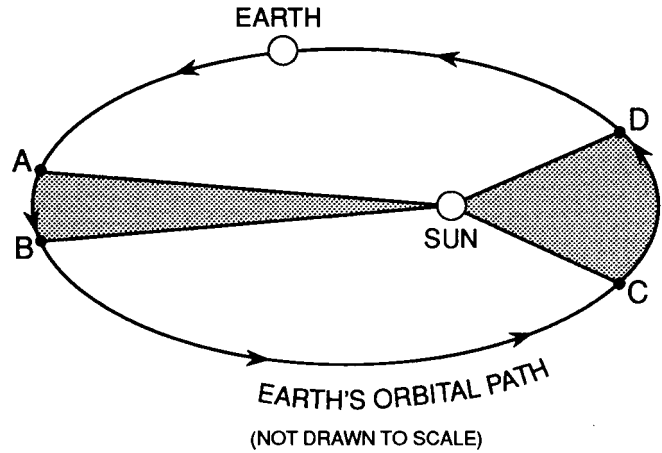
- 1) The phases of the Moon changed.
 - 2) The Moon expanded.
 - 3) The distance from the Earth to the Moon changed.
 - 4) The Moon rotated.
56. The diagram below represents a planet in orbit around a star.



Which statement best describes how the planet's energy is changing as it moves from point *A* to point *B*?

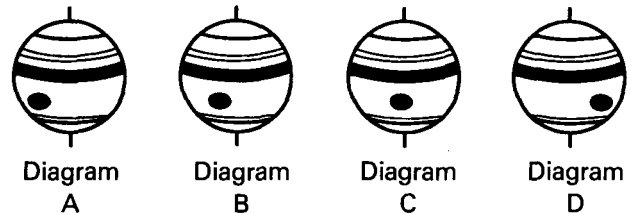
- 1) Kinetic energy is increasing and potential energy is decreasing.
- 2) Kinetic energy is decreasing and potential energy is increasing.
- 3) Both kinetic and potential energy are decreasing.
- 4) Both kinetic and potential energy are increasing.

57. The diagram below represents the Earth's orbital path around the Sun. The Earth takes the same amount of time to move from *A* to *B* as from *C* to *D*.



Which values are equal within the system?

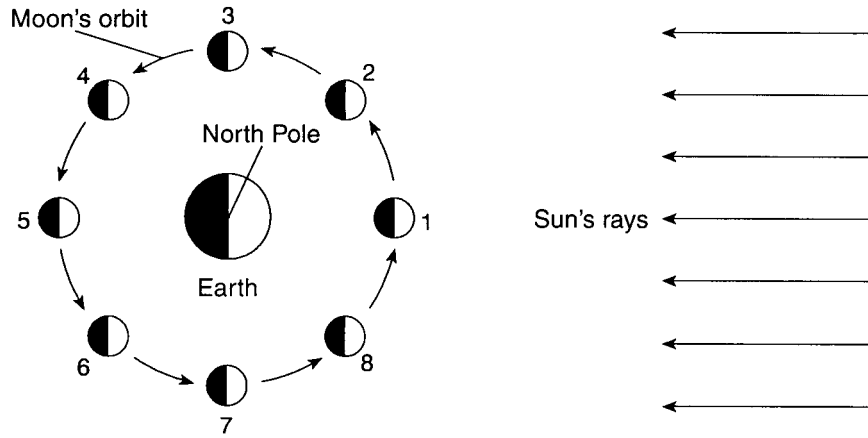
- 1) The shaded sections of the diagram are equal in area.
 - 2) The distance from the Sun to the Earth is the same at point *A* and at point *D*.
 - 3) The orbital velocity of the Earth at point *A* equals its orbital velocity at point *C*.
 - 4) The gravitational force between the Earth and the Sun at point *B* is the same as the gravitational force at point *D*.
58. A planet was viewed from Earth for several hours. The diagrams below represent the appearance of the planet at four different times.



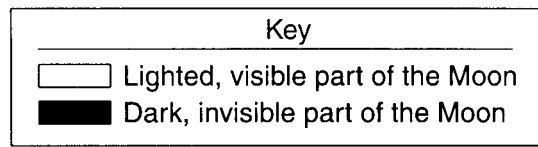
The best inference that can be made based on the diagrams is that this planet is

- 1) tilted on its axis
 - 2) changing seasons
 - 3) revolving
 - 4) rotating
59. If viewed from the Earth over a period of several years, the apparent diameter of Mars will
- 1) decrease constantly
 - 2) increase constantly
 - 3) remain unchanged
 - 4) vary in a cyclic manner
60. Billions of stars in the same region of the universe are called
- 1) solar systems
 - 2) asteroid belts
 - 3) constellations
 - 4) galaxies

61. Base your answer to the following question 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.

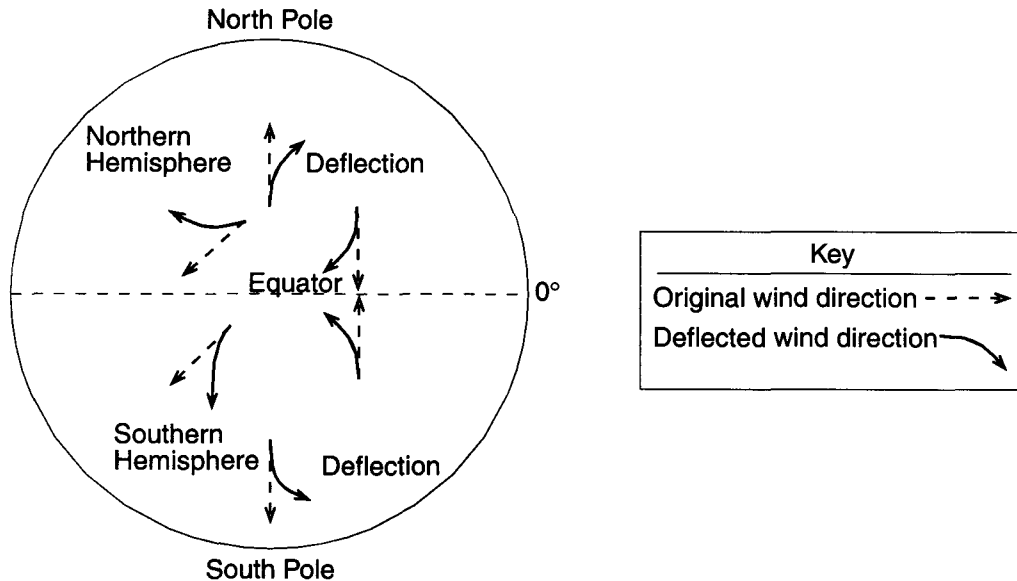


(Not drawn to scale)



Which device when placed on the Moon would provide evidence of Moon rotation?

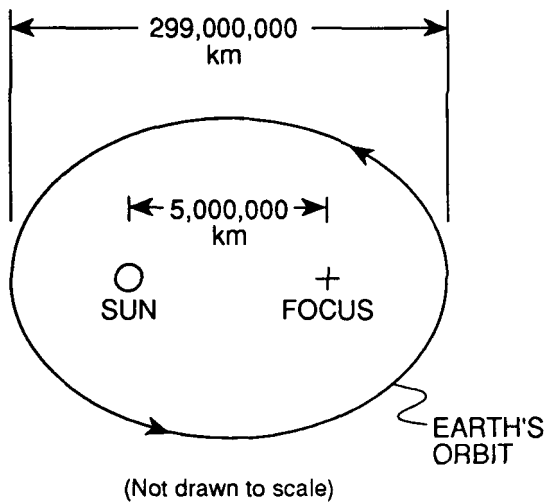
- 1) Foucault pendulum 2) seismograph 3) thermometer 4) wind vane
62. The diagram below shows some examples of how surface winds are deflected in the Northern and Southern Hemispheres because of Earth's rotation.



Earth's rotation causes winds to be deflected to the

- 1) right in both the Northern and Southern Hemispheres
 2) right in the Northern Hemisphere and left in the Southern Hemisphere
 3) left in the Northern Hemisphere and right in the Southern Hemisphere
 4) left in both the Northern and Southern Hemispheres

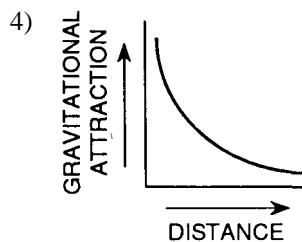
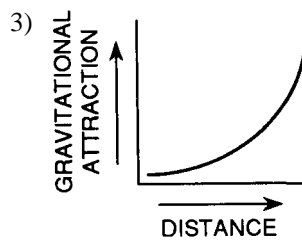
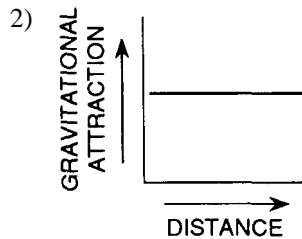
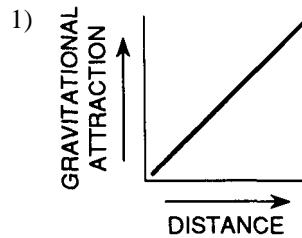
63. The diagram below represents the elliptical orbit of the Earth around the Sun.



Which equation should be used to find the eccentricity of the Earth's orbit?

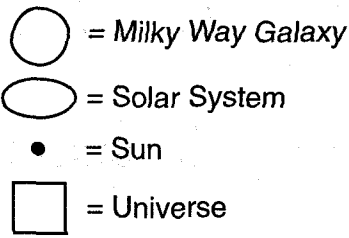
- 1) $\text{eccentricity} = \frac{299,000,000 \text{ km}}{5,000,000 \text{ km}}$
 - 2) $\text{eccentricity} = \frac{5,000,000 \text{ km}}{299,000,000 \text{ km}}$
 - 3) $\text{eccentricity} = 299,000,000 \text{ km} - 5,000,000 \text{ km}$
 - 4) $\text{eccentricity} = \frac{5,000,000 \text{ km}}{299,000,000 \text{ km} - 5,000,000 \text{ km}}$
64. Which statement best describes galaxies?
- 1) They are similar in size to the solar system.
 - 2) They contain only one star but hundreds of planets.
 - 3) They may contain a few hundred stars in a space slightly larger than the solar system.
 - 4) They may contain billions of stars in a space much larger than our solar system.
65. According to the big bang theory, the universe began as an explosion and is still expanding. This theory is supported by observations that the stellar spectra of distant galaxies show a
- 1) concentration in the yellow portion of the spectrum
 - 2) concentration in the green portion of the spectrum
 - 3) shift toward the blue end of the spectrum
 - 4) shift toward the red end of the spectrum
66. According to Hubble's law more rapidly moving galaxies are now
- 1) further away from us
 - 2) closer to us
 - 3) accelerating rapidly
 - 4) already contracting toward another big bang

67. Which graph best represents the relationship between the gravitational attraction of two objects and their distance from each other?

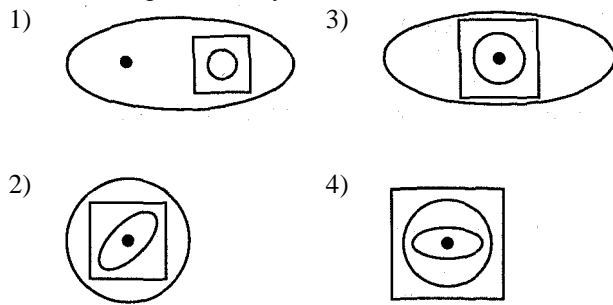


68. The major evidence supporting the "Big Bang" theory is
- 1) observations of supernova explosions.
 - 2) the discovery of black holes.
 - 3) observations that the Doppler red shift becomes greater as we look at more distant galaxies.
 - 4) observations that most galaxies are rotating
69. The most abundant element on the sun is
- | | |
|-------------|-----------|
| 1) hydrogen | 3) carbon |
| 2) helium | 4) oxygen |
70. Approximately how many times larger is the diameter of the sun compared to the earth?
- | | |
|--------------|-----------------|
| 1) 10 times | 3) 1000 times |
| 2) 100 times | 4) 10,000 times |
71. Most of the radiant energy released by the sun results from the process of
- | | |
|--------------------|--------------------------|
| 1) nuclear fission | 3) combustion |
| 2) nuclear fusion | 4) electrical generation |

72. The symbols below represent the Milky Way galaxy, the solar system, the Sun, and the universe.



Which arrangement of symbols is most accurate?



73. According to the graph, the Sun is classified as a

- 1) main sequence star with a temperature of approximately 4,000 K and a luminosity of 100
- 2) main sequence star with a temperature of approximately 6,000 K and a luminosity of 1
- 3) white dwarf star with a temperature of approximately 10,000 K and a luminosity of 0.01
- 4) blue supergiant star with a temperature of approximately 20,000 K and a luminosity of 700,000

74. An astronomer can estimate the temperature of a star by observing its

- 1) size
- 2) shape
- 3) color
- 4) brightness

75. By using a spectroscope an astronomer can

- 1) measure the size of a star
- 2) measure the altitude of a star
- 3) identify elements in the atmosphere of a star
- 4) measure the diameter of a star

76. The explosion of a massive star near the end of its life is known as a

- 1) nova
- 2) pulsar
- 3) supernova
- 4) nebula

77. Which type of electromagnetic radiation has the longest wavelength?

- 1) ultraviolet
- 2) gamma rays
- 3) visible light
- 4) radio waves

78. How does the amount of heat energy reflected by a smooth, dark-colored concrete surface compare with the amount of heat energy reflected by a smooth, light-colored concrete surface?

- 1) The dark-colored surface will reflect less heat energy.
- 2) The dark-colored surface will reflect more heat energy.
- 3) The dark-colored surface will reflect the same amount of heat energy.

79. Infrared, ultraviolet, and visible light are all part of the solar spectrum. The basic difference between them is their

- 1) wavelength
- 2) speed
- 3) source
- 4) temperature

80. An ice cube is placed in a glass of water at room temperature. Which heat exchange occurs between the ice and the water within the first minute?

- 1) The ice cube gains heat and the water loses heat.
- 2) The ice cube loses heat and the water gains heat.
- 3) Both the ice cube and the water gain heat.
- 4) Both the ice cube and the water lose heat.

81. Which statement is the best example of heat energy transfer by conduction?

- 1) Heat energy is transferred from the bottom to the top of a lake.
- 2) Heat energy is transferred from the surface soil to the rocks below.
- 3) Heat energy is transferred from the Earth's surface to the upper atmosphere.
- 4) Heat energy is transferred from the Sun to the Earth.

82. Which process is primarily responsible for the transfer of energy by air currents within the Earth's atmosphere?

- 1) convection
- 2) radiation
- 3) absorption
- 4) conduction

83. By which process does starlight travel through space?

- 1) absorption
- 2) conduction
- 3) convection
- 4) radiation

84. Which substance has the highest specific heat?

- 1) iron
- 2) water
- 3) lead
- 4) granite

85. The hottest climates on Earth are located near the Equator because this region

- 1) is usually closest to the Sun
- 2) reflects the greatest amount of insolation
- 3) receives the most hours of daylight
- 4) receives the most nearly perpendicular insolation

Base your answers to questions 86 through 88 on the data table below, which shows one cycle of equinoxes and solstices for the northern hemispheres of several planets in the solar system and the tilt of each planet's axis. Data for the planets are based on Earth's time system.

Data Table

Planet	Spring Equinox	Summer Solstice	Autumn Equinox	Winter Solstice	Tilt of Axis (degrees)
Venus	June 25	August 21	October 16	December 11	3.0
Earth	March 21	June 21	September 23	December 22	23.5
Jupiter	1997	2000	2003	2006	3.0
Saturn	1980	1987	1995	2002	26.8
Uranus	1922	1943	1964	1985	82.0
Neptune	1880	1921	1962	2003	28.5

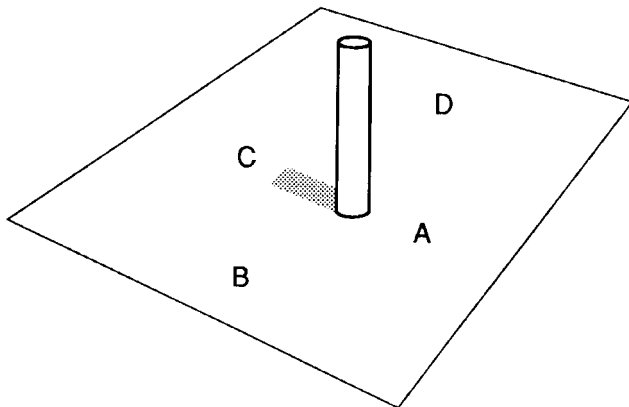
86. State the length, in years, of the spring season on Uranus.

87. Describe the relationship between a planet's distance from the Sun and the length of a season on that planet.

88. Identify *two* factors that cause seasons on Earth.

89. Compared to polar areas, why are equatorial areas of equal size heated much more intensely by the Sun?
- 1) The Sun's rays are more nearly perpendicular at the Equator than at the poles.
 - 2) The equatorial areas contain more water than the polar areas do.
 - 3) More hours of daylight occur at the Equator than at the poles.
 - 4) The equatorial areas are nearer to the Sun than the polar areas are.

90. The diagram below shows the noontime shadow cast by a vertical post located in New Jersey. Which letter indicates a location south of the post?



- 1) A
- 2) B
- 3) C
- 4) D

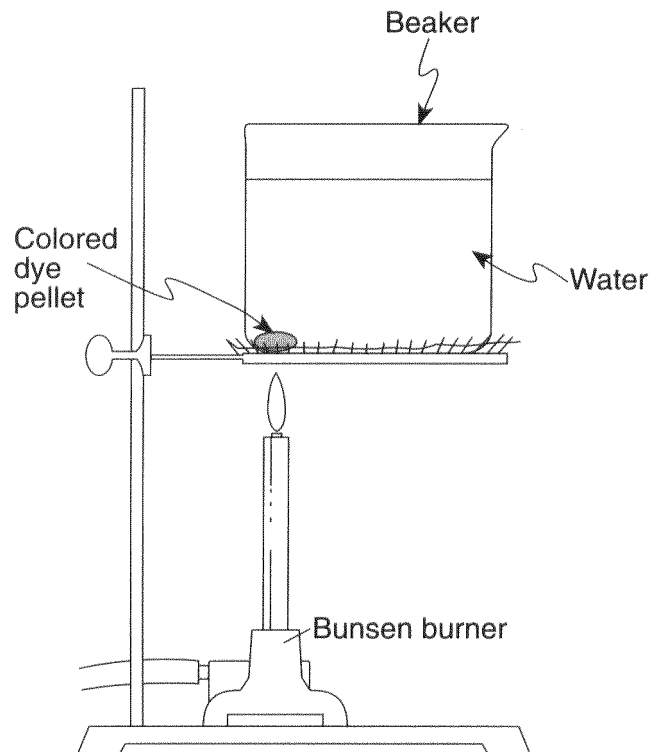
91. On which date does maximum insolation usually occur in New Jersey?

- 1) June 21
- 2) July 10
- 3) August 21
- 4) August 31

92. Which form of radiation given off by the Earth causes heating of the Earth's atmosphere?

- 1) infrared
- 2) ultraviolet
- 3) visible
- 4) X-ray

93. The diagram below represents a beaker of water that is being heated. As the colored dye pellet dissolves, the dye will show the movement of water in the beaker. On the diagram, draw arrows in the water to show the direction the colored dye will move when the water is heated as shown.



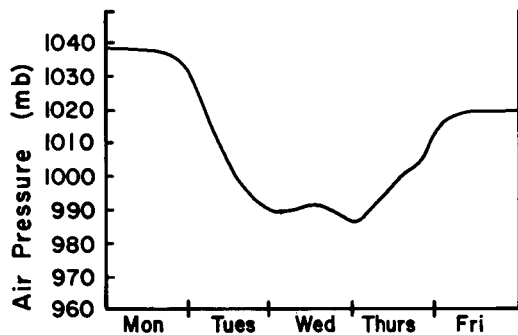
94. Base your answer to the following question on the passage below.

Ozone in Earth's Atmosphere

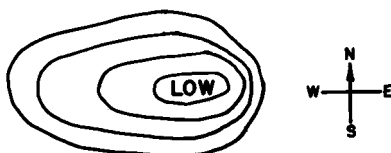
Ozone is a special form of oxygen. Unlike the oxygen we breathe, which is composed of two atoms of oxygen, ozone is composed of three atoms of oxygen. A concentrated ozone layer between 10 and 30 miles above Earth's surface absorbs some of the harmful ultraviolet radiation coming from the Sun. The amount of ultraviolet light reaching Earth's surface is directly related to the angle of incoming solar radiation. The greater the Sun's angle of insolation, the greater the amount of ultraviolet light that reaches Earth's surface. If the ozone layer were completely destroyed, the ultraviolet light reaching Earth's surface would most likely increase human health problems, such as skin cancer and eye damage.

State the name of the temperature zone of Earth's atmosphere where the concentrated layer of ozone gas exists.

95. Daily weather forecasts are based primarily on
- 1) ocean currents
 - 2) seismic data
 - 3) phases of the Moon
 - 4) air-mass movements
96. Which weather conditions are most probable when the moisture content of the air increases, resulting in a lower atmospheric pressure?
- 1) sunny and fair
 - 2) cold and windy
 - 3) partly cloudy, with skies becoming clear
 - 4) cloudy, with a chance of precipitation
97. The graph below shows the surface air pressure at a certain city during a five-day period. On which day was the warmest airmass probably over the city for the entire day?



- 1) Monday
 - 2) Tuesday
 - 3) Wednesday
 - 4) Friday
98. The diagram below shows the isolines of air pressure around a low-pressure center. On which side of the low-pressure center will the wind speed be greatest?



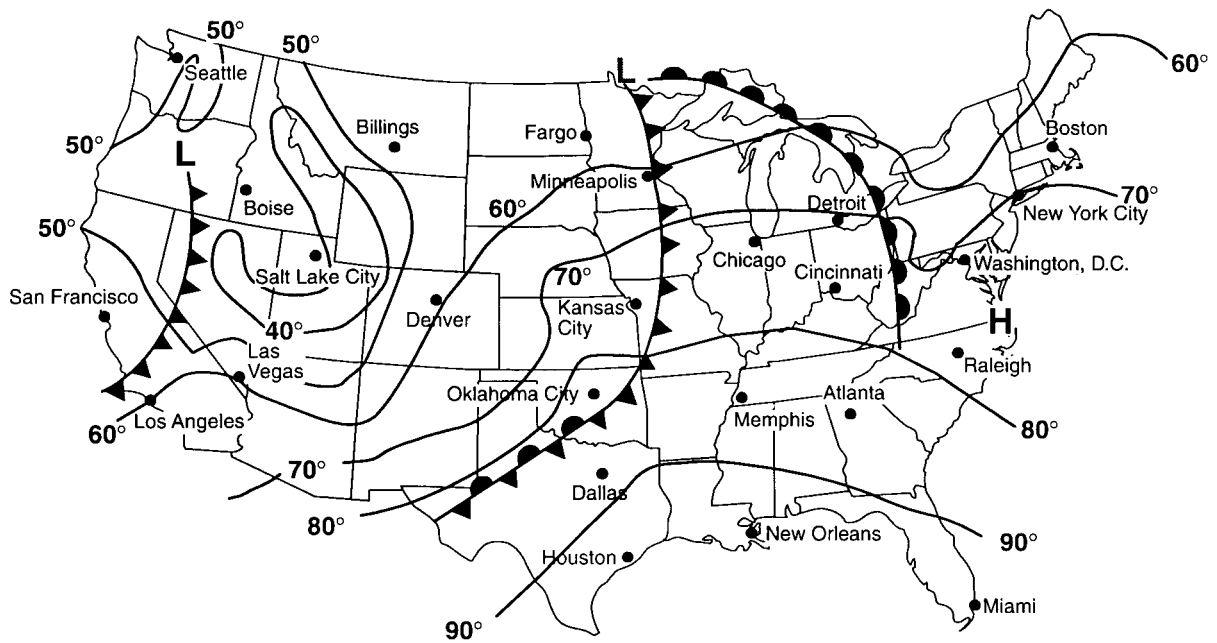
- 1) north
- 2) south
- 3) east
- 4) west

99. As the temperature of the atmosphere at a given location increases, the air pressure will most likely
- 1) decrease
 - 2) increase
 - 3) remain the same
100. As the dewpoint temperature of a sample of air decreases, the amount of moisture in that sample of air
- 1) decreases
 - 2) increases
 - 3) remains the same
101. Which gas in the atmosphere has the most influence on day-to-day weather changes?
- 1) ozone
 - 2) oxygen
 - 3) water vapor
 - 4) carbon dioxide
102. In the Northern Hemisphere, what is the direction of surface wind circulation in a low-pressure system?
- 1) counterclockwise and outward from the center
 - 2) counterclockwise and toward the center
 - 3) clockwise and outward from the center
 - 4) clockwise and toward the center
103. The diagram below represents a cross-sectional view of airmasses associated with a low-pressure system. The cold frontal interface is moving faster than the warm frontal interface. What usually happens to the warm air that is between the two frontal surfaces?



- 1) The warm air is forced over both frontal interfaces.
 - 2) The warm air is forced under both frontal interfaces.
 - 3) The warm air is forced over the cold frontal interface but under the warm frontal interface.
 - 4) The warm air is forced under the cold frontal interface but over the warm frontal interface.
104. The properties of an airmass depend mainly on the
- 1) wind speed within the airmass
 - 2) characteristics of the surface over which the airmass was formed
 - 3) size of the airmass
 - 4) rotation of the Earth

105. Base your answer to the following question on the weather map below, which shows the location of fronts and the temperature field on a given day in the United States.



Which two cities most likely have an air temperature closest to 75°F?

- 1) Chicago and Detroit
- 2) Los Angeles and Denver
- 3) Oklahoma City and Memphis
- 4) Cincinnati and Kansas City

106. Why do clouds usually form at the leading edge of a cold airmass?

- 1) Cold air flows over warm air, causing the warm air to descend and cool.
- 2) Cold air flows under warm air, causing the warm air to rise and cool.
- 3) Cold air contains more dust than warm air does.
- 4) Cold air contains more water vapor than warm air does.

107. Which abbreviation indicates a warm air mass that contains large amounts of water vapor?

- 1) cP
- 2) cT
- 3) mT
- 4) mP

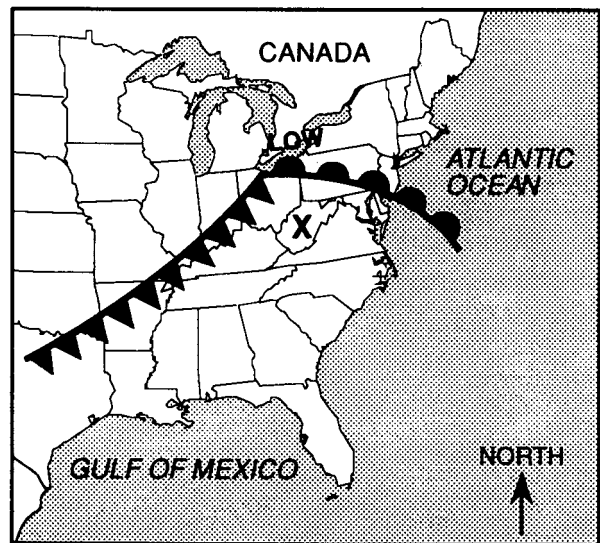
108. Which atmospheric condition will cause the greatest amount of evaporation from the surface of a lake?

- 1) calm, dry, cold
- 2) moist, cold, windy
- 3) calm, moist, hot
- 4) dry, hot, windy

109. Condensation will most likely occur in a given volume of air when the air is

- 1) saturated and contains no condensation nuclei
- 2) saturated and contains condensation nuclei
- 3) unsaturated and contains no condensation nuclei
- 4) unsaturated and contains condensation nuclei

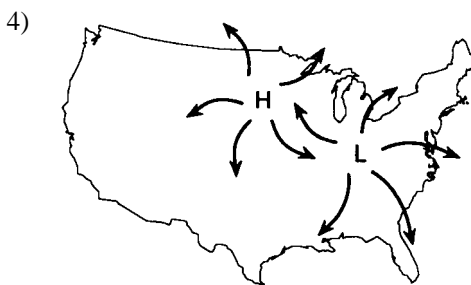
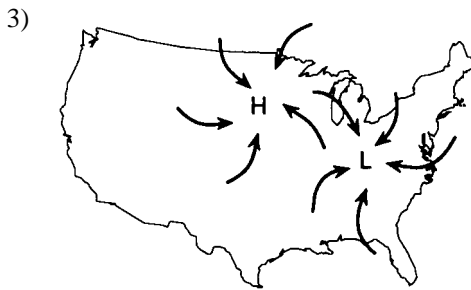
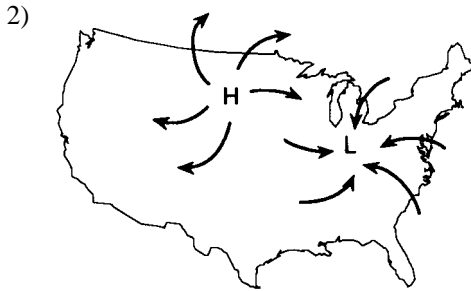
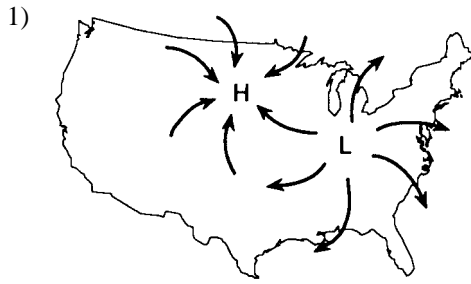
110. The weather map below shows a frontal system that has followed a typical storm track.



The air mass located over point X most likely originated over the

- 1) northern Atlantic Ocean
- 2) central part of Canada
- 3) Gulf of Mexico
- 4) Pacific Northwest

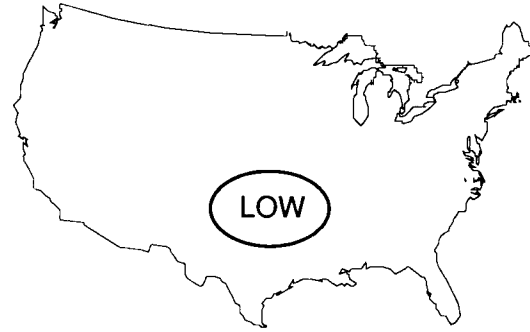
111. Which map correctly shows the wind directions of the high-pressure and low-pressure systems?



112. A cool breeze is blowing toward the land from the ocean on a warm, cloudless summer day. This condition is most likely caused by

- 1) a high-pressure system over the land
- 2) a hurricane approaching from the ocean
- 3) a cold front that is slowly approaching the land from the ocean
- 4) the air temperature being higher over the land than over the ocean

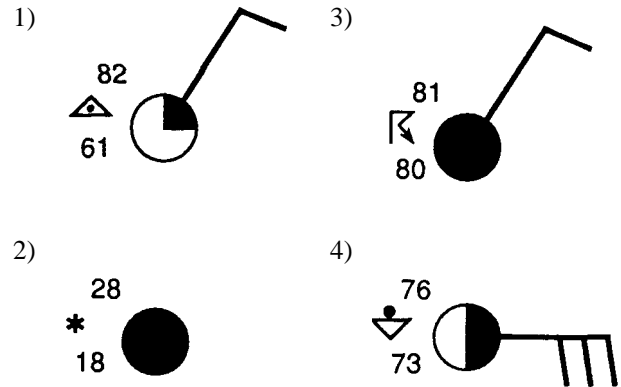
113. The map below shows a low-pressure system located over an area in the south-central United States.



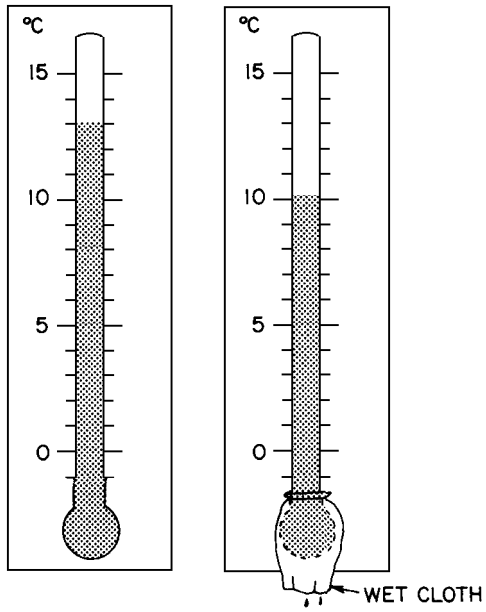
In the next few days, because of the prevailing winds, the air mass will probably move toward the

- 1) southeast
- 2) northeast
- 3) southwest
- 4) northwest

114. Which weather station model represents a location where a thunderstorm is occurring?



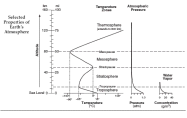
115. The two thermometers below show the dry-bulb and wet-bulb temperatures of the air.



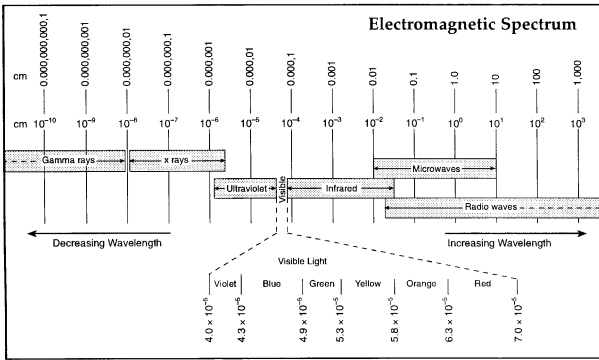
What is the approximate dewpoint temperature of the air?

- 1) -25°C
- 2) 7°C
- 3) 3°C
- 4) 4°C

Reference Tables



Reference Tables



Reference Tables

Section	Page
Table 1	1
Table 2	2
Table 3	3
Table 4	4
Table 5	5
Table 6	6
Table 7	7
Table 8	8
Table 9	9
Table 10	10

Reference Tables

Dewpoint Temperatures (°C)

Dry-Bulb Temperature (°C)	Difference Between Wet-Bulb and Dry-Bulb Temperatures (°C)															
	0	1	2	3	4	5	6	7	8	9	10	11	12	13	14	15
-20	-20	-33														
-18	-18	-28														
-16	-16	-24														
-14	-14	-21	-36													
-12	-12	-18	-28													
-10	-10	-14	-22													
-8	-8	-12	-18	-29												
-6	-6	-10	-14	-22												
-4	-4	-7	-12	-17	-29											
-2	-2	-5	-8	-13	-20											
0	0	-3	-6	-9	-15	-24										
2	2	-1	-3	-6	-11	-17										
4	4	1	-1	-4	-7	-11	-19									
6	6	4	1	-1	-4	-7	-13	-21								
8	8	6	3	1	-2	-5	-9	-14								
10	10	8	6	4	1	-2	-5	-9	-14	-28						
12	12	10	8	6	4	1	-2	-5	-9	-16						
14	14	12	11	9	6	4	1	-2	-5	-10	-17					
16	16	14	13	11	9	7	4	1	-1	-8	-10	-17				
18	18	16	15	13	11	9	7	4	2	-2	-5	-10	-19			
20	20	19	17	15	14	12	10	7	4	2	-2	-5	-10	-19		
22	22	21	19	17	16	14	12	10	8	5	3	-1	-5	-10	-19	
24	24	23	21	20	18	16	14	12	10	8	6	2	-1	-5	-10	-18
26	26	25	23	22	20	18	17	15	13	11	9	6	3	0	-4	-9
28	28	27	25	24	22	21	19	17	16	14	11	9	7	4	1	-3
30	30	29	27	26	24	23	21	19	18	16	14	12	10	8	5	1

Answer Key
[New Exam]

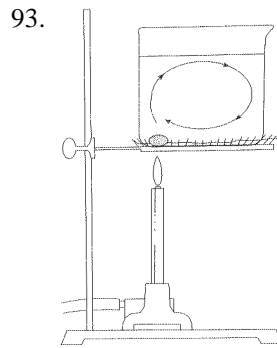
1. 2
2. 1
3. 1
4. 2
5. 4
6. 4
7. 1
8. 1
9. 1
10. 1
11. 1
12. 4
13. 4
14. 4
15. 2
16. 2
17. 3
18. 2
19. 4
20. 1
21. 2
22. 1
23. 2
24. 4
25. 4
26. 2
27. 2
28. 3
29. 1

30. 1
 31. 1
 32. 3
 33. 1
 34. *a*: gradient = change in field value / change in distance *or* Δ temperature / Δ distance *b*: gradient = 3C / 3m *c*: 1C/meter
 35. 3
 36. 4
 37. 4
 38. 1
 39. *Examples*: – Lack of contour lines indicates a relatively flat area. – The stream shows meanders. – The contour lines are spaced far apart.
 40. 1
 41. 3
 42. 2
 43. 4
 44. 4
 45. *examples*: – Contour lines bend upstream where they cross a stream. They bend east along Jones Creek. – Water flows from higher to lower elevations, and Jones Creek is higher in elevation on the east side of the map.
 46. 3
 47. 4
 48. 4
 49. 1
 50. 4
 51. 3
 52. 2
 53. 1
 54. 1
 55. 3
-

Answer Key
[New Exam]

56. 1
57. 1
58. 4
59. 4
60. 4
61. 1
62. 2
63. 2
64. 4
65. 4
66. 1
67. 4
68. 3
69. 1
70. 2
71. 2
72. 4
73. 2
74. 3
75. 3
76. 3
77. 4
78. 1
79. 1
80. 1
81. 2
82. 1
83. 4
84. 2

85. 4
86. Allow credit for 20 or 21 or 22 years.
87. The length of a planet's season increases with increasing distance from the Sun.
88. *Examples:* – tilt of Earth's axis – parallelism of Earth's axis
– Earth's revolution around the Sun
89. 1
90. 1
91. 1
92. 1



94. Stratosphere.
95. 4
96. 4
97. 3
98. 3
99. 1
100. 1
101. 3
102. 2
103. 1
104. 2
105. 4
106. 2
-

Answer Key
[New Exam]

107. 3

108. 4

109. 2

110. 3

111. 2

112. 4

113. 2

114. 3

115. 2
