The University of the State of New York

REGENTS HIGH SCHOOL EXAMINATION

EARTH SCIENCE

Thursday, January 25, 2001 — 1:15 to 4:15 p.m., only

The last page of the booklet is the answer sheet. Fold the last page along the perforations and, slowly and carefully, tear off the answer sheet. Then fill in the heading of your answer sheet.

All of your answers are to be recorded on the separate answer sheet. For each question, decide which of the choices given is the best answer. Then on the answer sheet, in the row of numbers for that question, circle with pencil the number of the choice that you have selected. The sample below is an example of the first step in recording your answers.

SAMPLE: (1) 2 3 4

If you wish to change an answer, erase your first penciled circle and then circle with pencil the number of the answer you want. After you have completed the examination and you have decided that all of the circled answers represent your best judgment, signal a proctor and turn in all examination material except your answer sheet. Then and only then, place an X in ink in each penciled circle. Be sure to mark only one answer with an X in ink for each question. No credit will be given for any question with two or more X's marked. The sample below indicates how your final choice should be marked with an X in ink.

SAMPLE: ⊗ 2 3 4

The *Earth Science Reference Tables*, which you may need to answer some questions in this examination, are supplied separately. Be certain you have a copy of the 2001 edition of these reference tables before you begin the examination.

When you have completed the examination, you must sign the statement printed at the end of the answer sheet, indicating that you had no unlawful knowledge of the questions or answers prior to the examination and that you have neither given nor received assistance in answering any of the questions during the examination. Your answer sheet cannot be accepted if you fail to sign this declaration.

DO NOT OPEN THIS EXAMINATION BOOKLET UNTIL THE SIGNAL IS GIVEN.

Part I

Answer all 55 questions in this part. [55]

Directions (1–55): For *each* statement or question, select the word or expression that, of those given, best completes the statement or answers the question. Record your answer on the separate answer sheet in accordance with the directions on the front page of this booklet. Some questions may require the use of the 2001 edition of the *Earth Science Reference Tables*.

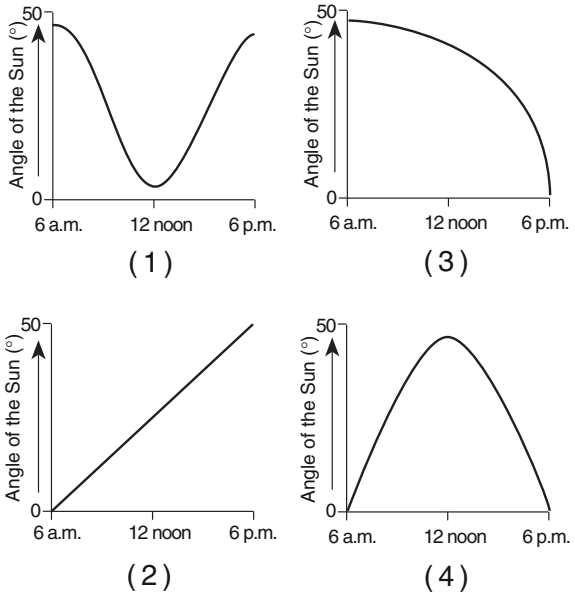
1 Which procedure is an example of classifying observed data?

1 grouping stars by brightness
2 graphing temperature versus time for a particular date
3 photographing the cloud cover for a location throughout 1 week
4 measuring the angle of Polaris from two different locations

2 As a ship crosses the Prime Meridian, the altitude of Polaris measured from the ship is 50°. What is the ship's location?

(1) 0° latitude 50° east longitude
(2) 0° latitude 50° west longitude
(3) 50° north latitude 0° longitude
(4) 50° south latitude 0° longitude

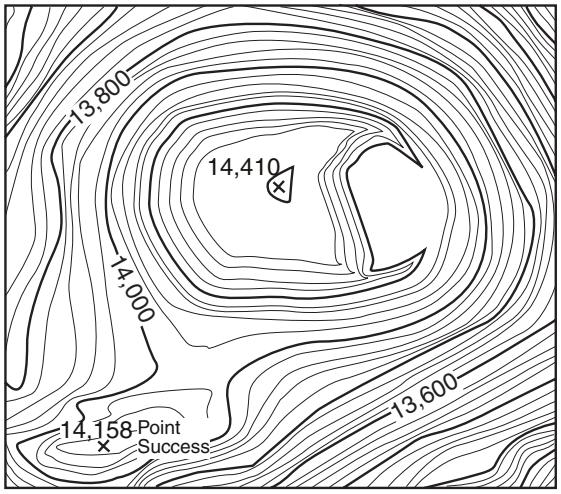
3 Which graph best represents the angle of the Sun above the horizon as observed from 6 a.m. to 6 p.m. on September 23 at a location in New York State?



4 Which event is most predictable?

1 The Sun rises.
2 An earthquake occurs.
3 A meteorite falls to Earth.
4 Coral fossils are found on mountaintops.

5 A topographic map of Mt. Rainier in Washington State is shown below.



What is the contour interval of the map?

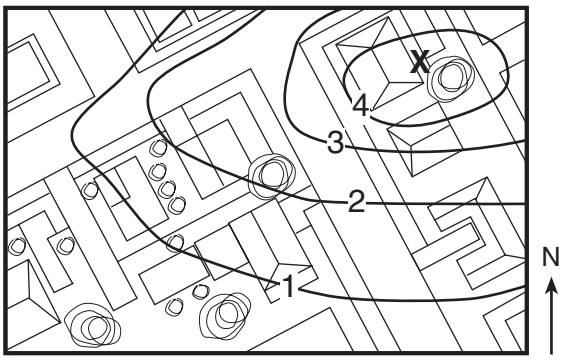
(1) 20 ft
(2) 40 ft
(3) 100 ft
(4) 200 ft

6 An observer on Earth determines that the apparent diameter of the Moon as viewed from Earth varies in a cyclic manner. The best explanation for this observation is that the

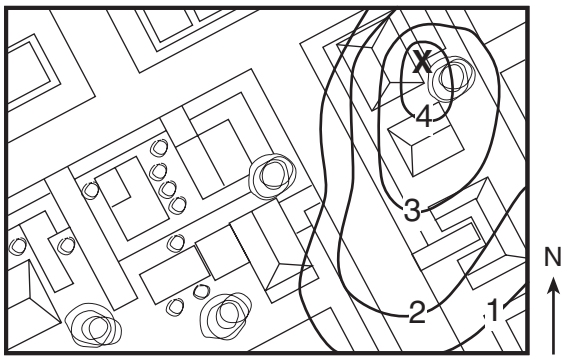
1 Moon is rotating
2 Moon's orbit is elliptical
3 atmospheric transparency of the Moon changes
4 distance between the Moon and the Sun changes

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

Map A
Odor Field



Map B
Odor Field, 1 Hour Later



Key	
1 Just noticeable	3 Moderate
2 Weak	4 Strong

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

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

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8 Which equation can be used to correctly calculate the air-pressure gradient between two locations?

1 $\text{gradient} = \dfrac{\text{change in air pressure (mb)}}{\text{average air temperature (°F)}}$

2 $\text{gradient} = \dfrac{\text{change in air pressure (mb)}}{\text{distance (km)}}$

3 $\text{gradient} = \dfrac{\text{change in distance (km)}}{\text{air pressure interval (mb)}}$

4 $\text{gradient} = \dfrac{\text{change in air pressure (mb)}}{\text{air pressure interval (mb)}}$

9 If the axis of Earth were *not* tilted relative to the plane of its orbit around the Sun, the result would be

1 a greater number of hours in a day
2 a greater number of days in a year
3 a reversal of polar and equatorial climates
4 an equal number of hours of daylight at most locations

10 If the distance between the Moon and Earth were double its present distance, the Moon's cycle of phases would occur

1 in reverse order and more slowly
2 in reverse order and more quickly
3 in the same order but more slowly
4 in the same order but more quickly

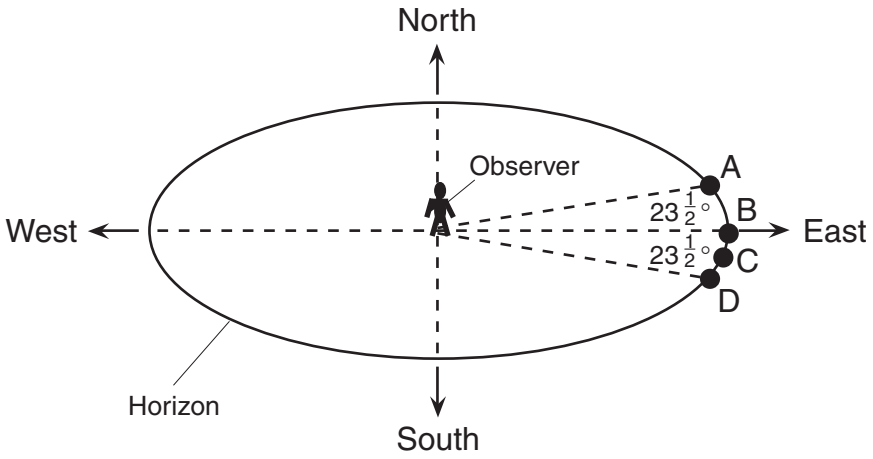
11 The apparent daily movement of the Sun across the sky is caused by

1 Earth's rotation on its axis
2 Earth's revolution around the Sun
3 the Sun's revolution around Earth
4 the Sun's rotation during a 24-hour period

12 Changing the color of the roof of a house from light to dark would probably increase the amount of solar energy that is

1 reflected
2 created
3 insulated
4 absorbed

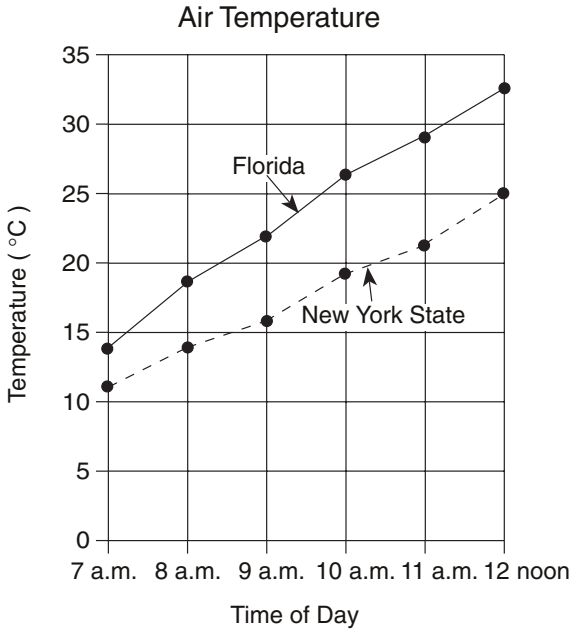
13 The diagram below, which represents a horizon in New York State, shows four positions of sunrise, *A*, *B*, *C*, and *D*, on different days of the year.



At which position would sunrise occur on June 21?

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

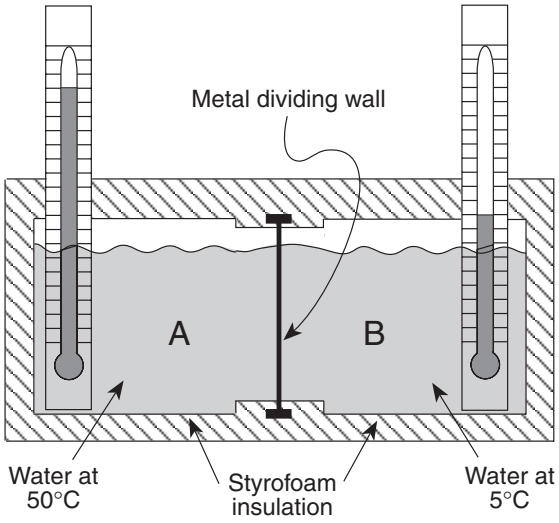
14 The graph below shows air temperatures on a clear summer day from 7 a.m. to 12 noon at two locations, one in Florida and one in New York State.



Air temperature rose slightly faster in Florida than in New York State because Florida

1 has a lower angle of insolation
2 has a higher angle of insolation
3 is closer to the Prime Meridian
4 is farther from the Prime Meridian

15 The cross section below shows two compartments of water of equal volume insulated by Styrofoam and separated by a metal dividing wall, forming a closed energy system.



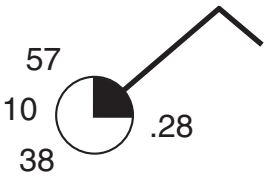
When the temperature of the water in compartment *A* decreases by 10 C°, the temperature of the water in compartment *B* will

1 remain unchanged
2 decrease by only 5 C°
3 decrease by approximately 10 C°
4 increase by approximately 10 C°

16 Radiation with the wavelength 5.0×10^{-5} centimeters is usually visible as what color?

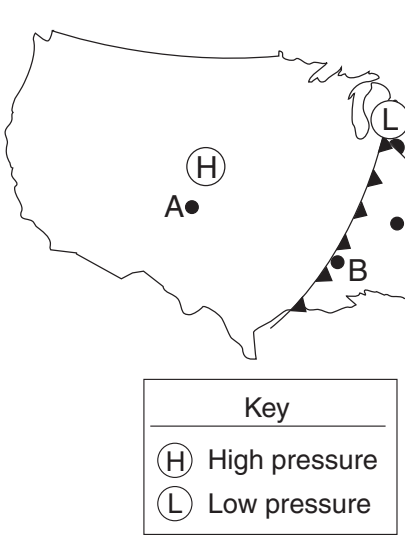
1 violet
2 blue
3 green
4 yellow

17 What is the visibility, in miles, shown on the station model below?



(1) 10
(2) 28
(3) 38
(4) 57

18 The map below shows high-pressure and low-pressure weather systems in the United States.



Which two lettered positions on the map are most likely receiving precipitation?

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

19 Earth's atmosphere is warmed when

(1) ultraviolet radiation emitted by Earth is absorbed by nitrogen and carbon dioxide in the atmosphere
(2) x-ray radiation emitted by Earth is absorbed by nitrogen and carbon dioxide in the atmosphere
(3) infrared radiation emitted by Earth is absorbed by carbon dioxide and water vapor in the atmosphere
(4) gamma radiation emitted by Earth is absorbed by carbon dioxide and water vapor in the atmosphere

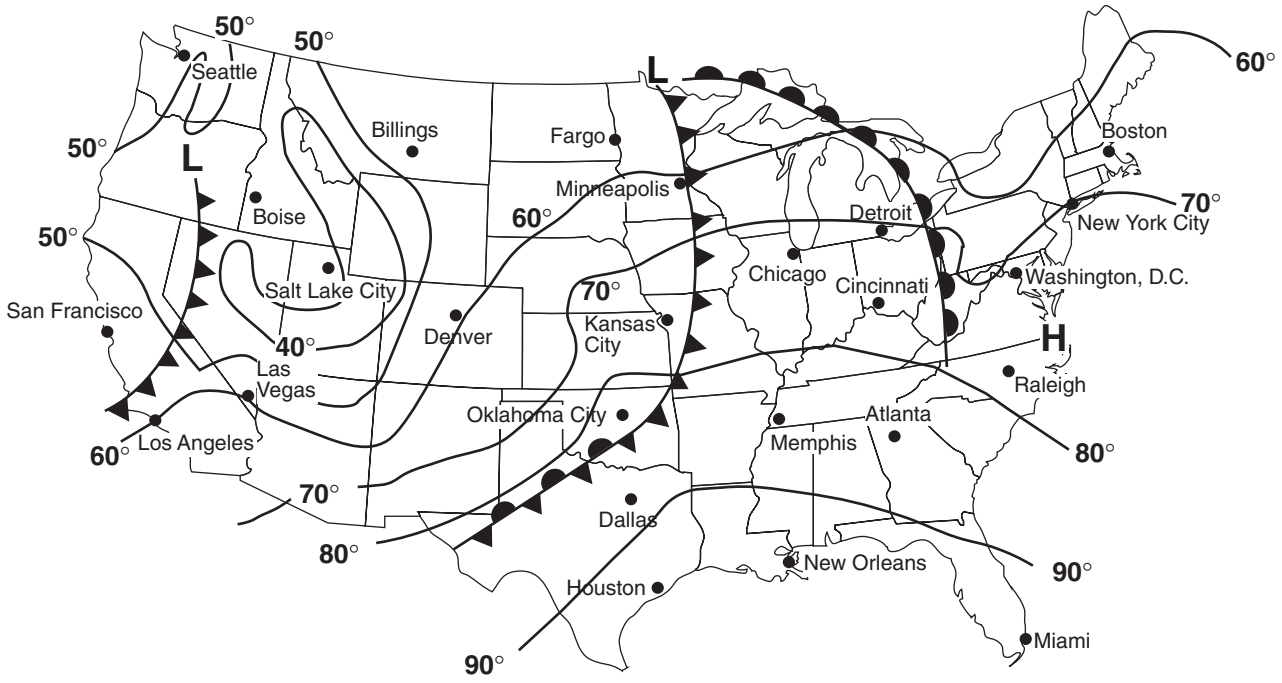
20 Which atmospheric conditions are necessary for condensation?

1 saturated air and dewpoint temperature much lower than air temperature
2 unsaturated air and dewpoint temperature much higher than air temperature
3 saturated air and equal dewpoint and air temperatures
4 unsaturated air and equal dewpoint and air temperatures

21 The heavy lake-effect snowfalls in the Tug Hill Plateau region occur primarily because the plateau is located

1 in the path of prevailing winds from Lake Ontario
2 in the Northern Hemisphere
3 near the Atlantic Ocean
4 west of the Hudson-Mohawk Lowlands

Base your answers to questions 22 and 23 on the weather map below, which shows the location of fronts and the temperature field on a given day in the United States.



22 The passage of a cold front most recently influenced the weather of which two cities?

1 Chicago and Boise
2 Las Vegas and Salt Lake City
3 Kansas City and Minneapolis
4 Detroit and Cincinnati

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

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

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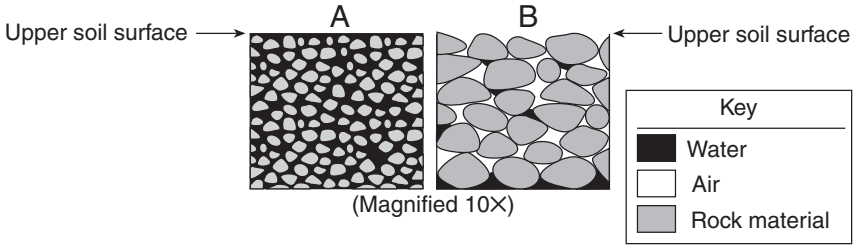
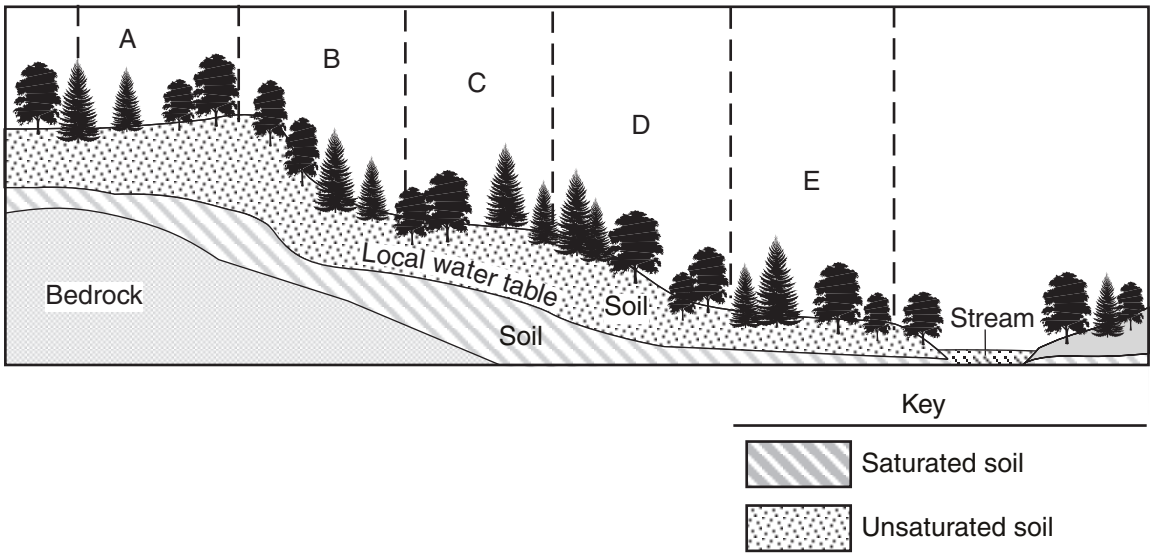
24 During a heavy rainstorm, soil samples *A* and *B* both became saturated with water. However, 10 minutes after the storm ended, the soils appeared as shown below.



Which statement best explains the observed change in the water content of the soil samples?

1 The permeability of *B* is greater than the permeability of *A*.
2 The porosity of *B* is greater than the porosity of *A*.
3 The capillarity of *B* is greater than the capillarity of *A*.
4 The surface runoff at *B* is greater than the surface runoff at *A*.

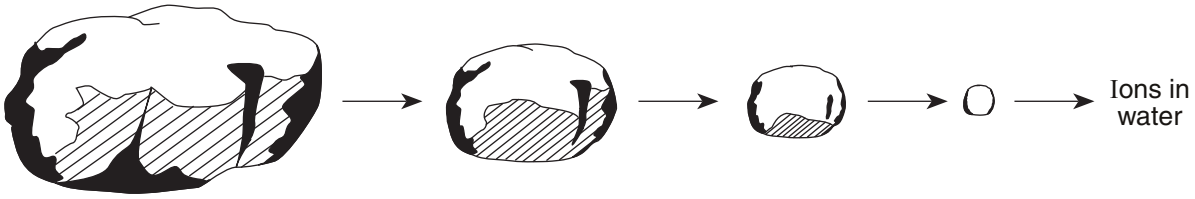
25 The cross section below represents a forested area in New York State.



During heavy rainfall, the greatest amount of runoff should occur in which two sections of the forest?

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

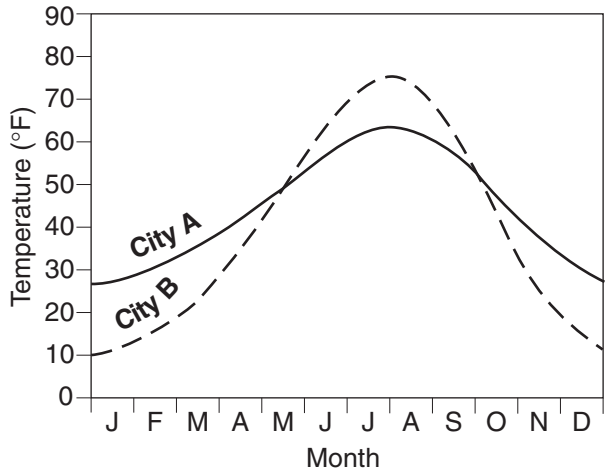
26 The diagram below shows what happens to a rock within a stream's erosional-depositional system as time passes.



Which process of change is best represented by the sequence shown in the diagram?

1 deposition
2 metamorphism
3 condensation
4 weathering

27 The graph below shows the average temperatures for cities *A* and *B* for 1 year.



Where are these two cities most likely located?

1 Both cities are in the Northern Hemisphere, with city *A* inland and city *B* on the coast.
2 Both cities are in the Southern Hemisphere, with city *A* inland and city *B* on the coast.
3 Both cities are in the Northern Hemisphere, with city *A* on the coast and city *B* inland.
4 Both cities are in the Southern Hemisphere, with city *A* on the coast and city *B* inland.

28 On which day of the year does New York State have the *fewest* hours of daylight?

1 April 21
2 June 21
3 October 21
4 December 21

29 For an igneous rock to be classified as rhyolite, it must be light colored, be fine grained, and contain

1 quartz
2 calcite
3 pyroxene
4 olivine

30 Which characteristics of a particle would usually result in the longest settling time for the particle in calm water?

1 low density and round shape
2 low density and flat shape
3 high density and round shape
4 high density and flat shape

31 Which size particle will remain suspended longest as a river enters the ocean?

1 pebble
2 sand
3 silt
4 clay

32 Particles of sediment collected from a lake bottom averaged 1.2 centimeters in diameter. If left on the lake bottom to become buried by more sediment and compressed into rock, these particles would form

1 sandstone
2 conglomerate
3 quartzite
4 granite

33 Scratching a mineral against a glass plate and rubbing a mineral on a streak plate are helpful procedures for determining a mineral's

1 density
2 identity
3 cleavage
4 internal atomic structure

34 Measurements of a stream taken over 5 years indicate that its velocity has decreased. The stream's decreased velocity was most likely caused by

1 an increase in atmospheric transparency
2 an increase in atmospheric surface winds
3 a decrease in gradient
4 a decrease in transpiration

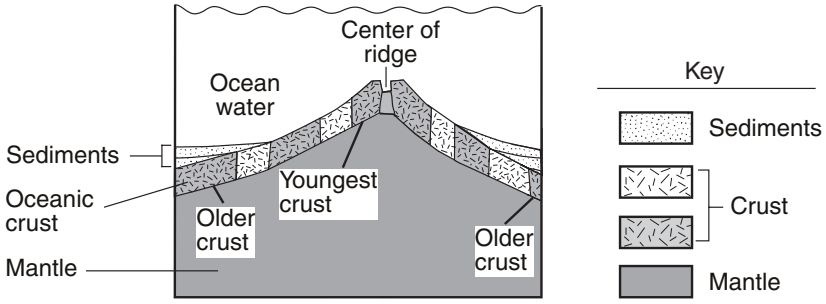
35 Which process is necessary for the formation of igneous rocks?

1 erosion
2 deposition
3 solidification
4 metamorphism

36 According to the plate tectonics theory, the Peru-Chile Trench and the Andes Mountains formed along the west coast of South America because the South American Plate

1 collided with the Nazca Plate
2 collided with the North American Plate
3 slid away from the Nazca Plate
4 slid away from the North American Plate

Base your answers to questions 37 and 38 on the cross section below, which shows a portion of Earth's crust and upper mantle near a mid-ocean ridge.



(Not drawn to scale)

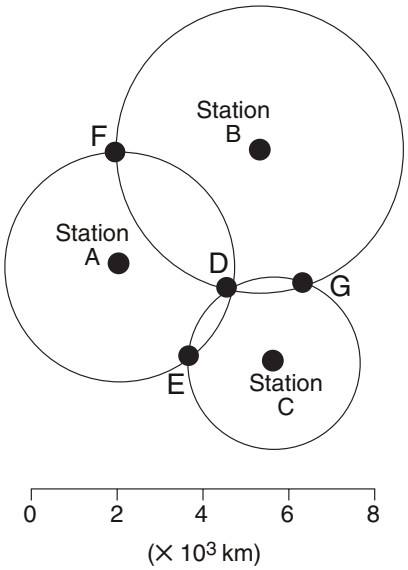
37 If the crust symbol represents basalt with normal magnetic polarity, what does the crust symbol most likely represent?

1 igneous rock with normal magnetic polarity
2 igneous rock with reversed magnetic polarity
3 sedimentary rock with normal magnetic polarity
4 sedimentary rock with reversed magnetic polarity

38 The geological features of the ocean floor in this region resulted from

1 colliding plates in the lithosphere
2 sinking iron and magnesium in the lithosphere
3 cooler temperatures in the mantle
4 rising convection currents in the mantle

Base your answers to questions 39 and 40 on the diagram below, which represents seismic stations *A*, *B*, and *C*. The distance from each station to an earthquake's epicenter is plotted.



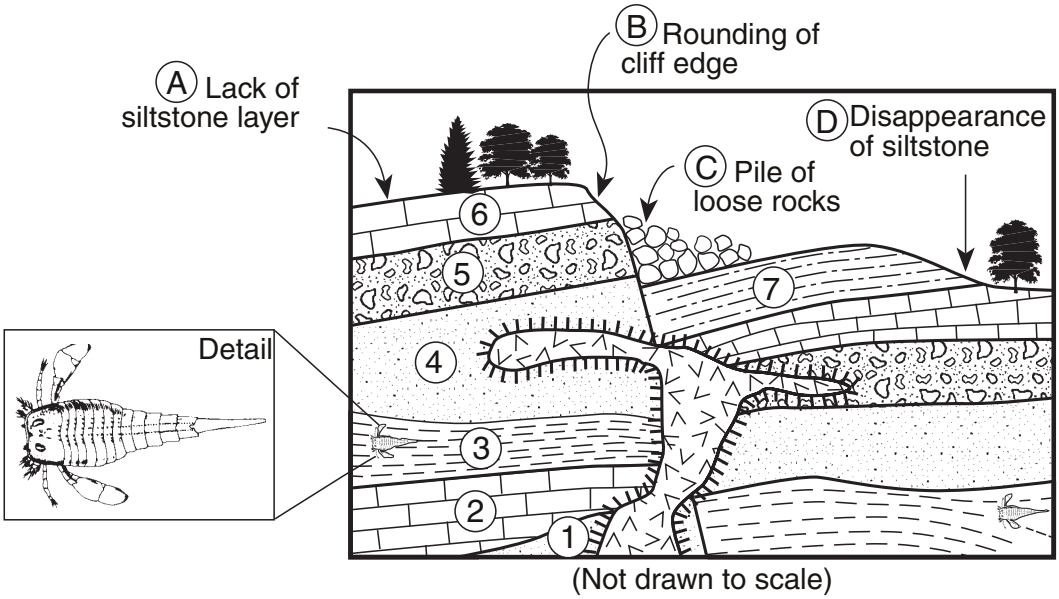
39 The *P*-wave of an earthquake originating 2,600 kilometers from seismic station *A* arrived at 5:24:45 a.m. What was the arrival time of the *S*-wave from the same earthquake?

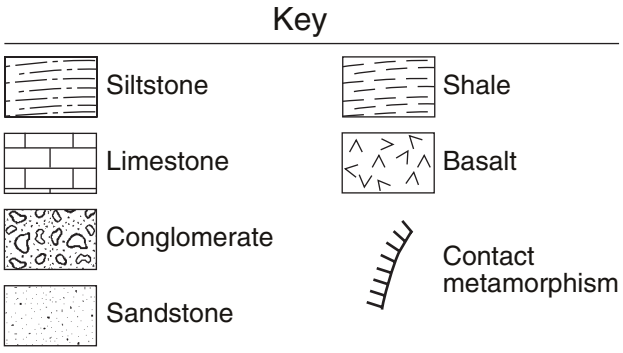
(1) 1:24:45 a.m.
(2) 5:21:05 a.m.
(3) 5:28:45 a.m.
(4) 9:24:05 a.m.

40 The epicenter is closest to point

(1) *D*
(2) *E*
(3) *F*
(4) *G*

Base your answers to questions 41 through 43 on the diagram below of a cross section of a portion of Earth's crust. Letters *A* through *D* represent landscape features, and numbers 1 through 7 represent rock layers. The detail shows a fossil found in layer 3.





41 What is the correct sequence of events from oldest to most recent in the geologic history of this area?

1 deposition of layers from 1 to 7 → intrusion of basalt → faulting
2 deposition of layers from 1 to 7 → faulting → intrusion of basalt
3 deposition of layers from 7 to 1 → intrusion of basalt → faulting
4 deposition of layers from 7 to 1 → faulting → intrusion of basalt

42 The fossil found in layer 3 indicates that the age of this shale layer is approximately

(1) 70 million years
(2) 220 million years
(3) 430 million years
(4) 520 million years

43 Which landscape features provide evidence that weathering and erosion were likely to have occurred?

(1) *A* and *D*, only
(2) *B* and *C*, only
(3) *A*, *C*, and *D*, only
(4) *A*, *B*, *C*, and *D*

44 A bone sample contains only $\frac{1}{4}$ of its original radioactive C^{14} content. How old is the bone sample?

(1) 1 C^{14} half-life
(2) 2 C^{14} half-lives
(3) 9 C^{14} half-lives
(4) 4 C^{14} half-lives

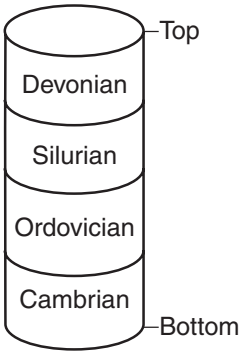
45 Which type of rock is most commonly found as an outcrop in the Allegheny Plateau in New York State?

1 sandstone
2 gneiss
3 basalt
4 slate

46 Many north-to-south elongated hills are found scattered across New York State. These hills contain a mixture of unsorted sediments of all sizes. Erosion and deposition by which agent probably formed these hills?

1 wind
2 waves
3 streams
4 glaciers

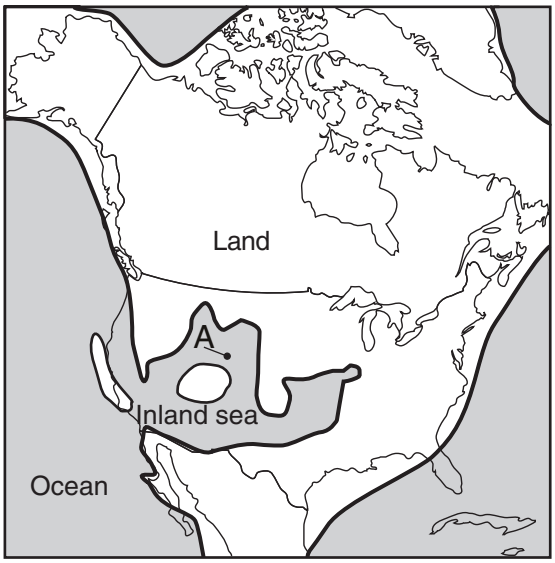
47 The diagram below represents bedrock of different ages beneath a location in New York State.



Assuming that the rock layers have not been overturned and that no unconformity exists, at which location is this bedrock found?

1 Albany
2 Elmira
3 Old Forge
4 Oswego

48 The shaded portion of the map below of North America shows areas believed to have been below sea level during the Pennsylvanian Period. Point *A* is a location in the inland sea.



Present-day evidence of the existence of the inland sea during the Pennsylvanian Period is best provided by

1 marine fossils at point *A*
2 seawater at point *A*
3 metamorphic rock at point *A*
4 terrestrial rock at point *A*

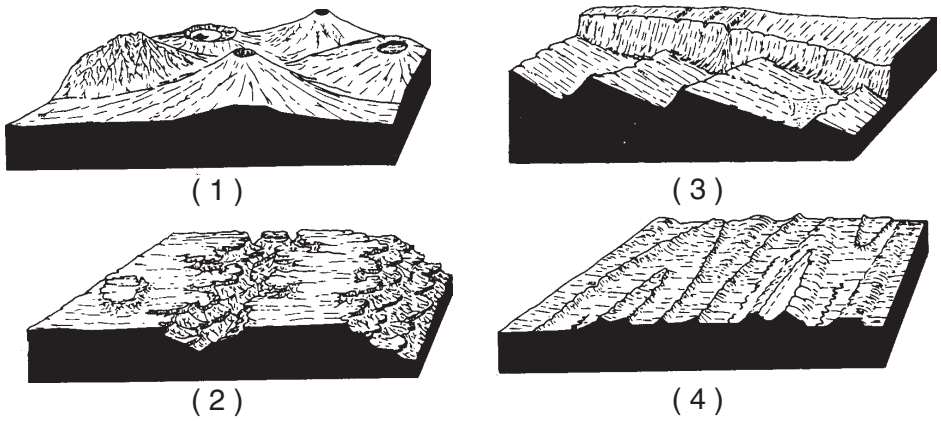
49 Which type of rock is most likely to contain fossils?

1 granite
2 gneiss
3 shale
4 metaconglomerate

50 Why are radioactive substances useful for measuring geologic time?

1 The ratio of decay products to radioactive substances remains constant in rocks.
2 The half-lives of radioactive substances are short.
3 Samples of radioactive substances are easy to collect from rocks.
4 Radioactive substances undergo decay at a predictable rate.

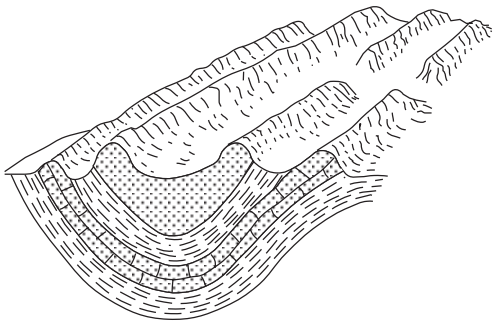
51 Which landscape region probably resulted from the erosion of faulted rock layers?



(1) (3)

(2) (4)

52 The diagram below shows the surface features and rock structure of a section of Earth's crust.



Which stream pattern would most likely form on this landscape region?

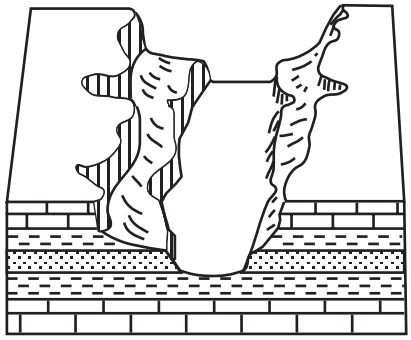
(1) (3)

(2) (4)

53 The generalized landscape regions of New York State are identified chiefly on the basis of

1 nearness to continental boundaries
2 nearness to major mountain ranges
3 climatic conditions
4 surface bedrock characteristics

54 The block diagram below shows a portion of Earth's surface.



If the climate in this area becomes more humid, which change will most likely occur?

1 The landscape features will become more rounded.
2 The elevation of the entire region will increase.
3 The limestone will stop dissolving.
4 The rate of wind erosion will increase.

Note that question 55 has only three choices.

55 Dynamic equilibrium between erosion and deposition in a river exists when the amount of deposition is

1 less than the amount of erosion
2 greater than the amount of erosion
3 the same as the amount of erosion

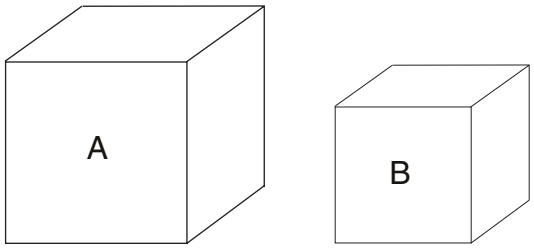
Part II

This part consists of ten groups, each containing five questions. Choose seven of these ten groups. Be sure that you answer all five questions in each group chosen. Record the answers to these questions on the separate answer sheet in accordance with the directions on the front page of this booklet. [35]

Group 1

If you choose this group, be sure to answer questions 56–60.

Base your answers to questions 56 through 60 on the 2001 edition of the *Earth Science Reference Tables*, the diagrams below, and your knowledge of Earth science. The diagrams represent two different solid, uniform materials cut into cubes *A* and *B*.



Mass of A = 320 g
Volume of A = 64 cm^3

Density of B = 3 g/cm^3
Volume of B = 27 cm^3

(Not drawn to scale)

56 What is the density of cube *A*?

(1) 0.2 g/cm^3
(2) 5.0 g/cm^3
(3) 12.8 g/cm^3
(4) 64.0 g/cm^3

57 What is the mass of cube *B*?

(1) 3 g
(2) 9 g
(3) 27 g
(4) 81 g

58 A student calculates the density of a third material as 8.3 grams per cubic centimeter instead of the accepted value of 8.0 grams per cubic centimeter. What is the student's approximate percent deviation (percent of error)?

(1) 3.0%
(2) 3.8%
(3) 30.0%
(4) 36.1%

Note that questions 59 and 60 have only three choices.

59 Assume cube *B* was broken into many irregularly shaped pieces. Compared to the density of the entire cube, the density of one of the pieces would be

1 less
2 greater
3 the same

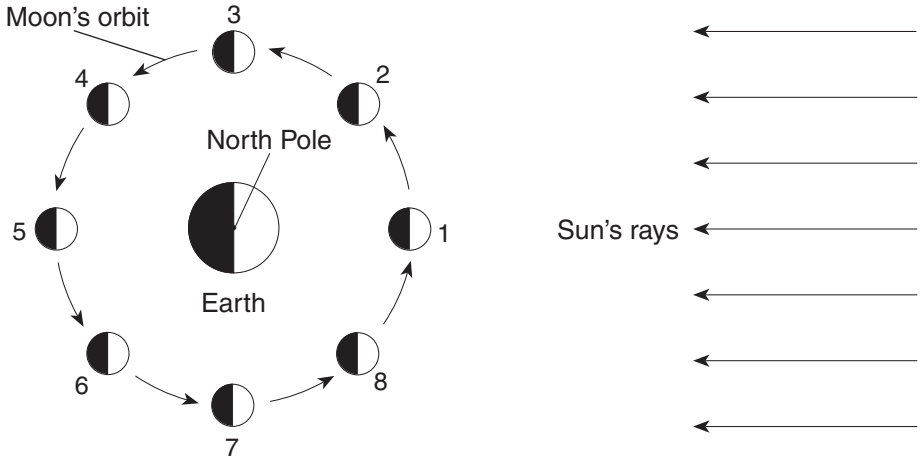
60 If a parcel of air is heated, its density will

1 decrease
2 increase
3 remain the same

Group 2

If you choose this group, be sure to answer questions 61–65.

Base your answers to questions 61 through 65 on the diagram below, which represents the Moon orbiting Earth as viewed from space above the North Pole. The Moon is shown at eight different positions in its orbit.



(Not drawn to scale)

Key
Lighted, visible part of the Moon
Dark, invisible part of the Moon

61 The approximate time required for the Moon to move from position 3 to position 7 is

(1) 1 hour (3) 3 months
(2) 2 weeks (4) 4 days

62 As the Moon changes location from position 2 to position 6, the visible portion of the Moon as observed from Earth

1 decreases, only
2 increases, only
3 decreases, then increases
4 increases, then decreases

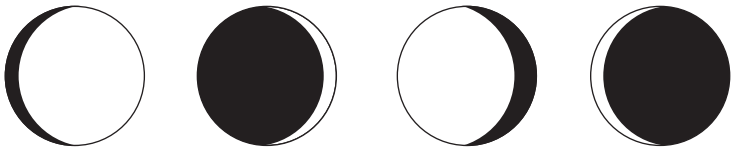
63 Which motion causes the Moon to show phases when viewed from Earth?

1 rotation of Earth
2 rotation of the Sun
3 revolution of Earth
4 revolution of the Moon

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

1 Foucault pendulum 3 thermometer
2 seismograph 4 wind vane

65 When the Moon is in position 2, which phase would be visible to an observer in New York State?

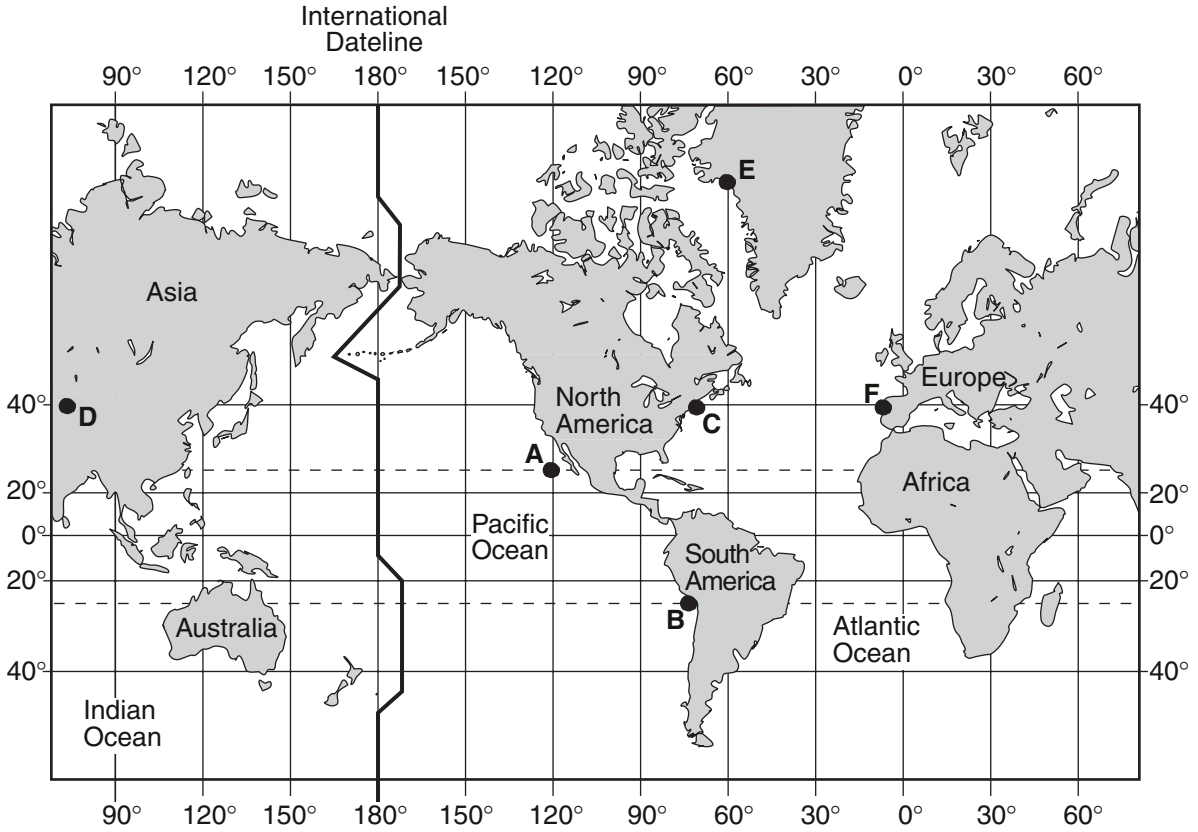


(1) (2) (3) (4)

Group 3

If you choose this group, be sure to answer questions 66–70.

Base your answers to questions 66 through 70 on the 2001 edition of the *Earth Science Reference Tables*, the map below, and your knowledge of Earth science. Letters *A* through *F* are locations on Earth's surface.



66 An observer at location *C* sees a full Moon at its highest point in the sky. When the observation is being made at location *C*, at which other location would it be *impossible* for a second observer also to see the full Moon?

(1) *A* (3) *F*
(2) *B* (4) *D*

67 Which location is closest to a divergent plate boundary at an oceanic ridge?

(1) *A* (3) *C*
(2) *B* (4) *E*

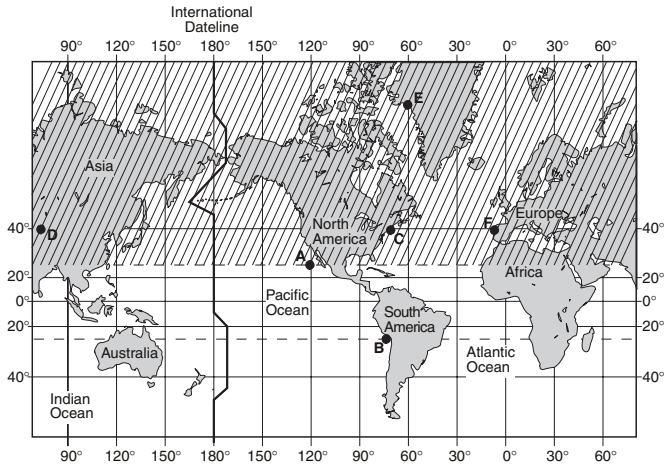
68 When solar time at location *E* is 12 noon, solar time at location *A* is closest to

(1) 6 a.m. (3) 12 noon
(2) 8 a.m. (4) 4 p.m.

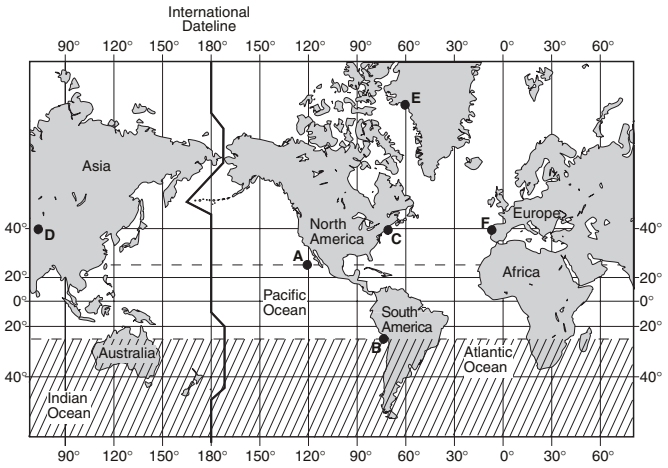
69 Ocean currents at location *A* move clockwise, and ocean currents at location *B* move counterclockwise. These currents curve due to Earth's

1 internal structure 3 rotation
2 magnetic field 4 revolution

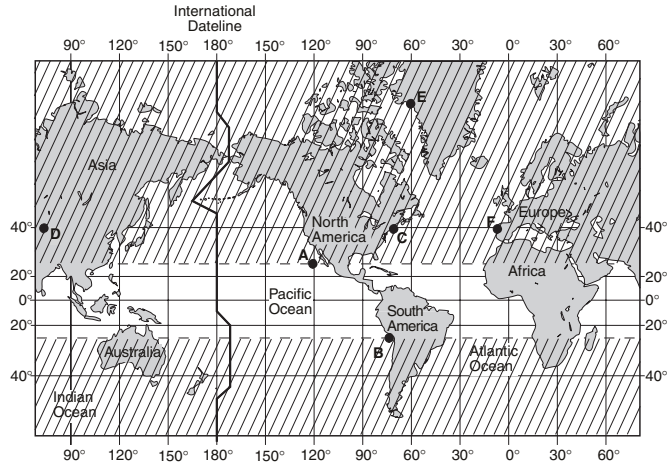
70 In which map does the shaded area ▨ correctly represent the part of Earth that receives direct (perpendicular) rays from the Sun sometime during the year?



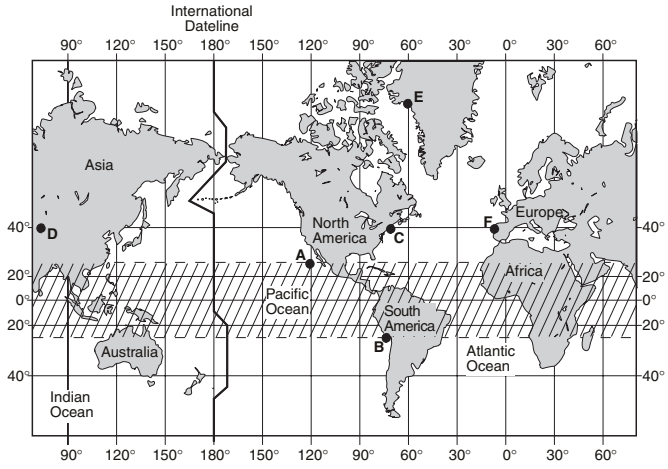
(1)



(3)



(2)

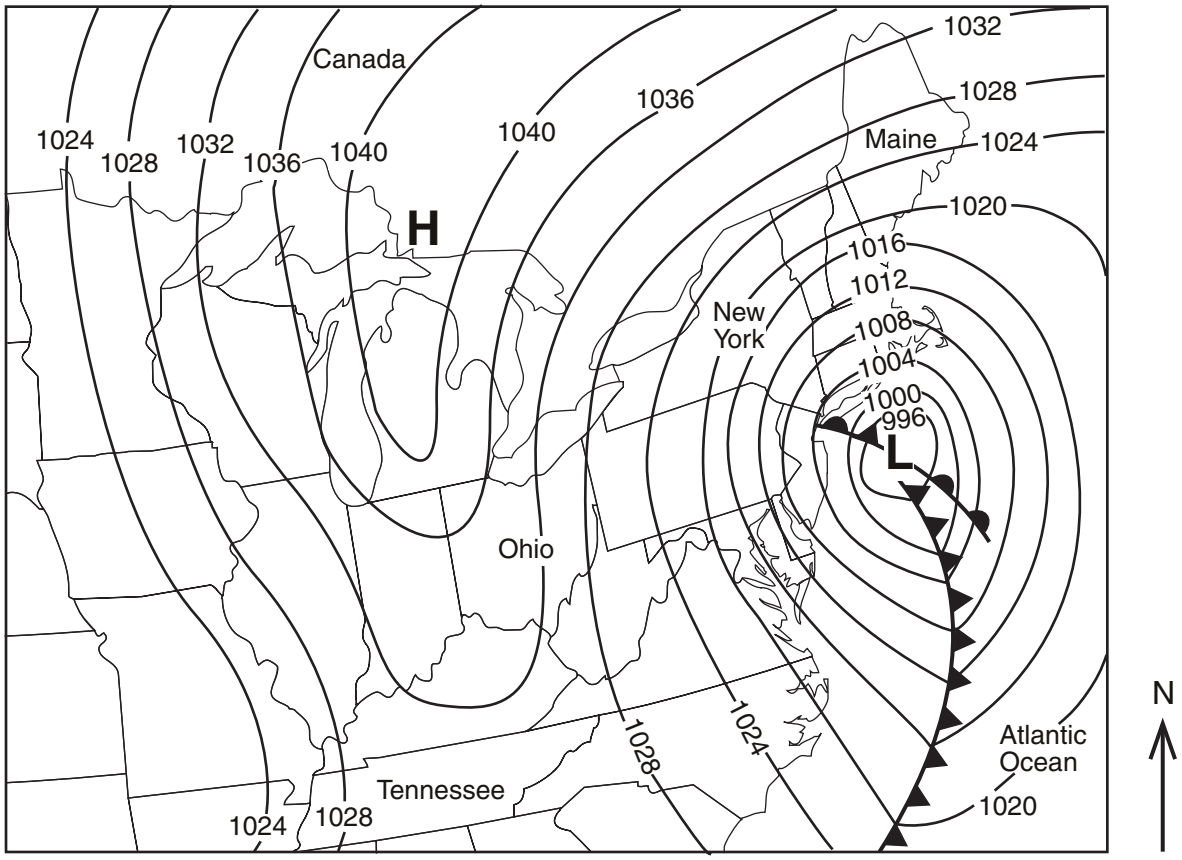


(4)

Group 4

If you choose this group, be sure to answer questions 71–75.

Base your answers to questions 71 through 75 on the 2001 edition of the *Earth Science Reference Tables*, the weather map below, and your knowledge of Earth science. The map shows a high-pressure center **(H)** and a low-pressure center **(L)**. Isobars are labeled in millibars.



71 The high-pressure system is most likely the center of a

1 continental polar air mass that originated in central Canada
2 maritime polar air mass that originated over the Gulf of Mexico
3 continental tropical air mass that originated in the Arctic region
4 maritime tropical air mass that originated over the Atlantic Ocean

72 Why does the region near the northern portion of the low-pressure center have cloudy skies and snow?

1 Air above this region is sinking and cooling, and water vapor is evaporating.
2 Air above this region is sinking and warming, and water vapor is evaporating.
3 Air above this region is rising and cooling, and water vapor is condensing.
4 Air above this region is rising and warming, and water vapor is condensing.

73 Which location has the highest velocity surface winds?

1 northern Maine
2 northwestern Ohio
3 central Tennessee
4 southeastern New York State

74 If the low-pressure system follows a typical storm track, the system will move toward the

1 northwest
2 northeast
3 southwest
4 southeast

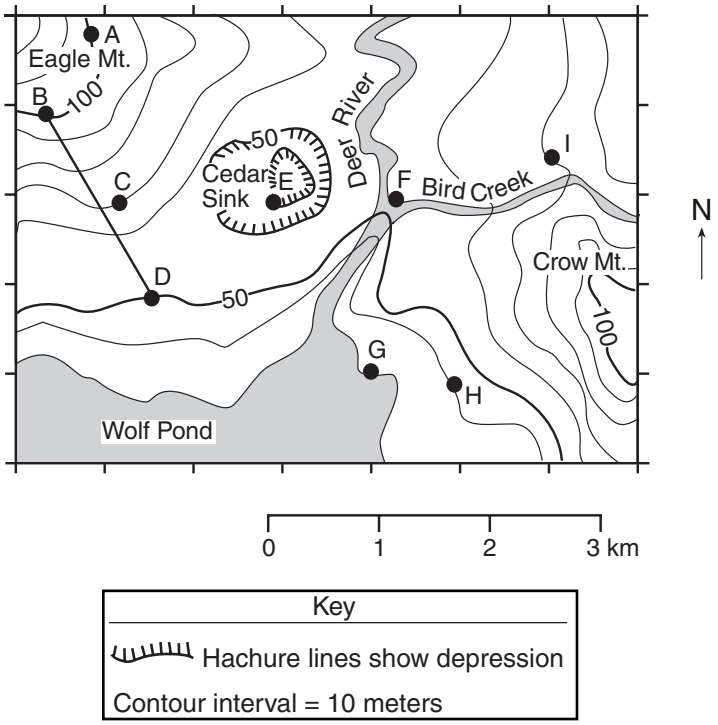
75 In this Northern Hemisphere low-pressure system, the surface winds are circulating

1 clockwise and toward the center
2 clockwise and away from the center
3 counterclockwise and toward the center
4 counterclockwise and away from the center

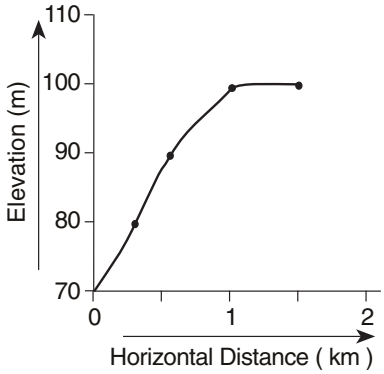
Group 5

If you choose this group, be sure to answer questions 76–80.

Base your answers to questions 76 through 80 on the 2001 edition of the *Earth Science Reference Tables*, the topographic map below, and your knowledge of Earth science. Points *A* through *I* are locations on the map. Elevations are shown in meters.



76 The profile below represents certain locations on the map.



The profile represents a cross section of the landscape between points

(1) *A* and *D*
(2) *B* and *C*
(3) *C* and *A*
(4) *I* and *H*

77 What is the approximate gradient along line *BD*?

(1) 25 m/km
(2) 50 m/km
(3) 100 m/km
(4) 150 m/km

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

1 northeast
2 northwest
3 southeast
4 southwest

79 Which locations have the same elevation?

(1) *A* and *C*
(2) *B* and *E*
(3) *C* and *I*
(4) *F* and *G*

80 The contour lines crossing Deer River show that the river flows

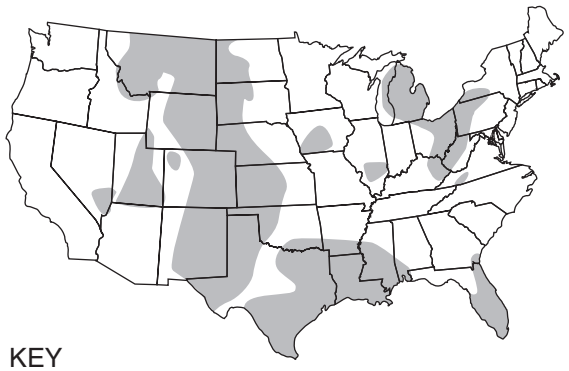
1 northward out of Wolf Pond
2 northward into Wolf Pond
3 southward out of Wolf Pond
4 southward into Wolf Pond

Group 6

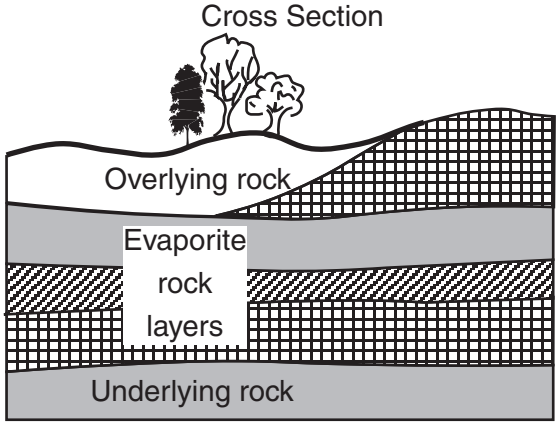
If you choose this group, be sure to answer questions 81–85.

Base your answers to questions 81 through 85 on the 2001 edition of the *Earth Science Reference Tables*, the map and cross section below, and your knowledge of Earth science. The shaded areas on the map represent regions of the United States that have evaporite rock layers (layers of rock formed from the evaporation of seawater) under the surface bedrock. The cross section shows the generalized structure of the area in which the evaporite layers are found in New York State.

United States Map



Cross Section



81 The presence of these evaporite rocks indicates that the shaded areas on the map at some time in the past were

1 high mountain ranges
2 glacial ice sheets
3 shallow seas
4 mid-ocean ridges

82 At which location in New York State are evaporite rocks found under the surface bedrock?

1 Old Forge
2 Jamestown
3 Massena
4 Kingston

83 Each of these evaporite rocks is normally formed by

1 chemical processes
2 cooling of lava
3 decreased heat and pressure
4 melting of magma

84 These evaporite deposits could be composed of which minerals?

1 garnet and pyroxene
2 mica and feldspar
3 hornblende and olivine
4 halite and gypsum

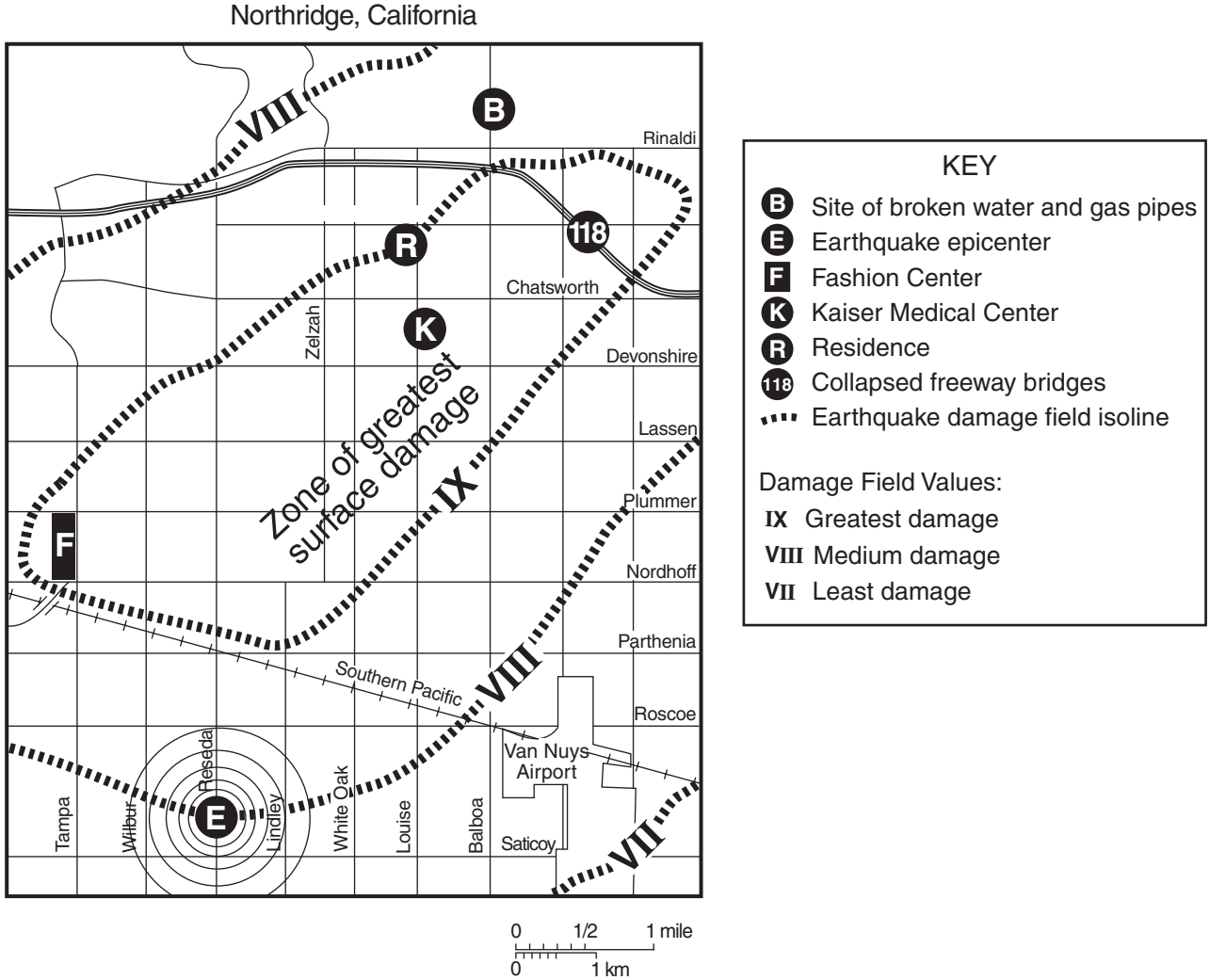
85 The surface rocks overlying these evaporite rock layers are most likely which type of rock?

1 sedimentary
2 plutonic igneous
3 regional metamorphic
4 contact metamorphic

Group 7

If you choose this group, be sure to answer questions 86–90.

Base your answers to questions 86 through 90 on the 2001 edition of the *Earth Science Reference Tables*, the map below, and your knowledge of Earth science. The map shows part of the earthquake damage field that resulted from the earthquake that occurred in Northridge, in southern California, in January 1994. Several sites associated with the earthquake and earthquake damage are shown.



86 Which surface location had the *least* damage?

(1) *R* (3) *E*
(2) *B* (4) *F*

87 This earthquake provides evidence for the existence of

1 Earth's solid outer core
2 convection cells in Earth's outer core
3 faulting of bedrock at Northridge
4 magnetic field reversals at Northridge

88 Which information would have been most useful for locating the earthquake epicenter?

1 the difference between the arrival times of the *P*-wave and the *S*-wave
2 the arrival time of the *S*-wave
3 the velocity of the *P*-wave
4 the location of damage from the earthquake

89 The greatest surface damage occurred in zone IX because

1 the regional seismograph stations were closest to zone IX
2 of local conditions at zone IX
3 zone IX was reached first by earthquake waves
4 zone IX was at the epicenter of the earthquake

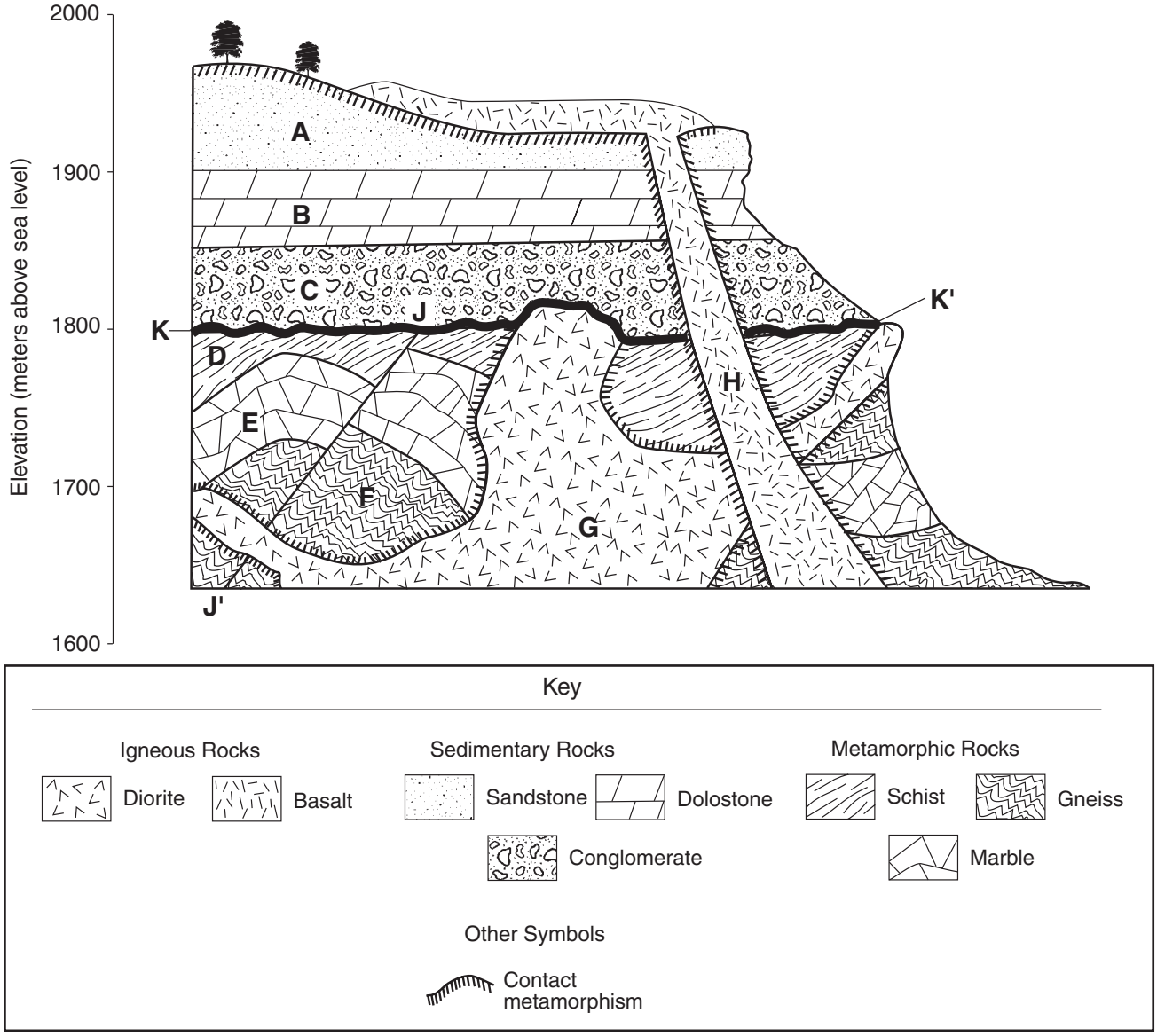
90 Which crustal plate boundary is most closely associated with this earthquake?

1 Cocos Plate — Pacific Plate
2 Cocos Plate — Nazca Plate
3 North American Plate — Nazca Plate
4 North American Plate — Pacific Plate

Group 8

If you choose this group, be sure to answer questions 91–95.

Base your answers to questions 91 through 95 on the 2001 edition of the *Earth Science Reference Tables*, the geologic cross section below, and your knowledge of Earth science. The cross section shows the rock structure of a region of Earth's crust. Letters *A* through *H* are rock units. Lines *J–J′* and *K–K′* are interfaces within the cross section. Rock layers *A*, *B*, and *C* have not been overturned.



91 If layer *C* is Devonian in age, layer *B* would be most likely to contain a

1 crinoid of Pennsylvanian age
2 stromatolite of Precambrian age
3 graptolite of Ordovician age
4 trilobite of Cambrian age

92 Which rocks appear to be most resistant to weathering and erosion under present climate conditions?

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

93 The unconformity at interface *K–K′* was created most directly by

1 a short period of dolostone deposition followed by faulting
2 a long period of weathering and erosion followed by deposition
3 a major episode of igneous activity
4 an intense episode of regional metamorphism

94 Which event occurred before the formation of rock layer *B*?

1 weathering of rock layer *A*
2 faulting of rocks along line *J–J′*
3 intrusion of igneous rock layer *H*
4 formation of metamorphic rock above rock layer *A*

95 Which statement best explains the presence of the metamorphic rock exposed under the trees at the top of the cross section?

1 Weathering of the surface of layer *A* caused local metamorphism.
2 Layer *A* had previously undergone regional metamorphism when it was buried deeper in the crust.
3 Part of igneous rock *H*, which caused the metamorphism, was removed by weathering and erosion.
4 Exposed sandstone normally changes to the metamorphic rock quartzite over time.

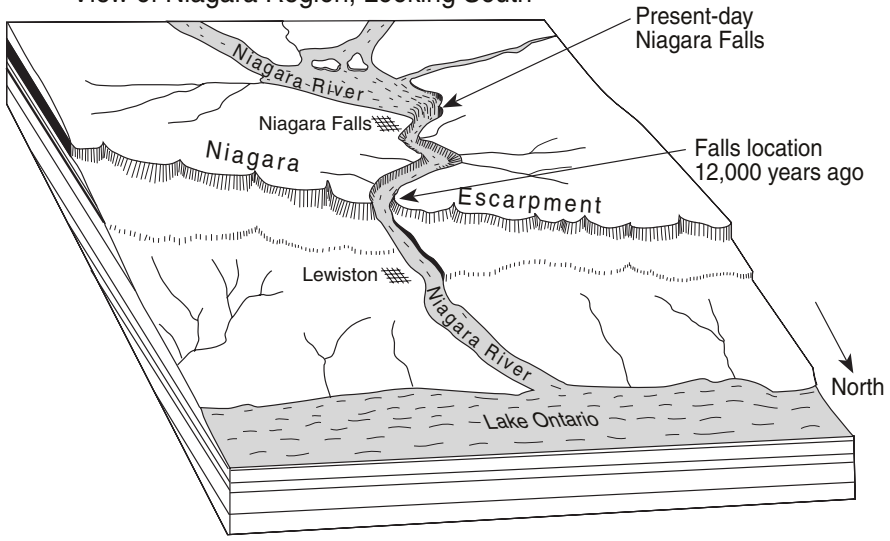
Group 9

If you choose this group, be sure to answer questions 96–100.

Base your answers to questions 96 through 100 on the 2001 edition of the *Earth Science Reference Tables*, the block diagram and the cross section below, and your knowledge of Earth science. The block diagram shows the present position of Niagara Falls in relation to the Niagara Escarpment. The cross section shows the general bedrock structure of present-day Niagara Falls.

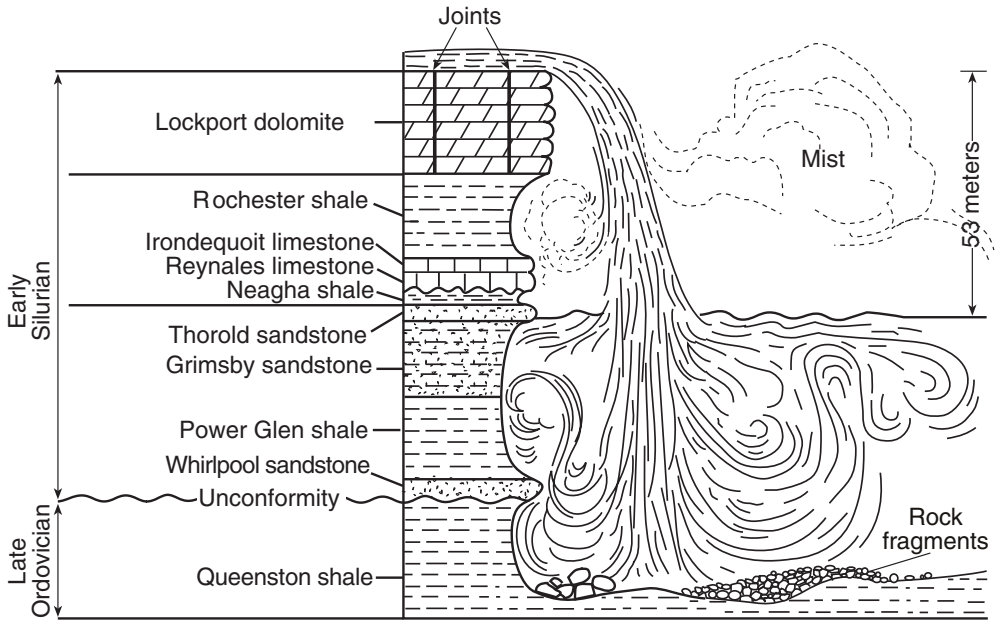
Block Diagram

View of Niagara Region, Looking South



(Vertical Exaggeration 2x)

Cross Section



96 What is the approximate age of the Queenston shale?

(1) 97 million years
(2) 220 million years
(3) 331 million years
(4) 452 million years

97 Which evidence in the cross section of Niagara Falls most clearly shows that erosion is occurring today?

1 upper rock units of early Silurian age
2 layering of the rock units of the face of the falls
3 sand grains within the Grimsby and Whirlpool sandstones
4 piles of rock fragments at the base of the falls

98 During the last 12,000 years, the waterfall gradually shifted upstream 11 kilometers. The average rate of headward erosion from the original waterfall location at the escarpment (cliff) near Lewiston to the present-day waterfall location was approximately 1 kilometer every

(1) year
(2) 100 years
(3) 1,000 years
(4) 10,000 years

99 At the end of the glacial period, the Niagara River began flowing over the Niagara Escarpment. At the end of which epoch of geologic time did this situation occur?

1 Pleistocene
2 Pliocene
3 Miocene
4 Oligocene

100 There are no major faults in the vicinity of the Niagara Escarpment that would explain its formation by crustal movement. What is the most logical explanation of how the escarpment formed?

1 Erosion removed the rock layers north of the escarpment.
2 The rock layers north of the escarpment were folded upward.
3 The Lockport dolomite was deposited south of the escarpment only.
4 The unconformity provided a layer that was resistant to the erosion of the river.

Group 10

If you choose this group, be sure to answer questions 101–105.

Base your answers to questions 101 through 105 on the 2001 edition of the *Earth Science Reference Tables* and on your knowledge of Earth science.

101 A parcel of air has a dry-bulb temperature reading of 16°C and a wet-bulb temperature reading of 13°C. What is the relative humidity?

(1) 11%
(2) 13%
(3) 71%
(4) 80%

102 As water velocity of a stream increases from 25 to 225 centimeters per second, in which order will particles of different sizes begin to move?

1 sand → pebbles → cobbles → boulders
2 silt → sand → pebbles → cobbles
3 cobbles → pebbles → sand → silt
4 silt → pebbles → sand → cobbles

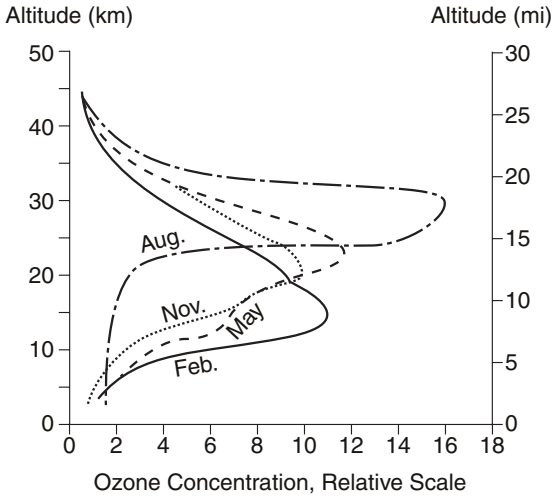
103 Which statement most accurately compares Earth's crust and Earth's mantle?

1 The crust is thinner and less dense than the mantle.
2 The crust is thinner and more dense than the mantle.
3 The crust is thicker and less dense than the mantle.
4 The crust is thicker and more dense than the mantle.

104 Which planet is approximately 20 times farther from the Sun than Earth is?

1 Jupiter
2 Saturn
3 Uranus
4 Neptune

105 The graph below shows the average concentration of ozone in Earth's atmosphere over Arizona during 4 months of the year.



Which layer of Earth's atmosphere contains the greatest concentration of ozone?

1 troposphere
2 stratosphere
3 mesosphere
4 thermosphere

Part II (35 credits)

Answer the questions in only seven of the ten groups in this part. Be sure to mark the answers to the groups of questions you choose in accordance with the instructions on the front cover of the test booklet. Leave blank the three groups of questions you do not choose to answer.

Tear Here

Group 1				
56	1	2	3	4
57	1	2	3	4
58	1	2	3	4
59	1	2	3	
60	1	2	3	

Group 2				
61	1	2	3	4
62	1	2	3	4
63	1	2	3	4
64	1	2	3	4
65	1	2	3	4

Group 3				
66	1	2	3	4
67	1	2	3	4
68	1	2	3	4
69	1	2	3	4
70	1	2	3	4

Group 4				
71	1	2	3	4
72	1	2	3	4
73	1	2	3	4
74	1	2	3	4
75	1	2	3	4

Group 5				
76	1	2	3	4
77	1	2	3	4
78	1	2	3	4
79	1	2	3	4
80	1	2	3	4

Group 6				
81	1	2	3	4
82	1	2	3	4
83	1	2	3	4
84	1	2	3	4
85	1	2	3	4

Group 7				
86	1	2	3	4
87	1	2	3	4
88	1	2	3	4
89	1	2	3	4
90	1	2	3	4

Group 8				
91	1	2	3	4
92	1	2	3	4
93	1	2	3	4
94	1	2	3	4
95	1	2	3	4

Group 9				
96	1	2	3	4
97	1	2	3	4
98	1	2	3	4
99	1	2	3	4
100	1	2	3	4

Group 10				
101	1	2	3	4
102	1	2	3	4
103	1	2	3	4
104	1	2	3	4
105	1	2	3	4

Tear Here

I do hereby affirm, at the close of this examination, that I had no unlawful knowledge of the questions or answers prior to the examination and that I have neither given nor received assistance in answering any of the questions during the examination.

Signature

The University of the State of New York

REGENTS HIGH SCHOOL EXAMINATION

EARTH SCIENCE

Thursday, January 25, 2001 — 1:15 to 4:15 p.m., only

ANSWER SHEET

Part I Credits	.....
Part II Credits	.....
Performance Test Credits . . **(Converted from Raw Score)**	..... _____
Total Examination Score . . .	.....
Reviewer's Initials:	_____

Tear Here

Student . . . . . Sex: ☐ Male ☐ Female

Teacher . . . . . School . . . . . .

Grade (circle one) 8 9 10 11 12

Record all of your answers on this answer sheet in accordance with the instructions on the front cover of the test booklet.

Part I (55 credits)

1	1	2	3	4	**16**	1	2	3	4	**31**	1	2	3	4	**46**	1	2	3	4
2	1	2	3	4	**17**	1	2	3	4	**32**	1	2	3	4	**47**	1	2	3	4
3	1	2	3	4	**18**	1	2	3	4	**33**	1	2	3	4	**48**	1	2	3	4
4	1	2	3	4	**19**	1	2	3	4	**34**	1	2	3	4	**49**	1	2	3	4
5	1	2	3	4	**20**	1	2	3	4	**35**	1	2	3	4	**50**	1	2	3	4
6	1	2	3	4	**21**	1	2	3	4	**36**	1	2	3	4	**51**	1	2	3	4
7	1	2	3	4	**22**	1	2	3	4	**37**	1	2	3	4	**52**	1	2	3	4
8	1	2	3	4	**23**	1	2	3	4	**38**	1	2	3	4	**53**	1	2	3	4
9	1	2	3	4	**24**	1	2	3	4	**39**	1	2	3	4	**54**	1	2	3	4
10	1	2	3	4	**25**	1	2	3	4	**40**	1	2	3	4	**55**	1	2	3	
11	1	2	3	4	**26**	1	2	3	4	**41**	1	2	3	4					
12	1	2	3	4	**27**	1	2	3	4	**42**	1	2	3	4					
13	1	2	3	4	**28**	1	2	3	4	**43**	1	2	3	4					
14	1	2	3	4	**29**	1	2	3	4	**44**	1	2	3	4					
15	1	2	3	4	**30**	1	2	3	4	**45**	1	2	3	4					

Record your answers for Part II on the back of this sheet.

Tear Here