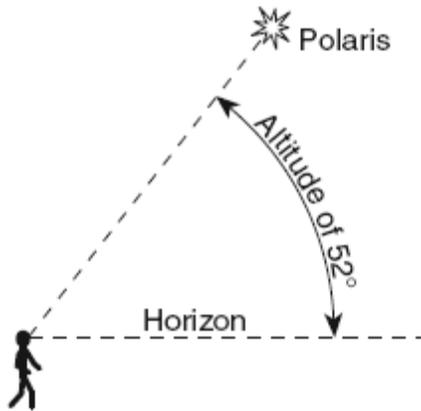


1. The diagram below shows an observer on Earth viewing the star *Polaris*.



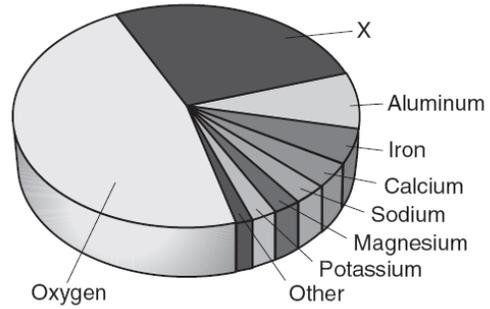
What is this observer's latitude?

- (1) 38° N (3) 52° N
 (2) 38° S (4) 52° S

2. Oxygen is the most abundant element by volume in Earth's

- (1) inner core (3) hydrosphere
 (2) troposphere (4) crust

3. The pie graph below shows the elements comprising Earth's crust in percent by mass.



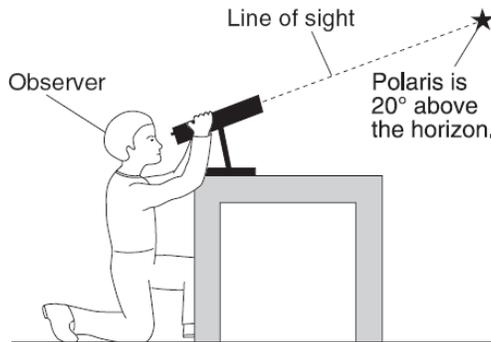
Which element is represented by the letter X?

- (1) silicon (3) nitrogen
 (2) lead (4) hydrogen

4. The two elements that make up the largest percentage by mass of Earth's crust are oxygen and

- (1) silicon (3) hydrogen
 (2) potassium (4) nitrogen

The diagram below shows an observer measuring the altitude of *Polaris*.



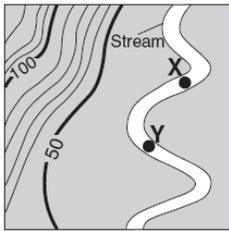
(Not drawn to scale)

5. What is the latitude of the observer?

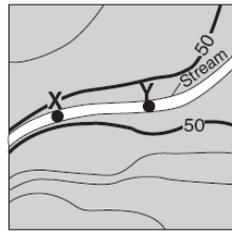
- (1) 20° N (3) 70° N
 (2) 20° S (4) 70° S

The four streams shown on the topographic maps below have the same volume between X and Y. The distance from X to Y is also the same. All the maps are drawn to the same scale and have the same contour interval.

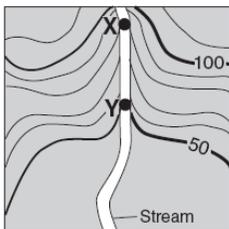
6. Which map shows the stream with the greatest velocity between points X and Y?



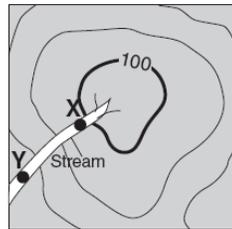
(1)



(3)



(2)

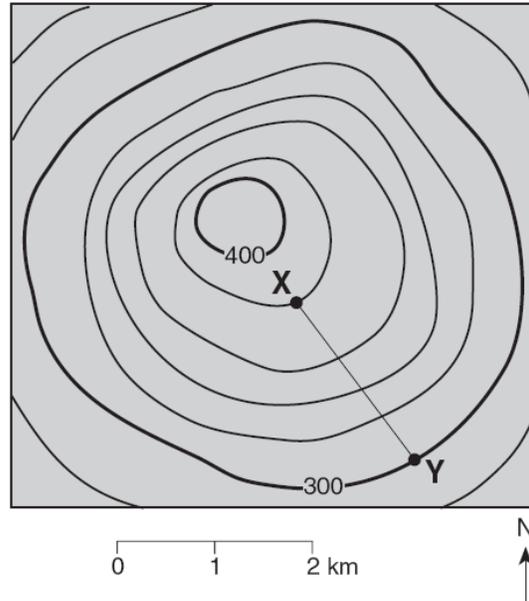


(4)

7. What is the inferred temperature at the boundary between Earth's stiffer mantle and outer core?

- (1) 2,500°C
- (2) 4,500°C
- (3) 5,000°C
- (4) 6,200°C

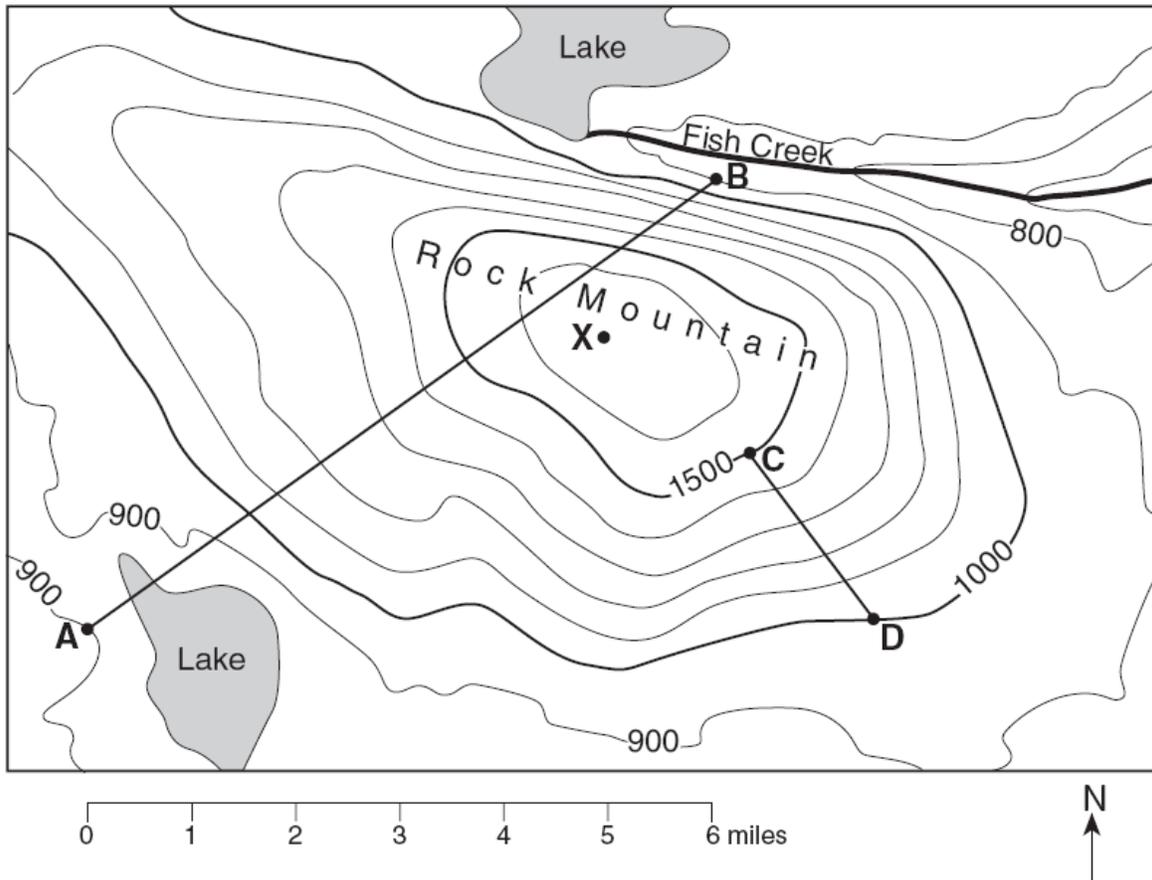
The topographic map below shows a hill. Points X and Y represent locations on the hill's surface. Elevations are shown in meters.



8. What is the gradient between points X and Y?

- (1) 40 m/km
- (2) 80 m/km
- (3) 100 m/km
- (4) 120 m/km

Base your answers to questions 9 through 11 on the topographic map below. Points A, B, C, D, and X represent locations on the map. Elevations are measured in feet.



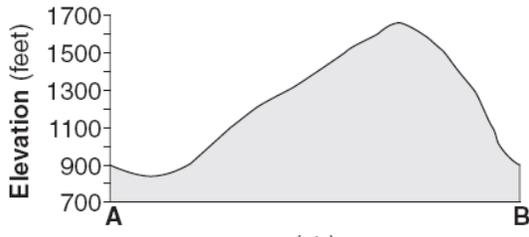
9 What is the highest possible elevation of point X on Rock Mountain?

- (1) 1,599 ft
- (2) 1,600 ft
- (3) 1,601 ft
- (4) 1,699 ft

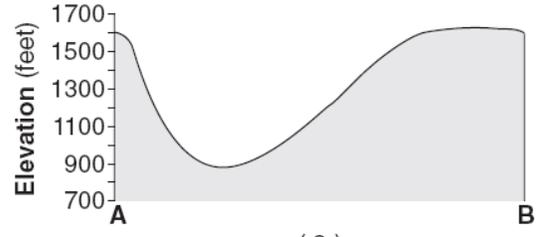
10 What is the average gradient of the slope along straight line CD?

- (1) 100 ft/mi
- (2) 250 ft/mi
- (3) 500 ft/mi
- (4) 1,000 ft/mi

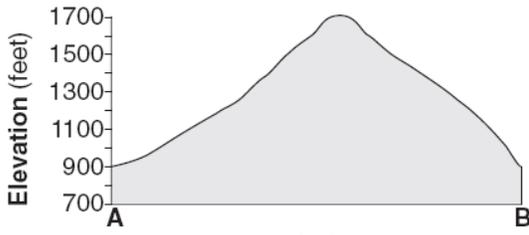
11 Which cross section best represents the profile along straight line AB?



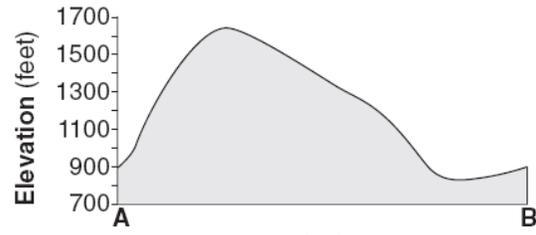
(1)



(3)

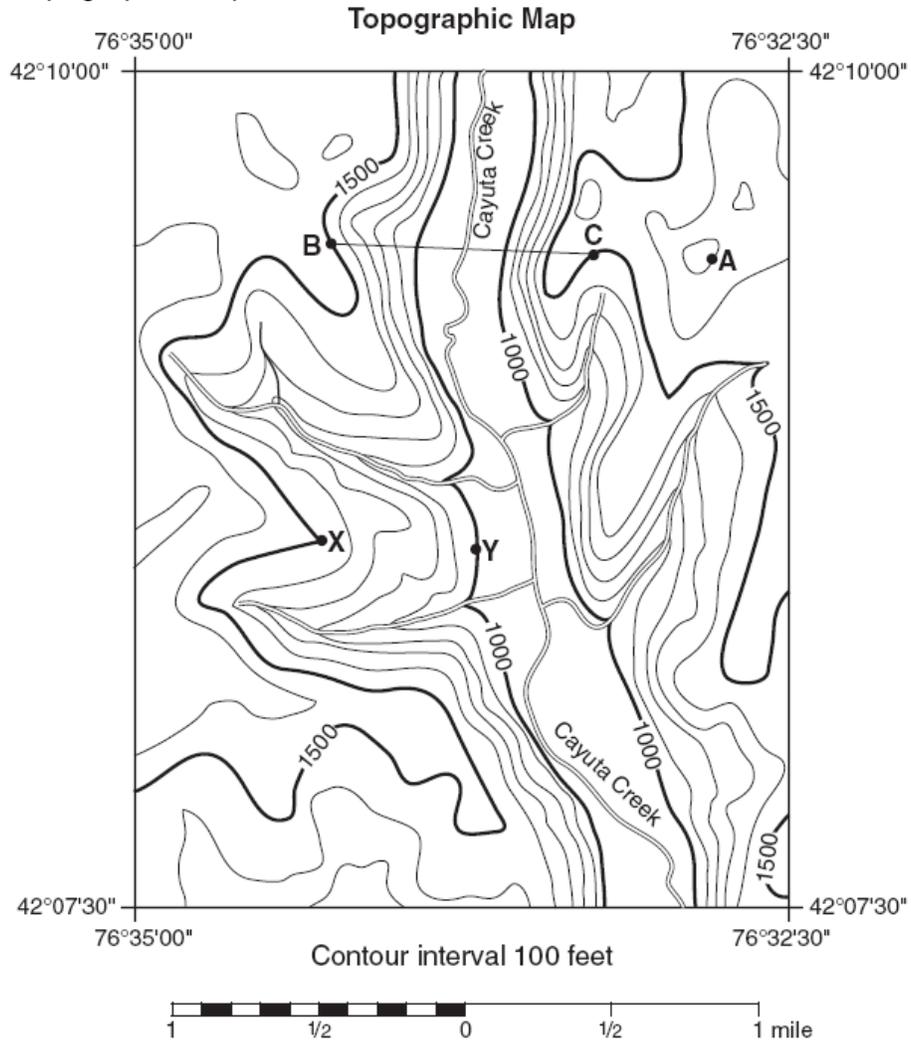


(2)

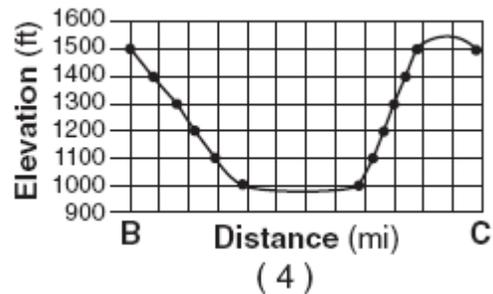
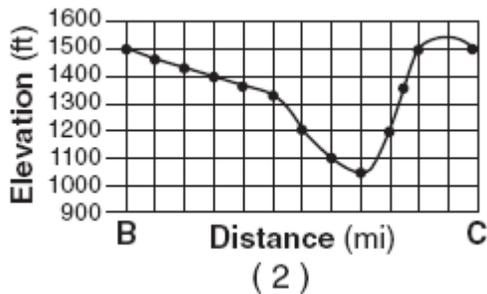
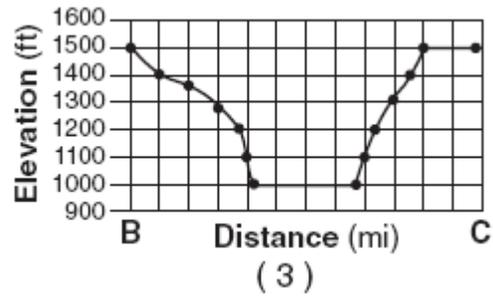
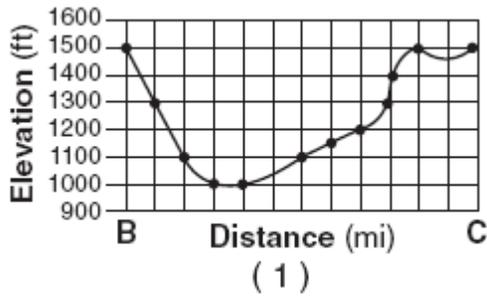


(4)

Base your answers to questions 12 through 16 on the maps below. Points A, B, C, X, and Y are locations on the topographic map. The small map identifies the New York State region shown in the topographic map.



12 Which graph best represents the profile from point B to point C?



13 What is the elevation of point A on the topographic map?

- (1) 1,700 ft (3) 1,600 ft
- (2) 1,650 ft (4) 1,550 ft

14 What is the approximate gradient between point X and point Y?

- (1) 100 ft/mi (3) 500 ft/mi
- (2) 250 ft/mi (4) 1,000 ft/mi

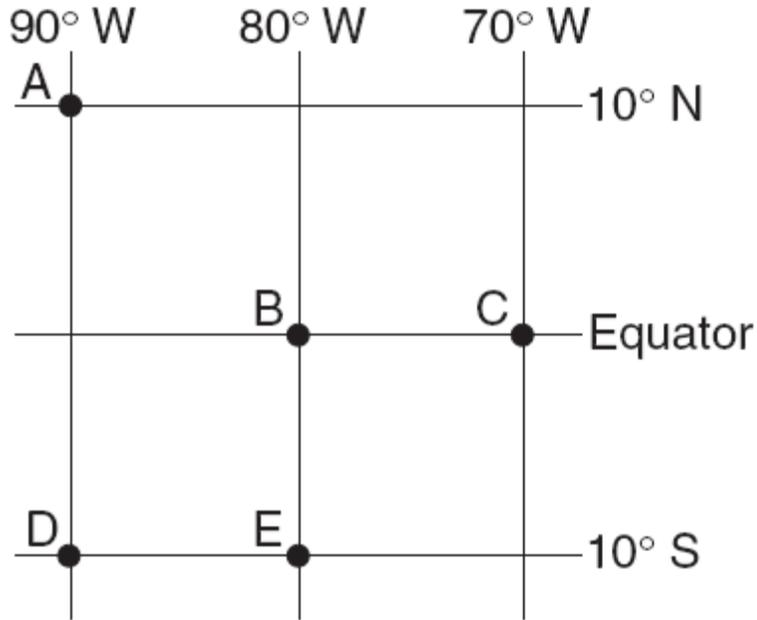
15 At the end of the Ice Age, the valley now occupied by Cayuta Creek was a channel for southward flowing glacial meltwater. Into which present-day river valley did this meltwater most likely flow?

- (1) Hudson River
- (2) Genesee River
- (3) Delaware River
- (4) Susquehanna River

16 Which evidence best supports the inference that the meltwater river that once occupied the Cayuta Creek valley was larger than the modern Cayuta Creek?

- (1) The modern Cayuta Creek occupies a Vshaped valley.
- (2) The valley floor is wider than the modern Cayuta Creek.
- (3) The modern Cayuta Creek lacks meanders and a flood plain.
- (4) The tributary streams meet the modern Cayuta Creek at nearly right angles.

Base your answers to questions 17 and 18 on the map below, which shows the latitude and longitude of five observers, A, B, C, D, and E, on Earth.



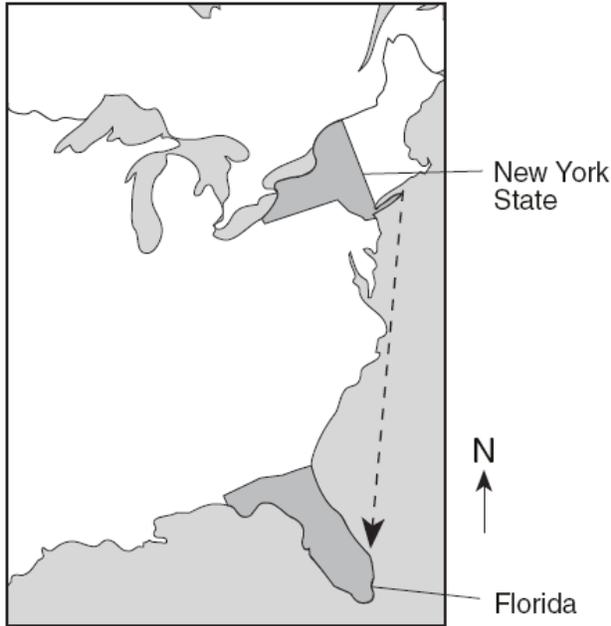
17 What is the altitude of *Polaris* (the North Star) above the northern horizon for observer A?

- (1) 0°
- (2) 10°
- (3) 80°
- (4) 90°

18 Which two observers would be experiencing the same apparent solar time?

- (1) A and C
- (2) B and C
- (3) B and E
- (4) D and E

The dashed line on the map below shows a ship's route from Long Island, New York, to Florida. As the ship travels south, the star *Polaris* appears lower in the northern sky each night.



19 The best explanation for this observation is that *Polaris*

- (1) rises and sets at different locations each day
- (2) has an elliptical orbit around Earth
- (3) is located directly over Earth's Equator
- (4) is located directly over Earth's North Pole

20 When the time of day for a certain ship at sea is 12 noon, the time of day at the Prime Meridian (0° longitude) is 5 p.m. What is the ship's longitude?

- (1) 45° W (3) 75° W
- (2) 45° E (4) 75° E

The diagram below shows the latitude-longitude grid on an Earth model. Points A and B are locations on the surface.

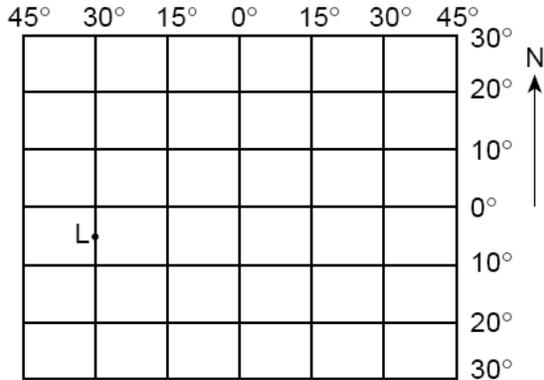


21 On Earth, the solar time difference between point A and point B would be

- (1) 1 hour (3) 12 hours
- (2) 5 hours (4) 24 hours

The diagram below represents part of Earth's latitude-longitude system.

22 What is the latitude and longitude of point *L*?



- (1) 5° E 30° N (3) 5° N 30° E
 (2) 5° W 30° S (4) 5° S 30° W

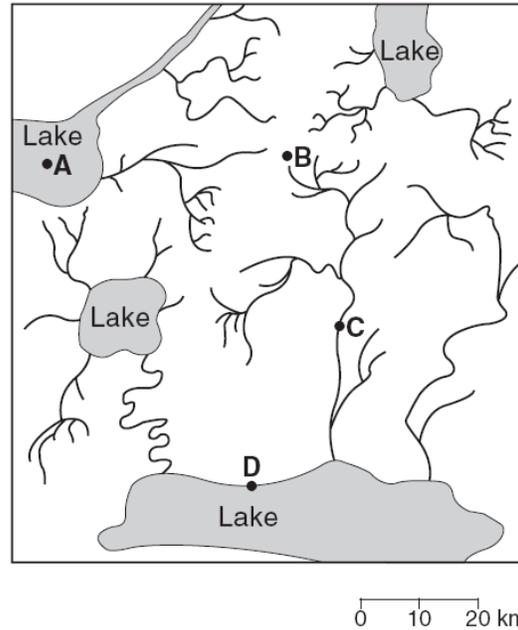
23 The length of an Earth year is based on Earth's

- (1) rotation of 15°/hr
 (2) revolution of 15°/hr
 (3) rotation of approximately 1°/day
 (4) revolution of approximately 1°/day

24 What time is it in Greenwich, England (at 0° longitude), when it is noon in Massena, New York?

- (1) 7 a.m. (3) 5 p.m.
 (2) noon (4) 10 p.m.

The map below shows the stream drainage patterns for a region of Earth's surface. Points *A*, *B*, *C*, and *D* are locations in the region.



25 The highest elevation most likely exists at point

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

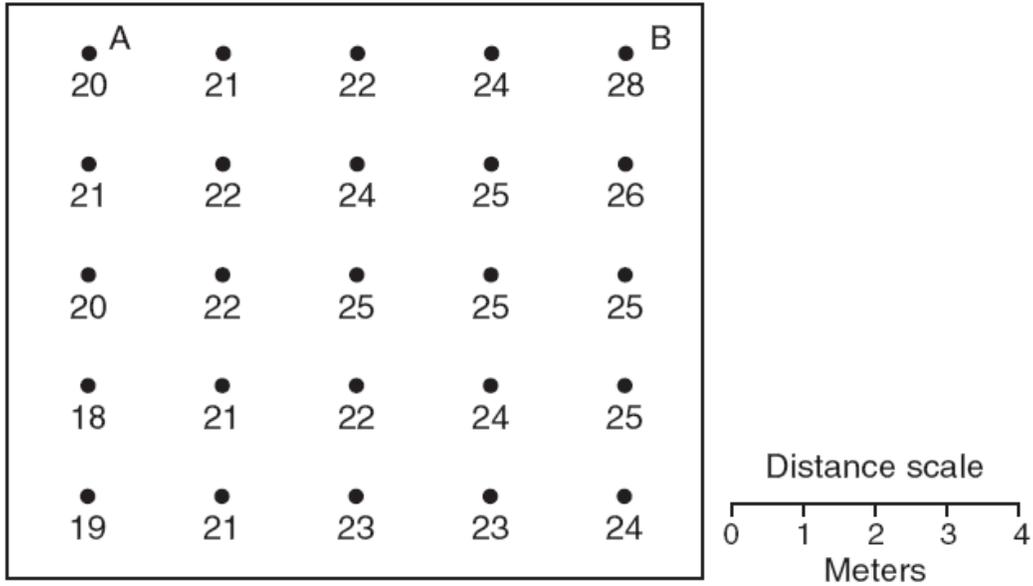
26 Earth's rate of rotation is approximately

- (1) 1° per day (3) 180° per day
 (2) 15° per day (4) 360° per day

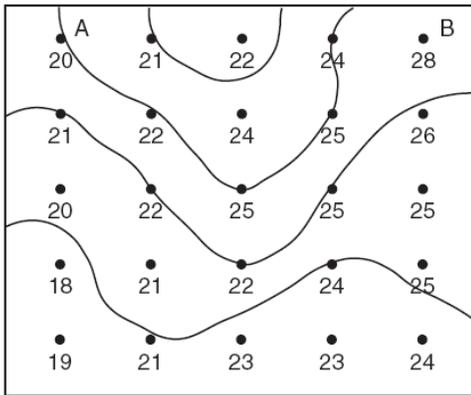
27 What is the approximate location of the Canary Islands hot spot?

- (1) 32° S 18° W (3) 32° N 18° W
 (2) 32° S 18° E (4) 32° N 18° E

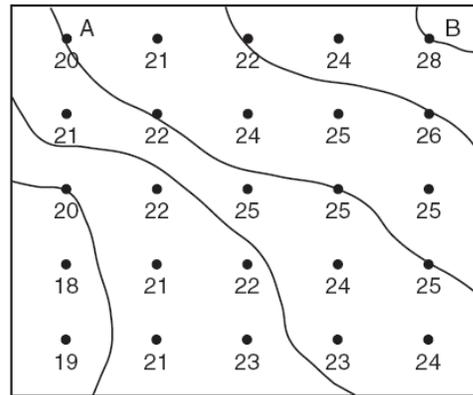
The field map below shows air temperature measurements, in degrees Celsius, taken at the same elevation within a closed room. Two reference points, *A* and *B*, are shown.



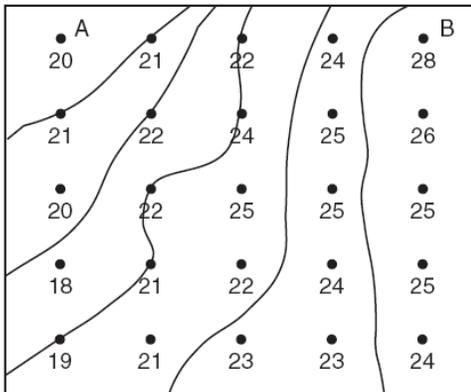
28 Which temperature field map shows correctly drawn isotherms?



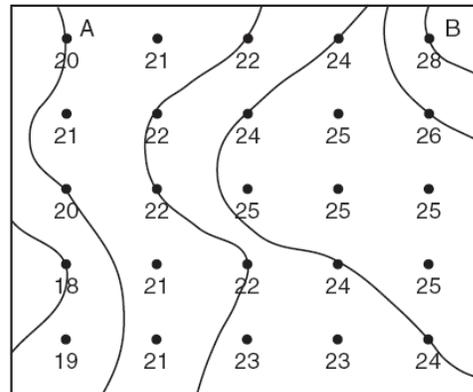
(1)



(3)

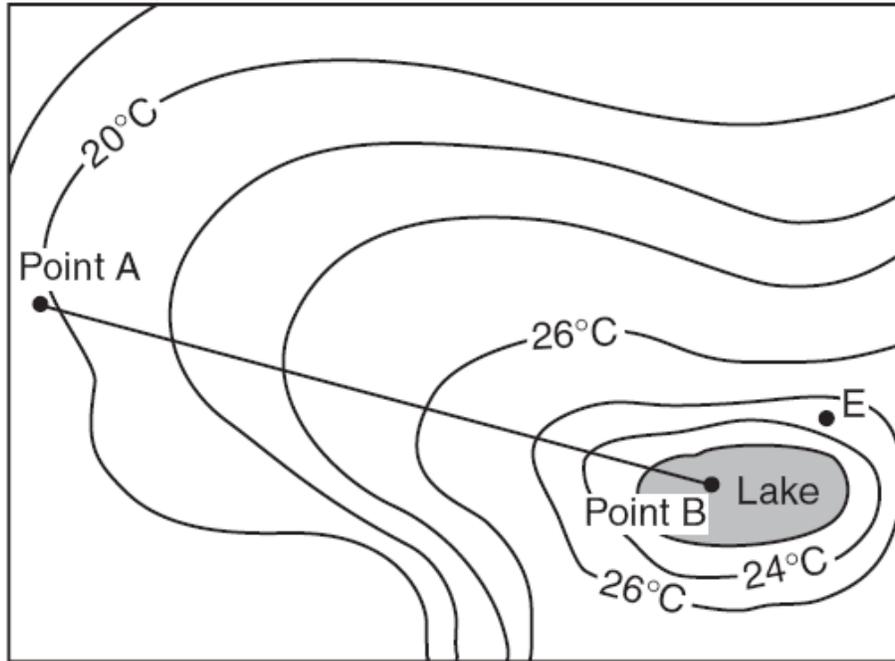


(2)

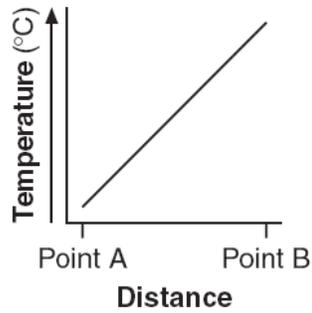


(4)

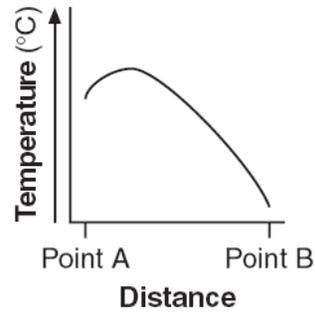
The temperature field map below represents surface air temperatures within a park. The location of a lake within the park is also indicated.



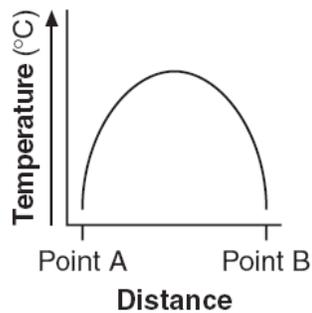
29 Which graph best represents the temperature profile along a straight line from point A to point B?



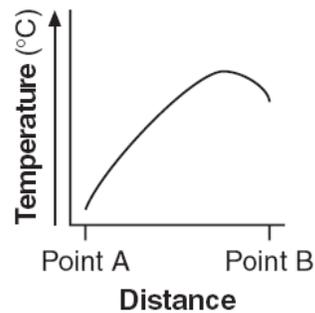
(1)



(3)

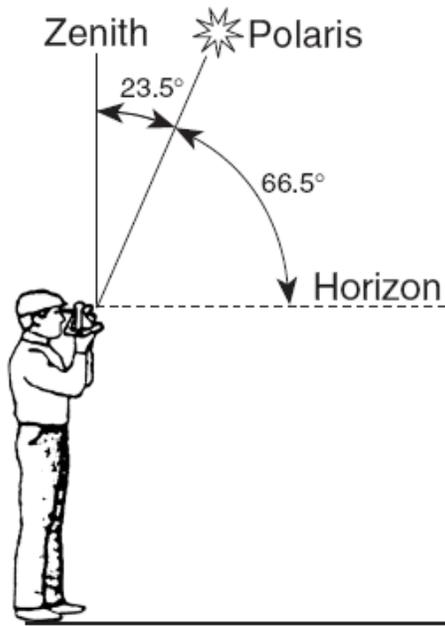


(2)



(4)

The diagram below shows an observer on Earth measuring the altitude of *Polaris*.

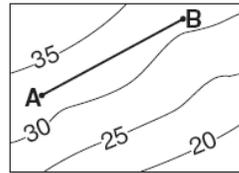


30 What is the latitude of this observer?

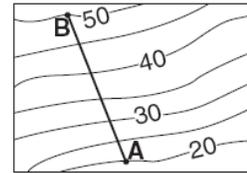
- (1) 90° N
- (2) 66.5° N
- (3) 43° N
- (4) 23.5° N

On each topographic map below, the straight-line distance from point A to point B is 5 kilometers.

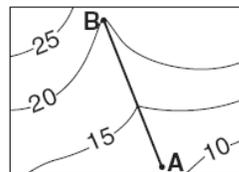
31 Which topographic map shows the steepest gradient between A and B?



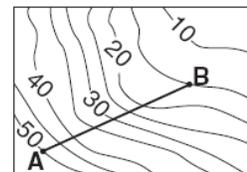
(1)



(3)

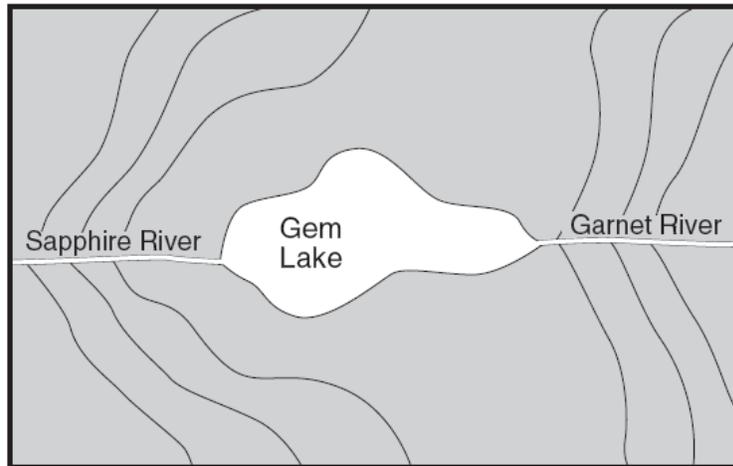


(2)



(4)

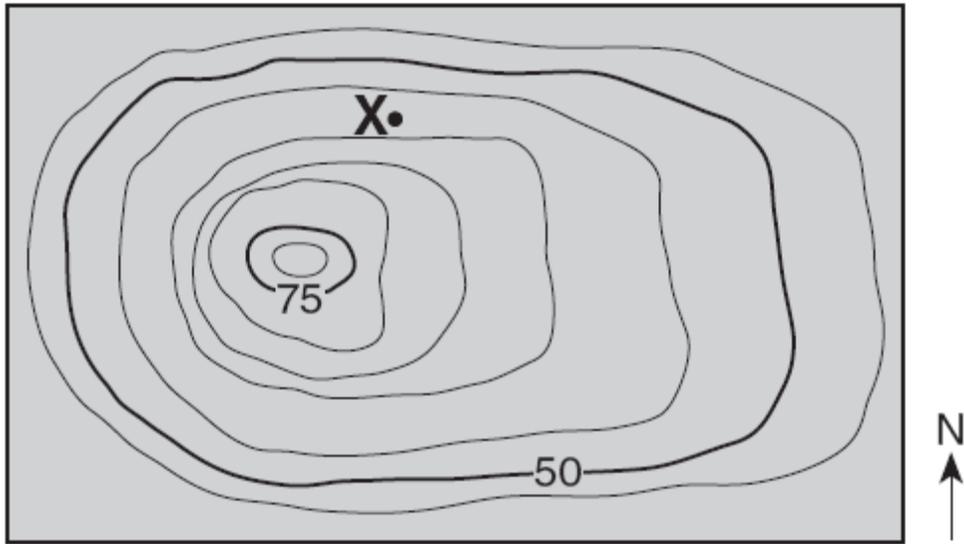
The topographic map below shows a lake and two rivers.



32 In which direction does each of the rivers flow?

- (1) The Sapphire River and the Garnet River both flow east.
- (2) The Sapphire River and the Garnet River both flow west.
- (3) The Sapphire River flows east and the Garnet River flows west.
- (4) The Sapphire River flows west and the Garnet River flows east.

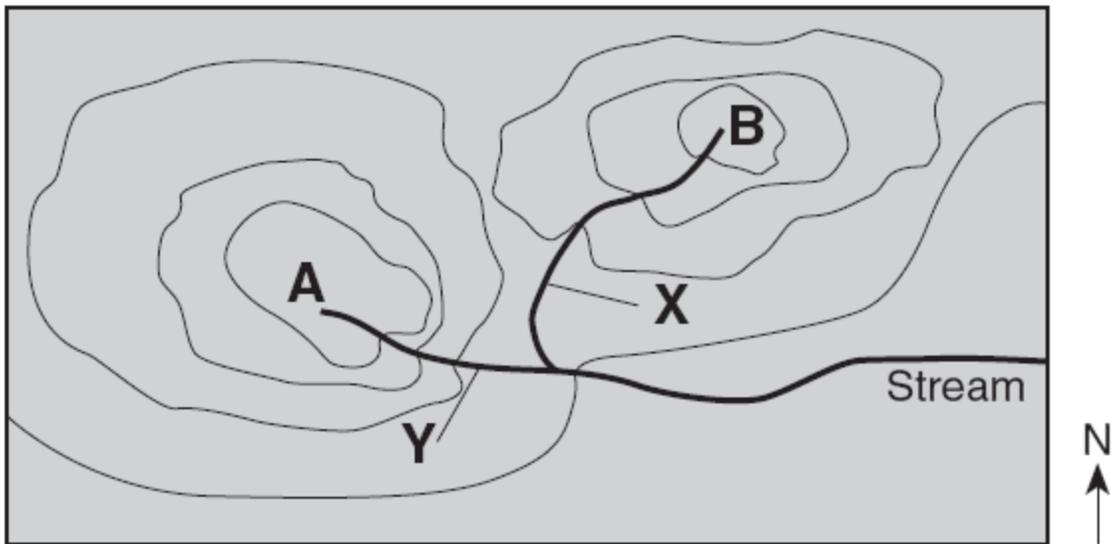
Point X is a location on the topographic map below. Elevations are measured in meters.



33 What is a possible elevation, in meters, of point X?

- (1) 55
- (2) 57
- (3) 68
- (4) 70

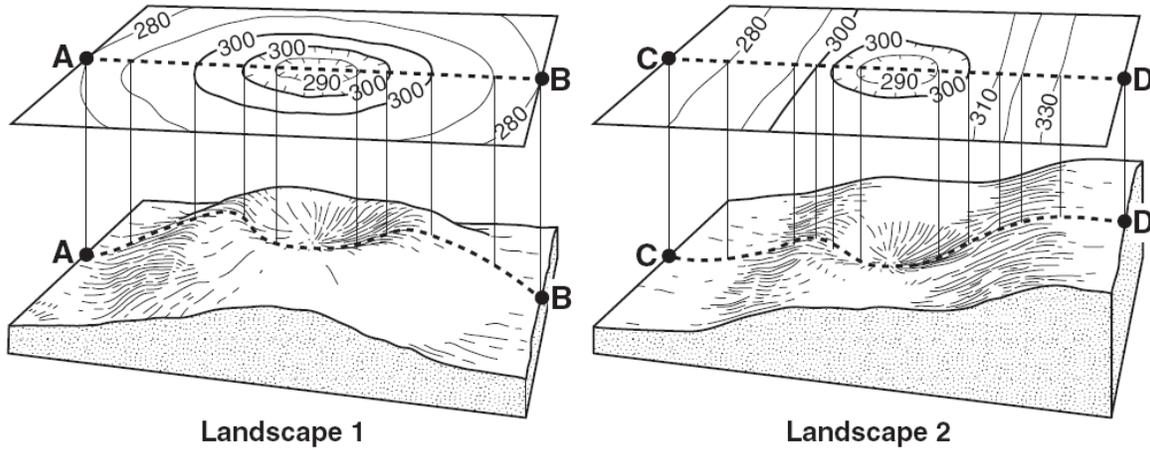
The topographic map below shows two hills labeled A and B. The tributary streams labeled X and Y have the same volume of water.



34 Which statement is best supported by the map?

- (1) Hill A is higher than hill B.
 - (2) Hill B is higher than hill A.
 - (3) Stream X flows faster than stream Y.
 - (4) Stream Y flows faster than stream X.
-

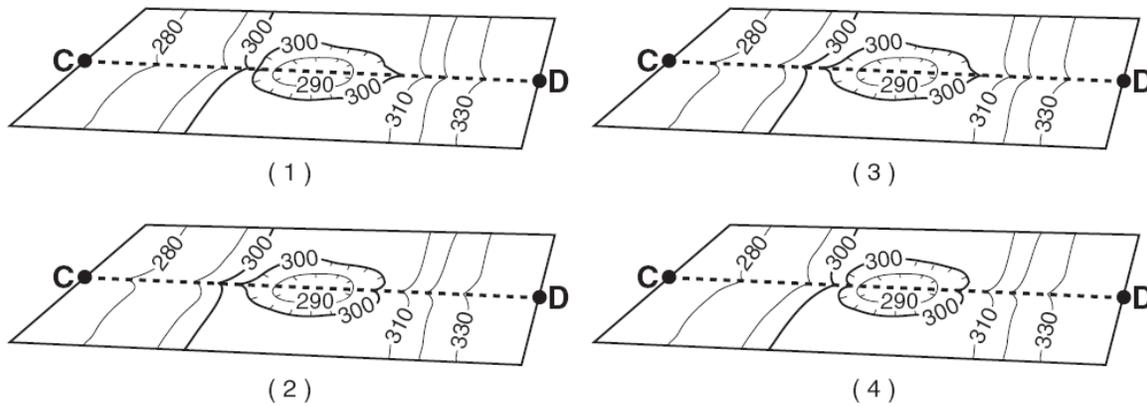
Base your answers to questions 35 and 36 on the topographic maps and block diagrams of two landscape regions shown below. The block diagrams show a three-dimensional view of the topographic maps directly above them. Elevations are measured in feet. Points *A*, *B*, *C*, and *D* are locations on Earth's surface.



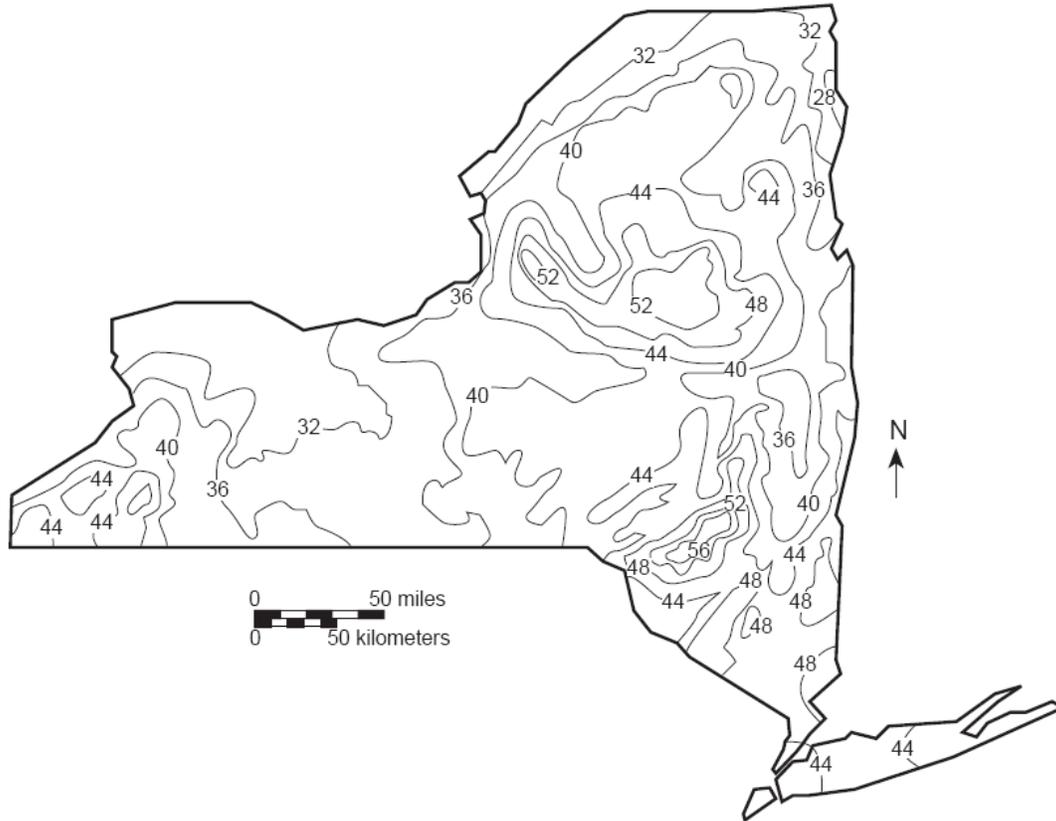
35 Which contour interval is used on both topographic maps?

- (1) 10 ft
- (2) 20 ft
- (3) 30 ft
- (4) 40 ft

36 A stream begins to flow downhill from point *D* toward the depression. After a period of time, the depression fills with water. Overflowing water from the depression moves downhill toward point *C*. Which topographic map shows the most likely resulting change in the contour lines?



Base your answers to questions 37 and 38 on the field map below, which shows the average annual precipitation in New York State for the past 25 years. Isoline values represent inches per year.



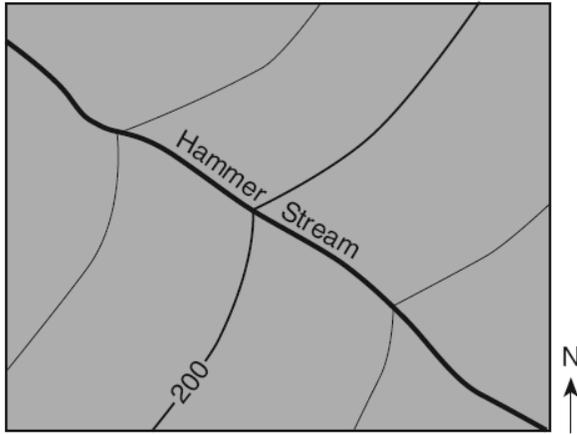
37 Jamestown received more rainfall per year than Elmira. A reason for this difference is that Jamestown is located

- (1) closer to a large body of water
- (2) at a higher latitude
- (3) at a lower elevation
- (4) in the prevailing southerly wind belt

38 Which of these locations had the *lowest* average annual precipitation?

- (1) Kingston
- (2) New York City
- (3) Old Forge
- (4) Plattsburgh

The topographic map below shows part of a stream.



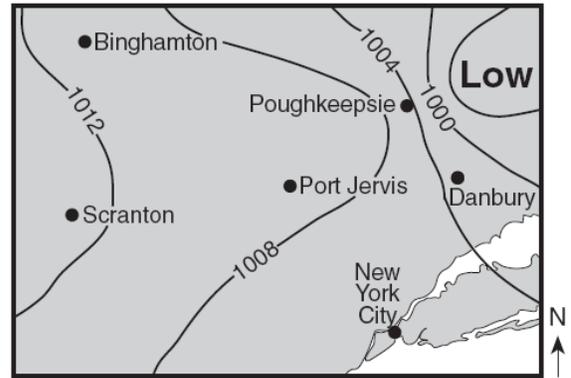
39 In which general direction is the stream flowing?

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

40 The approximate latitude of Utica, New York, is

- (1) 43°05' N
- (2) 43°05' S
- (3) 75°15' E
- (4) 75°15' W

Base your answers to questions 41 and 42 on the weather map below, which shows a low-pressure system centered near Poughkeepsie, New York. Isobars shown are measured in millibars.



41 Which city is most likely experiencing winds of the greatest velocity?

- (1) New York City
- (2) Binghamton
- (3) Poughkeepsie
- (4) Scranton

42 Surface winds are most likely blowing from

- (1) Danbury toward New York City
- (2) Poughkeepsie toward Scranton
- (3) Binghamton toward Danbury
- (4) Port Jervis toward Binghamton

42 From which New York State location would *Polaris* be observed to have an altitude closest to 43° above the northern horizon?

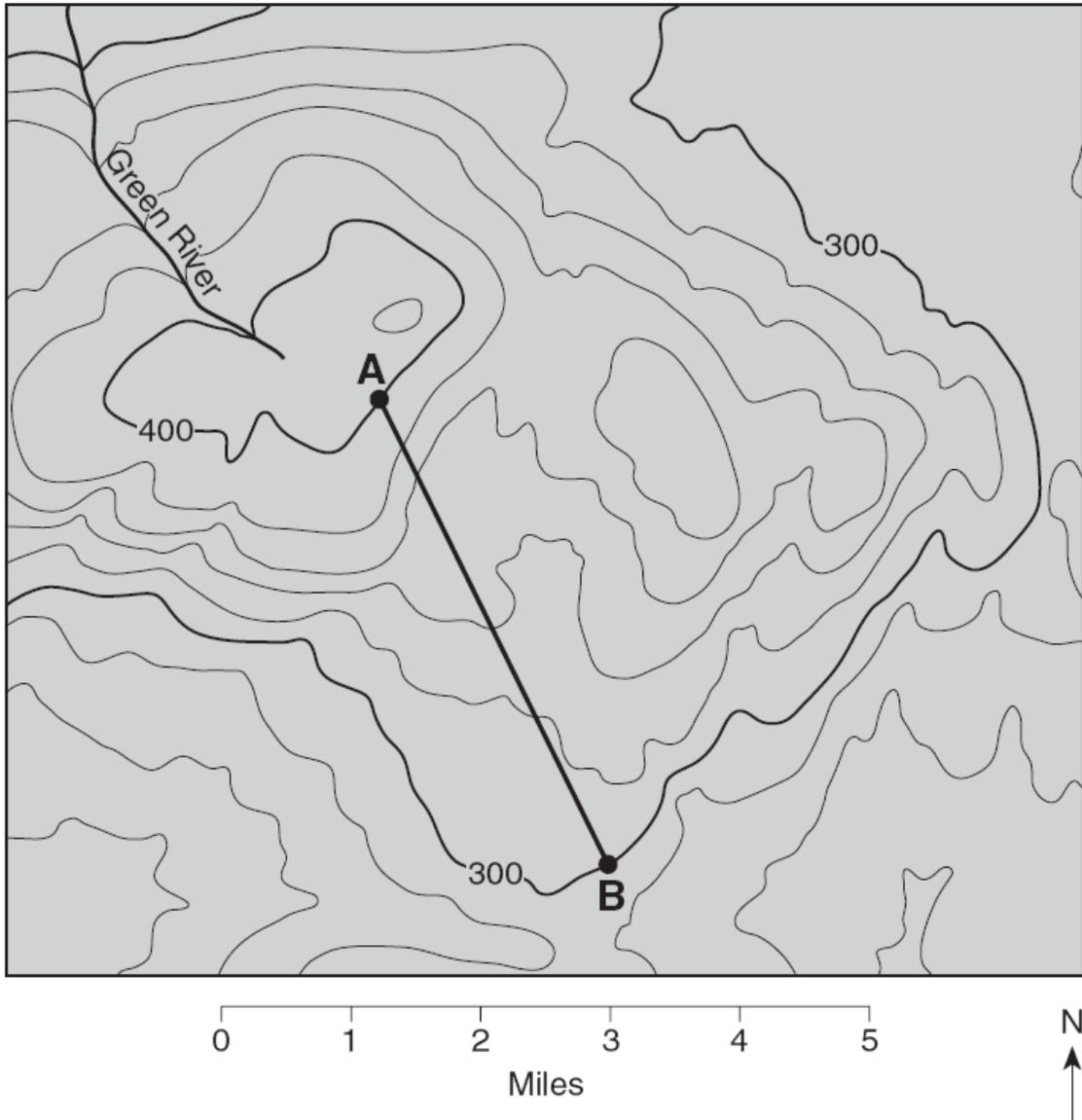
- (1) Binghamton
- (2) Utica
- (3) Watertown
- (4) New York City

Base your answers to questions 43 and 44 on the isoline map below, which shows the average yearly precipitation, in inches, across New York State.



- 43 Which New York State landscape region receives the greatest average yearly precipitation?
- (1) Catskills (3) Adirondack Mountains
(2) Tug Hill Plateau (4) Taconic Mountains
- 44 Approximately how many inches of average yearly precipitation does Rochester, New York, receive?
- (1) 26 (3) 38
(2) 30 (4) 42
-

Base your answers to questions 45 through 48 on the topographic map below. Elevations are in feet. Points *A* and *B* are locations on the map.



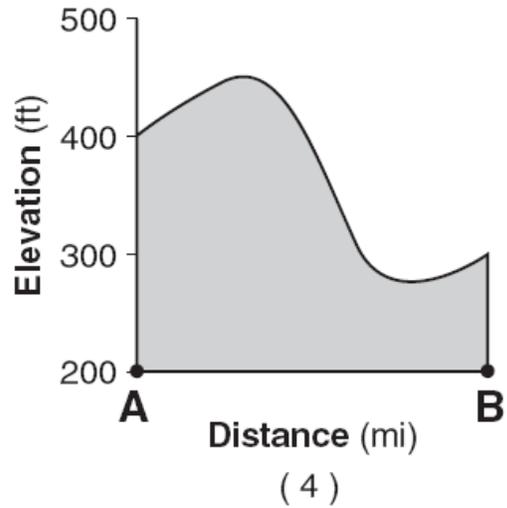
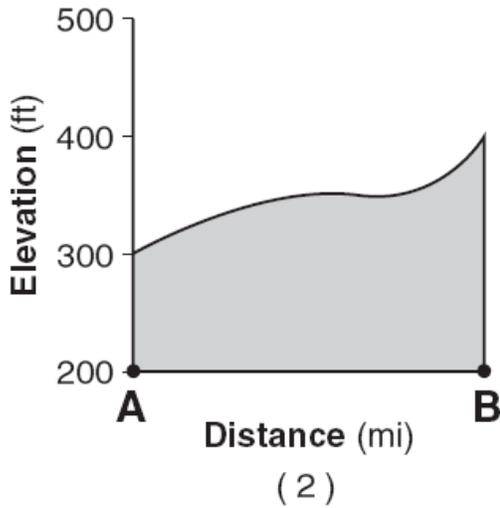
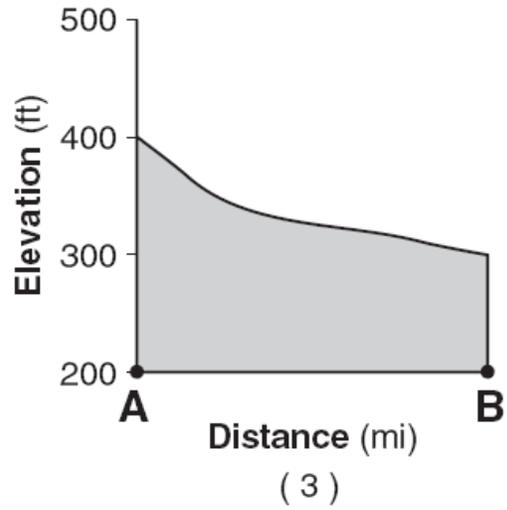
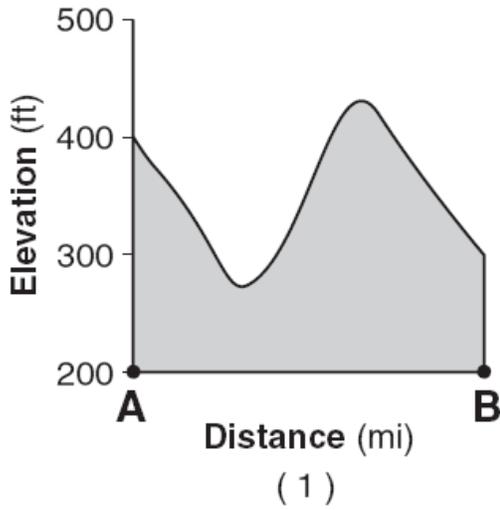
45 Toward which direction does the Green River flow?

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

46 What is the gradient along the straight line between points *A* and *B*?

- (1) 10 ft/mi
- (2) 20 ft/mi
- (3) 25 ft/mi
- (4) 35 ft/mi

47 Which graph best represents the profile along line AB?

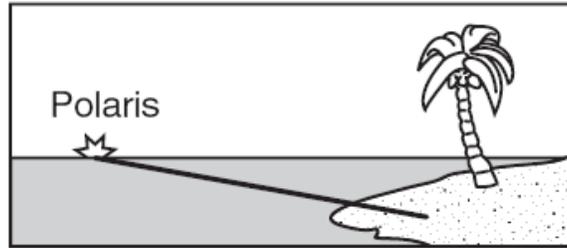


48 What evidence can be used to determine that the land surface in the northeast corner of the map is relatively flat?

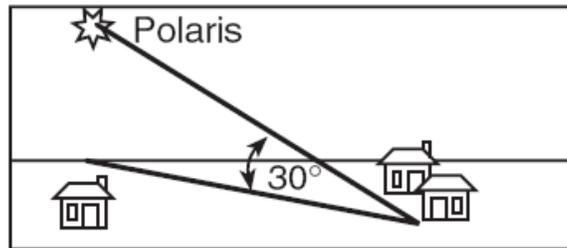
- (1) a rapidly flowing river
- (2) a large region covered by water
- (3) the dark contour line labeled 300
- (4) the absence of many contour lines

49 Which statement about *Polaris* is best illustrated by the diagrams shown below?

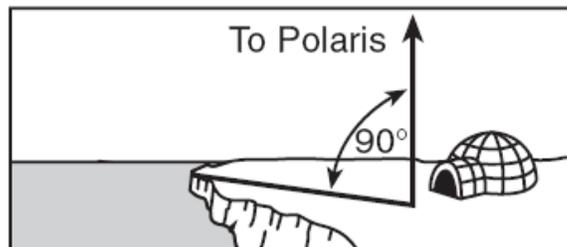
At Equator



At New Orleans, Louisiana

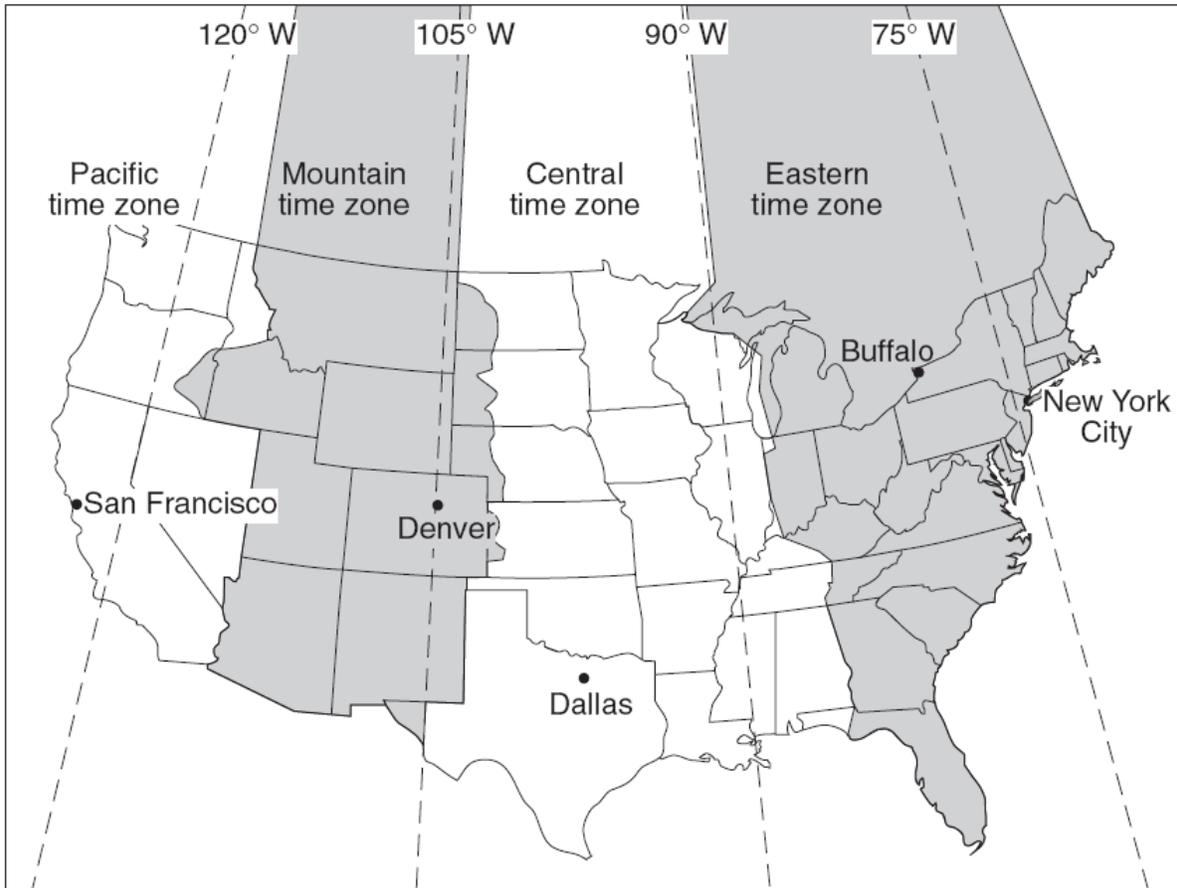


At North Pole



- (1) *Polaris* is located in a winter constellation.
 - (2) *Polaris* is located at the zenith at each location.
 - (3) *Polaris*' apparent movement through the sky follows a south-to-north orientation.
 - (4) *Polaris*' altitude is equal to a location's latitude.
-

Base your answers to questions 50 and 51 on the United States time zone map shown below. The dashed lines represent meridians (lines of longitude).



51 If the time in Buffalo, New York, is 5 a.m., what time would it be in San Francisco, California?

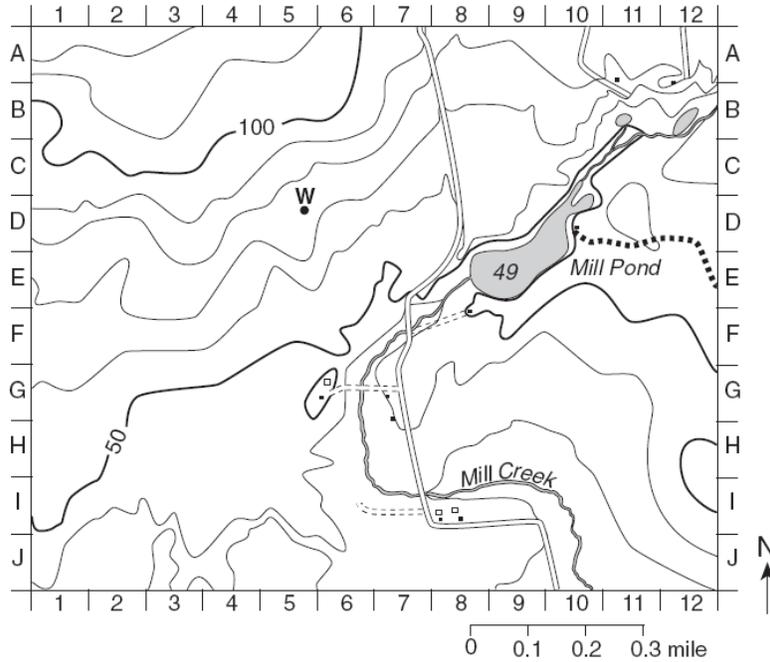
- (1) 8 a.m.
- (2) 2 a.m.
- (3) 3 a.m.
- (4) 4 a.m.

52 The basis for the time difference between adjoining time zones is Earth's

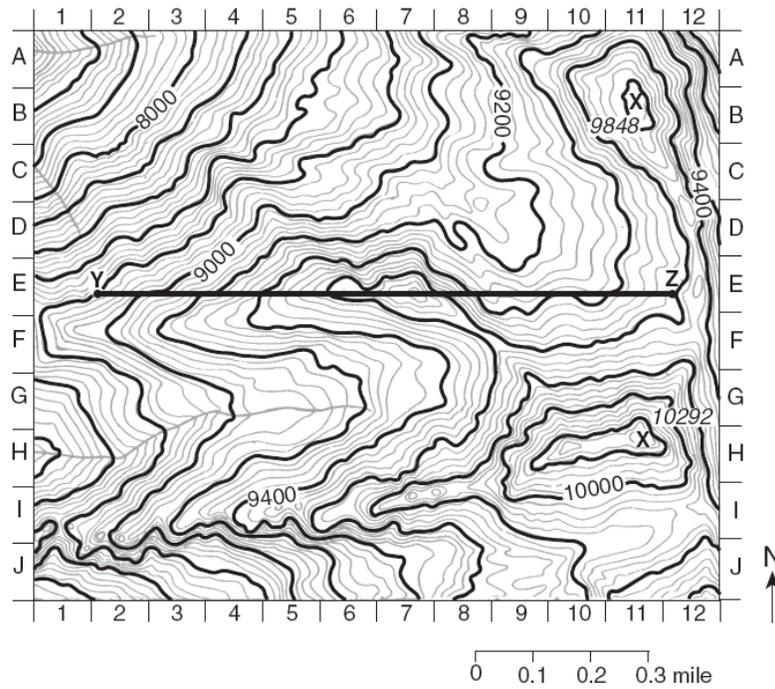
- (1) 1° per hour rate of revolution
 - (2) 1° per hour rate of rotation
 - (3) 15° per hour rate of revolution
 - (4) 15° per hour rate of rotation
-

Base your answers to questions 53 through 56 on the two topographic maps below. A grid system of numbers and letters appears along the edge of each map to help locate features. Both maps show elevations in feet above sea level.

Map A



Map B



53 Which statement correctly describes one difference between these maps?

- (1) Map A has a greater relief (elevation change between high and low locations) than map B.
- (2) Map A represents a much larger surface area than map B.
- (3) Map A shows more contour lines than map B.
- (4) Map A generally shows gentler slopes than map B.

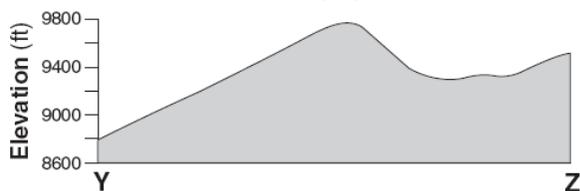
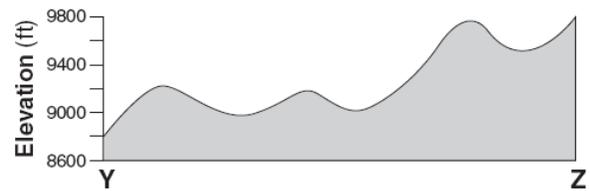
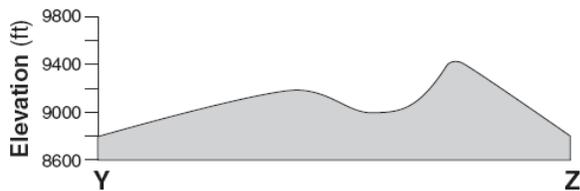
54 On map B, what is the approximate straight-line distance from the center of the X within grid area B-11 to the center of the X within grid area H-11?

- (1) 0.3 mi
- (2) 0.6 mi
- (3) 1.2 mi
- (4) 1.5 mi

55 Which direction is the stream mainly flowing within grid area H-1 on map B?

- (1) northward
- (2) southward
- (3) eastward
- (4) westward

56 Which cross section best represents the topographic profile along the straight line from point Y to point Z on map B?



57 As a ship crosses the Prime Meridian, an observer on the ship measures the altitude of *Polaris* at 60°.

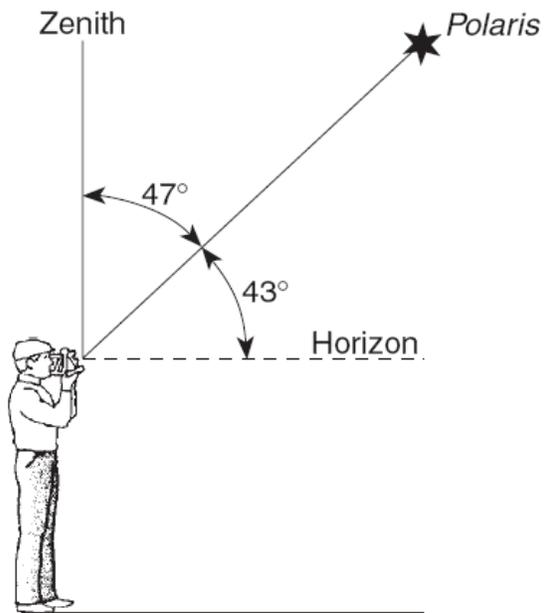
What is the ship's location?

- (1) 60° south latitude and 0° longitude
- (2) 60° north latitude and 0° longitude
- (3) 0° latitude and 60° east longitude
- (4) 0° latitude and 60° west longitude

58 Which element is most abundant in Earth's lithosphere?

- (1) oxygen
- (2) silicon
- (3) hydrogen
- (4) nitrogen

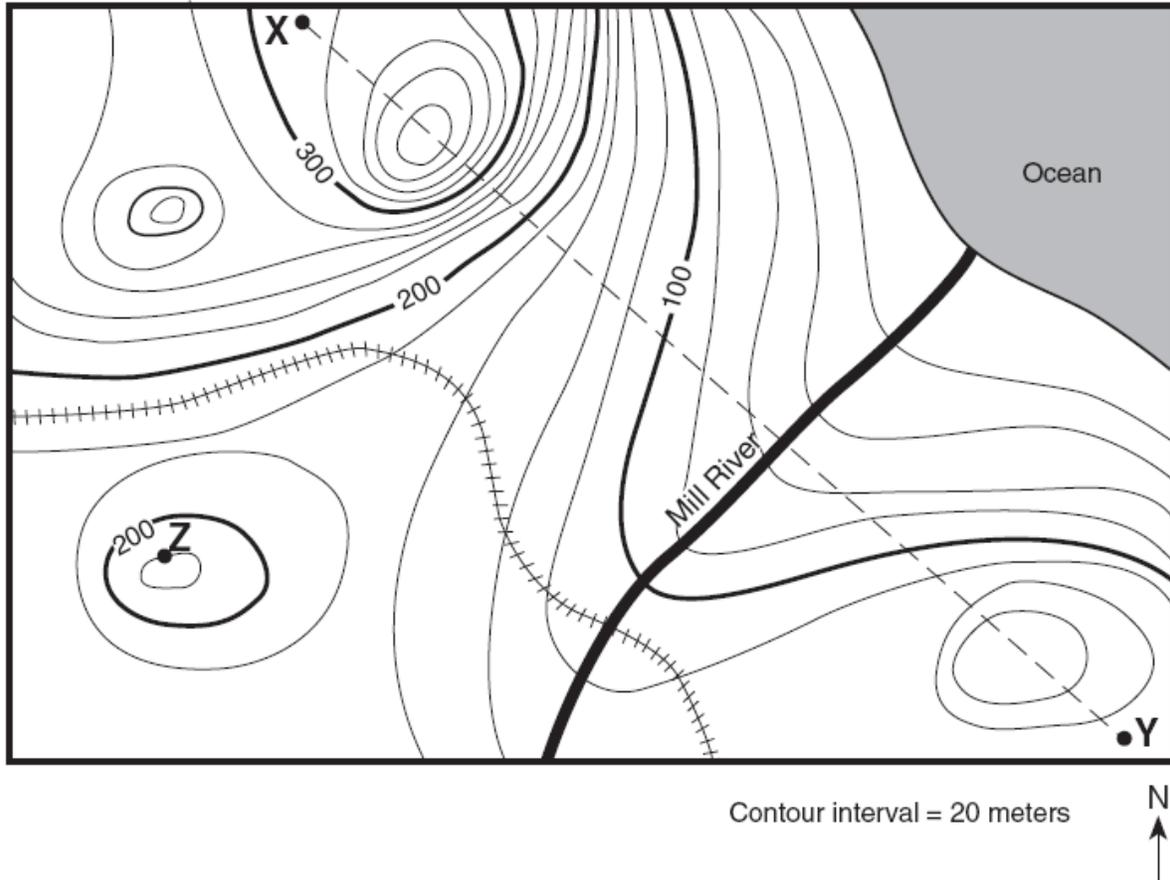
The diagram below shows an observer on Earth measuring the altitude of *Polaris*.



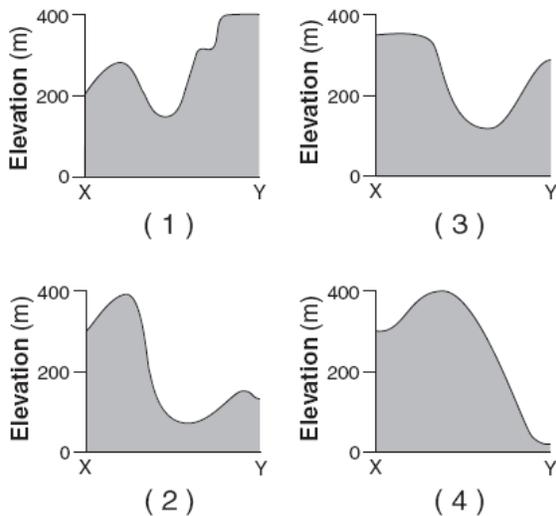
59 What is the latitude of this observer?

- (1) 43°N
- (2) 43°S
- (3) 47°N
- (4) 47°S

Base your answers to questions 60 through 38 on the topographic map below. Points X, Y, and Z are locations on the map. Elevations are expressed in meters.



60 Which profile best represents the topography along the dashed line from point X to point Y?



61 Mill River generally flows toward the

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

62 What is the elevation of point Z?

- (1) 190 m
- (2) 220 m
- (3) 240 m
- (4) 250 m

