

Earth Science Mid-term

Review Packet

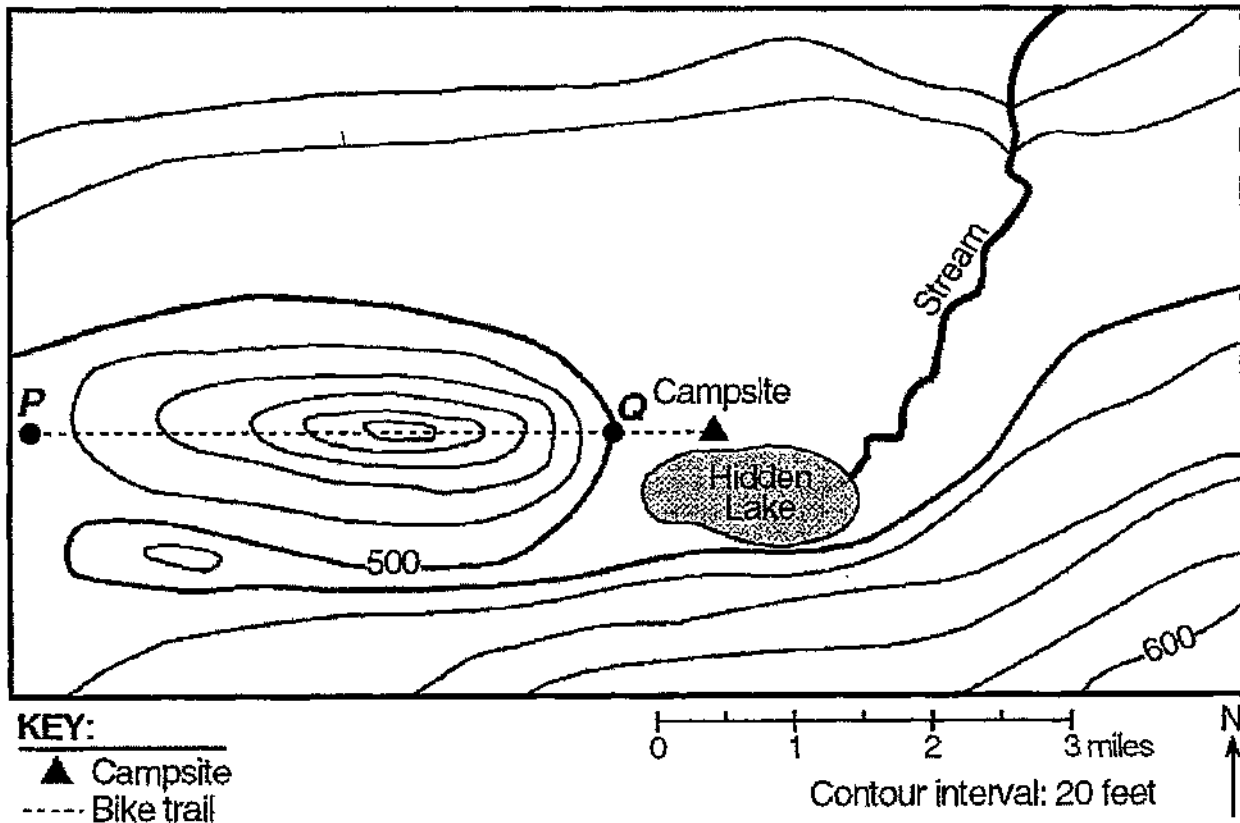
Midterm date: Jan 23, 2013

Name: _____

Name _____

Midterm

A group of Earth Science students decided to take an adventurous camping trip, so they rode bicycles to a New York 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.



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

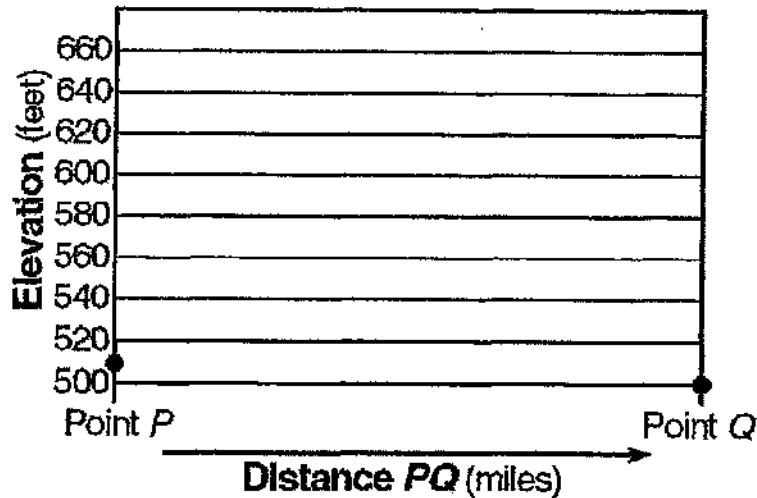
2. The students decided to measure the speed of the stream by floating apples down a straight section of the stream. Describe the steps the students must take to determine the stream's surface rate of movement (speed) by using a stopwatch, a 10-foot rope, and several apples. Include the equation for calculating rate.

2

3. On the grid below, draw a profile of the landscape along the bicycle trail from point *P* to point *Q* by following the directions below.

(a) Plot the elevation along line *PQ* by marking with a dot each point where a contour line is crossed by line *PQ*. Point *P* and point *Q* have been plotted for you.

(b) Connect the dots to complete the profile.



4. (a) The next day the students decided to move their campsite 1 mile directly east of their original campsite. On the given map, place another campsite symbol to indicate the location of their second campsite.

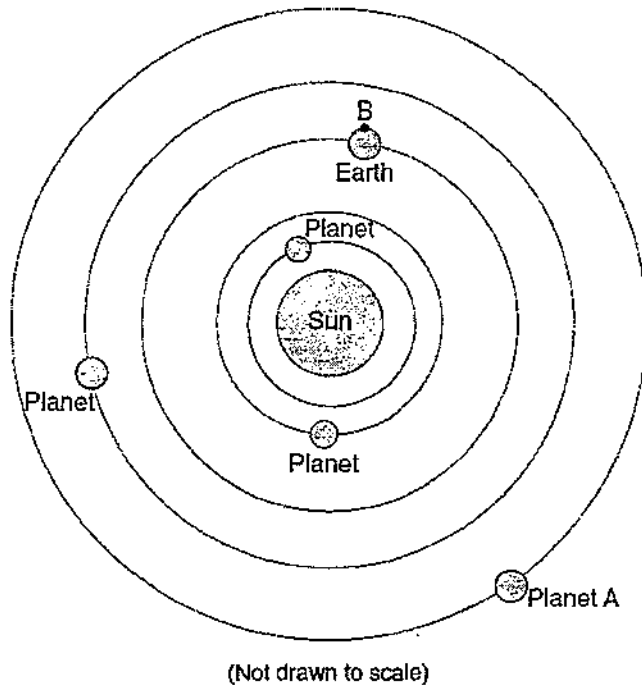
(b) The students decided to take a different route home to avoid riding their bicycles up the steep hill. Plan a return route that will take the campers back to point *P* and that will involve the least change in elevation during the trip. On the given map, draw a line from the second campsite to point *P* to show the route. Place arrows on the line to show the direction that the students will be traveling.

5. (a) State the general compass direction in which the stream is flowing in the given map. _____

(b) State how contour lines provide the evidence for determining this direction. _____

Review Packet for Midterm

Base your answers to questions 73 through 76 on the diagram below, which shows the heliocentric model of a part of our solar system. The planets closest to the Sun are shown. Point *B* is a location on Earth's equator.



73 State the name of planet A. [1]

74 Explain why location *B* experiences both day and night in a 24-hour period. [1]

75 On the graph in *your answer booklet*, draw a line to show the general relationship between a planet's distance from the Sun and the planet's period of revolution. [1]

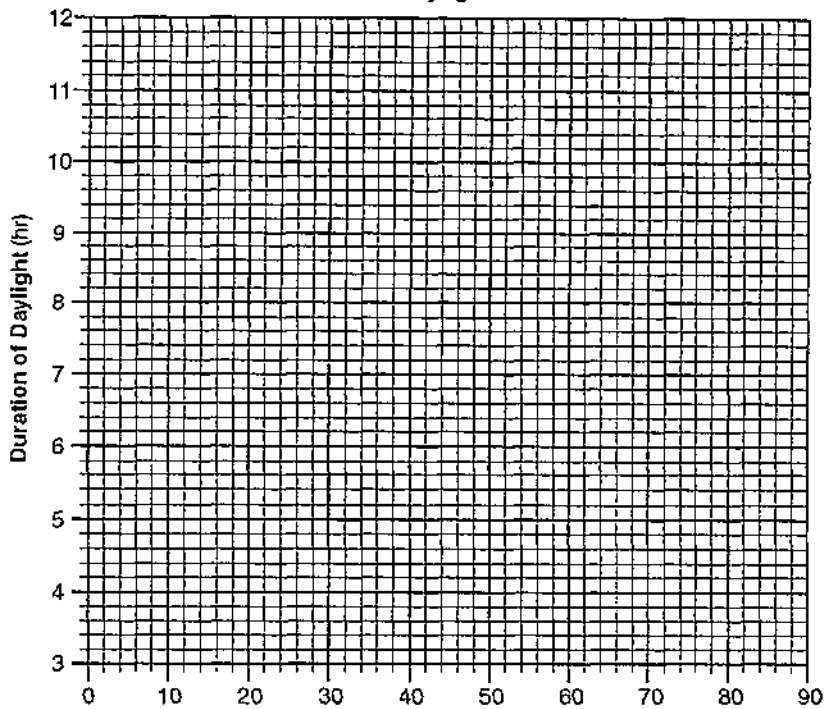
76 Identify *one* feature of the geocentric model of our solar system that differs from the heliocentric model shown. [1]

Base your answers to questions 54 through 57 on the data table below. The data table shows the latitude of several cities in the Northern Hemisphere and the duration of daylight on a particular day.

Data Table

City	Latitude (°N)	Duration of Daylight (hr)
Panama City, Panama	9	11.6
Mexico City, Mexico	19	11.0
Tampa, Florida	28	10.4
Memphis, Tennessee	35	9.8
Winnipeg, Canada	50	8.1
Churchill, Canada	59	6.3
Fairbanks, Alaska	65	3.7

Duration of Daylight and Latitude

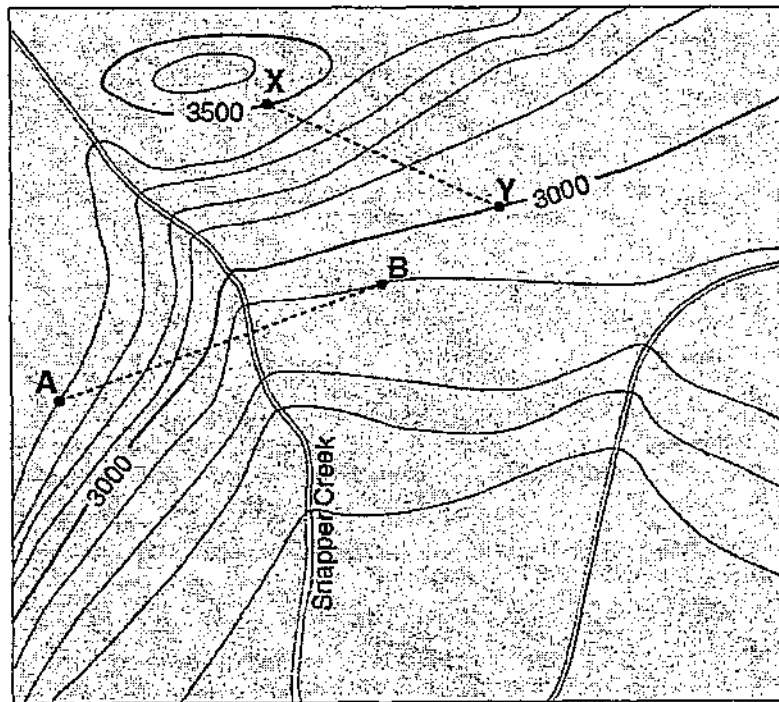


54. On the grid above, plot with an X the duration of daylight for each city shown in the data table. Connect your Xs with a smooth curved line.

- 55 Based on the data table, state the relationship between latitude and the duration of daylight. [1]
- 56 Use your graph to determine the latitude at which the Sun sets 7 hours after it rises. [1]
- 57 The data were recorded for the first day of a certain season in the Northern Hemisphere. State the name of this season. [1]

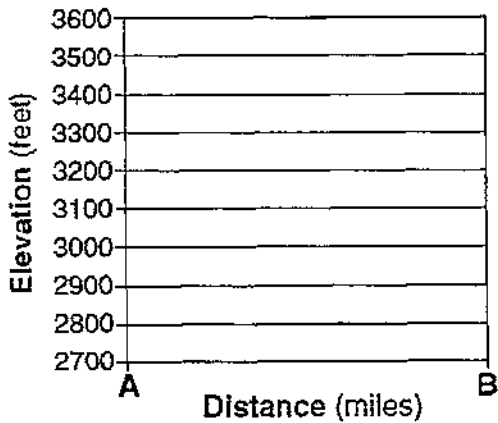
4

Base your answers to questions 79 through 81 on the topographic map below. Points A, B, X, and Y are locations on Earth's surface.



0 1 2 3 miles Contour Interval = 100 feet

Profile from A to B



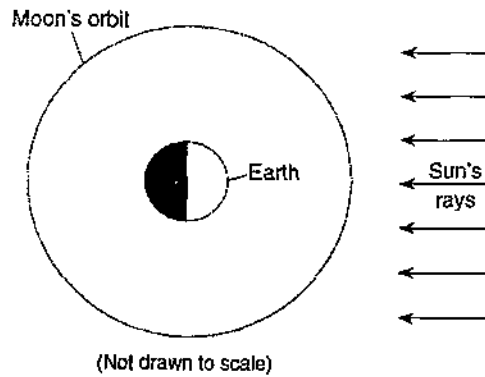
Construct a topographic profile along line AB by plotting X's and connect the Xs with a smooth curved line.

80. Toward which compass direction is Snapper Creek flowing? [1]

81. Calculate the gradient between points X and Y. Units must be included in your answer. [1]









51

Place an X on the moon's orbit to show the moon's position during a solar eclipse.



Base your answers to questions 71 through 74 on the data table below and on the graph in your answer booklet. The data table shows the maximum altitude and phase of the Moon observed above the southern horizon on certain dates during January and February at a New York State location. The line on the graph in your answer booklet shows the altitude of the noontime Sun observed during the same time period at the same New York State location.

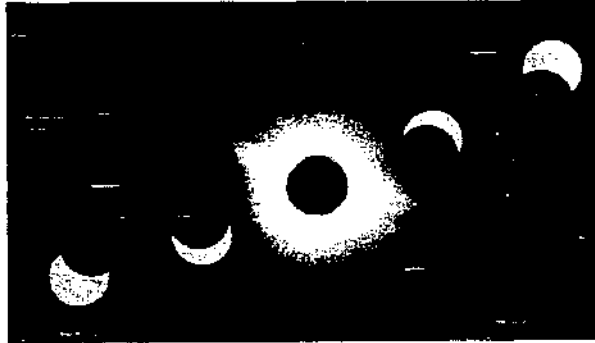
Data Table

Date	Maximum Altitude of Moon (°)	Phase of Moon
January 4	26	new 
January 13	63	first quarter 
January 19	72	full 
January 26	35	last quarter 
February 3	34	new 
February 11	70	first quarter 
February 18	60	full 
February 25	27	last quarter 

6

71. Plot with an X the maximum altitude of the moon for each date shown in the data table on the following page.

72 The multiple-exposure photograph below, taken on February 3, shows a total solar eclipse in the middle of the photograph. The maximum altitude of the Sun on this date was 34° above the southern horizon at this New York State location.



Based on the data table, explain why this total solar eclipse occurred on February 3. [1]

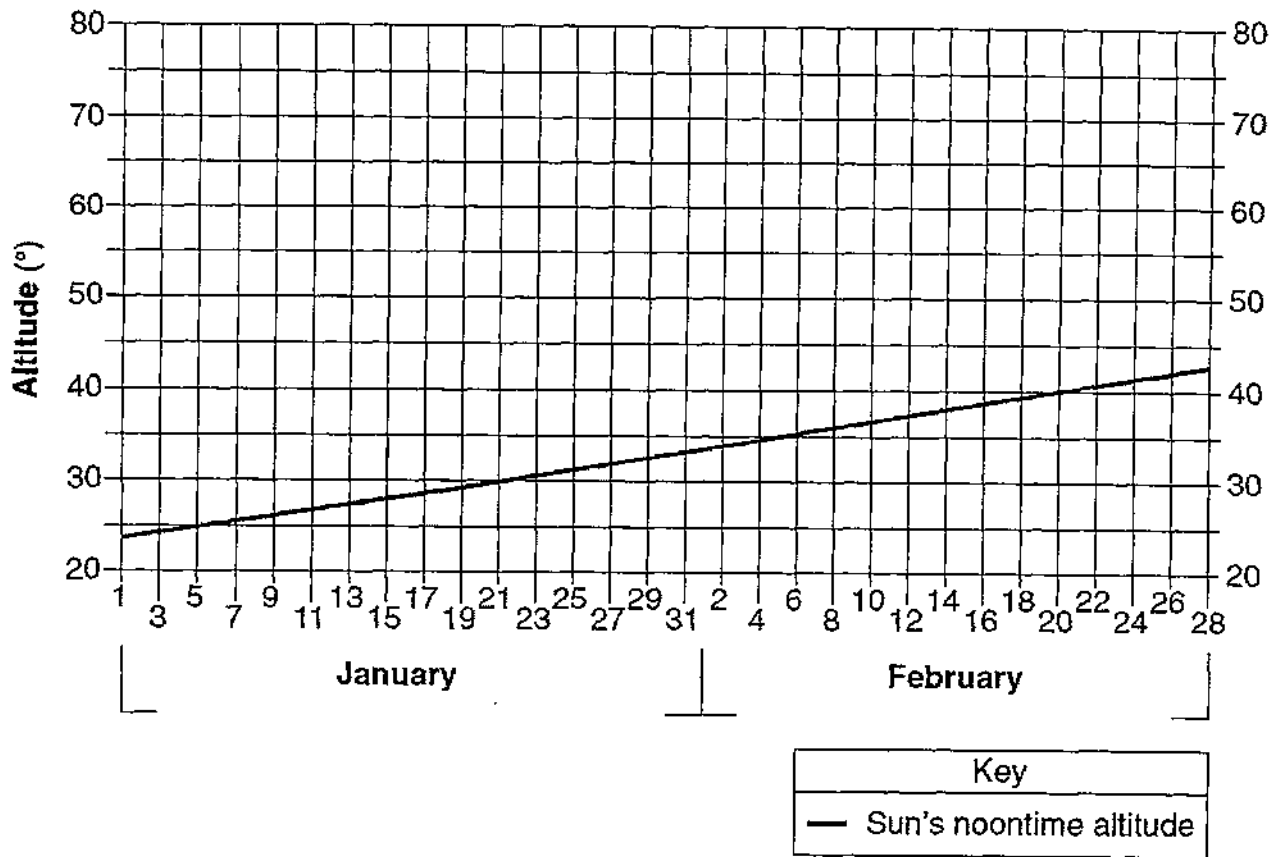
73. The diagram below shows the Moon's orbit around Earth. Place an X on the orbit to represent the Moon's position on February 18.

74. Assuming that February had 28 days, on which date in March did the next full Moon occur?



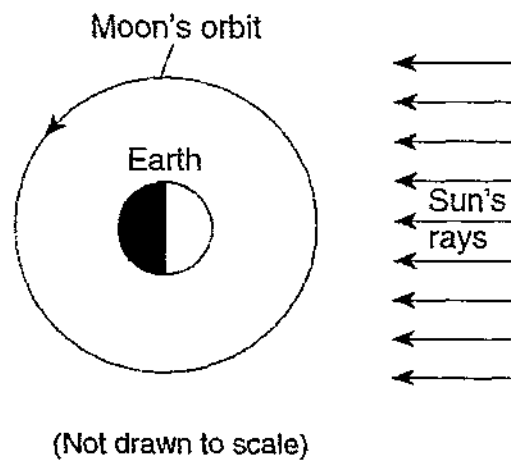
71

Maximum Altitude of Sun and Moon



72

73



74 March _____

8

- 1 Which statement best describes the age of our solar system and the universe?
- (1) The universe is at least twice as old as our solar system.
 - (2) Our solar system is at least twice as old as the universe.
 - (3) Our solar system and the universe are estimated to be 5 billion years old.
 - (4) Our solar system and the universe are estimated to be 10 billion years old.

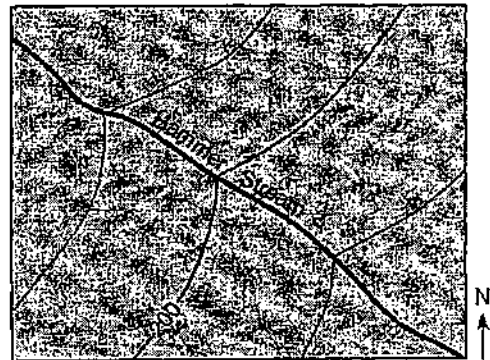
- 2 A Foucault pendulum is used to prove that
- (1) the Sun rotates on its axis
 - (2) the Sun revolves around Earth
 - (3) Earth rotates on its axis
 - (4) Earth revolves around the Sun

- 3 Compared to the terrestrial planets, the Jovian planets are
- (1) smaller and have lower densities
 - (2) smaller and have greater densities
 - (3) larger and have lower densities
 - (4) larger and have greater densities

- 4 Which process produces the energy that allows the stars of the universe to radiate visible light?
- (1) convection (3) insolation
 - (2) nuclear fusion (4) radioactive decay

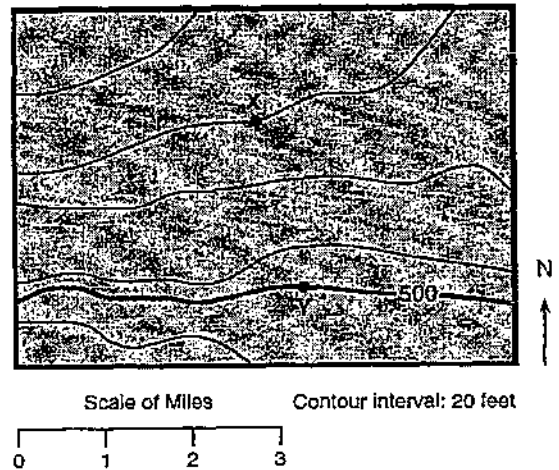
- 7 The spinning of Earth on its axis causes the apparent rising and setting of the
- (1) Sun, only
 - (2) Sun and the Moon, only
 - (3) Moon and some stars, only
 - (4) Sun, the Moon, and some stars

- 9 The topographic map below shows part of a stream.



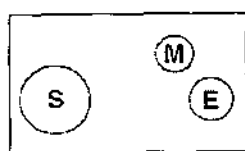
- In which general direction is the stream flowing?
- (1) northeast
 - (2) northwest
 - (3) southeast
 - (4) southwest

- 22 The topographic map below shows locations X and Y.

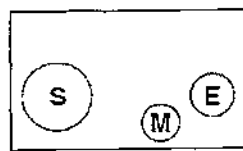


- What is the approximate gradient between X and Y?
- (1) 15 ft/mi
 - (2) 20 ft/mi
 - (3) 30 ft/mi
 - (4) 60 ft/mi

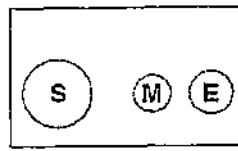
- 15 Which arrangement of the Sun, the Moon, and Earth results in the highest high tides, and the lowest low tides on Earth? (Diagrams are not drawn to scale.)



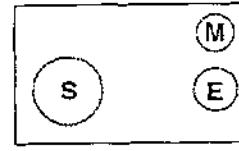
(1)



(2)



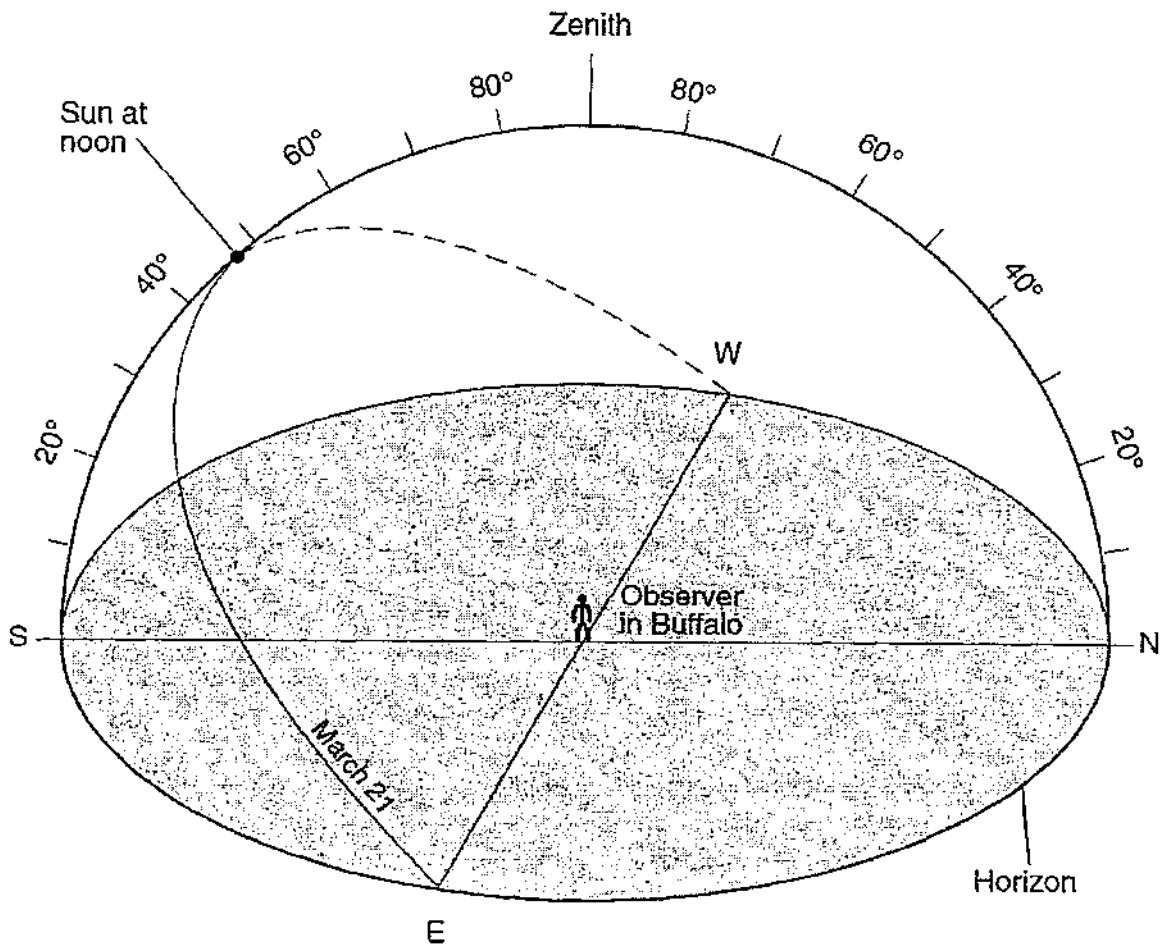
(3)



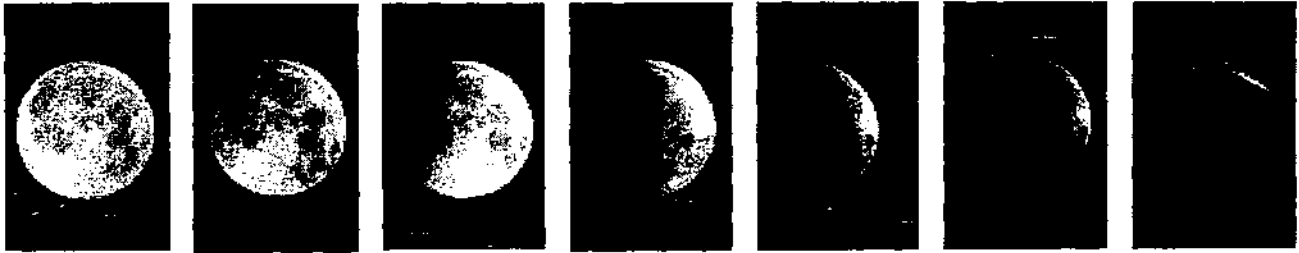
(4)

The sky model shows the apparent path of the Sun on March 21st for an observer in Buffalo, New York. Draw a line to represent the apparent path of the Sun from sunrise to sunset at Buffalo on December 21st, June 21st and August 21st. Be sure your path indicates the correct altitude of the noon Sun and begins and ends at the correct positions on the horizon.

Place an asterisk at the apparent position of the North Star as seen from Buffalo.



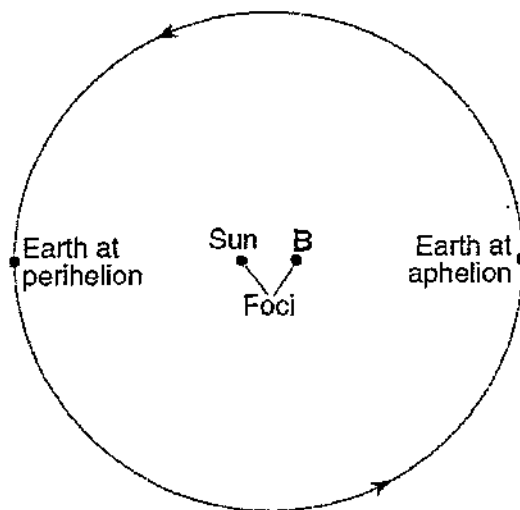
33 The photographs below show the surface of the Moon as seen from Earth over an 80-minute period during a single night.



Which motion is responsible for this changing appearance of the Moon?

- (1) The Moon moves into the shadow of Earth.
- (2) The Moon moves into the shadow of the Sun.
- (3) The Sun moves into the shadow of Earth.
- (4) The Sun moves into the shadow of the Moon.

Base your answers to questions 51 through 53 on the diagram below, which represents a model of Earth's orbit. Earth is closest to the Sun at one point in its orbit (perihelion) and farthest from the Sun at another point in its orbit (aphelion). The Sun and point B represent the foci of this orbit.

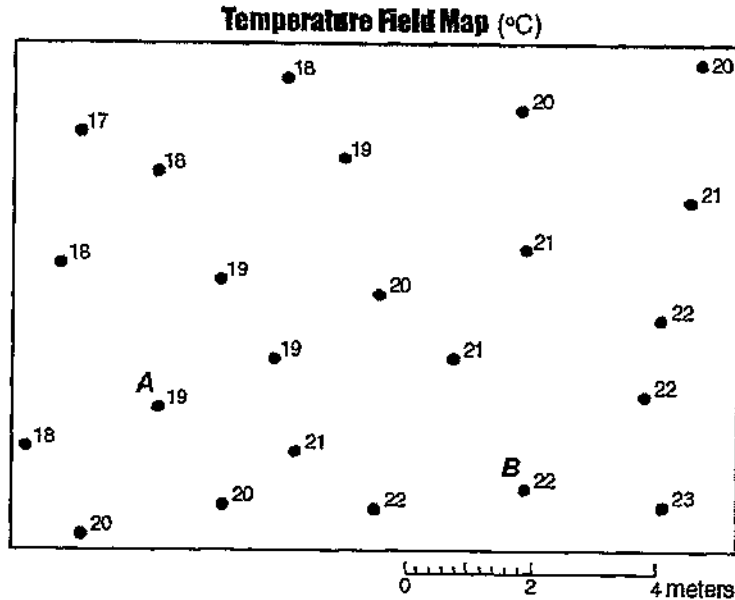


(Not drawn to scale)

- 51 Explain why Earth's orbit is considered to be elliptical. [1]
- 52 Describe the change that takes place in the gravitational attraction between Earth and the Sun as Earth moves from perihelion to aphelion and back to perihelion during one year. [1]
- 53 Describe how the shape of Earth's orbit would differ if the Sun and focus B were farther apart. [1]

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The temperature field map below shows temperature readings in degrees Celsius recorded by students in a science classroom. The readings were taken at the same time at floor level. Temperature readings for points A and B are labeled on the map.



34. Determine the temperature gradient from point A to point B in the given map by following the directions below.

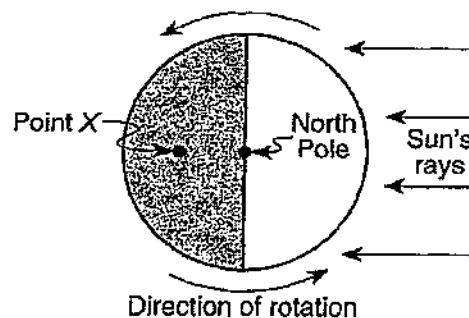
(a) Write the equation used to determine the gradient.	
(b) Substitute values from the field map into the equation.	
(c) Solve the equation and label the answer with the proper units.	

35. On the given temperature field map, use solid lines to draw the 17° C, 18° C, 19°C, and 22° C isotherms. [Isotherms must extend to the boundary of the map. Label each isotherm to indicate its temperature.]

36. The diagram below represents the direction of Earth's rotation as it appears from above the North Pole. Point X is a location on Earth's surface.

The time at point X is *closest* to

- A) 9 p.m.
- B) 12 midnight
- C) 12 noon
- D) 9 a.m.

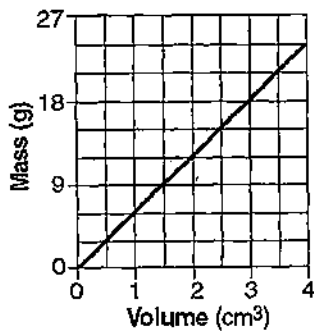


12

NAME _____

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- 12) The graph below shows the relationship between the mass and volume of a mineral. What is the density of this mineral?



- A) 4.5 g/cm³ C) 9.0 g/cm³
 B) 6.0 g/cm³ D) 30 g/cm³
- 13) A student calculated the density of a mineral sample to be 2.7 grams per cubic centimeter. If the accepted value is 3.0 grams per cubic centimeter, what was the student's percent of error?
- A) 30% C) 10%
 B) 11% D) 9%
- 14) A quantity of water is frozen solid and then heated from 0°C to 10°C. Which statement best describes the properties of the water during this time?
- A) Volume and density change.
 B) Mass changes but volume remains constant.
 C) Mass and volume change.
 D) Volume changes but density remains constant.
- 15) The basic measurements used to describe stream velocity are
- A) length and shape
 B) time and direction
 C) mass and volume
 D) distance and time
- 16) An observer incorrectly measured the mass of a rock as 428.7 grams. The actual mass was 450.0 grams. What was the observer's approximate percentage of error?
- A) 2.1% C) 4.7%
 B) 4.3% D) 5.0%

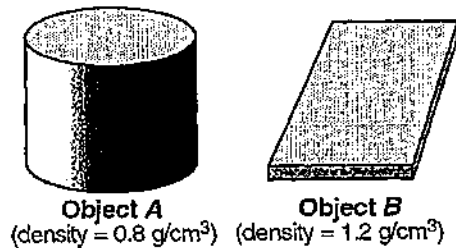
- 17) A mineral sample is found to have a density of 3.0 grams per cubic centimeter. It is then broken into two pieces, with one piece twice as large as the other. The smaller of the two pieces will have a density of

- A) 3.0 g/cm³ C) 6.0 g/cm³
 B) 1.5 g/cm³ D) 1.0 g/cm³

- 18) A student classifies several objects. The classification system should be based on

- A) interpretations
 B) hypotheses
 C) inferences
 D) observations

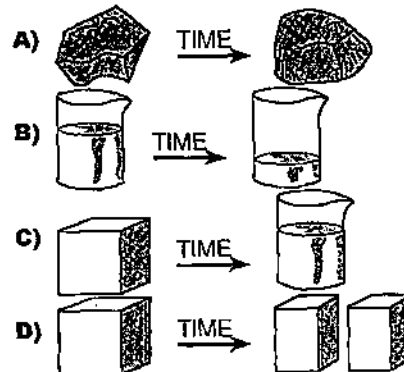
- 19) The diagrams below represent two solid objects, A and B, with different densities.



What will happen when the objects are placed in a container of water (water temperature = 4°C)?

- A) Both objects will float.
 B) Both objects will sink.
 C) Object B will float, and object A will sink.
 D) Object A will float, and object B will sink.

- 20) The diagrams below show physical changes in four materials after a period of time. Chemical composition of each material remained the same. Which material most likely changed in density?



32) The table below identifies four density groups.

Group	Density g/cm ³
A	1.0-3.9
B	4.0-7.9
C	8.0-11.9
D	12.0-15.9

According to this classification system, a sample of quartz with a mass of 27 grams and a volume of 10 cubic centimeters should be placed in group

- A) A B) B C) C D) D

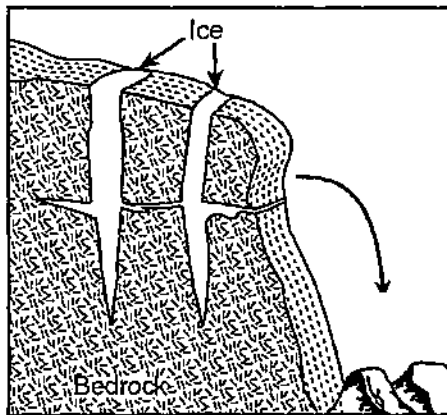
33) Which statement about a rock sample is most likely an inference?

- A) The rock has changed color due to weathering.
- B) The rock has flat sides and sharp corners.
- C) The rock has thin, distinct layers.
- D) The rock is made of small, dark-colored crystals.

34) The circumference of the Earth is about 4.0×10^4 kilometers. This value is equal to

- A) 40,000 km C) 400,000 km
B) 400 km D) 4,000 km

35) The diagram below shows a process of weathering called frost wedging.



Frost wedging breaks rocks because as water freezes it increases in

- A) density C) mass
B) volume D) specific heat

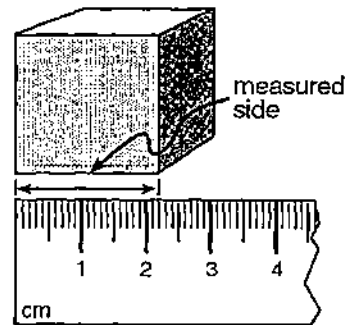
36) A student determines the density of a rock to be 2.2 grams per cubic centimeter. If the accepted density of the rock is 2.5 grams per cubic centimeter, what is the percent deviation (percentage of error) from the accepted value?

- A) 8.8% C) 13.6%
B) 30.0% D) 12.0%

37) While walking on a glacier, an observer makes several statements. Which statement is an inference?

- A) "The rocks on this glacier are of different sizes."
- B) "There are many cracks in this glacier."
- C) "Some parts of this glacier will start melting this spring."
- D) "Some of the snow on this glacier is powdery."

38) If each side of the cube shown below has the same length as the measured side, what is the approximate volume of the cube?



- A) 2.20 cm³ C) 10.65 cm³
B) 4.84 cm³ D) 6.60 cm³

39) A scientist who is studying a stream would have the most difficulty determining the stream's

- A) transported sediment size
- B) velocity
- C) age in years
- D) temperature

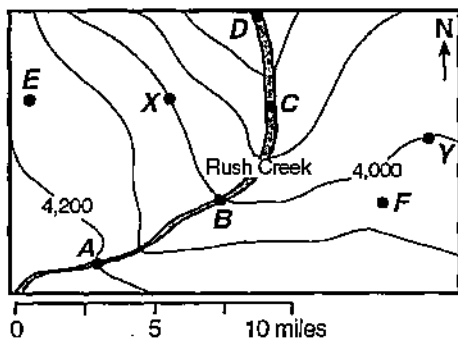
40) Water has its greatest density at a temperature of

- A) 32°C C) 4°C
B) 10°C D) -6°C

- 57) The latitude and longitude of which location are *closest* to those of New York State?
 A) A B) B C) C D) D
- 58) What are the approximate latitude and longitude of location A?
 A) 105°S, 25°E C) 25°N, 105°W
 B) 105°N, 25°W D) 25°N, 105°E
- 59) According to the *Earth Science Reference Tables*, at which New York State location is the altitude of Polaris *closest* to 42°?
 A) Albany C) Mt. Marcy
 B) Slide Mt. D) Rochester

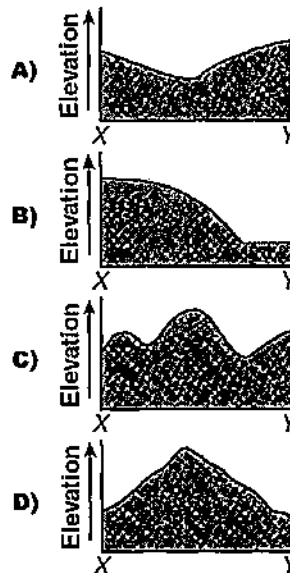
Questions 60 through 64 refer to the following:

Points A, B, C, D, E, F, X, and Y are locations on the topographic map below. Elevation is measured in feet.



- 60) Between points C and D, Rush Creek flows toward the
 A) north C) west
 B) east D) south
- 61) Which locations have the *greatest* difference in elevation?
 A) E and Y C) C and F
 B) B and X D) A and D
- 62) What is the contour interval used on this map?
 A) 200 ft C) 100 ft
 B) 50 ft D) 20 ft
- 63) The gradient between points A and B is *closest* to
 A) 40 ft/mi C) 200 ft/mi
 B) 80 ft/mi D) 20 ft/mi

- 64) Which diagram *best* represents the profile along a straight line between points X and Y?



Questions 65 and 66 refer to the following:

The data table below shows the air pressures and air temperatures collected by nine observers at different elevations on the same side of a high mountain. The data was collected at 12:00 noon on a clear, calm day.

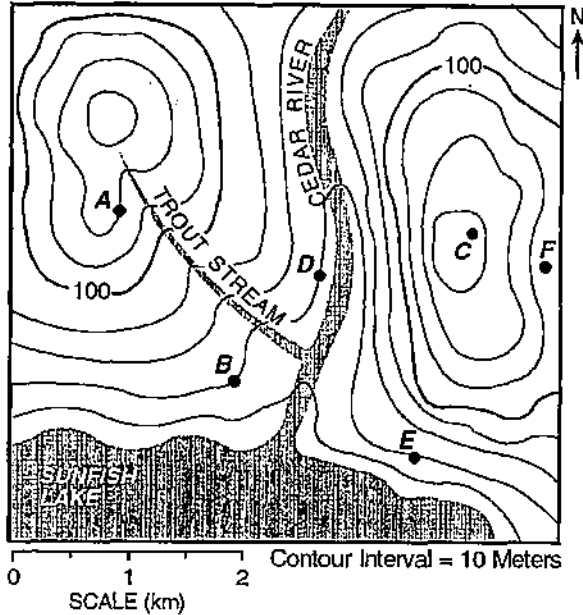
Station	Elevation (m)	Air Pressure (mb)	Air Temperature (°C)
1	SEA LEVEL	1,000	22
2	200	980	20
3	400	960	18
4	600	940	16
5	800	920	14
6	1,000	900	12
7	1,200	880	10
8	1,400	860	9
9	1,600	840	8

- 65) From sea level to an elevation of 1,200 meters, air pressure decreased at the rate of
 A) 100.0 mb/m C) 0.1 mb/m
 B) 10.0 mb/m D) 1.0 mb/m

15

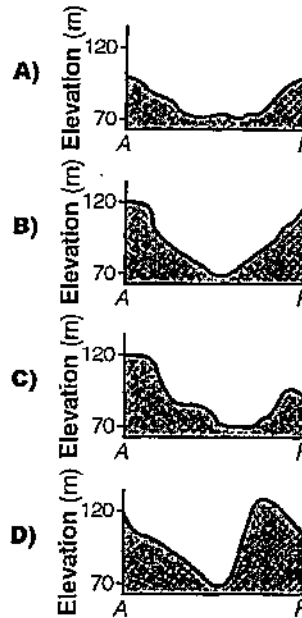
Questions 71 through 75 refer to the following:

The diagram below represents a contour map. Points A through F represent locations on the map.



- 71) If no elevation values were given, which general rule could be used to establish that Cedar River flows into Sunfish Lake?
- A) Rivers shown on maps generally flow southward.
 - B) Rivers always flow toward large bodies of water.
 - C) A large body of water is generally the source of water for a river.
 - D) Contour lines bend upstream when crossing a river.

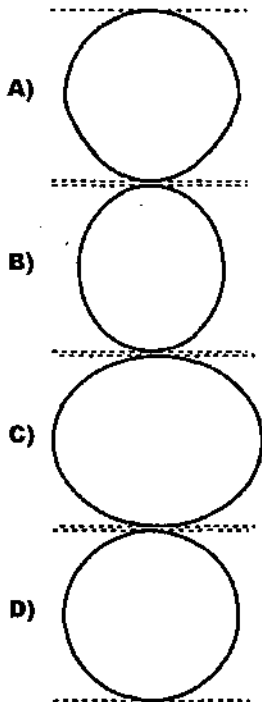
- 72) Which diagram best represents the topographic profile from location A to location F?



- 73) Which statement about hill C is best supported by the map?
- A) The steepest slope of hill C is on the western side.
 - B) Hill C has been shaped by glaciers.
 - C) Hill C is located approximately 2 km west of the Cedar River.
 - D) The highest possible elevation of hill C is 179 m.
- 74) What is the most likely elevation of the surface of Sunfish Lake?
- A) 151 m
 - B) 140 m
 - C) 28 m
 - D) 55 m
- 75) Which location has the same elevation as location D?
- A) F
 - B) A
 - C) E
 - D) C
- 76) From which measurement could the circumference of the Earth be determined?
- A) the period of a Foucault pendulum at two different locations
 - B) gravity at the poles and at the Equator
 - C) the altitude of Polaris at midnight above the northern horizon from one location
 - D) the Sun's altitude at noon from two different locations at the same longitude

16

92) Which diagram most accurately shows the cross-sectional shape of the Earth?



93) According to the *Earth Science Reference Tables*, as altitude increases from the tropopause to the mesopause, the atmospheric temperature will

- A) increase, then decrease
- B) decrease, only
- C) increase, only
- D) decrease, then increase

94) How are latitude and longitude lines drawn on a globe of the Earth?

- A) Longitude lines are parallel and latitude lines meet at the poles.
- B) Longitude lines are parallel and latitude lines meet at the Equator.
- C) Latitude lines are parallel and longitude lines meet at the Equator.
- D) Latitude lines are parallel and longitude lines meet at the poles.

95) To an observer on a ship at sea, at which latitude does the North Star appear *closest* to the horizon?

- A) 5° N
- B) 50° N
- C) 85° N
- D) 20° N

96) What is the difference in mean solar time between 30°N 75°W and 30°N 90°W?

- A) 1 hour
- B) 3 hours
- C) 6 hours
- D) 2 hours

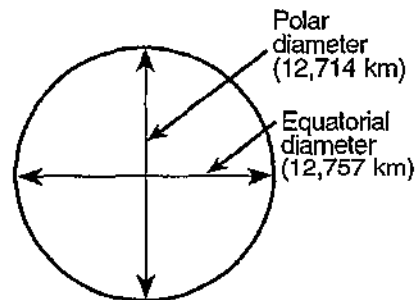
97) A contour map shows two locations, X and Y, 5 kilometers apart. The elevation at location X is 800 meters and the elevation at location Y is 600 meters. What is the gradient between the two locations? [Refer to the *Earth Science Reference Tables*.]

- A) 12 m/km
- B) 40 m/km
- C) 160 m/km
- D) 120 m/km

98) The actual polar diameter of the Earth is 12,714 kilometers. The equatorial diameter of the Earth is approximately

- A) 12,700 km
- B) 12,671 km
- C) 12,714 km
- D) 12,757 km

99) The diagram below represents the Earth's polar and equatorial diameters.



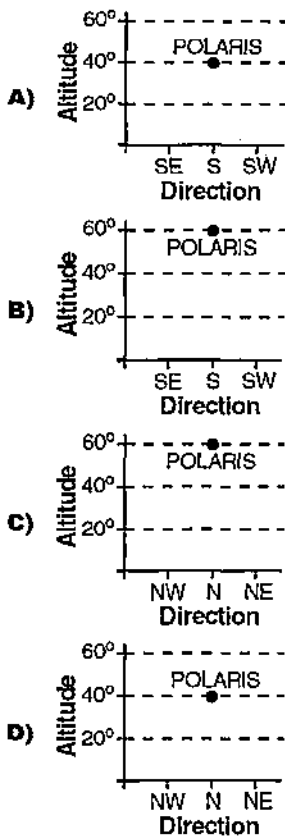
The Earth's polar circumference must be

- A) greater than the equatorial circumference
- B) less than the equatorial circumference
- C) the same as the equatorial circumference

100) Which list shows atmospheric layers in the correct order upward from the Earth's surface?

- A) thermosphere, mesosphere, stratosphere, troposphere
- B) thermosphere, troposphere, mesosphere, stratosphere
- C) stratosphere, mesosphere, troposphere, thermosphere
- D) troposphere, stratosphere, mesosphere, thermosphere

106) Which diagram *best* shows the altitude and direction of Polaris for an observer in New York City? [Refer to the *Earth Science Reference Tables.*]



107) A stream in New York State begins at a location 350 meters above sea level and flows into a swamp 225 meters above sea level. The length of the stream is 25 kilometers. What is the gradient of the stream?

- A) 12 m/km
- B) 5 m/km
- C) 9 m/km
- D) 17 m/km

108) The angle of the star Polaris above the northern horizon can be used to determine an observer's

- A) latitude
- B) solar time
- C) longitude
- D) local time

109) Measurements taken from space show the Earth to be

- A) greatest in diameter at the poles
- B) pear shaped
- C) a perfect sphere
- D) greatest in diameter at the Equator

110) Which object *best* represents a true scale model of the shape of the Earth?

- A) a football
- B) a Ping-Pong ball
- C) a pear
- D) an egg

111) Oxygen is the most abundant element by volume in the Earth's

- A) hydrosphere
- B) crust
- C) troposphere
- D) inner core

112) According to the *Earth Science Reference Tables*, what is the temperature of the atmosphere at the stratopause?

- A) -55°C
- B) 15°C
- C) -90°C
- D) 0°C

113) In which atmospheric layer is most water vapor found?

- A) troposphere
- B) mesosphere
- C) stratosphere
- D) thermosphere

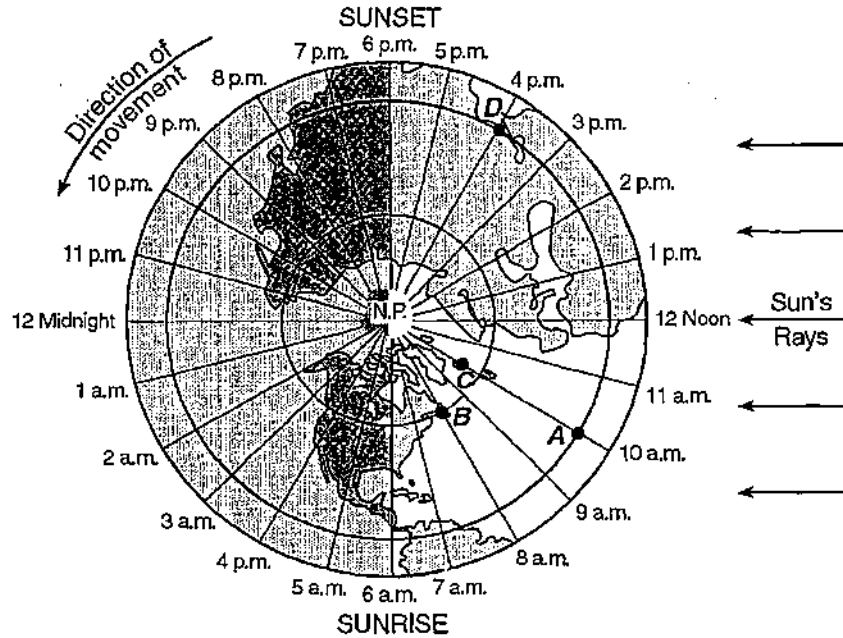
114) From which set of polar and equatorial diameters can the actual shape of the Earth be inferred?

- A) polar diameter = 12,714 km, equatorial diameter = 12,714 km
- B) polar diameter = 12,714 km, equatorial diameter = 12,756 km
- C) polar diameter = 12,756 km, equatorial diameter = 12,714 km
- D) polar diameter = 12,756 km, equatorial diameter = 12,756 km

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Questions 152 through 154 refer to the following:

The map below represents a view of the Earth looking down from above the North Pole (N.P.), showing the Earth's 24 standard time zones. The Sun's rays are striking the Earth from the right. Points A, B, C, and D are locations on the Earth's surface.



152) Which two points have the same longitude?

- A) B and C
- B) A and D
- C) A and C
- D) B and D

153) At which position would the altitude of the North Star (Polaris) be *greatest*?

- A) A
- B) B
- C) C
- D) D

154) Areas within a time zone generally keep the same standard clock time. In degrees of longitude, approximately how wide is one standard time zone?

- A) $23\frac{1}{2}^\circ$
- B) 15°
- C) $7\frac{1}{2}^\circ$
- D) 30°