Name: _____

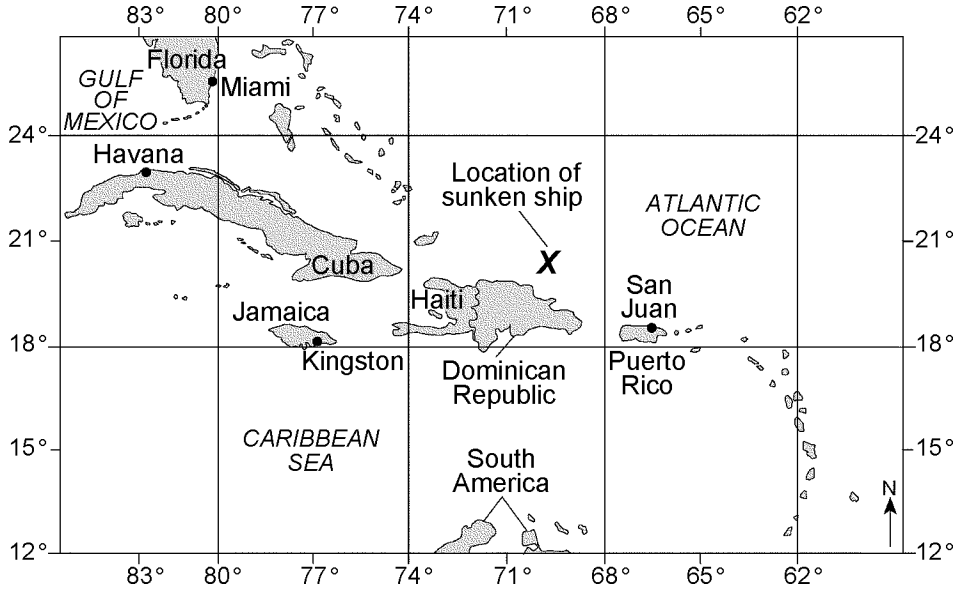
1) If an observer on Earth views *Polaris* on the horizon, the observer is located at the
   A) Tropic of Cancer (23.5DN)
   B) Tropic of Capricorn (23.5DS)
   C) North Pole (90DN)
   D) equator (0D)

2) What is the approximate altitude of *Polaris* at Syracuse, New York?
   A) 47D B) 43D C) 76D D) 90D

Questions 3 and 4 refer to the following:

The map below shows sections of the Atlantic Ocean, the Caribbean Sea, and the Gulf of Mexico.

SHIPWRECK:
In 1641, the crew of the ship *Concepcion* used the Sun and stars for navigation. The crew thought that the ship was just north of Puerto Rico, but ocean currents had carried them off course. The ship hit a coral reef and sank off the coast of the Dominican Republic. The **X** on the map marks the location of the sunken ship.



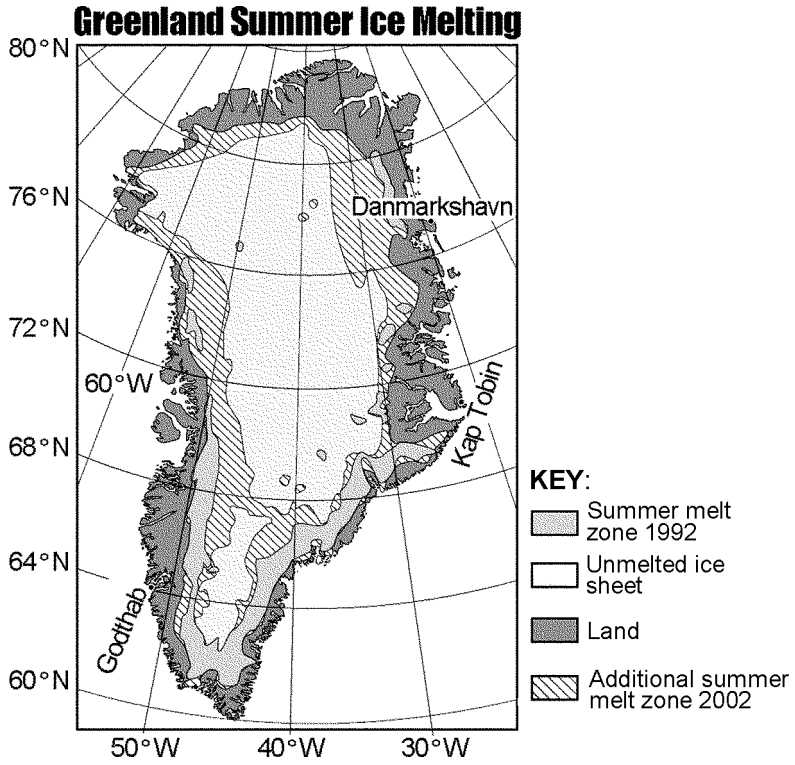
3) At which location on the given map does *Polaris* appear the *highest* in the nighttime sky?
   A) San Juan, Puerto Rico C) Havana, Cuba
   B) Kingston, Jamaica D) Miami, Florida

4) According to the given map, what is the approximate latitude and longitude of the sunken ship?
   A) 20.5DN 70DE C) 20.5DS 70DW
   B) 20.5DN 70DW D) 20.5DS 70DE

5) Near which two latitudes are *most* of Earth's major deserts located?

A) 30DS and 60DS
B) 60DS and 60DN
C) 30DN and 30DS
D) 0D and 90DN

6) The map below shows the extent of summer ice-melt zones on Greenland in 1992 and 2002. The summer melt zone is an area where summer heat turns snow and ice around the edges of the ice sheet into slush and ponds of meltwater. Three coastal locations are shown on the map.



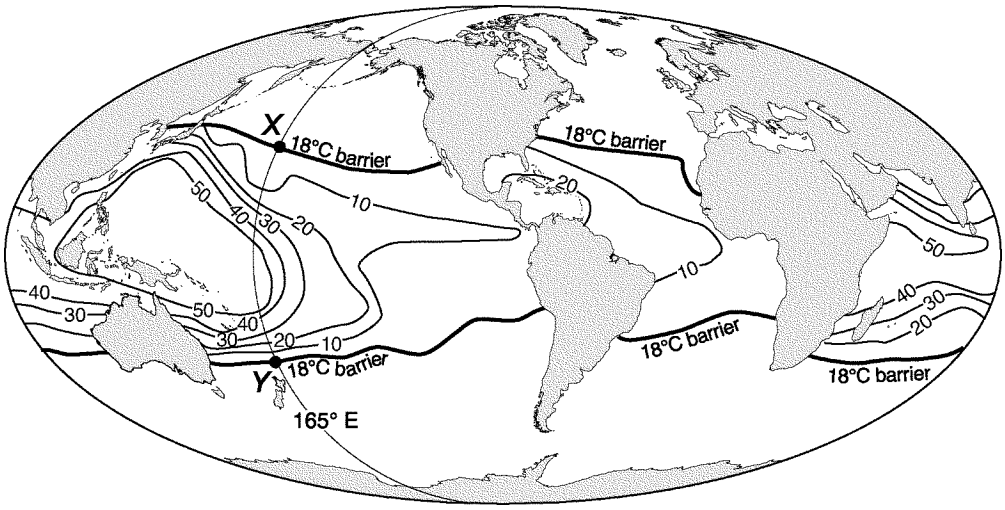
ARCTIC MELTDOWN:

Scientists are concerned because average arctic temperatures are rising. The Greenland Ice Sheet, the dominant area of continental ice in the arctic region, broke all previous records for melting in 2002. In 2004, the total amount of ice resting on top of the continental crust in the arctic region was estimated to be about 3,100,000 cubic kilometers. If all this ice were to melt, the ocean levels would rise approximately 8.5 meters. A reduction in ice-covered areas exposes more land surfaces. This increases absorption of insolation and accelerates arctic warming. Scientists continue to collect data to define the role of greenhouse gases in the warming of the arctic region.

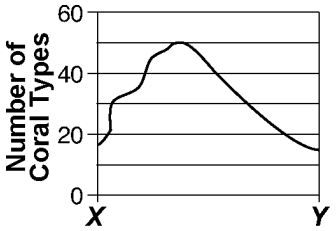
What is the approximate latitude and longitude of Godthab, Greenland?

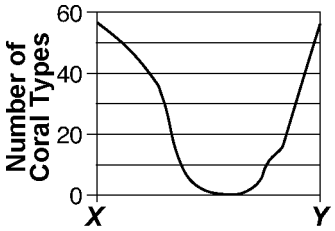
A) 64DN 51.5DW
B) 22DN 70.5DW
C) 70.5DN 22DW
D) 51.5DN 64DW

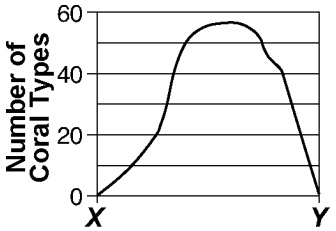
7) The map below shows coral reef distribution and diversity (number of different coral types) around the world. Isolines on the map represent the number of different types of coral. Coral reefs are found mostly in shallow tropical waters and do not grow when ocean temperatures fall below 18°C. The 18°C barrier ( ) represents the outer boundaries within which coral reefs normally grow. Points *X* and *Y* are locations on the map.

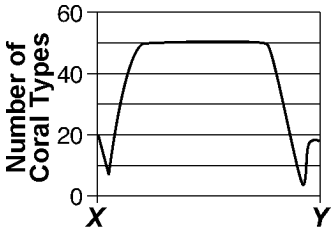


Which graph shows the number of coral types found along the 165° east longitude line between point *X* and point *Y* in the map shown?

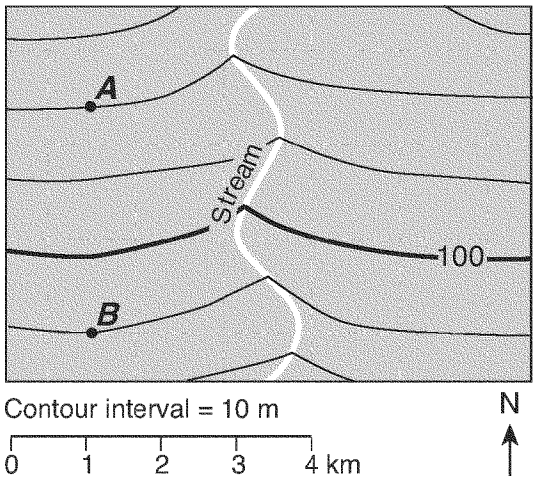
A)


C)


B)


D)


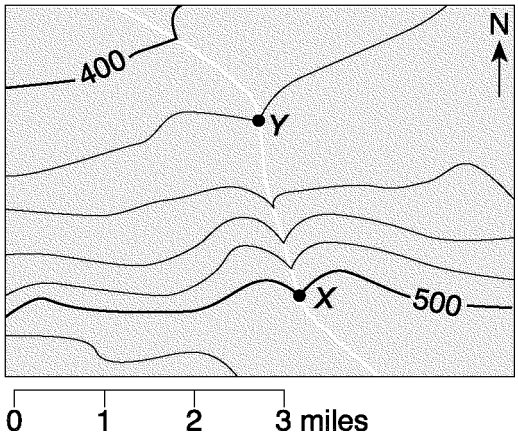
8) The topographic map below shows the location of a stream. Points *A* and *B* are locations on Earth's surface.



What is the gradient between points *A* and *B*?

A) 2 m/km
B) 20 m/km
C) 10 m/km
D) 1 m/km

9) The topographic map below shows a stream crossing several contour lines and passing through points *X* and *Y*. Elevations are measured in feet.

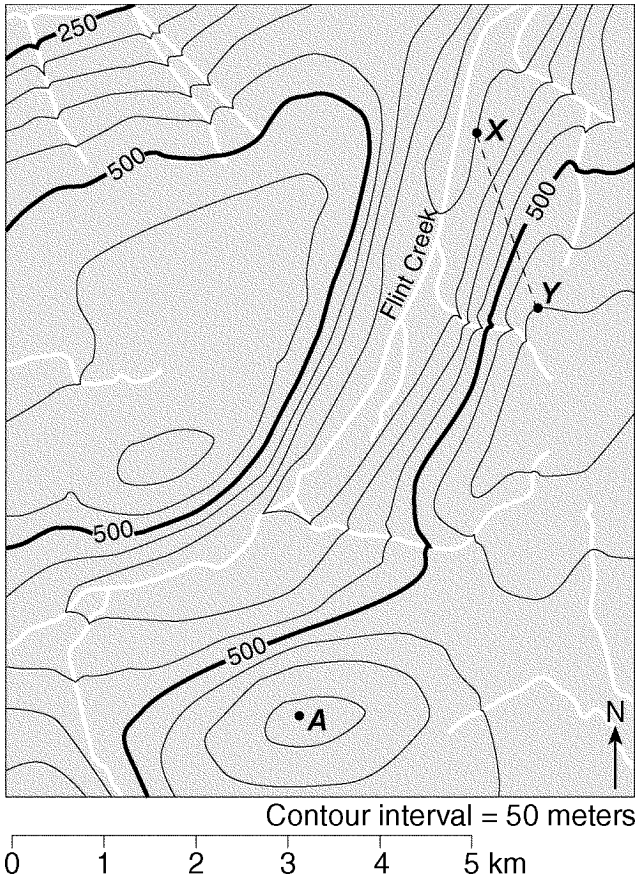


What is the approximate gradient between point *X* and point *Y*?

A) 40 ft/mi
B) 10 ft/mi
C) 80 ft/mi
D) 20 ft/mi

Questions 10 through 12 refer to the following:

Points *A*, *X*, and *Y* are reference points on the topographic map below.



10) What is the approximate gradient along the straight dashed line between points *X* and *Y* on the given map?

A) 100 m/km
B) 300 m/km
C) 150 m/km
D) 50 m/km

11) What is a possible elevation of point *A* on the given map?

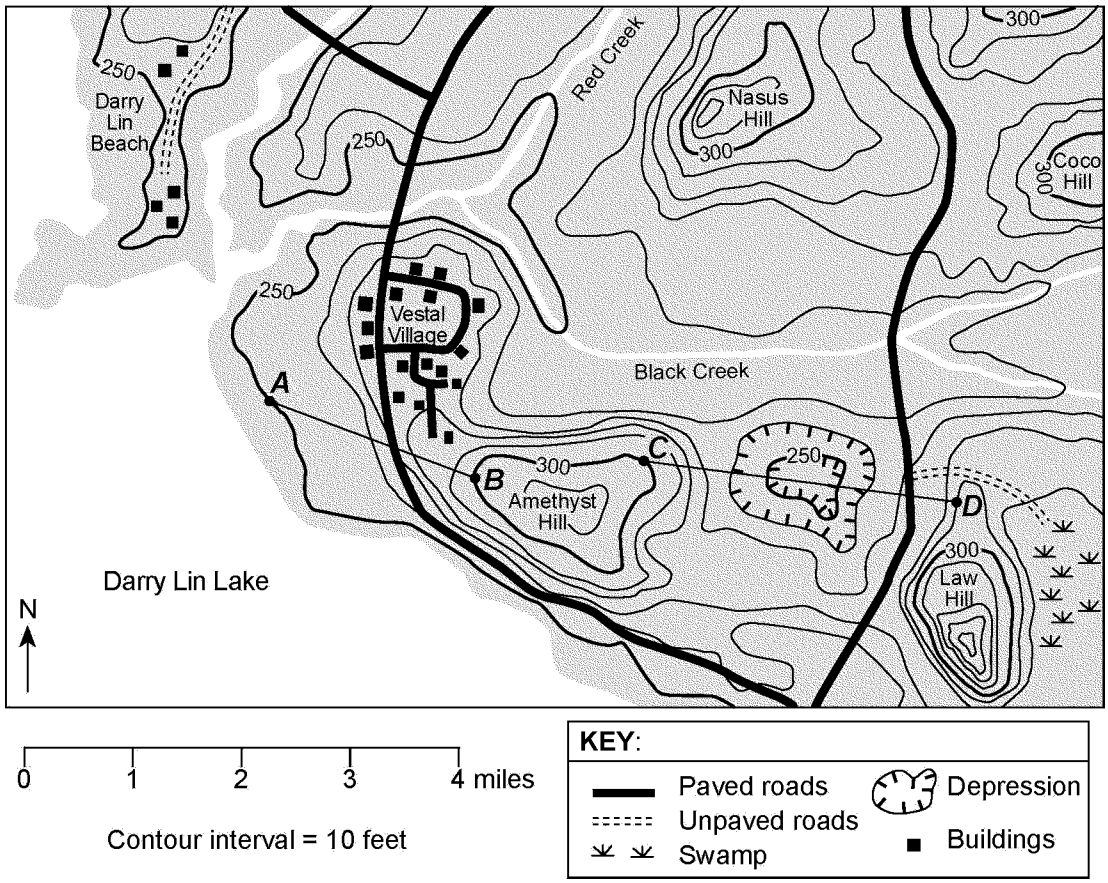
A) 655 meters
B) 600 meters
C) 575 meters
D) 710 meters

12) In which general direction does Flint Creek flow on the given map?

A) northeast
B) northwest
C) southwest
D) southeast

Questions 13 through 16 refer to the following:

Points *A*, *B*, *C*, and *D* represent locations on the surface of Earth. Elevations are measured in feet.



13) Based on the topographic map shown, in which general direction does Red Creek flow?

A) northeast
B) southeast
C) southwest
D) northwest

14) What is the approximate gradient from point *A* to point *B* on the given topographic map?

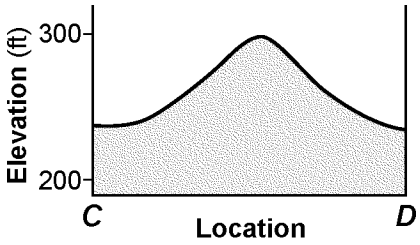
A) 75 feet per mile
B) 100 feet per mile
C) 50 feet per mile
D) 25 feet per mile

15) What is a possible elevation for the surface of Darry Lin Lake in the given topographic map?

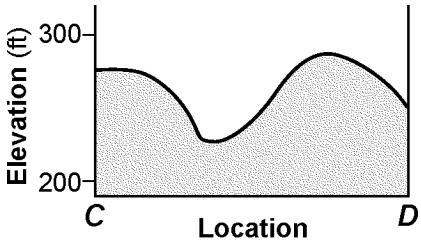
A) 242 feet
B) 228 feet
C) 255 feet
D) 268 feet

16) Which cross section represents an accurate profile of the landscape between points *C* and *D* on the given topographic map?

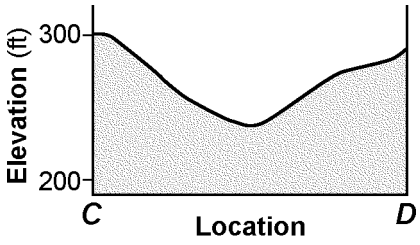
A)



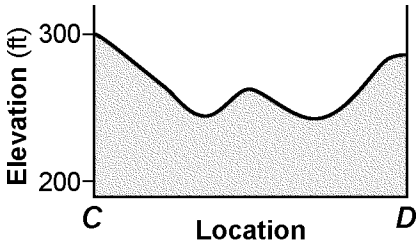
B)



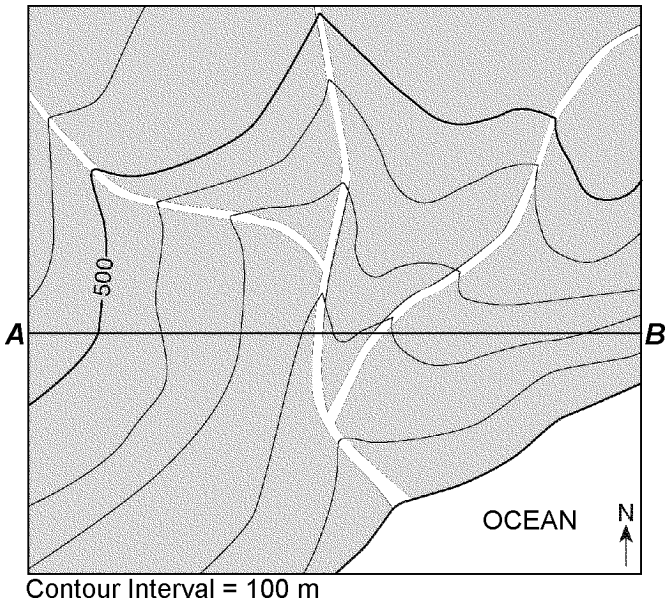
C)



D)



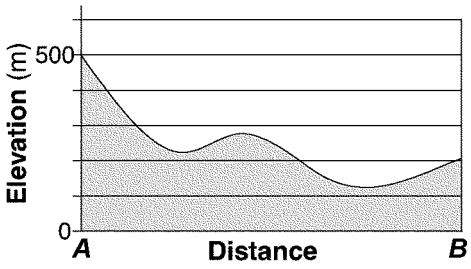
17) The contour map below shows elevations recorded in meters. Line *AB* is a reference line on the map.



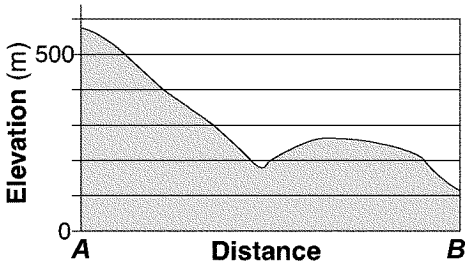
Contour Interval = 100 m

Which graph *best* represents the profile from point *A* to point *B*?

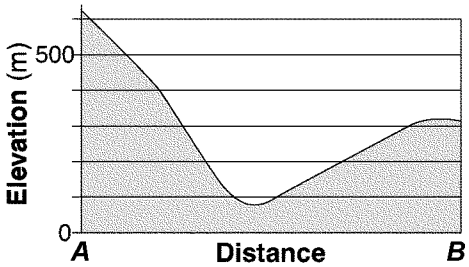
A)



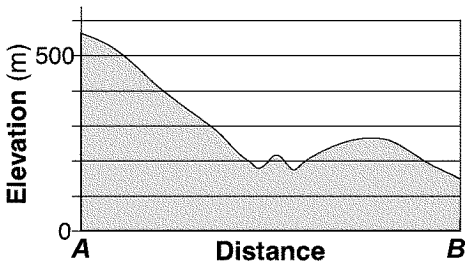
B)



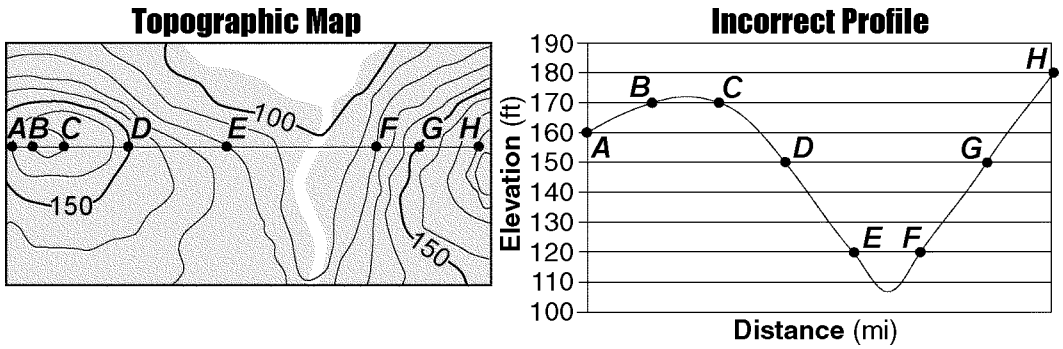
C)



D)



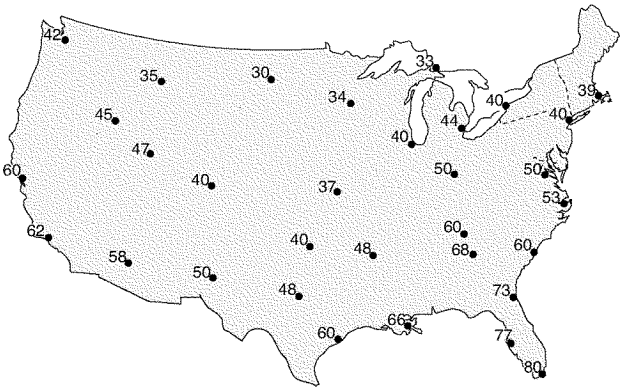
18) A topographic map and an incorrectly constructed profile from point *A* to point *H* on the map are shown below.



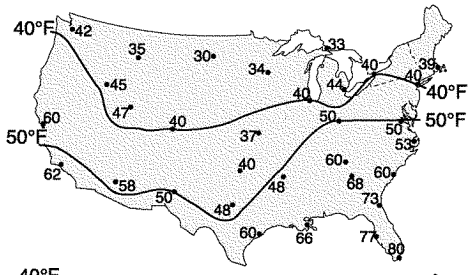
What mistake was made in the construction of this profile?

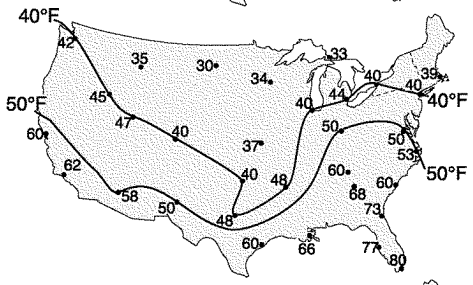
A) using a contour interval of 10 feet
B) plotting points *A* through *H* the same distance apart horizontally
C) increasing the elevation from point *F* to point *H*
D) drawing a curved line instead of a straight line from point *B* to point *C*

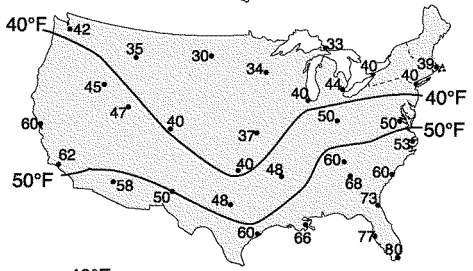
19) The weather map below shows the air temperatures recorded at the same time at cities across the United States.

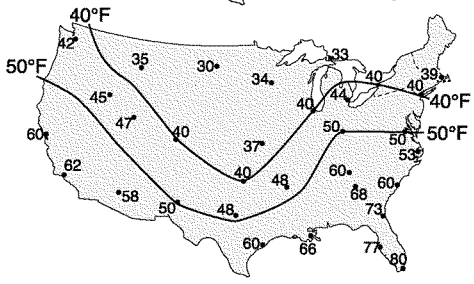


Which map correctly shows the locations of the 40DF and 50DF isotherms?

A)


B)


C)


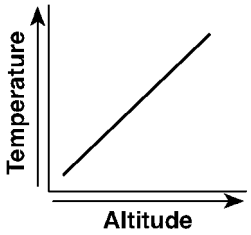
D)


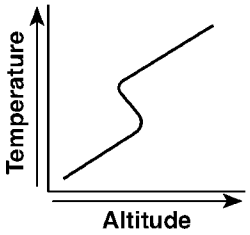
20) Most of Earth's weather events take place in the

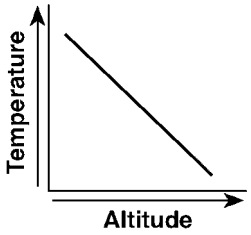
A) troposphere
B) mesosphere
C) stratosphere
D) thermosphere

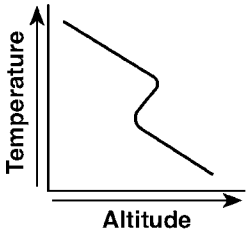
21) Scientists infer that *most* of Earth's earliest atmosphere was produced by
A) vaporizing comets that impacted Earth's surface
B) capturing gases from a nearby planet
C) a collision with a giant gas cloud
D) the escape of gases from Earth's molten surface

22) Which graph *best* shows the general relationship between altitude and temperature in the troposphere?

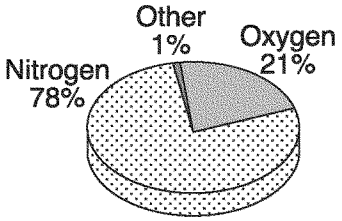
A)


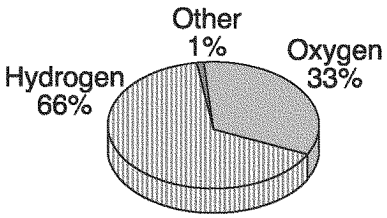
C)


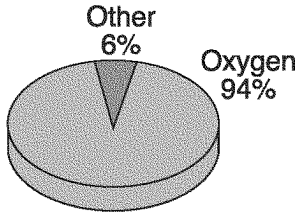
B)


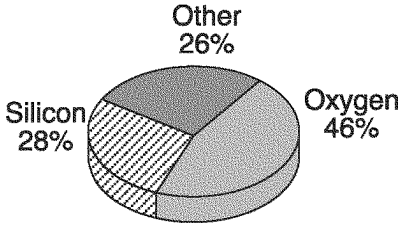
D)


23) Which pie graph correctly shows the percentage of elements by volume in Earth's troposphere?

A)


C)


B)


D)


24) What is the approximate percent of oxygen by volume present in Earth's lower atmosphere?
A) 46% B) 21% C) 33% D) 94%

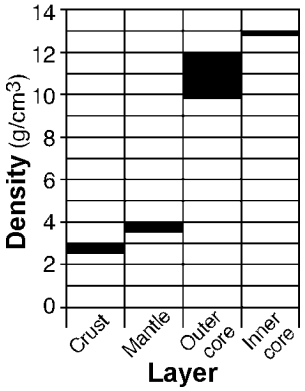
25) Which atmospheric temperature zone is located between 8 and 32 miles above Earth's surface and contains an abundance of ozone?
A) troposphere C) thermosphere
B) mesosphere D) stratosphere

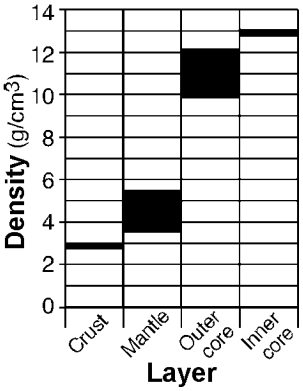
26) At what approximate altitude in the atmosphere can stratospheric ozone be found?
A) 100 km B) 10 km C) 30 km D) 70 km

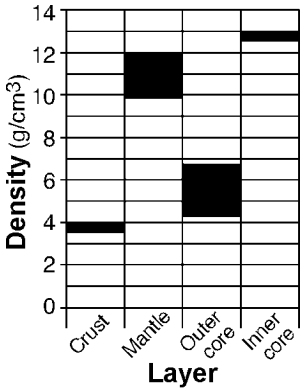
27) Compared to the oceanic crust, the continental crust is
A) less dense and more basaltic
B) less dense and more felsic
C) more dense and more granitic
D) more dense and more mafic

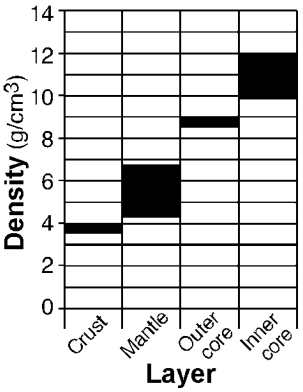
28) Which element, found in *both* biotite mica and muscovite mica, makes up the *greatest* percent by volume of Earth's crust?
A) oxygen
B) potassium
C) nitrogen
D) silicon

29) Which graph *best* shows the range of density in each of Earth's layers?

A)


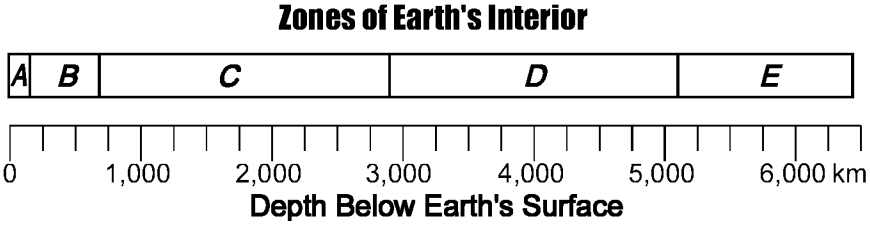
C)


B)


D)


Questions 30 through 34 refer to the following:

The diagram below represents zones of Earth's interior, identified by letters *A* through *E*. The scale shows depths below Earth's surface, measured in kilometers.



30) In what zone of the given diagram is the Moho boundary located?
A) *A*
B) *B*
C) *E*
D) *D*

31) What is the approximate thickness of zone *C* in the diagram shown?
A) 1,600 km
B) 2,250 km
C) 650 km
D) 2,900 km

32) Which zone in the given diagram is characterized by partially melted rock and large-scale convection currents?

A) zone *E* B) zone *C* C) zone *A* D) zone *B*

33) Which zone of Earth's interior has a density *closest* to the densities of the other terrestrial planets?

A) zone *C* B) zone *A* C) zone *E* D) zone *D*

34) *S*-waves produced by an earthquake are transmitted through zones

A) *C*, *D*, and *E*, but not zones *A* and *B*
B) *A*, *B*, and *C*, but not zones *D* and *E*
C) *A* and *B*, but not zones *C*, *D*, and *E*
D) *D* and *E*, but not zones *A*, *B*, and *C*

35) The inferred temperature at the interface between the stiffer mantle and the asthenosphere is *closest* to

A) 5,000DC C) 2,500DC
B) 1,000DC D) 4,500DC

36) What is the inferred pressure, in millions of atmospheres, in Earth's interior at a depth of 2,900 kilometers?

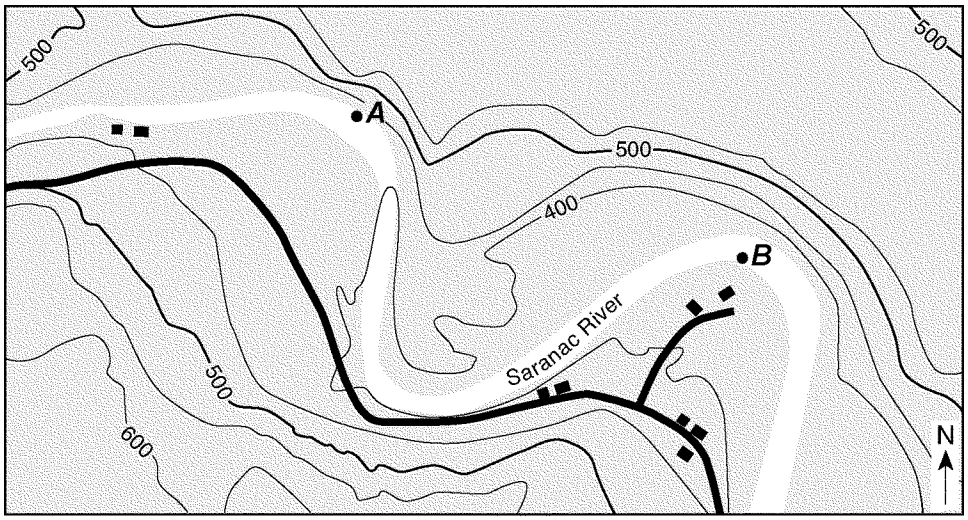
A) 9.9 B) 1.4 C) 4,900 D) 3.0

37) In which Earth layer does the pressure reach 3.5 million atmospheres?

A) inner core C) stiffer mantle
B) crust D) outer core

Questions 38 through 40 refer to the following:

The topographic map below shows an area of the Saranac River just west of Plattsburgh, New York. Points *A* and *B* are locations in the river.



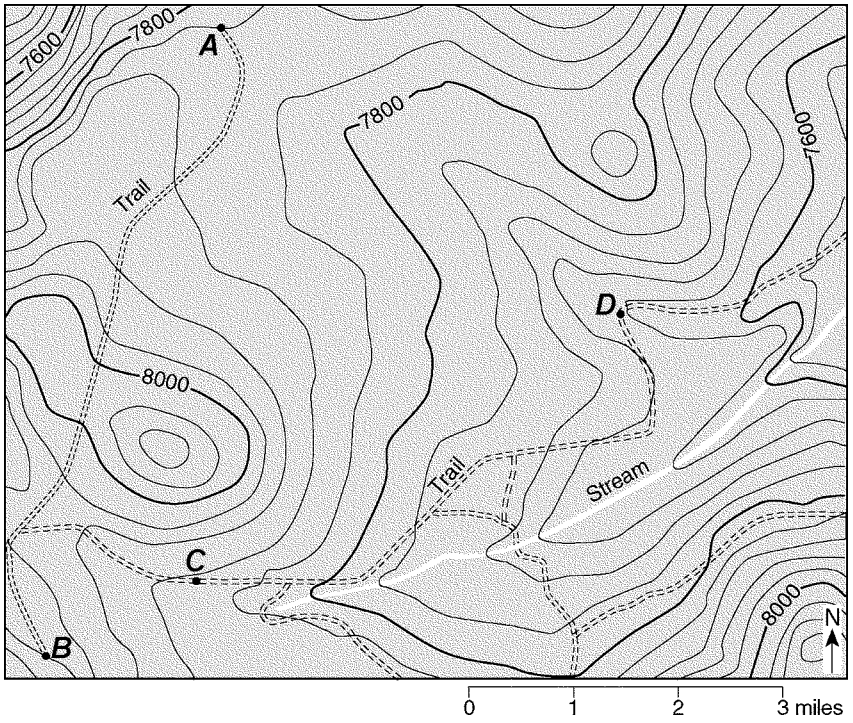
38) In the region of the Saranac River shown, the land area that is lower in elevation than 450 feet is a floodplain. On the map provided, draw a diagonal-line pattern, ▨, to indicate the entire floodplain area.

39) Describe how the contour lines shown on the given map indicate that the Saranac River flows from point *A* to point *B*.

40) Identify *one* emergency preparedness activity that people living in the floodplain area shown can take to protect themselves and their property from possible flooding.

Questions 41 through 44 refer to the following:

On the topographic map below, letters *A* through *D* represent locations on the map. Elevations are measured in feet. Dashed lines represent trails.



41) On the map provided, place an **X** on the trail between *A* and *B* so the center of the **X** indicates where the slope is *steepest*.

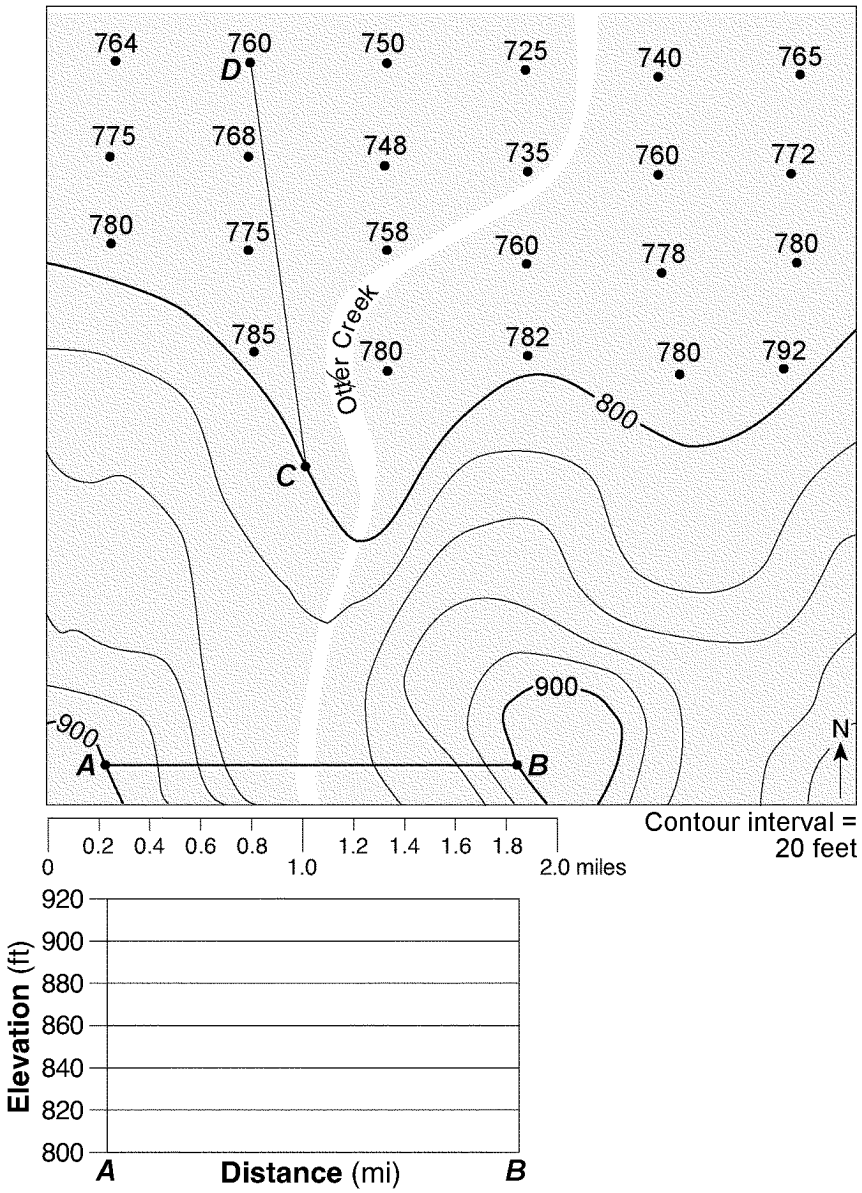
42) On the map provided, first draw an arrow on the stream to show the direction in which the stream is flowing. Then state *one* piece of evidence shown on the map that supports the direction of the arrow you drew on the stream.

43) Identify the contour interval used in the given map.

44) Based on the given map, how long will it take a person to hike along the trail from point *C* to point *D* at a rate of 3 miles per hour?

Questions 45 through 48 refer to the following:

The map below shows elevations in feet at various points. The southern part of the map has contour lines representing elevations at 20-foot intervals. Lines *AB* and *CD* are reference lines on the map.



45) Calculate the gradient along line *CD* on the given map and label your answer with the correct units.

46) Explain how the contour lines on the given map indicate the direction of flow of Otter Creek.

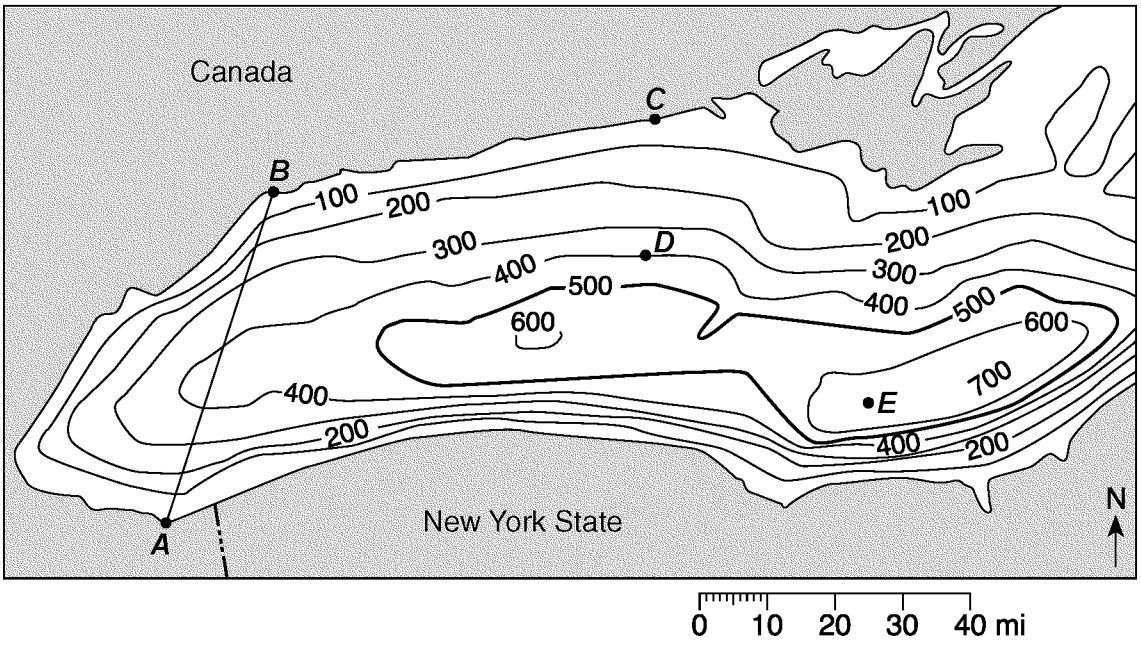
47) On the map provided, draw contour lines for the 780-ft, 760-ft, and 740-ft elevations. Extend your contour lines to the edges of the map.

48) On the grid provided, construct a topographic profile along line *AB* by plotting the elevation of each contour line that crosses line *AB* on the given map. Connect the plots with a line to complete the profile.

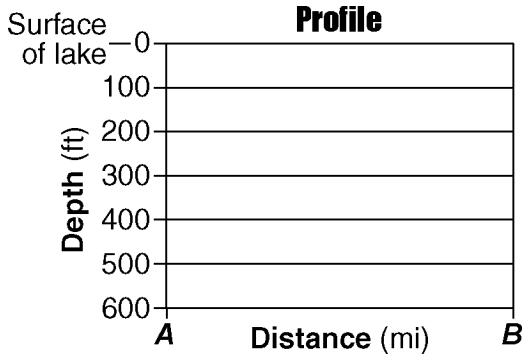
Questions 49 through 52 refer to the following:

The field map below shows the depth of Lake Ontario. Isoline values indicate water depth, in feet. Points *A*, *B*, and *C* represent locations on the shoreline of Lake Ontario. Points *D* and *E* represent locations on the bottom of the lake.

Water Depth of Lake Ontario



49) On the grid provided below, draw a profile of the bottom of western Lake Ontario by plotting the depth of the water along line *AB*. Plot *each* point where an isoline showing depth is crossed by line *AB*. Connect the plots with a line, starting at *A* and ending at *B*, to complete the profile.



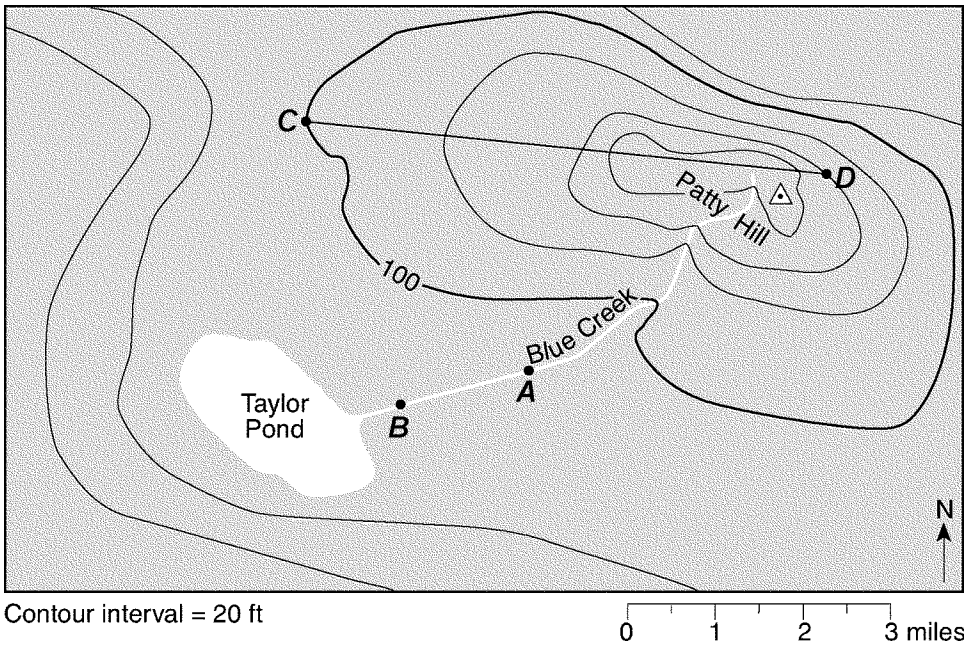
50) Calculate the gradient of the lake bottom between point *C* and point *D* in the given field map. [*Label your answer with the correct units.*]

51) What is a possible depth of the water at location *E* in the field map shown?

52) What evidence shown on the map indicates that the southern section of the bottom of Lake Ontario has the *steepest* slope?

Questions 53 through 57 refer to the following:

On the topographic map below, letters *A*, *B*, *C*, and *D* represent locations on Earth's surface. The symbol ⧋ marks the highest elevation on Patty Hill. Elevations are shown in feet.



53) What is a possible elevation at the ⧋ symbol at the top of Patty Hill on the topographic map shown?

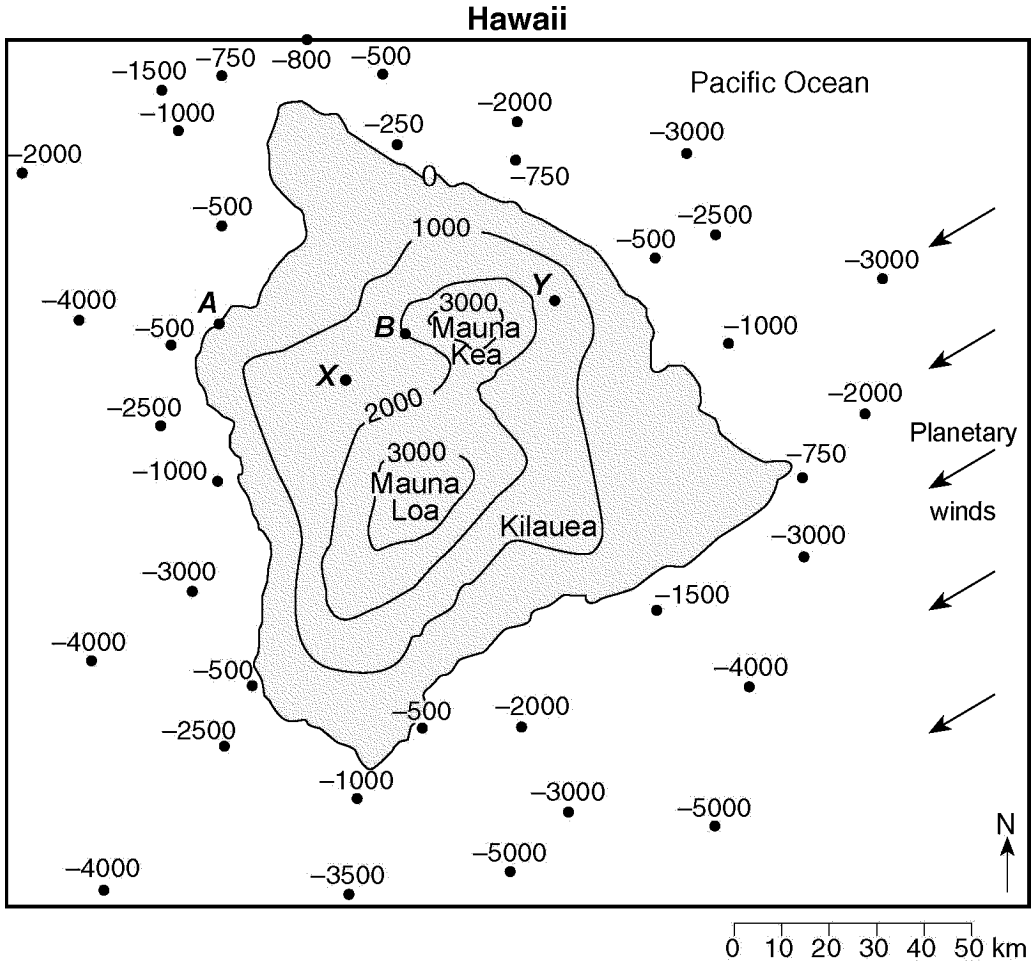
54) Indicate, using a compass direction, the *steepest* side of Patty Hill on the topographic map shown.

55) Explain how the shape of the contour lines crossing Blue Creek on the topographic map shows the direction that the creek is flowing.

56) A student placed a floating wooden block in Blue Creek at location *A* on the given topographic map. Fifteen minutes later, the floating block arrived at location *B*. What was the creek's rate of flow from *A* to *B*? [*Express your answer to the nearest tenth.*]

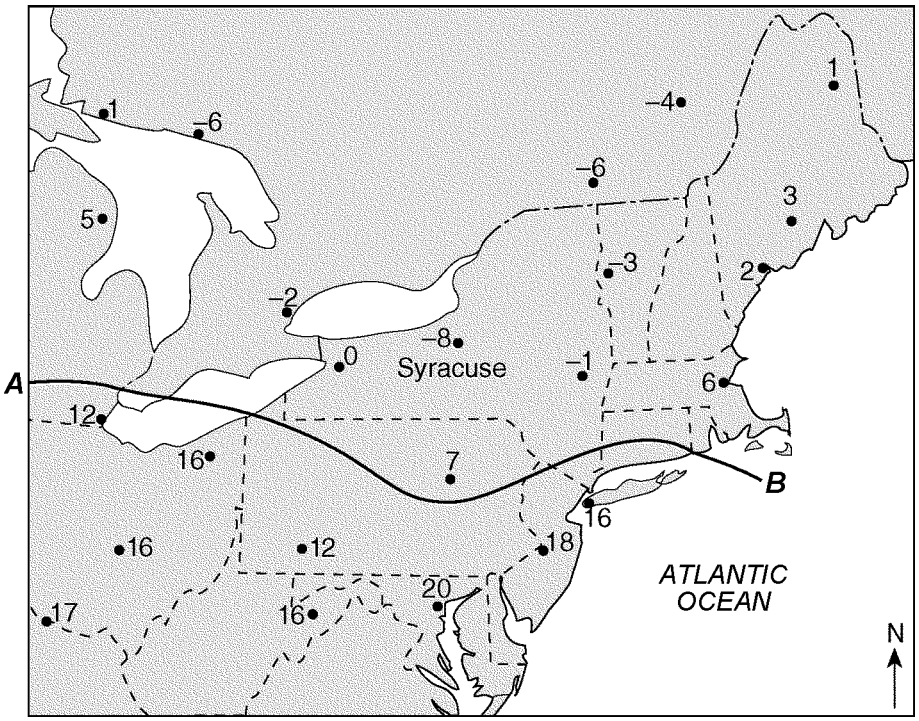
57) On the grid below, construct a profile of the land surface along line *CD* on the given topographic map. Plot the elevation of *each* contour line that crosses line *CD*. Connect the plots with a line to complete the profile.

58) On the topographic map of Hawaii below, points *A*, *B*, *X*, and *Y* represent surface locations on the island. Land elevations and Pacific Ocean depths are shown in meters.



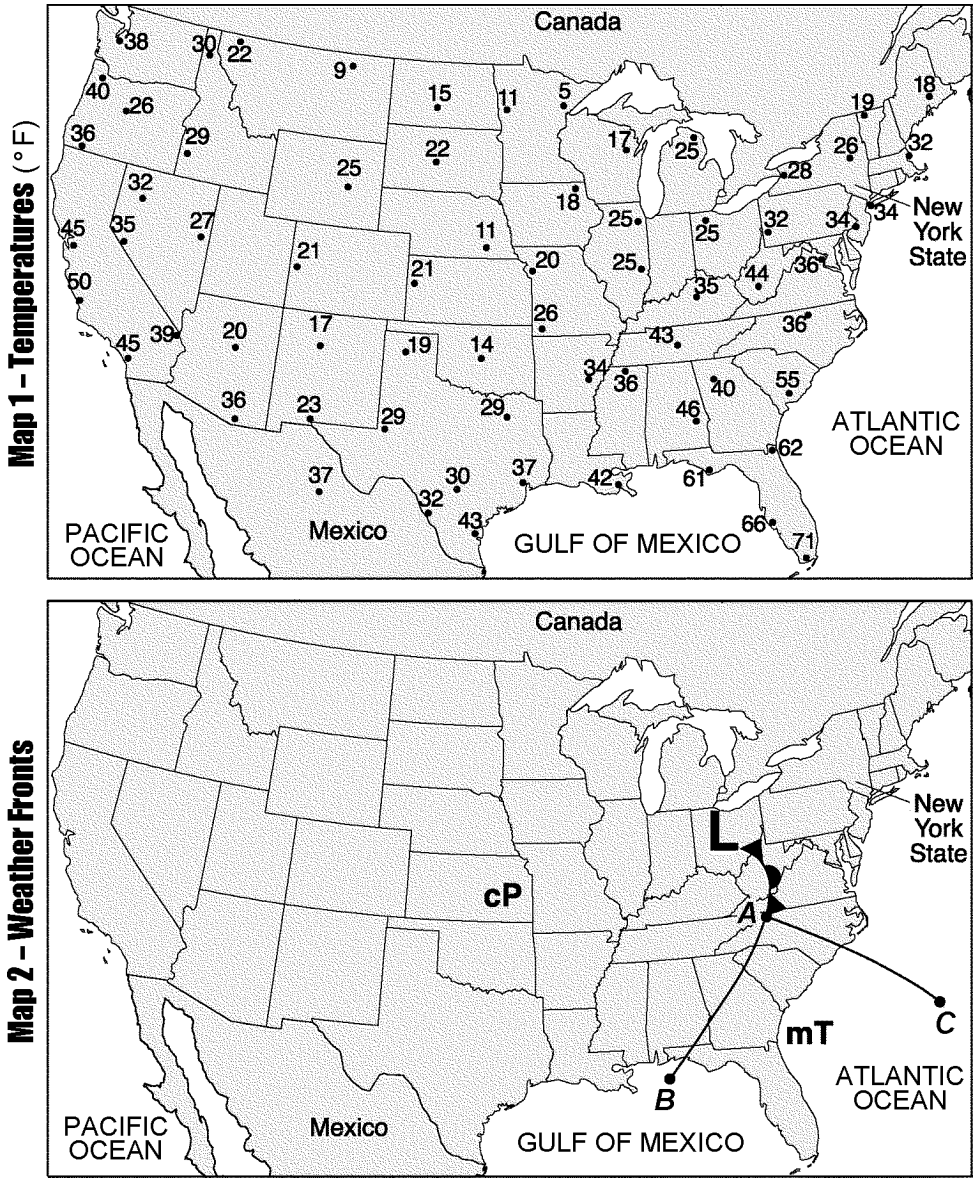
On the map topographic provided, draw the *1000-meter ocean-depth isoline. Extend the isoline to the edge of the map.

59) The weather map below shows air temperatures (in DF) at locations in the northeastern United States and part of Canada. Syracuse, New York, is labeled. Line *AB* represents a stationary frontal boundary.



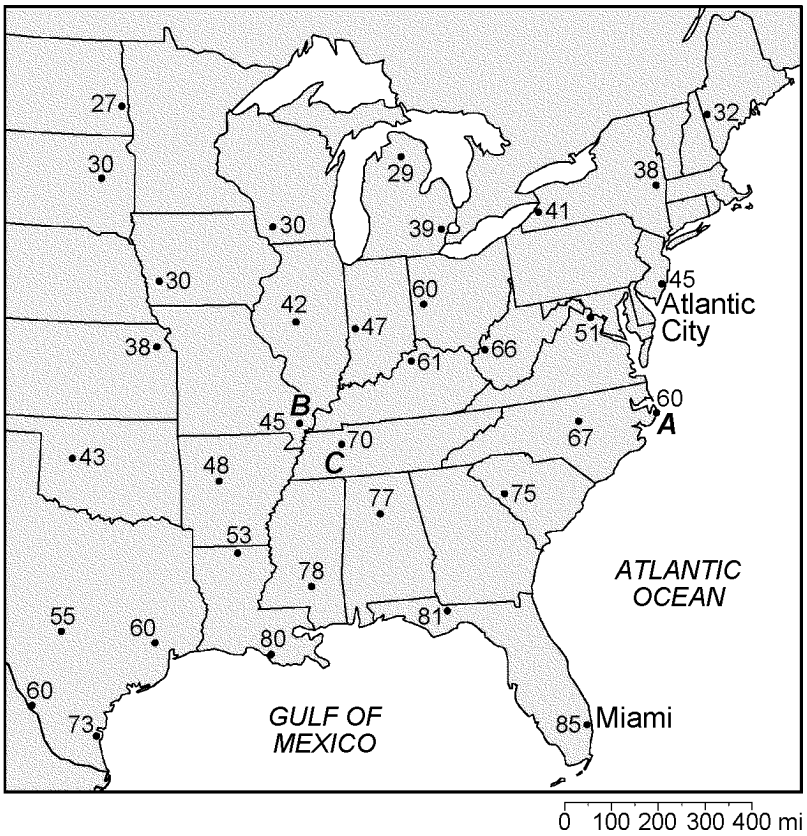
On the weather map provided, draw the isotherm for 0DF. [*Extend each end of the isotherm to the edge of the map*.]

60) Map 1 below shows air temperatures in the United States and Mexico, recorded in DF, at the points shown on the map. Map 2 below shows the location of a low-pressure system at the time these air temperatures were measured. An occluded front extends from the center of the low-pressure system (**L**) to point *A*. Lines *AB* and *AC* are two other frontal boundaries. Two air masses are shown. The storm system later moved toward New York State and produced an ice storm.



On map 1 of the diagram shown, draw the 32DF isotherm.

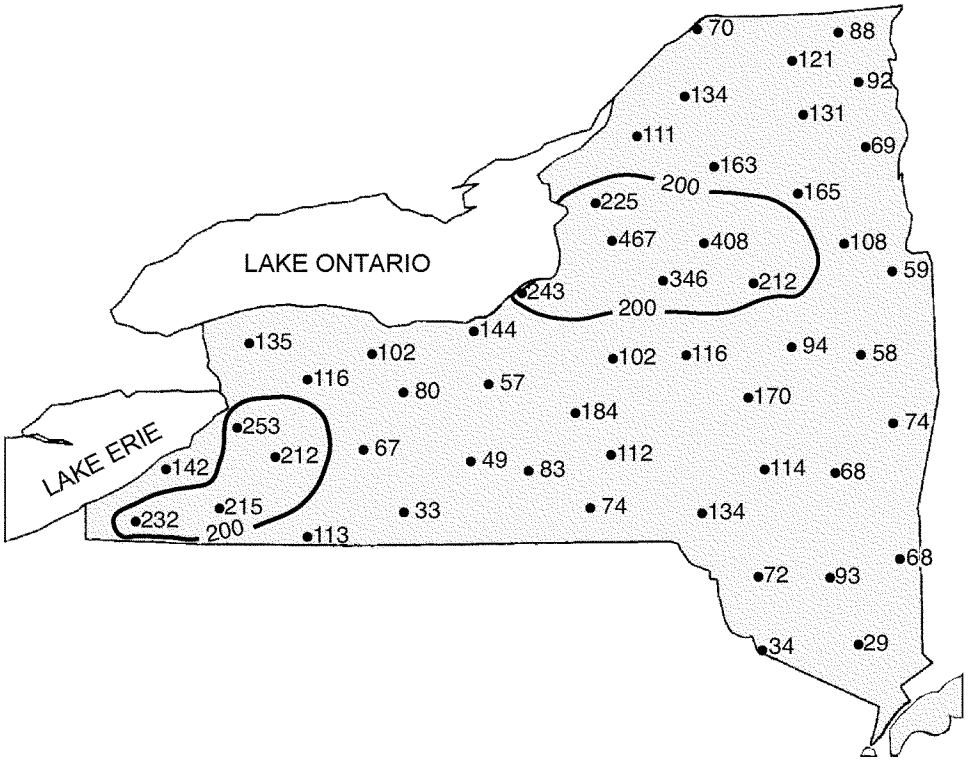
61) The map below shows surface air temperatures, in degrees Fahrenheit, for a portion of the United States. These temperatures were recorded at noontime on the same winter day. Two coastal cities are labeled: Atlantic City, New Jersey and Miami, Florida. Other selected locations are labeled *A*, *B*, and *C*.



On the map provided, draw the 60DF isotherm from location *A* to the western edge of the map.

Questions 62 and 63 refer to the following:

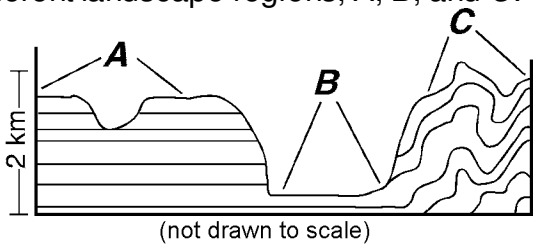
The map below shows the snowfall from the fall of 1976 through the spring of 1977, measured in inches, for most of New York State. The 200-inch snowfall isolines are shown on the map.



62) On the map provided, draw the 100-inch snowfall isoline. Extend the isoline to the edges of New York State.

63) The amount of snowfall for Massena is shown on the given map. What was the amount of snowfall for Massena?

64) The cross section below shows the general bedrock structure of an area containing three different landscape regions, *A*, *B*, and *C*.



Which list correctly identifies the type of landscapes represented by letters *A*, *B*, and *C*?

A) *A* = mountain, *B* = plain, *C* = plateau
B) *A* = plain, *B* = plateau, *C* = mountain
C) *A* = mountain, *B* = plateau, *C* = plain
D) *A* = plateau, *B* = plain, *C* = mountain

65) The large waterfall at Niagara Falls, New York, was originally located at the Niagara Escarpment. Which term *best* describes an escarpment?

A) U-shaped valley
B) V-shaped valley
C) cliff
D) drumlin

66) Landscapes characterized by gentle slopes and meandering streams are most often found in regions with

A) steep mountain cliffs
B) sediment-covered bedrock
C) recently active faults and folds
D) high volcanic activity

67) Old Forge and Watertown, located at nearly the same latitude in New York State, have very different landscapes. Which factor is primarily responsible for these landscape differences?

A) average annual precipitation
B) average annual temperature
C) soil characteristics
D) bedrock structure

68) A plane traveling in a straight line from Watertown to Utica would fly over which landscape region?

A) St. Lawrence Lowlands
B) Champlain Lowlands
C) Tug Hill Plateau
D) Adirondack Mountains

69) The Catskills landscape region is classified as a plateau because it has

A) low elevations and mostly horizontal bedrock
B) low elevations and mostly faulted or folded bedrock
C) high elevations and mostly faulted or folded bedrock
D) high elevations and mostly horizontal bedrock

70) New York's Tug Hill landscape region is classified as a plateau because this region has a

A) low elevation with distorted bedrock
B) high elevation with nearly horizontal layers of bedrock
C) high elevation with distorted bedrock
D) low elevation with nearly horizontal layers of bedrock

71) Which type of surface bedrock is most commonly found in New York State Tug Hill Plateau region?

A) intrusive igneous rock layers
B) faulted metamorphic rock layers
C) horizontal sedimentary rock layers
D) extrusive igneous rock layers

72) The *longest* portion of the Genesee River in New York State flows through which landscape region?

A) Tug Hill Plateau
B) St. Lawrence Lowlands
C) Erie-Ontario Lowlands
D) Allegheny Plateau

73) Which river in New York State flows for several miles over surface bedrock that is more than 542 million years old?

A) Susquehanna
B) Genesee
C) Hudson
D) Mohawk

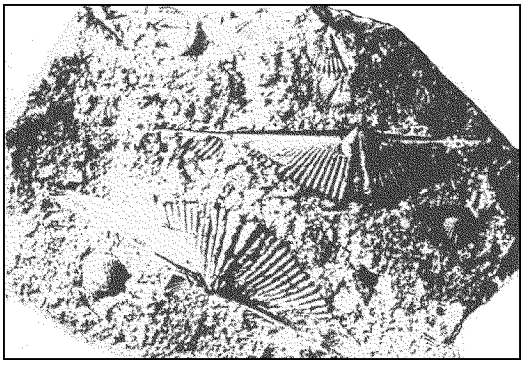
74) Which of the following two cities in New York State are located in the Interior Lowlands?

A) Buffalo and Watertown
B) Riverhead and New York City
C) Massena and Old Forge
D) Elmira and Binghamton

75) In which New York State landscape region have fossilized footprints of *Coelophysis* dinosaurs been found in the surface bedrock?

A) Allegheny Plateau
B) Hudson-Mohawk Lowlands
C) Newark Lowlands
D) Tug Hill Plateau

76) The photograph below shows index fossil shells found in bedrock in New York State.



These index fossil shells were most likely found in the surface bedrock of which landscape region?

A) the Catskills
B) Adirondack Mountains
C) St. Lawrence Lowlands
D) Tug Hill Plateau

77) Which two locations are found in the same major geographic landscape province?

A) Massena and Mount Marcy
B) Elmira and Riverhead
C) Albany and Old Forge
D) Jamestown and Slide Mountain

78) Which type of surface bedrock is commonly found in New York State between Elmira and Ithaca?

A) granite
B) quartzite
C) shale
D) marble

79) In New York State, the surface bedrock of the Catskills consists mainly of

A) limestones, shales, sandstones, and conglomerates
B) quartzites, dolostones, marbles, and schists
C) conglomerates, red sandstones, basalt, and diabase
D) weakly consolidated gravels and sands

80) The surface bedrock in the Hudson Highlands consists mostly of

A) diabase, dolostone, and granite
B) gneiss, quartzite, and marble
C) limestone, shale, sandstone, and conglomerate
D) slate, siltstone, and basalt

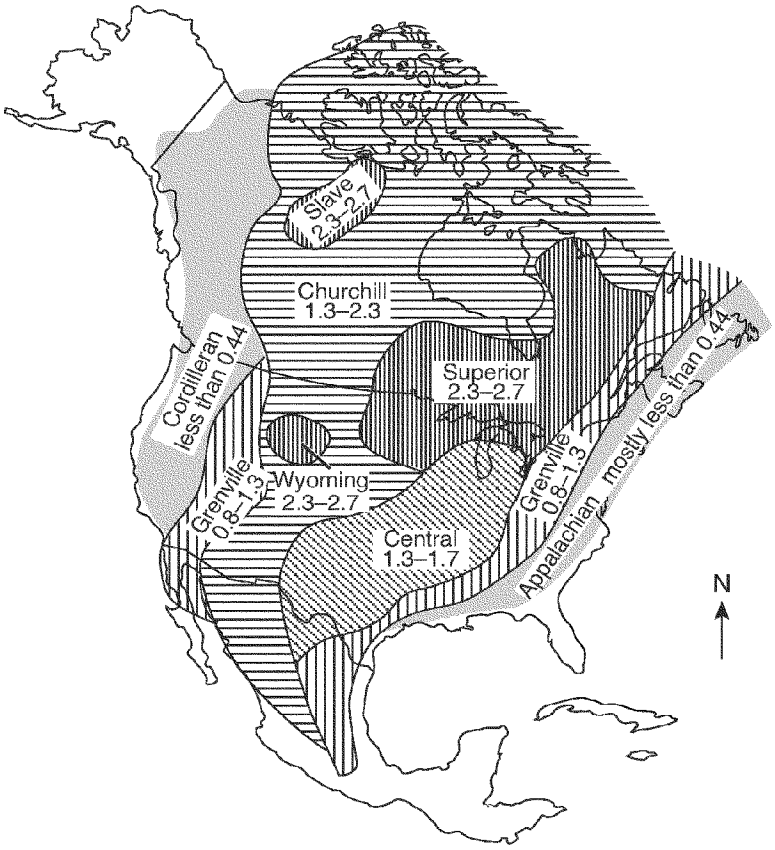
81) The bedrock of the Adirondack Mountains was formed mainly by the

A) contact metamorphism of unconsolidated gravels
B) cementation of clastic sediments and precipitates from seawater
C) compaction and recrystallization of volcanic material
D) regional metamorphism of sedimentary and igneous rocks

82) Which New York State location has surface bedrock that has been subjected to very intense regional metamorphism?

A) 41D001 N 72D151 W
B) 44D301 N 74D001 W
C) 42D301 N 75D001 W
D) 44D001 N 76D001 W

83) The map below shows the names and ages of different bedrock formations in North America. The bedrock ages are shown in billions of years.

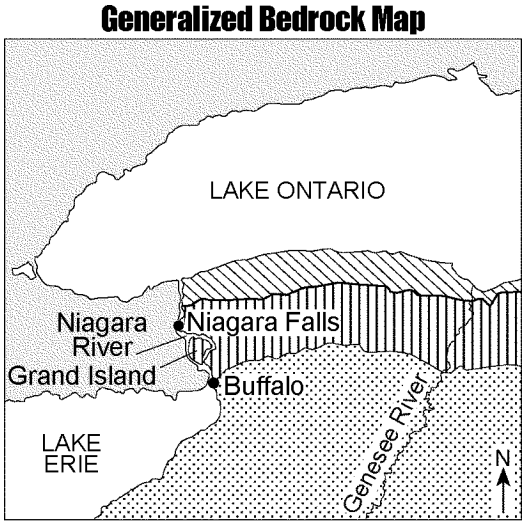


The ages shown on the map suggest that the

A) younger bedrock has been added to the east and west coasts of the continent
B) oldest bedrock is located in the Churchill formation
C) youngest bedrock is located in the Wyoming formation
D) age of bedrock increases from west to east across the continent

Questions 84 through 86 refer to the following:

The map below shows the generalized bedrock of a part of western New York State.



84) During which geologic time period was the surface bedrock of Grand Island formed?

A) Ordovician
B) Devonian
C) Cambrian
D) Silurian

85) Sediments that are transported by the Genesee River generally become

A) smaller and rounder
B) larger and rounder
C) smaller and more angular
D) larger and more angular

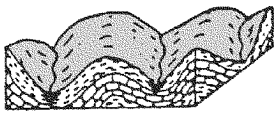
86) As the Niagara River enters Lake Ontario the velocity of the river water

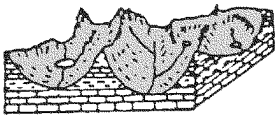
A) decreases and smaller sediments are deposited first
B) increases and smaller sediments are deposited first
C) decreases and larger sediments are deposited first
D) increases and larger sediments are deposited first

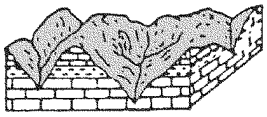
87) Which agent of erosion most likely formed the drumlins and finger lakes in New York State?

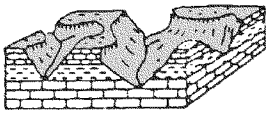
A) mass movement
B) wave action
C) running water
D) moving ice

88) Which landscape surface resulted primarily from erosion by glaciers?

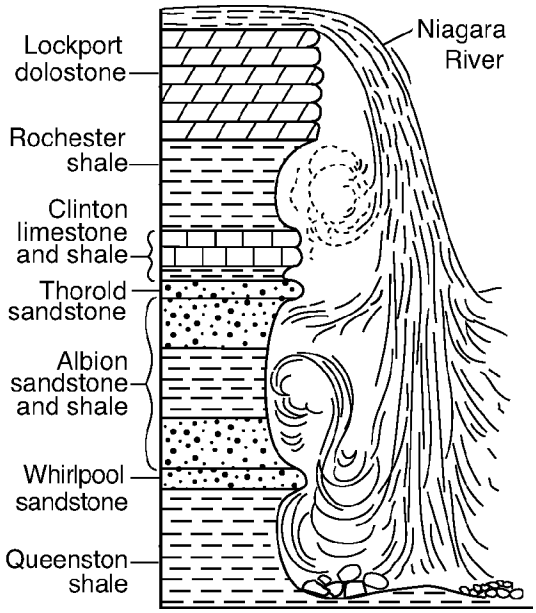
A) 

C) 

B) 

D) 

89) A cross section of Niagara Falls is shown below.

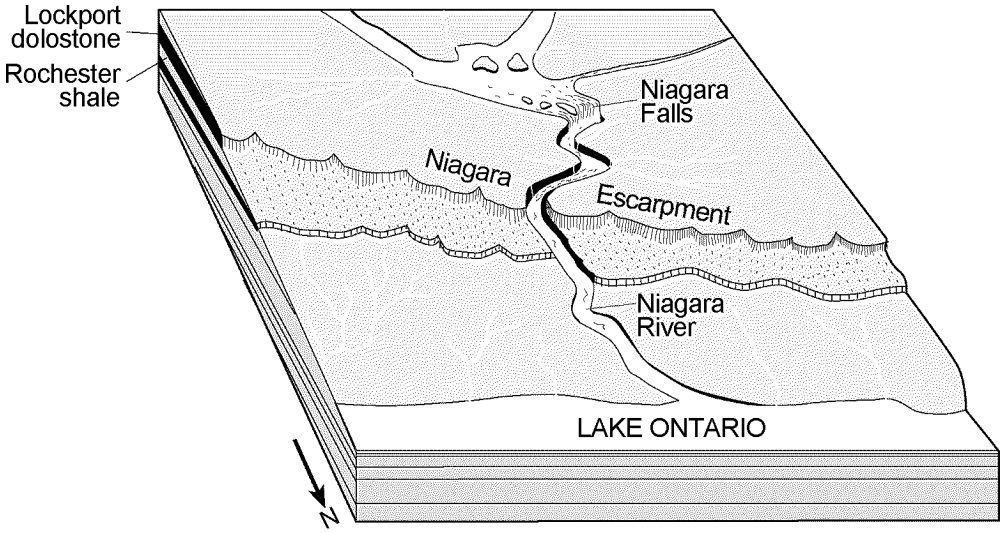


Which two rock units appear to be *most* resistant to weathering and erosion?

A) Lockport dolostone and Whirlpool sandstone
B) Thorold sandstone and Queenston shale
C) Rochester shale and Albion sandstone and shale
D) Clinton limestone and shale and Queenston shale

Questions 90 and 91 refer to the following:

The block diagram below is of the Niagara Falls region as viewed from the north.



The Niagara River began to flow over the Niagara Escarpment about 12,000 years ago when the last Pleistocene ice sheet melted and retreated north from the Niagara Escarpment. Since that time, Niagara Falls has eroded upriver, leaving a deep, steep-sided valley that is 11,000 meters long. The top bedrock layer of the escarpment is the Lockport dolostone which lies above the Rochester shale. The shale is more easily weathered than the dolostone. This causes the dolostone to be undercut. As a result, the dolostone breaks off in large blocks that tumble to the base of Niagara Falls.

90) In which New York State landscape region is Niagara Falls located?

91) Toward which compass direction is the location of Niagara Falls likely to move in the future?

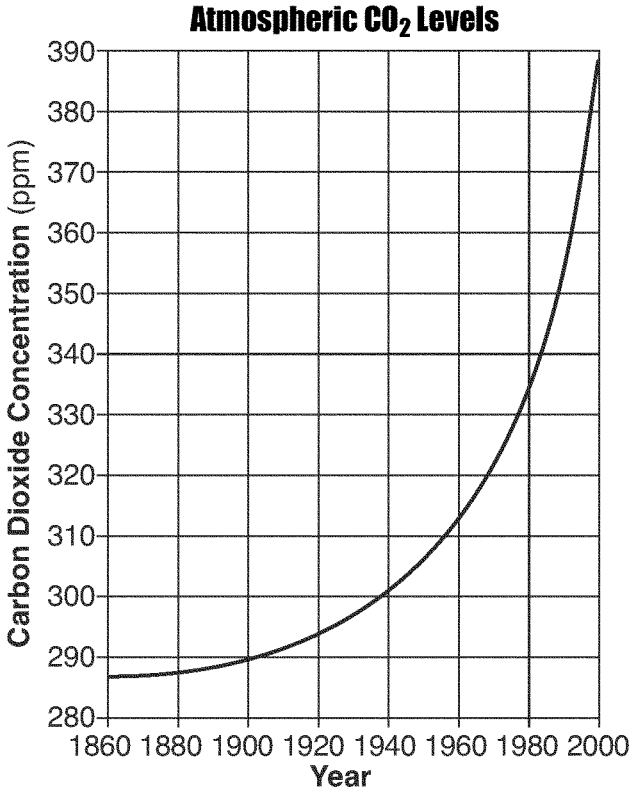
92) The presence of coal in Antarctica indicates that
   A) Antarctica currently has areas of tropical climate
   B) Antarctica's climate was once warmer
   C) forests can grow on continental glaciers
   D) coal can form in cold climates

93) Which change is most likely to occur in a landscape if its climate changes from humid to arid?
   A) Surface features will become more rounded.
   B) Wind will become a more important agent of erosion.
   C) Vegetation will increase.
   D) Chemical weathering will increase.

94) Which factor most likely determines why a greater number of coral types are found farther south along the east coast of southern Africa than along the west coast?

A) temperature of the ocean currents
B) angle of the Sun's rays
C) distance from the equator
D) seasonal air temperature range

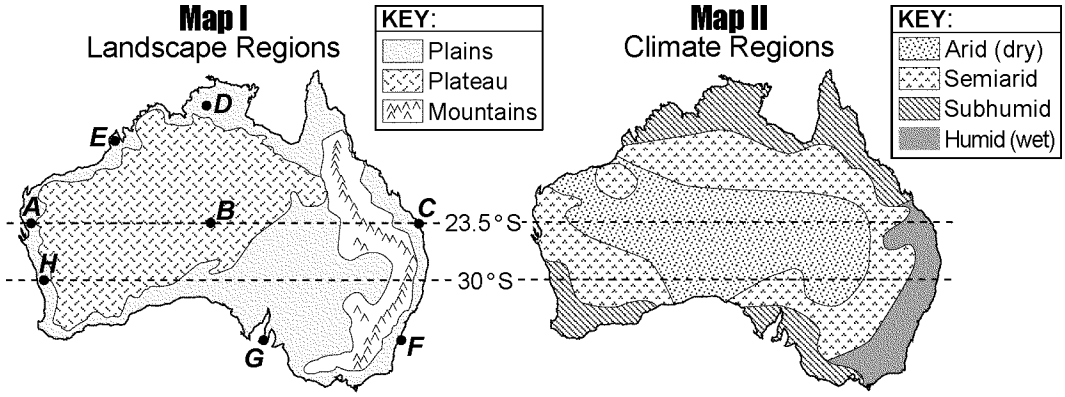
95) The graph below shows changes in carbon dioxide concentrations in Earth's atmosphere over a 140-year period. Carbon dioxide concentrations are shown in parts per million (ppm).



This significant change in CO_2 concentration is most likely caused by

A) increased El Niño activity, and is predicted to decrease average global temperatures
B) decreased cloud cover, and is predicted to decrease average global temperatures
C) increased use of fossil fuels, and is predicted to increase average global temperatures
D) decreased volcanic activity, and is predicted to increase average global temperatures

96) Two maps of Australia are shown below.Map *I* shows Australia's major landscape regions. Letters *A* through *H* represent locations in Australia. Map *II* shows Australia's general climate regions.

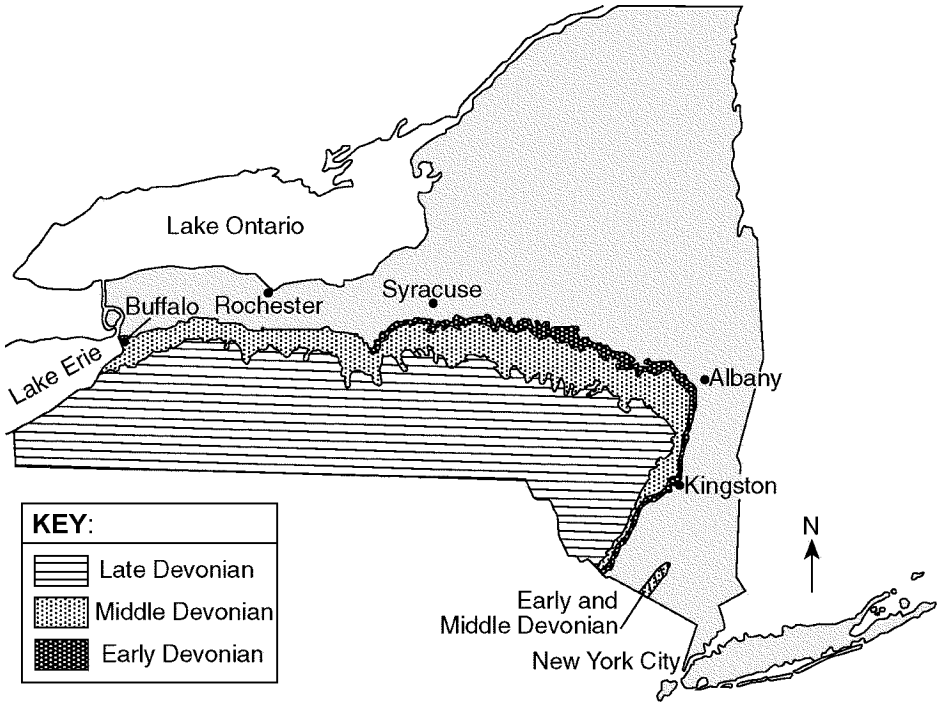


Location *B* on the given map is in a landscape region that has

A) high elevations and horizontal bedrock
B) low elevations and horizontal bedrock
C) high elevations and deformed bedrock
D) low elevations and deformed bedrock

Questions 97 and 98 refer to the following:

The map below shows the geographical distribution of most of the Devonian-age surface bedrock in New York State.

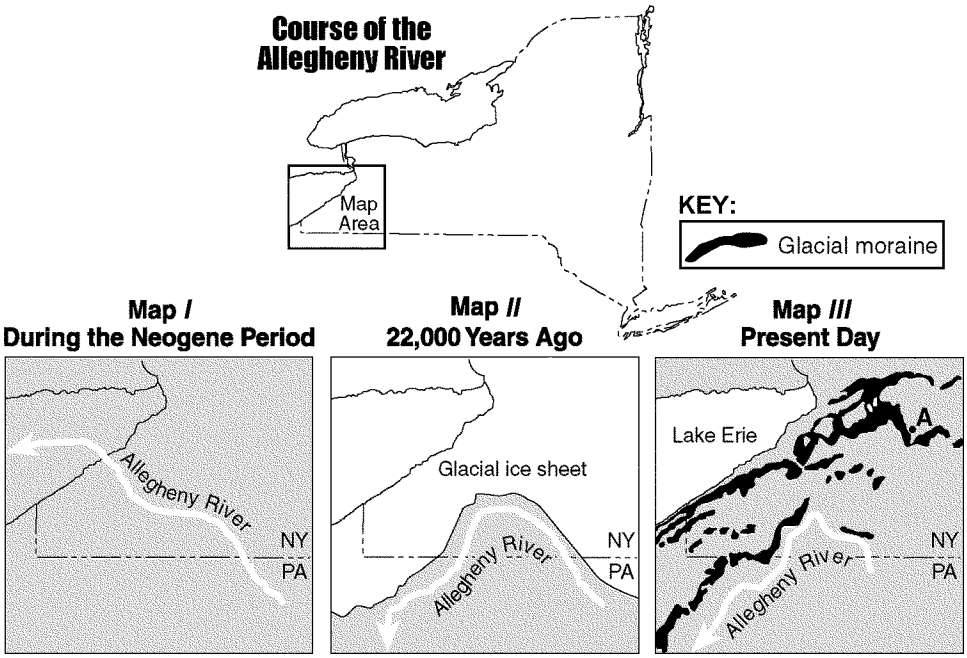


97) On the map provided, place an **X** at a location where the gastropod fossil *Platyceras* might be found in the surface bedrock.

98) State the name of the New York State landscape region that includes most of the Devonian-age surface bedrock shown on the given map.

Questions 99 through 102 refer to the following:

The southwest corner of the New York State map below is enlarged in maps *I*, *II*, and *III*. Arrows on maps *I*, *II*, and *III* show the location and direction of flow for part of the Allegheny River at different times during the Cenozoic Era. The present boundaries of New York State and Lake Erie are shown on each map. Point *A* on map *III* represents a location in New York State.



99) Map *II* shows the course of the Allegheny River during a specific part of a geologic time period. State the name of this geologic time period.

100) Explain why the direction of flow of the Allegheny River changed between the times shown on map *I* and map *II*.

101) Based on the given maps, identify the present-day feature that prevents the Allegheny River from returning to its earlier (Neogene) direction of flow to the northwest.

102) The diagram below shows a partial cross section of a valley near location *A* on map *III*. On this diagram, draw a line beginning at *X* and ending at *Y* to show the shape of this valley after it was eroded by glacial ice that flowed down the valley.