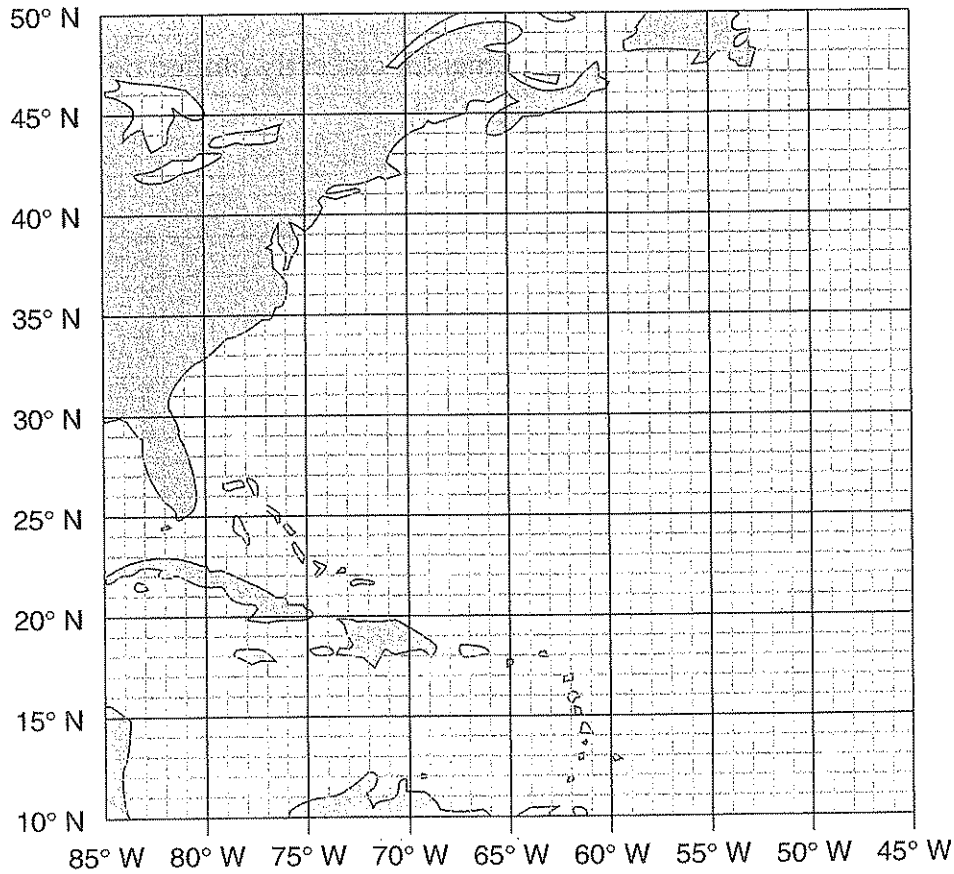


All Multiple Choice Questions are Worth 3 points each.

- 1. 1 2 3 4
- 2. 1 2 3 4
- 3. 1 2 3 4
- 4. 1 2 3 4
- 5. 1 2 3 4
- 6. 1 2 3 4
- 7. 1 2 3 4
- 8. 1 2 3 4
- 9. 1 2 3 4

- 10. 1 2 3 4
- 11. 1 2 3 4
- 12. 1 2 3 4
- 13. 1 2 3 4
- 14. 1 2 3 4
- 15. 1 2 3 4
- 16. 1 2 3 4
- 17. 1 2 3 4

18. (14 points)



Questions 19 through 26 are worth 3 points each.

19. \_\_\_\_\_

20. 1 2 3 4

21. 1 2 3 4

22. 1 2 3 4

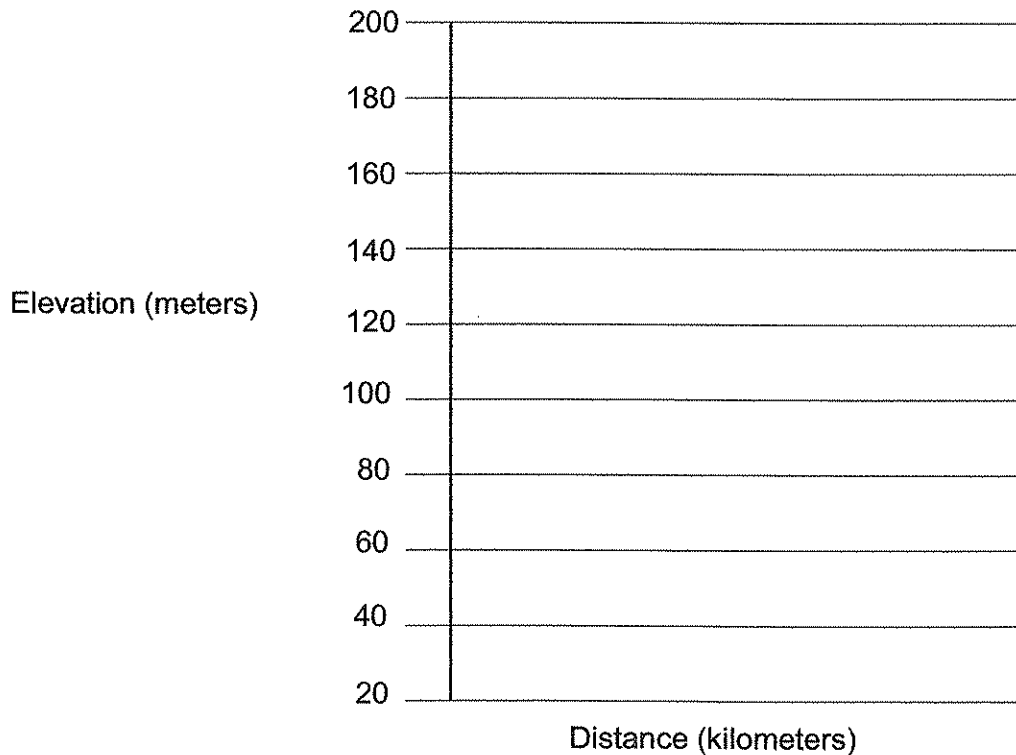
23. 1 2 3 4

24. \_\_\_\_\_

25 Gradient = \_\_\_\_\_

26. \_\_\_\_\_  
\_\_\_\_\_

27 This question is worth 11 points (10 points for correctly plotted points, 1 point for correctly drawn line)



1 What are the two most abundant elements by mass found in Earth's crust?

- (1) aluminum and iron
- (2) sodium and chlorine
- (3) calcium and carbon
- (4) oxygen and silicon

2 An air temperature of  $95^{\circ}\text{C}$  most often exists in which layer of the atmosphere?

- (1) troposphere
- (2) thermosphere
- (3) mesosphere
- (4) stratosphere

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

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

4 In which layer of Earth's interior is the pressure inferred to be 1.0 million atmospheres?

- (1) outer core
- (2) inner core
- (3) rigid mantle
- (4) stiffer mantle

5 If the base of a cloud is located at an altitude of 2 kilometers and the top of the cloud is located at an altitude of 8 kilometers, this cloud is located in the

- (1) troposphere, only
- (2) stratosphere, only
- (3) troposphere and stratosphere
- (4) stratosphere and mesosphere

6 At which New York State location will an observer most likely measure the altitude of *Polaris* as approximately  $42^{\circ}$ ?

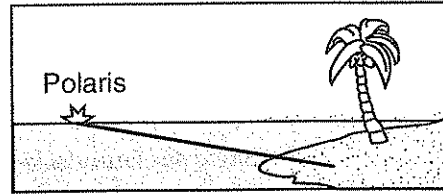
- (1) Jamestown
- (2) Plattsburgh
- (3) Oswego
- (4) New York City

7 At which location will the highest altitude of the star *Polaris* be observed?

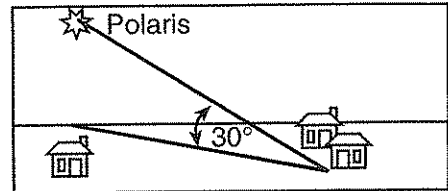
- (1) Equator
- (2) Tropic of Cancer
- (3) Arctic Circle
- (4) central New York State

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

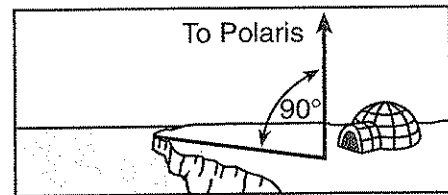
At Equator



At New Orleans, Louisiana

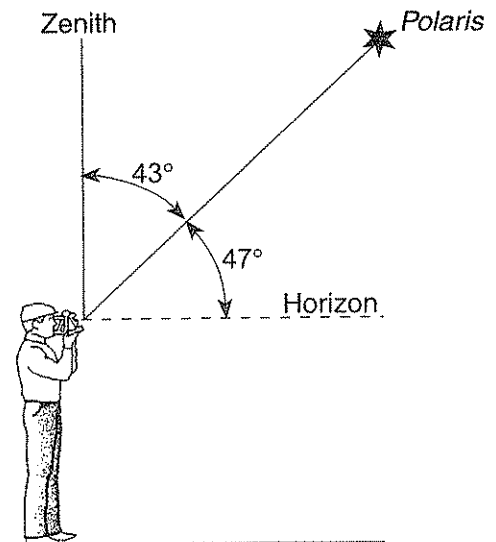


At North Pole



- (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.

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

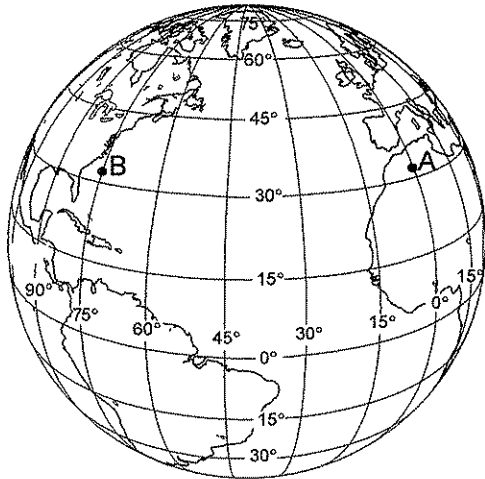


What is the latitude of this observer?

- (1)  $43^{\circ}\text{ N}$
- (2)  $43^{\circ}\text{ S}$
- (3)  $47^{\circ}\text{ N}$
- (4)  $47^{\circ}\text{ S}$

- 10 As a ship crosses the Prime Meridian, an observer on the ship measures the altitude of *Polaris* at  $60^\circ$ . What is the ship's location?
- (1)  $60^\circ$  north latitude and  $0^\circ$  longitude
  - (2)  $60^\circ$  south latitude and  $0^\circ$  longitude
  - (3)  $0^\circ$  latitude and  $60^\circ$  east longitude
  - (4)  $0^\circ$  latitude and  $60^\circ$  west longitude

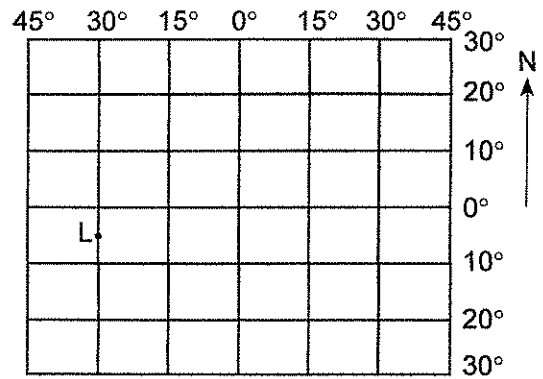
- 11 The diagram below shows the latitude-longitude grid on an Earth model. Points *A* and *B* are locations on the surface.



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

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

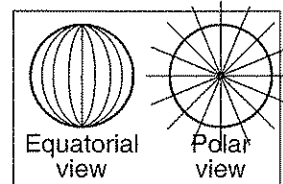
- 12 The diagram below represents part of Earth's latitude-longitude system.



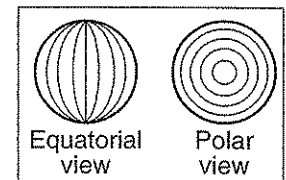
What is the latitude and longitude of point *L*?

- (1)  $5^\circ$  E  $30^\circ$  N
- (2)  $5^\circ$  W  $30^\circ$  S
- (3)  $5^\circ$  N  $30^\circ$  E
- (4)  $5^\circ$  S  $30^\circ$  W

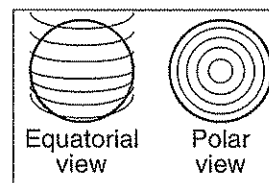
- 13 The lines on which set of views best represent Earth's latitude system?



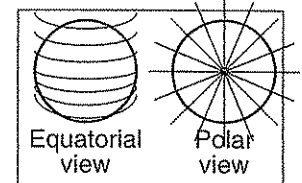
(1)



(3)

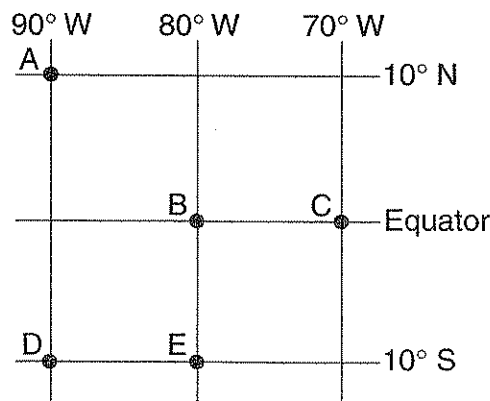


(2)



(4)

Base your answers to questions 14 and 15 on the map below, which shows the latitude and longitude of five observers, *A*, *B*, *C*, *D*, and *E*, on Earth.



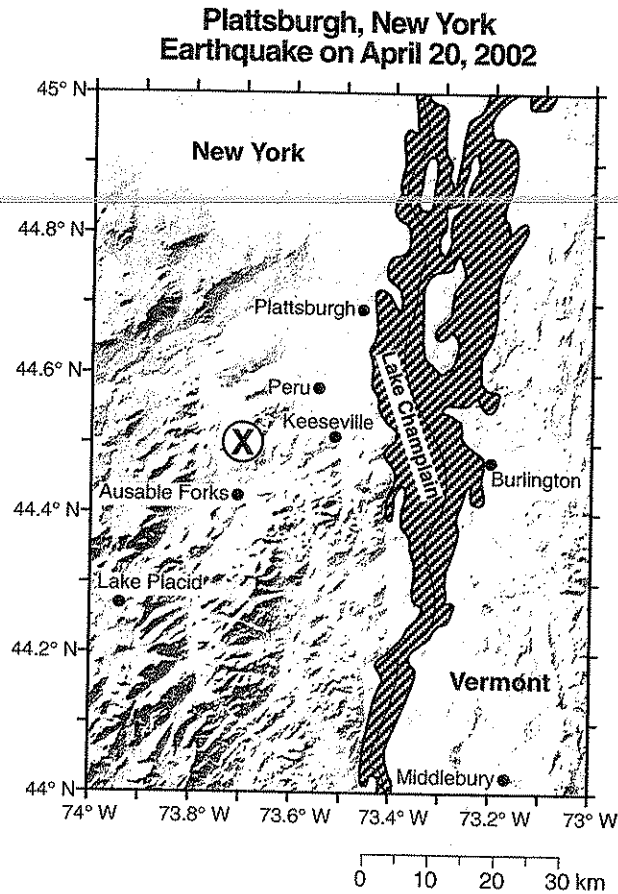
- 14 What is the altitude of *Polaris* (the North Star) above the northern horizon for observer *A*?

- (1)  $0^\circ$
- (2)  $10^\circ$
- (3)  $80^\circ$
- (4)  $90^\circ$

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

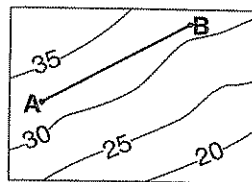
- (1) *A* and *C*
- (2) *B* and *C*
- (3) *B* and *E*
- (4) *D* and *E*

Base your answer to question 19 on the map below and on your knowledge of Earth science. The map shows the location of the epicenter, (X), of an earthquake that occurred on April 20, 2002, about 29 kilometers southwest of Plattsburgh, New York.

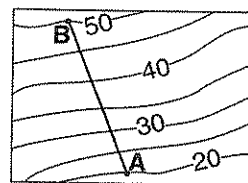


19 State the latitude and longitude of this earthquake epicenter. Express your answers to the nearest tenth of a degree and include the compass directions. [3 points]

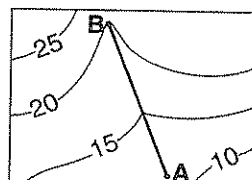
20 On each topographic map below, the straight-line distance from point A to point B is 5 kilometers. Which topographic map shows the steepest gradient between A and B?



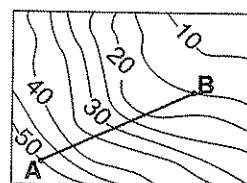
(1)



(3)

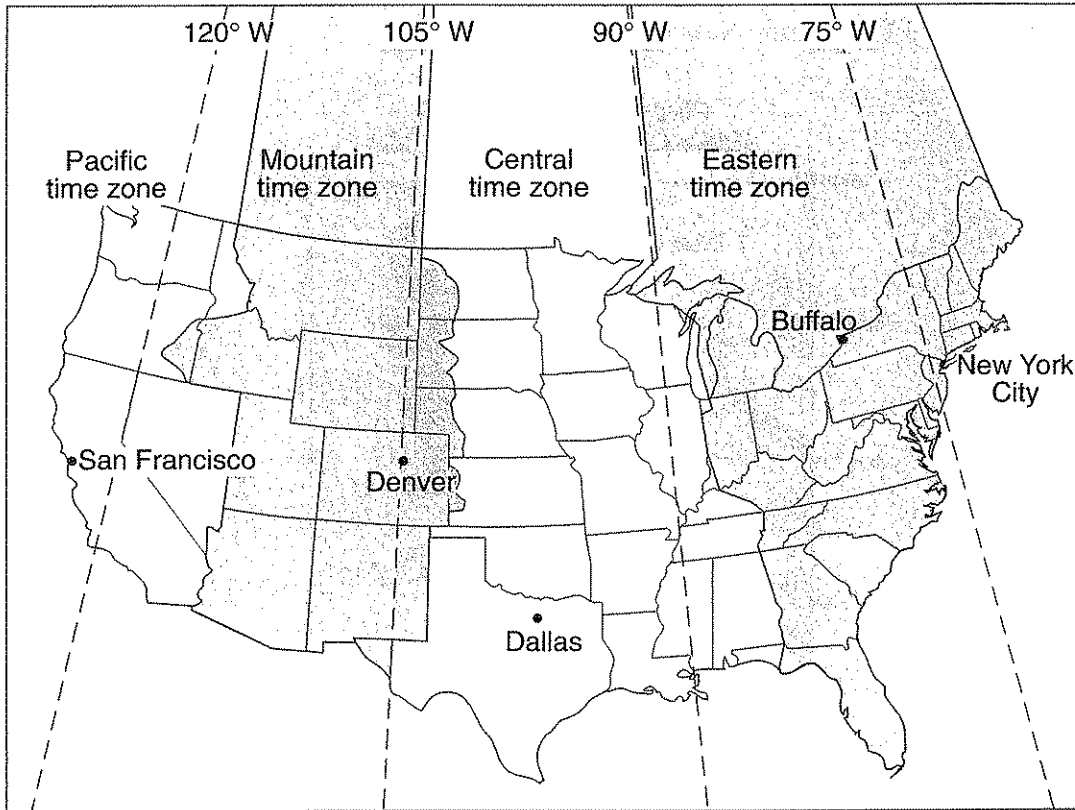


(2)



(4)

Base your answers to questions 16 and 17 on the United States time zone map shown below. The dashed lines represent meridians (lines of longitude).



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

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

17 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

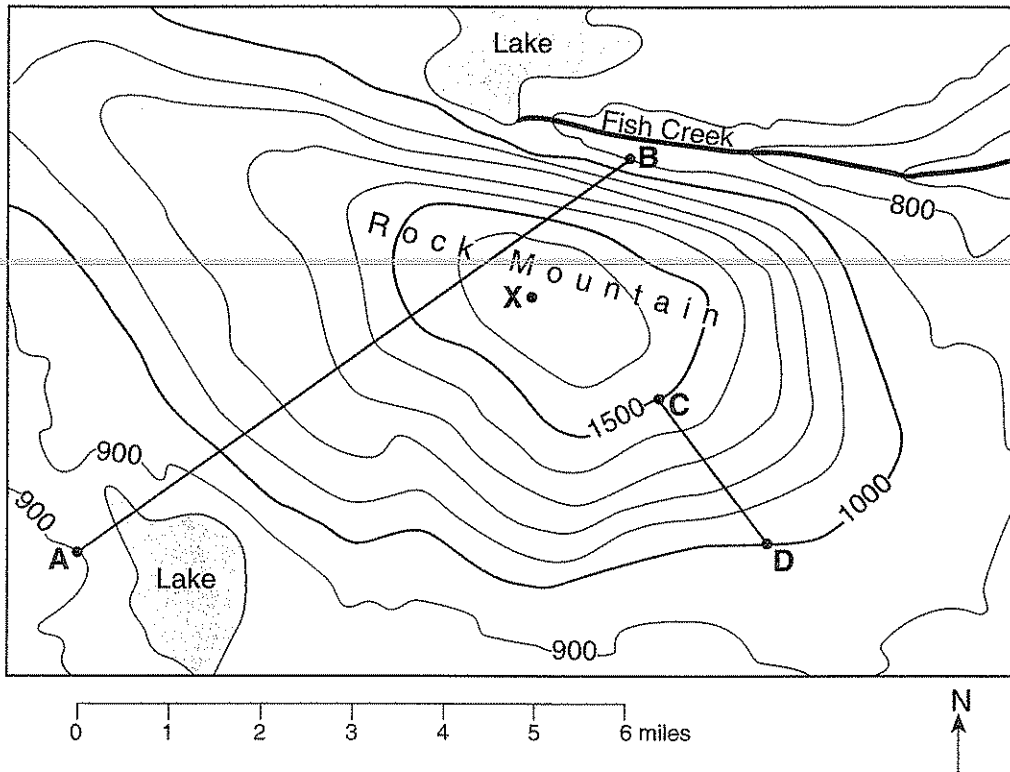
Base your answer to question 18 on the data table below, which shows recorded information for a major Atlantic hurricane. Use the map provided in your answer booklet to answer question 18.

**Hurricane Data**

| Date     | Time       | Latitude | Longitude | Maximum Winds (knots) | Air Pressure (mb) |
|----------|------------|----------|-----------|-----------------------|-------------------|
| Sept. 10 | 11:00 a.m. | 19° N    | 59° W     | 70                    | 989               |
| Sept. 11 | 11:00 a.m. | 22° N    | 62° W     | 95                    | 962               |
| Sept. 12 | 11:00 a.m. | 23° N    | 67° W     | 105                   | 955               |
| Sept. 13 | 11:00 a.m. | 24° N    | 72° W     | 135                   | 921               |
| Sept. 14 | 11:00 a.m. | 26° N    | 77° W     | 125                   | 932               |
| Sept. 15 | 11:00 a.m. | 30° N    | 79° W     | 110                   | 943               |

18 Using the latitude and longitude data in the table, place an **X** on the map provided in your answer booklet for each location of the hurricane during these 6 days. Connect all the **X**s with a solid line. [14 points]

Base your answers to questions 21 through 23 on the topographic map below. Points A, B, C, D, and X represent locations on the map. Elevations are measured in feet.



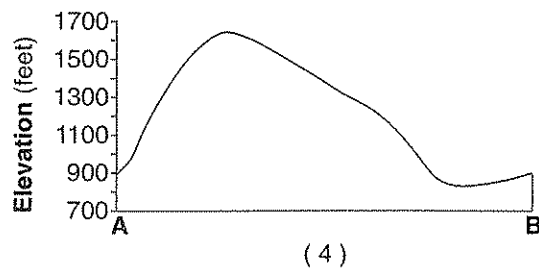
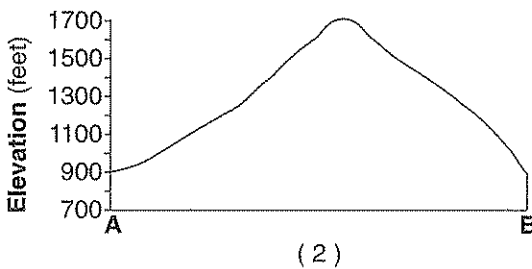
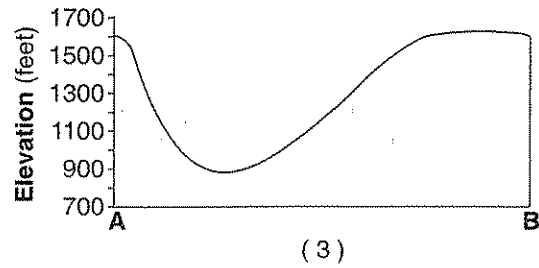
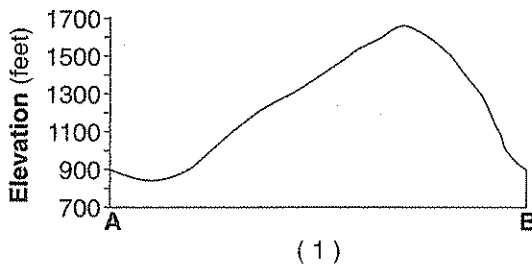
21 What is the highest possible elevation of point X on Rock Mountain?

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

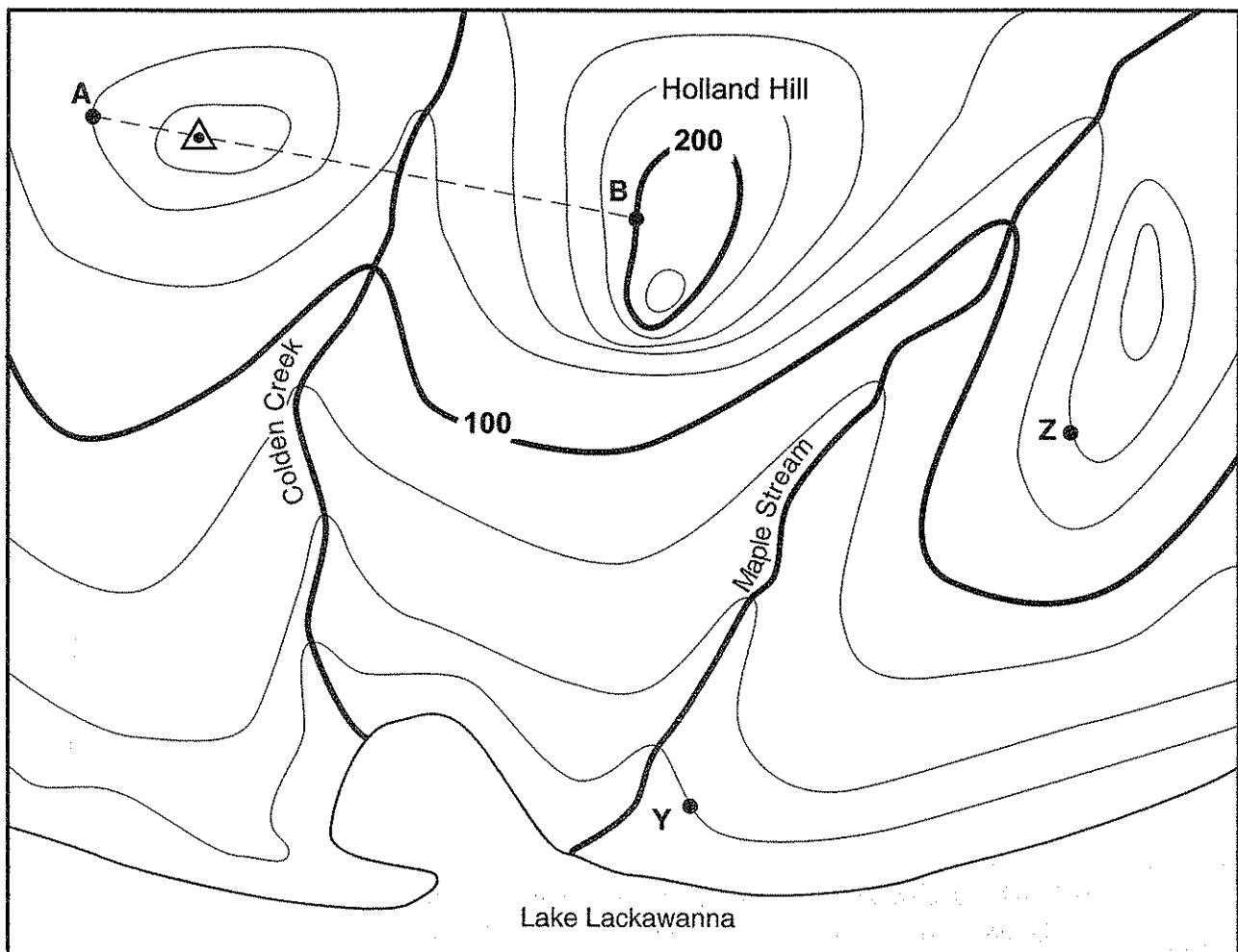
22 What is the average gradient of the slope along straight line CD?

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

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



Base your answers to questions 24 through 27 on the topographic map below. Points A, B, Y, and Z are reference points on the topographic map. ▲



Contour Interval 20 meters

0 1 2 3 kilometers



- 24 State the general compass direction in which Maple Stream is flowing.
- 25 Calculate the gradient between points Y and Z on the map, and label the answer with the correct units.
- 26 Describe the evidence shown on the map that indicates that the southern side of Holland Hill has the steepest slope.
- 27 On the grid provided *in your answer booklet*, construct a topographic profile from point A to point B by following the directions below.
  - a Plot the elevation along line AB by marking with an X *each* point where a contour line is crossed by line AB. Points A and B have been plotted for you.
  - b Complete the profile by correctly connecting the plotted points with a smooth, curved line.