

The University of the State of New York
REGENTS HIGH SCHOOL EXAMINATION

EARTH SCIENCE

Thursday, August 13, 1998 — 12:30 to 3:30 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: (X) 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 1994 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.

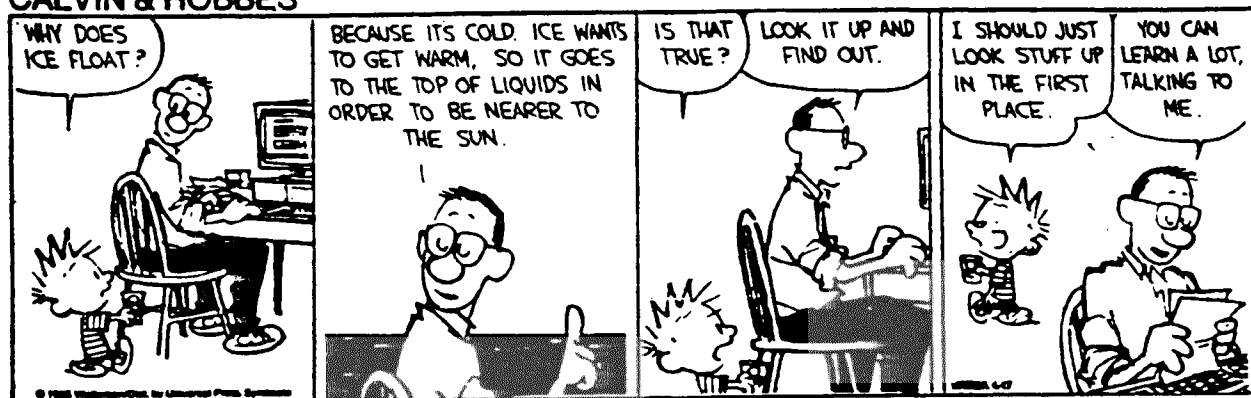
Part I

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 *Earth Science Reference Tables*.

1 The cartoon below presents a humorous look at science.

CALVIN & HOBBS



The correct explanation of why ice floats is that, compared to liquid water, solid ice

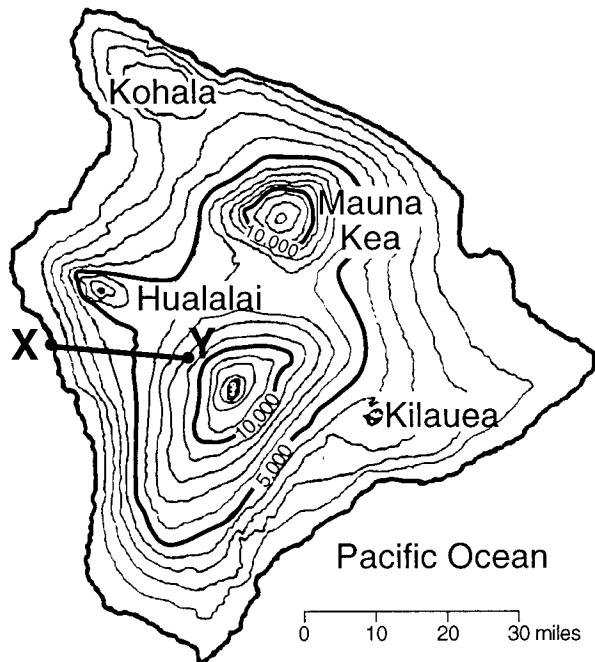
- 1 has less mass
- 2 has more mass
- 3 is less dense
- 4 is more dense

- 2 What is the best example of a cyclic event?
 - 1 the impact of a meteorite near Albany
 - 2 an earthquake in the Tug Hill Plateau
 - 3 the appearance of Halley's comet over New York City
 - 4 the radioactive decay of potassium-40 in the bedrock of Mt. Marcy
- 3 A student measures the velocity of the water in a stream as 2.5 meters per second. The actual velocity of the water is 3.0 meters per second. What is the approximate percent deviation of the student's measurement?
 - (1) 0.50%
 - (2) 17%
 - (3) 20.0%
 - (4) 50.0%
- 4 Which altitude of Polaris could be observed in New York State?
 - (1) 23°
 - (2) 35°
 - (3) 44°
 - (4) 90°

Note that question 5 has only three choices.

- 5 Compared to the circumference of Earth measured at the Equator, the circumference of Earth measured through the poles is
 - 1 slightly smaller
 - 2 slightly larger
 - 3 exactly the same
- 6 Which statement provides the best evidence that Earth revolves around the Sun?
 - 1 The Sun follows an apparent daily path, rising in the east and setting in the west.
 - 2 A Foucault pendulum appears to shift its direction of swing in a predictable manner.
 - 3 The stars appear to follow circular paths around the North Star (Polaris).
 - 4 The seasons of spring, summer, fall, and winter repeat in a pattern.

7 The topographic map below shows the island of Hawaii. Elevations are measured in feet.



What is the approximate average gradient along line XY?

- (1) 200 ft/mi
- (2) 400 ft/mi
- (3) 800 ft/mi
- (4) 1,000 ft/mi

8 The deflection of planetary winds (the Coriolis effect) is a direct result of the

- 1 rotation of Earth
- 2 revolution of Earth
- 3 gravitational forces within Earth
- 4 convection currents within the asthenosphere

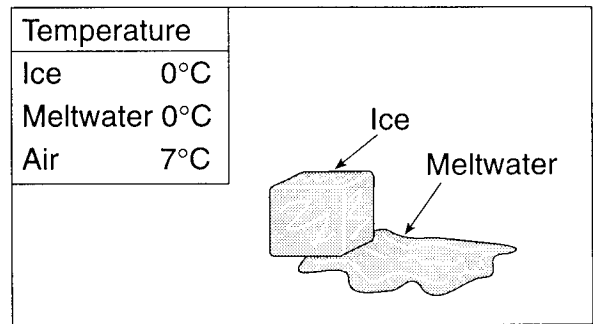
9 Units of time are based on Earth's motion relative to other celestial objects. The year is best defined as Earth's motion relative to the

- 1 asteroids
- 2 Sun
- 3 Moon
- 4 planets

10 Differences in Earth's orbital velocity around the Sun are caused primarily by changes in the

- 1 inclination of Earth's axis
- 2 rate of rotation of Earth
- 3 distance between Earth and the Sun
- 4 oblate spheroid shapes of Earth and the Sun

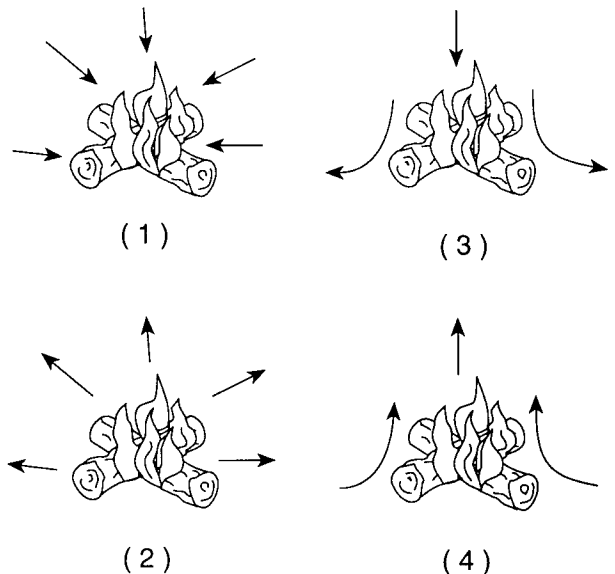
11 The diagram below shows a melting ice cube.



Which statement best describes the energy transfer?

- 1 The meltwater is a heat source and the surrounding air is a heat sink.
- 2 The meltwater and ice cube are both heat sources.
- 3 The ice cube and surrounding air are both heat sources.
- 4 The ice cube is a heat sink and the surrounding air is a heat source.

12 Which diagram best represents the direction of convection currents around the burning wood of a campfire?



13 During which process would 1 gram of water gain the most energy?

- 1 evaporating
- 2 condensing
- 3 melting
- 4 freezing

14 At which latitude and on which date does the surface of Earth receive the greatest intensity of insolation?

- 1 the Tropic of Cancer ($23\frac{1}{2}^{\circ}$ N) on December 21
- 2 the Equator (0°) on September 23
- 3 the Antarctic Circle ($66\frac{1}{2}^{\circ}$ S) on June 21
- 4 the South Pole (90° S) on March 21

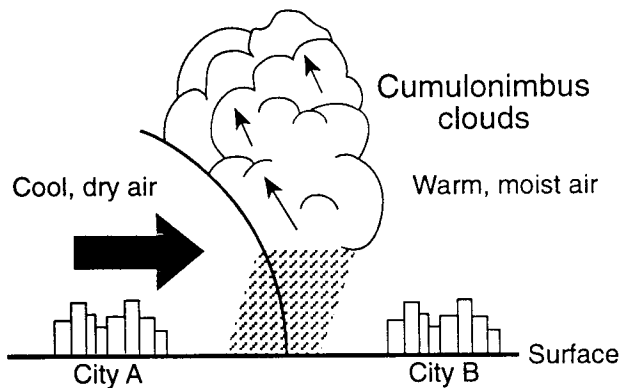
15 Scientists have theorized that an increased concentration of carbon dioxide will cause an increase in worldwide atmospheric temperature. This theory is based on the fact that carbon dioxide is a

- 1 good absorber of infrared radiation
- 2 poor absorber of infrared radiation
- 3 good reflector of ultraviolet radiation
- 4 poor reflector of ultraviolet radiation

16 Air pressure is usually highest when the air is

- | | |
|------------------|------------------|
| 1 warm and humid | 3 cold and humid |
| 2 warm and dry | 4 cold and dry |

17 The cross section below shows a weather front. The large arrow shows the direction of the movement of the cool air mass.



Which type of weather front is shown?

- | | |
|--------------|--------------------|
| 1 warm front | 3 occluded front |
| 2 cold front | 4 stationary front |

18 Clouds usually form when moist air rises because the air

- | | |
|-----------------------|---------------------|
| 1 contracts and cools | 3 expands and cools |
| 2 contracts and warms | 4 expands and warms |

19 An air mass that originates over the northern Pacific Ocean and moves southward over the United States would most likely be labeled on a weather map as

- | | |
|--------|--------|
| (1) mP | (3) cP |
| (2) mT | (4) cT |

20 What is the primary cause of winds?

- 1 humidity differences
- 2 air pressure differences
- 3 the revolution of Earth
- 4 the rotation of Earth

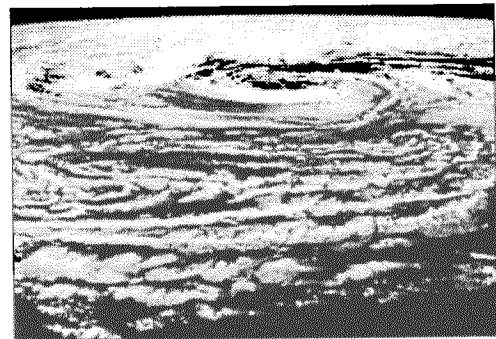
21 What is the most effective method for increasing the rate of evaporation of a given amount of water?

- 1 decreasing the water's temperature
- 2 decreasing the air movement over the water's surface
- 3 increasing the water's surface area
- 4 increasing the air pressure over the water's surface

22 A sling psychrometer shows a dry-bulb reading of 14°C and a wet-bulb reading of 9°C . What are the dewpoint and the relative humidity?

- | | |
|-----------------------------------|---------------------------------|
| (1) -10°C and 16% | (3) 4°C and 16% |
| (2) -10°C and 50% | (4) 4°C and 50% |

23 The satellite photograph below shows a Northern Hemisphere cloud pattern.



The center of this cloud pattern is most likely the center of a

- 1 cold, dry air mass
- 2 warm, dry air mass
- 3 low-pressure system
- 4 high-pressure system

24 The northeastward flow of the Gulf Stream ocean current is caused primarily by

- 1 tides
- 2 precipitation
- 3 atmospheric winds
- 4 revolution of Earth

25 The potential evapotranspiration of an area is most dependent on the

- 1 amount of runoff
- 2 pore space in the soil
- 3 ground-water storage
- 4 insolation received

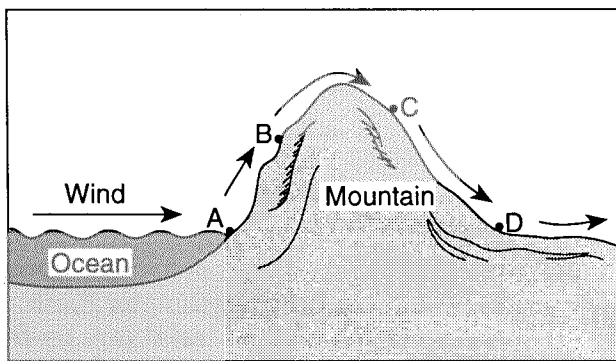
26 Which climate conditions are typical of regions near the North Pole and the South Pole?

- 1 low temperature and low precipitation
- 2 low temperature and high precipitation
- 3 high temperature and low precipitation
- 4 high temperature and high precipitation

27 Compared to land surface temperature changes, water surface temperature changes occur

- 1 more slowly because water has a lower specific heat
- 2 more slowly because water has a higher specific heat
- 3 faster because water has a lower specific heat
- 4 faster because water has a higher specific heat

28 The cross section below shows the flow of prevailing winds over a mountain ridge.



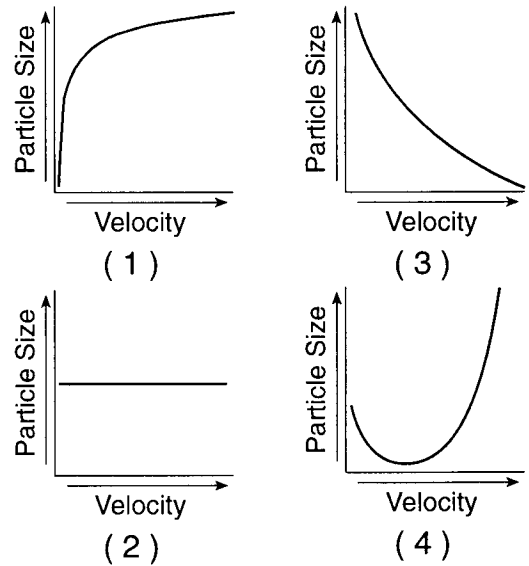
Which location is most likely to receive precipitation?

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

29 In hot, wet climates, bedrock rapidly weathers into soil because water

- 1 dissolves many minerals
- 2 expands when it freezes
- 3 is part of most chemical compounds
- 4 cools the surroundings when it evaporates

30 Which graph best shows the general relationship between stream velocity and the diameter of particles transported by a stream?



31 The diagram below shows a sedimentary rock drawn actual size.

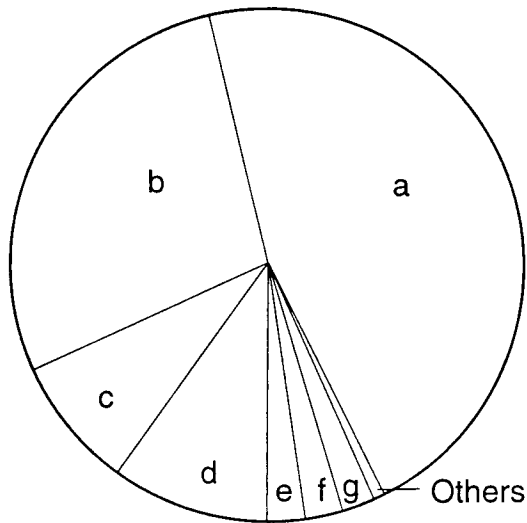


This rock is classified as having a

- 1 clastic texture consisting of sand-size particles
- 2 clastic texture consisting of mixed grain sizes
- 3 nonclastic texture with mixed grain sizes
- 4 nonclastic texture with coarse-grained particles

- 32 A sediment particle transported by a stream over a long period of time will most likely show
- 1 a decrease in mass and number of angular edges
 - 2 a decrease in density and size
 - 3 an increase in weight and hardness
 - 4 an increase in volume and number of cleavage planes

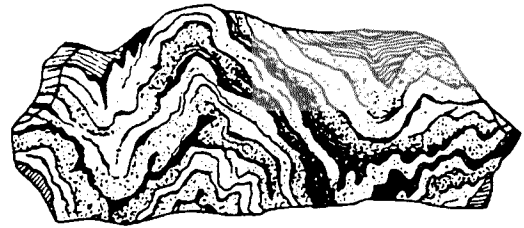
- 33 The graph below shows the percent by mass of the elements of Earth's crust. Each letter on the graph represents an element.



Which elements are represented by the letters *a* and *b*, respectively?

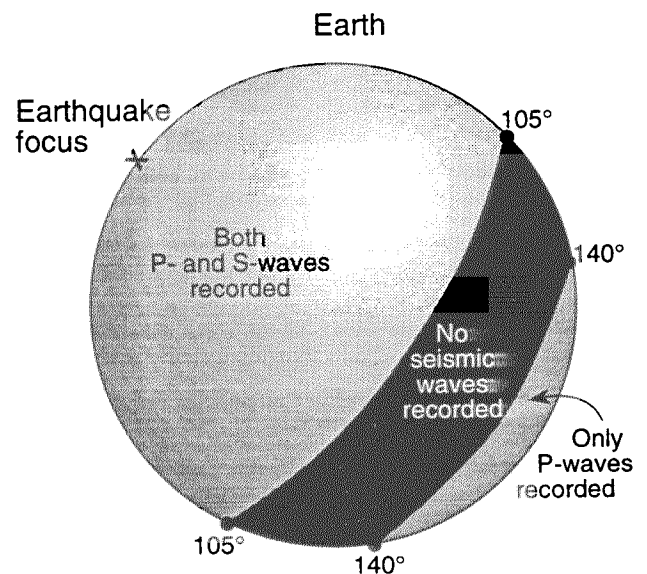
- 1 aluminum and iron
 - 2 calcium and nitrogen
 - 3 potassium and sodium
 - 4 oxygen and silicon
- 34 Which sedimentary rock is formed by the compaction and cementation of sorted sediments 0.05 centimeter in diameter?
- 1 shale
 - 2 siltstone
 - 3 sandstone
 - 4 conglomerate
- 35 Compared to the continental crust, the oceanic crust is
- 1 thicker
 - 2 more dense
 - 3 more granitic
 - 4 more felsic

- 36 The diagram below represents a sample of a rock.



This rock would be classified as metamorphic because it shows

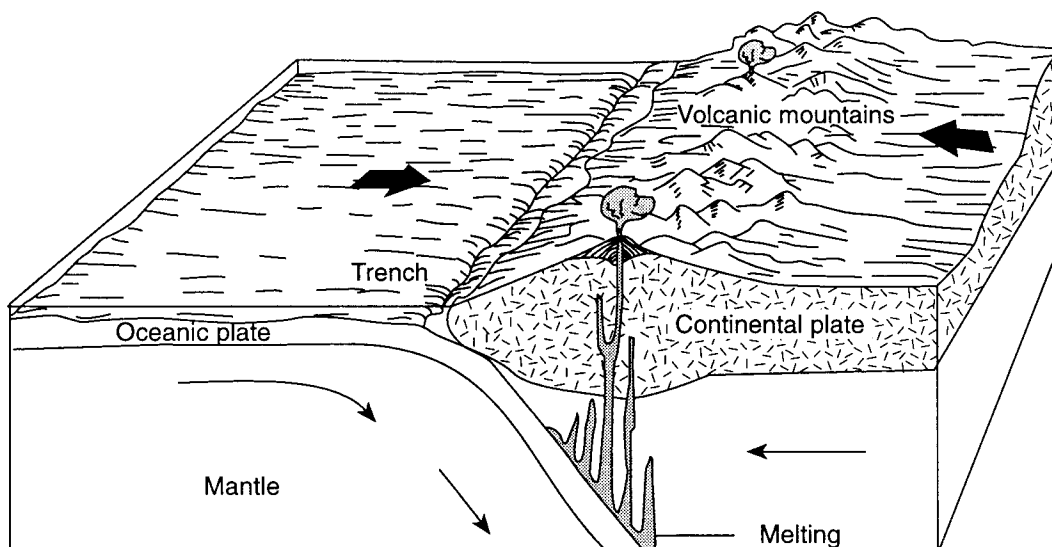
- 1 distorted banding
 - 2 an organic composition
 - 3 a mixture of minerals
 - 4 crystals from precipitation
- 37 An earthquake recorded by seismic stations around the world created the pattern of seismic wave recordings shown in the diagram below.



Which statement best explains this pattern of wave recordings?

- (1) Some seismic waves cannot travel through oceans to reach every location on Earth.
- (2) S-waves are too weak to travel very far from the earthquake focus.
- (3) Mountain ranges and tectonic plate boundaries absorb or bend seismic waves.
- (4) Layers with different properties inside Earth absorb or bend seismic waves.

38 The diagram below shows the collision of an oceanic plate and a continental plate.



Collisions between oceanic plates and continental plates are thought to result primarily from

- | | |
|--------------------------------------|---------------------------------------|
| 1 hot liquid magma in the inner core | 3 volcanic eruptions along coastlines |
| 2 convection currents in the mantle | 4 meteor impacts in the ocean basins |

39 Which information indicates that new seafloor rock is forming along a mid-ocean ridge and then moving horizontally away from the ridge?

- 1 Most volcanoes are located under ocean water.
- 2 Seafloor rock is older than continental rock.
- 3 Fossils of marine organisms can be found at high elevations on continents.
- 4 The age of seafloor rock increases as the distance from the mid-ocean ridge increases.

40 An earthquake shear wave generally travels faster as the wave moves deeper into Earth's interior because greater depths have

- 1 less confining pressure
- 2 lower melting points
- 3 greater rock density
- 4 greater rock temperatures

41 Layers of volcanic ash often serve as useful geologic time markers because ash layers usually

- 1 deposit quickly over a wide area
- 2 are older than the surrounding rock
- 3 can be sampled easily
- 4 darken with age

42 What is the approximate temperature at the mantle-outer core boundary?

- | | |
|-------------|-------------|
| (1) 1,500°C | (3) 5,000°C |
| (2) 4,500°C | (4) 7,000°C |

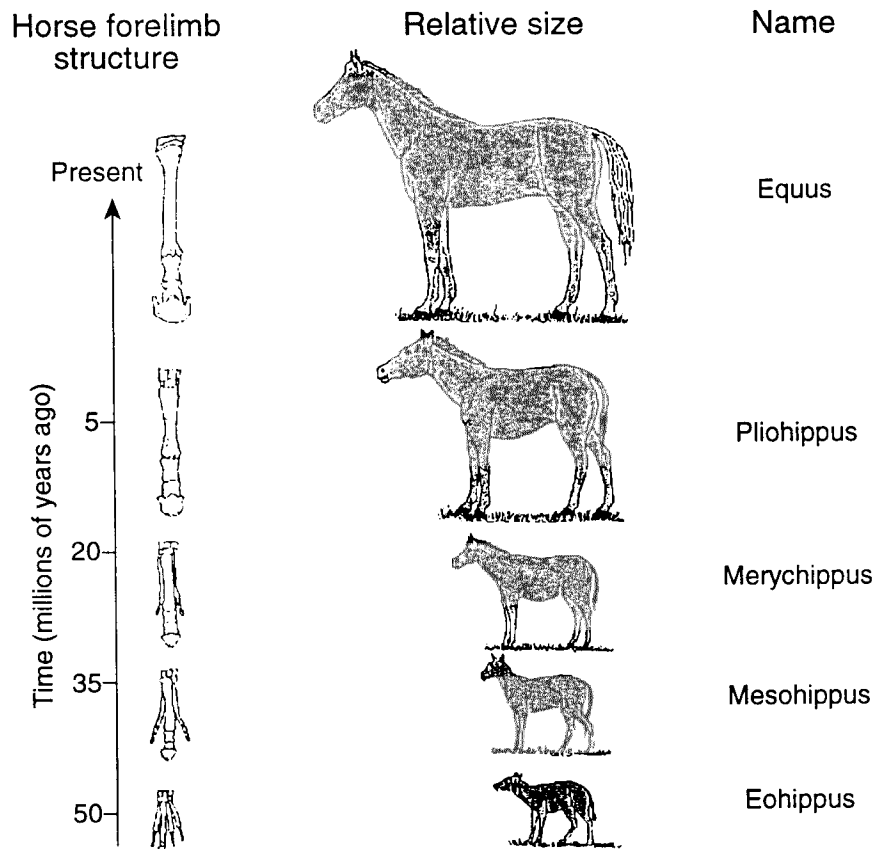
43 According to available fossil evidence, which set of events is listed in the correct order from earliest to most recent?

- 1 extinction of trilobites, extinction of armored fishes, extinction of dinosaurs
- 2 appearance of first corals, appearance of earliest insects, appearance of earliest reptiles
- 3 decline of brachiopods, appearance of earliest amphibians, appearance of earliest grasses
- 4 peak development of eurypterids, appearance of earliest birds, appearance of earliest chordates

44 Which statement about the species of animals and plants that lived on Earth in the past is best supported by the fossil record?

- 1 Most became extinct.
- 2 Most lived on the land.
- 3 Most were preserved in metamorphic rock.
- 4 Most appeared during the Cambrian Period.

Base your answers to questions 45 and 46 on the *Earth Science Reference Tables* and on the diagram below. The diagram shows the evolutionary development of the horse, as supported by the fossil record.



45 The earliest geologic epoch in which Mesohippus existed was the

- | | |
|-------------|------------|
| 1 Paleocene | 3 Miocene |
| 2 Eocene | 4 Pliocene |

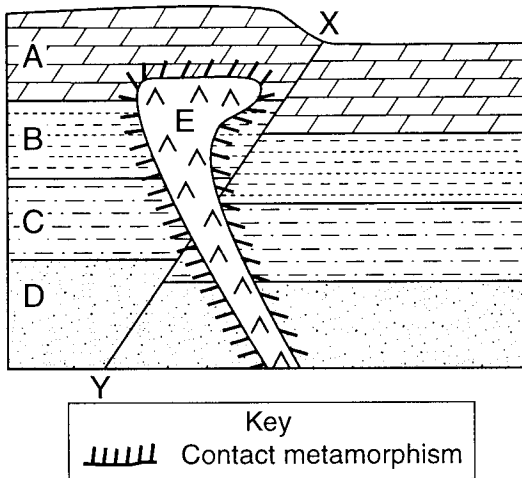
46 Which statement best explains the changing appearance of the horse, as supported by the fossil record?

- 1 The horse evolved due to the influence of humans.
- 2 The horse evolved from a complex life-form to a simpler life-form.
- 3 The horse evolved into a life-form better able to survive.
- 4 The horse evolved from larger ancestors without forelimbs.

47 Which statement best explains why geologic materials from the Quaternary Period must be dated by using radioactive isotopes different from the isotopes used to date materials from the Cambrian Period?

- 1 All rocks contain radioactive substances.
- 2 Some isotopes decay faster than others.
- 3 Not all isotopes form stable decay products.
- 4 The decay of atoms occurs as a random event.

48 The geologic cross section below shows sedimentary rock layers A, B, C, and D, which have not been overturned. E is an igneous intrusion. Line XY represents a fault.



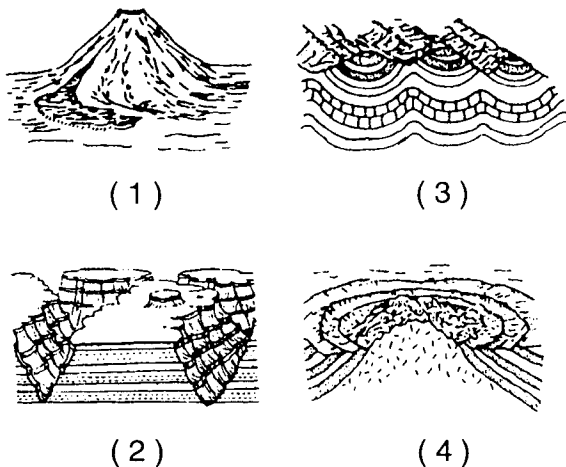
Which geologic event occurred most recently?

- 1 deposition of sediments for rock layer A
- 2 formation of the fault
- 3 intrusion of the igneous material E
- 4 cementation of sediments for rock layer D

49 Chemical evaporite bedrock is found approximately 20 kilometers south of Rochester, New York. This bedrock most likely formed during which geologic time interval?

- 1 Silurian Period
- 2 Devonian Period
- 3 Pleistocene Epoch
- 4 Pennsylvanian Epoch

50 Which diagram represents a plateau landscape?



51 Which major North American landscape region covers the greatest surface area of New York State?

- 1 New England Highlands
- 2 Grenville Highlands
- 3 Interior Lowlands
- 4 Appalachian Uplands

52 Which characteristics of Earth's surface can be determined by using a topographic map?

- 1 hillslope and stream gradients
- 2 bedrock erosion and stream velocity
- 3 hilltop elevations and bedrock age
- 4 soil thickness and benchmark movement

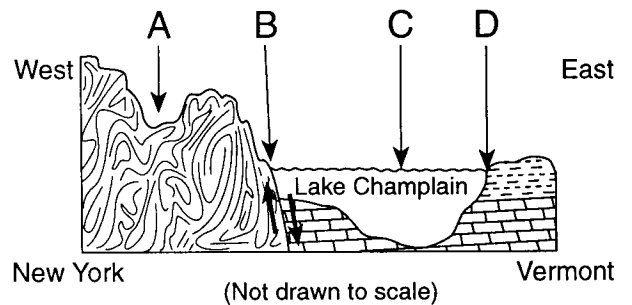
53 Which New York State landscape region includes the location 43°30' N latitude, 75°45' W longitude?

- 1 Adirondack Mountains
- 2 Erie-Ontario Lowlands
- 3 St. Lawrence Lowlands
- 4 Tug Hill Plateau

54 The surface bedrock in the Catskills consists of

- 1 slate, rhyolite, and basalt
- 2 diabase, anorthosite, and granite
- 3 limestone, shale, sandstone, and conglomerate
- 4 quartzite, gneiss, marble, and schist

55 The generalized geologic cross section below represents part of New York and Vermont.



A major landscape region boundary is shown at location

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

Part II

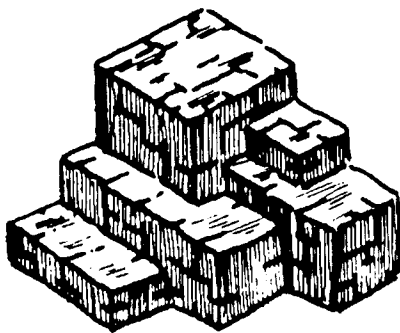
This part consists of ten groups, each containing five questions. Choose seven of these ten groups. Be sure that you answer all five questions in each group chosen. Record the answers to these questions on the separate answer sheet in accordance with the directions on the front page of this booklet. [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 *Earth Science Reference Tables*, the diagram and table below, and your knowledge of Earth science.

Mineral Sample A



Mass = 210 grams

Mineral Density Table

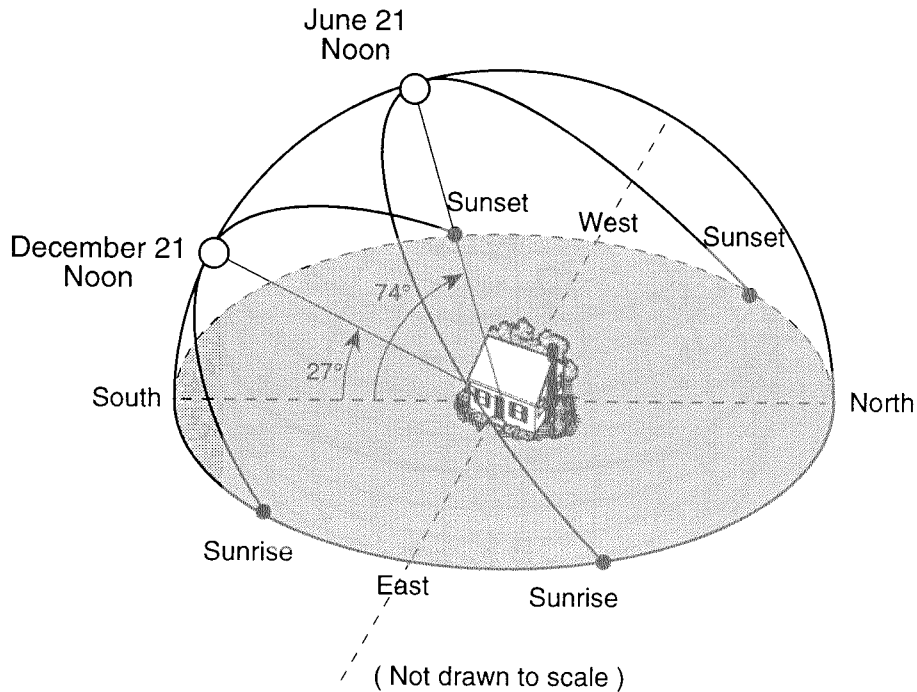
Mineral	Density (g/cm ³)	Mineral	Density (g/cm ³)
Gypsum	2.3	Hornblende	3.2
Orthoclase	2.6	Chalcopyrite	4.2
Quartz	2.7	Pyrite	5.0
Calcite	2.7	Magnetite	5.2
Dolomite	2.9	Galena	7.5
Fluorite	3.2	Copper	8.9

- 56 If the volume of mineral sample A is 28 cubic centimeters, sample A is most likely
- 1 copper
 - 2 galena
 - 3 chalcopyrite
 - 4 dolomite
- 57 The original shape of mineral sample A was altered when it was hit with a rock hammer. Which physical property caused the mineral to break as it did?
- 1 hardness
 - 2 luster
 - 3 cleavage
 - 4 streak
- 58 A student measured the mass of a sample of quartz three times. The mass was the same the first and second times, but was less the third time. This decrease in mass could have occurred before the third measurement if the sample had been
- 1 heated and expanded
 - 2 cooled and contracted
 - 3 soaked in water
 - 4 dropped and a piece was lost
- 59 Under identical conditions, several samples of the mineral pyrite are measured, and their densities are compared. The values obtained should show that
- 1 rounded samples are more dense than rough samples
 - 2 large samples are more dense than small samples
 - 3 small samples are more dense than large samples
 - 4 all the pyrite samples have the same density
- 60 When a sample of the mineral calcite is heated, it expands, causing its density to be
- 1 less than 2.7 g/cm³
 - 2 exactly 2.7 g/cm³
 - 3 between 2.7 and 3.0 g/cm³
 - 4 greater than 3.0 g/cm³

Group 2

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

Base your answers to questions 61 through 65 on the *Earth Science Reference Tables*, the diagram below, and your knowledge of Earth science. The diagram represents the Sun's apparent path in relation to a house on June 21 and on December 21.



61 What is the most likely location of the house shown in the diagram?

- | | |
|--------------|-----------------|
| 1 Australia | 3 South America |
| 2 North Pole | 4 North America |

62 For the roof of this house, which color would absorb the most insolation and also reradiate the most energy?

- | | |
|---------|---------|
| 1 white | 3 grey |
| 2 green | 4 black |

63 Which factor is a cause of the difference in the noontime altitude of the Sun on June 21 and December 21?

- 1 the tilt of Earth's axis
- 2 the Sun's apparent diameter
- 3 Earth's changing distance from the Sun
- 4 the Sun's period of rotation

64 On a clear day, the house will receive the greatest intensity of solar electromagnetic radiation in the form of

- 1 infrared radiation
- 2 ultraviolet radiation
- 3 visible light radiation
- 4 radio radiation

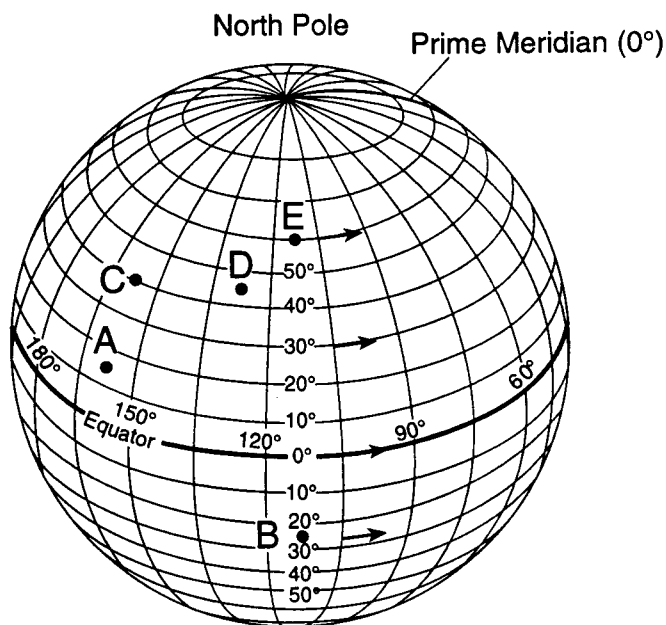
65 On which side of the house should a solar collector be installed to absorb the greatest amount of insolation?

- | | |
|---------|--------|
| 1 north | 3 east |
| 2 south | 4 west |

Group 3

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

Base your answers to questions 66 through 70 on the *Earth Science Reference Tables*, the diagram below, and your knowledge of Earth science. The diagram represents latitude and longitude lines on Earth. Points A through E represent locations on Earth. Arrows represent direction of rotation.



66 What is the approximate latitude and longitude of location A?

- (1) 160° N, 15° E (3) 15° N, 160° E
 (2) 160° S, 15° W (4) 15° N, 160° W

67 When the local time at location C is 3 p.m., the local time at location D is

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

68 Locations C and D both have the same

- 1 prevailing wind direction
- 2 latitude
- 3 altitude of Polaris
- 4 longitude

69 Which location has the longest duration of insolation on December 21?

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

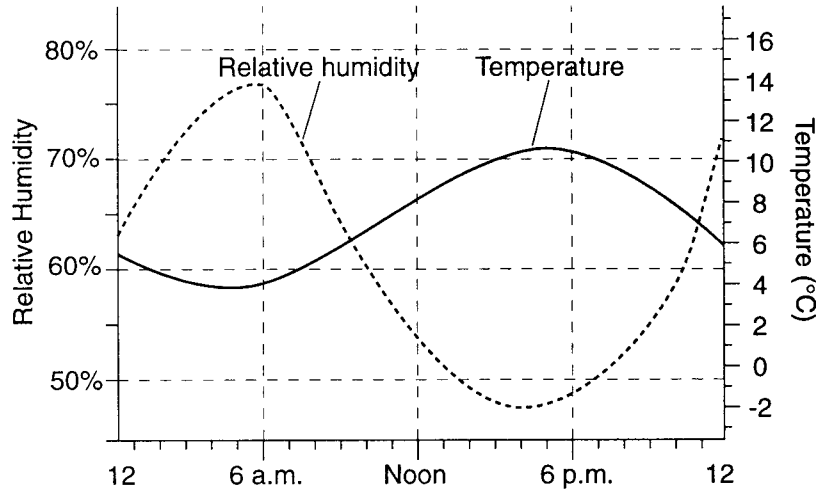
70 At which location will the Sun reach the highest angle above the horizon at solar noon?

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

Group 4

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

Base your answers to questions 71 through 75 on the *Earth Science Reference Tables*, the graph below, and your knowledge of Earth science. The graph shows variations in air temperature and relative humidity for a spring day in Oswego, New York.



71 What was the approximate relative humidity at 6:00 p.m.?

- (1) 11%
- (2) 47%
- (3) 59%
- (4) 71%

72 At what time did the air most likely have the greatest capacity to hold water vapor?

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

73 Which change most likely caused the decrease in relative humidity between 6:00 a.m. and 3:00 p.m.?

- 1 The dewpoint increased.
- 2 The moisture content of the air increased.
- 3 The rate of evaporation increased.
- 4 The air temperature increased.

74 At what time during this spring day were the air temperature and dewpoint closest?

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

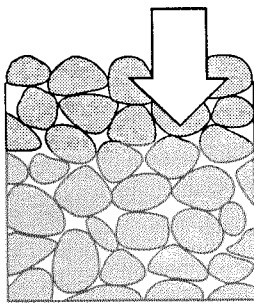
75 At 7 p.m., the air temperature was 10°C and the dewpoint was calculated to be 0°C. According to the Lapse Rate chart on the *Earth Science Reference Tables*, the altitude to the base of a cloud formed by air rising from Earth's surface was approximately

- (1) 1.0 km
- (2) 2.0 km
- (3) 1.2 km
- (4) 2.2 km

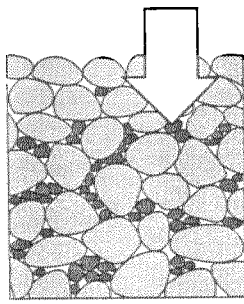
Group 5

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

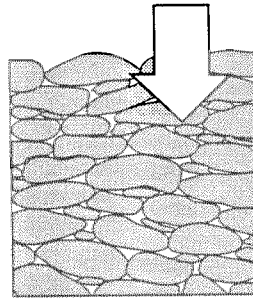
Base your answers to questions 76 through 80 on the *Earth Science Reference Tables*, the diagram below, and your knowledge of Earth science. The diagram represents samples of soil and bedrock at Earth's surface. The arrows represent possible infiltration of rainwater.



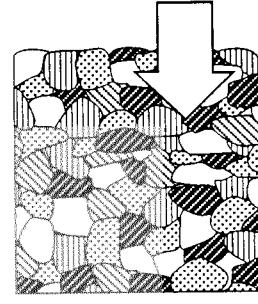
Pebble soil



Pebble-and-sand soil



Conglomerate bedrock



Granite bedrock

76 The *least* amount of rainwater will infiltrate the surface of the

- 1 pebble soil
- 2 pebble-and-sand soil
- 3 conglomerate bedrock
- 4 granite bedrock

77 Which sample probably has the greatest porosity?

- 1 pebble soil
- 2 pebble-and-sand soil
- 3 conglomerate bedrock
- 4 granite bedrock

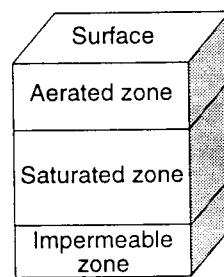
78 The pebble-and-sand soil has greater capillarity than the pebble soil because the pebble-and-sand soil

- 1 is weathering more rapidly
- 2 is more loosely packed
- 3 has smaller pore spaces
- 4 has less surface area

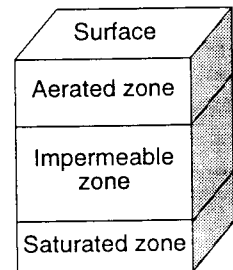
79 Which three minerals are usually found in granite?

- 1 biotite, olivine, and hornblende
- 2 quartz, pyroxene, and olivine
- 3 potassium feldspar, quartz, and hornblende
- 4 plagioclase feldspar, biotite, and pyroxene

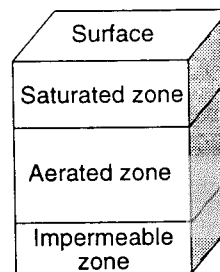
80 Zones within soil and rock are classified by the water movement occurring in the zones. Which diagram best represents the most common arrangement of these zones?



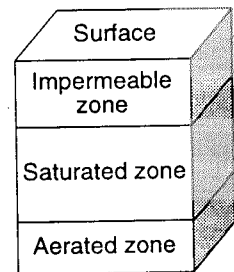
(1)



(3)



(2)

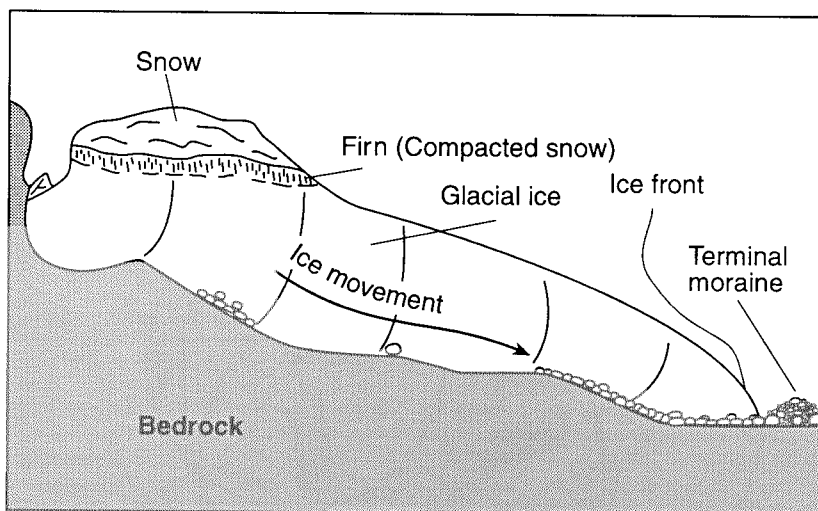


(4)

Group 6

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

Base your answers to questions 81 through 85 on the *Earth Science Reference Tables*, the diagram below, and your knowledge of Earth science. The diagram represents a profile of a mountain glacier in the northern United States.



81 The downhill movement of mountain glaciers such as the one shown in the diagram is primarily caused by

- 1 evaporation of ice directly from the glacier
- 2 snow blowing across the top of the glacier
- 3 the force of gravity pulling on the glacier
- 4 water flowing over the glacier

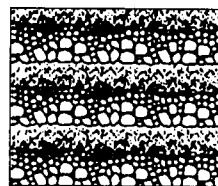
82 The velocity of the ice movement is primarily controlled by the

- 1 slope of the bedrock surface
- 2 amount of sediment at the terminal moraine
- 3 length of the glacier
- 4 size of the sediment transported by the glacier

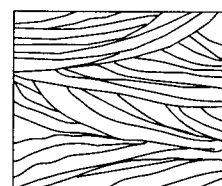
83 Over a period of years, this glacier gains more snow mass than it loses. What will be the most likely result of this gain?

- 1 The glacier will decrease in size, and the ice front will retreat.
- 2 The glacier will decrease in size, and the ice front will advance.
- 3 The glacier will increase in size, and the ice front will retreat.
- 4 The glacier will increase in size, and the ice front will advance.

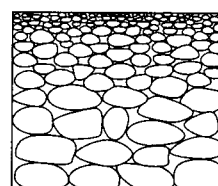
84 Which cross section best represents the sediment that was transported and deposited by this glacier?



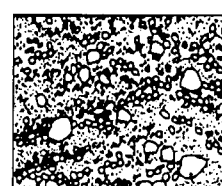
(1)



(3)



(2)



(4)

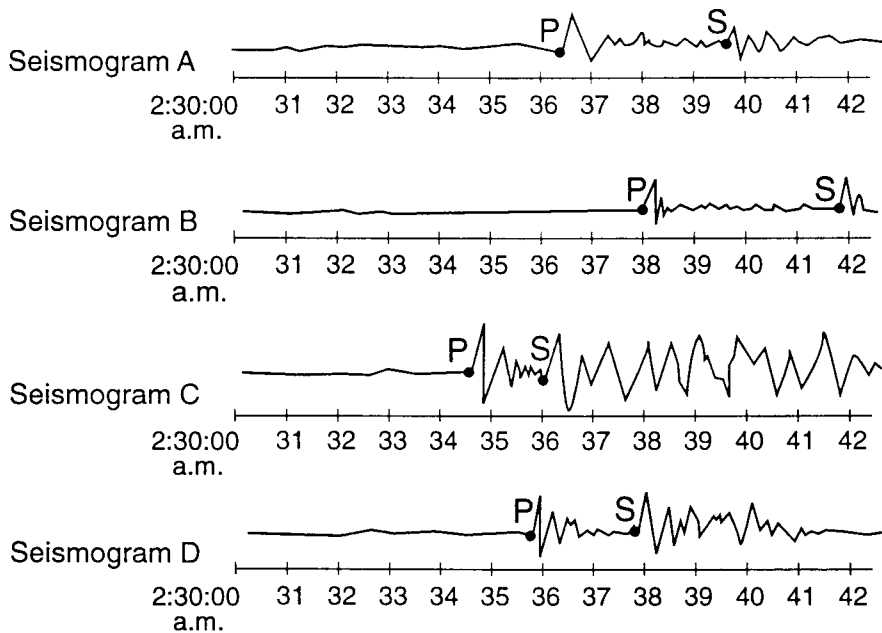
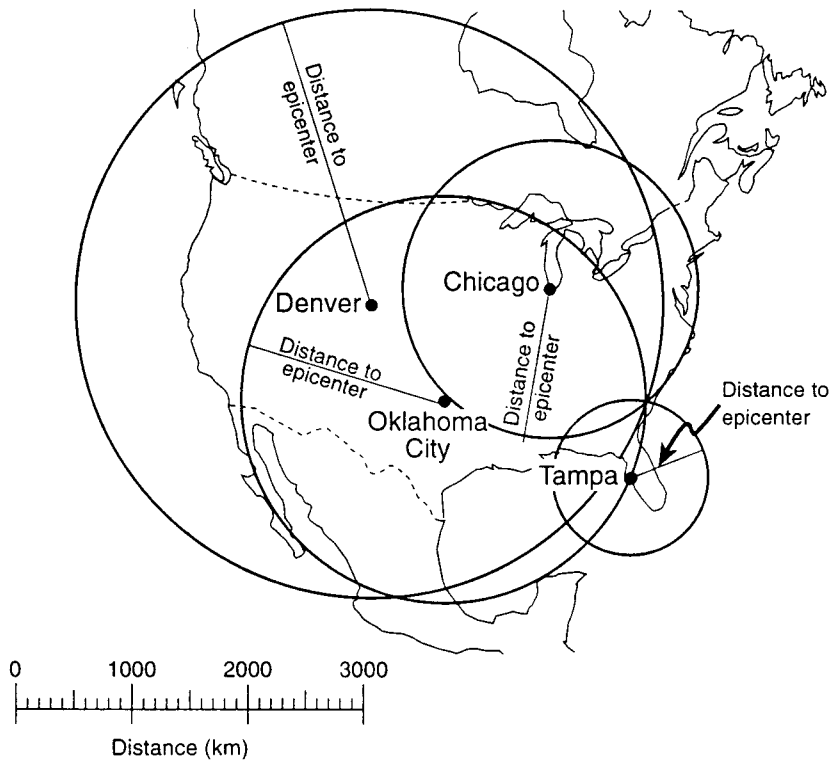
85 If the climate warms, causing the glacier to melt away, the region that the glacier formerly occupied will be a

- (1) U-shaped valley with polished bedrock
- (2) V-shaped valley with jagged bedrock
- (3) flat plain with bedrock that has been metamorphosed
- (4) deep ocean trench with bedrock that has been melted and cooled

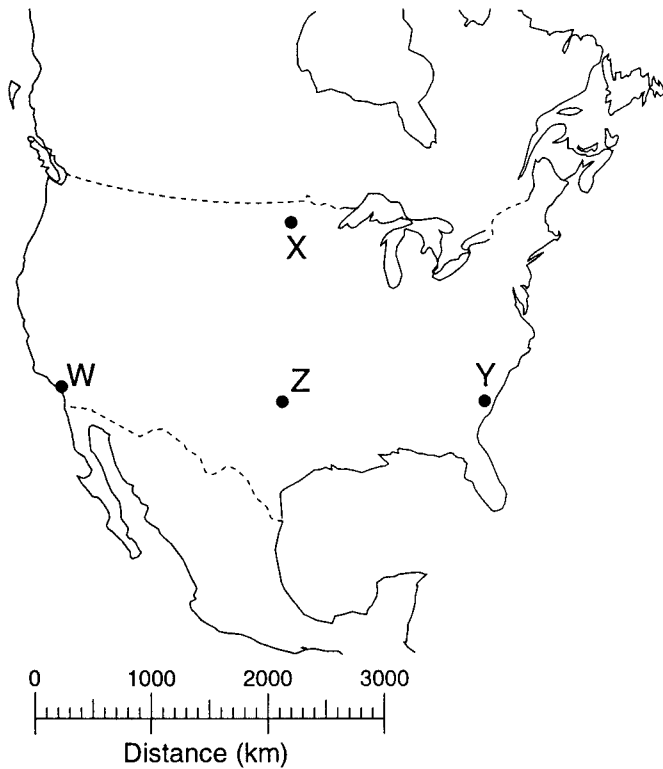
Group 7

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

Base your answers to questions 86 through 90 on the *Earth Science Reference Tables*, the map and seismograms below, and your knowledge of Earth science. The map shows seismic stations in Chicago, Denver, Oklahoma City, and Tampa that recorded data from an earthquake. Seismograms A, B, C, and D show, in Greenwich time, the arrival times of the earthquake waves at the four stations.



86 Which location on the map below is closest to the epicenter of this earthquake?



- | | |
|-------|-------|
| (1) W | (3) Y |
| (2) X | (4) Z |

87 Which seismogram was recorded at Tampa?

- | | |
|----------------|----------------|
| 1 seismogram A | 3 seismogram C |
| 2 seismogram B | 4 seismogram D |

88 What was the origin time of this earthquake?

- | | |
|------------------|------------------|
| (1) 2:33:00 a.m. | (3) 2:35:40 a.m. |
| (2) 2:34:40 a.m. | (4) 2:37:00 a.m. |

89 The *P*-wave generated by this earthquake took 2 minutes and 40 seconds to reach one of the seismic stations. Approximately how long did the *S*-wave take to reach this same seismic station?

- (1) 1 minute 20 seconds
- (2) 2 minutes 40 seconds
- (3) 3 minutes 30 seconds
- (4) 4 minutes 50 seconds

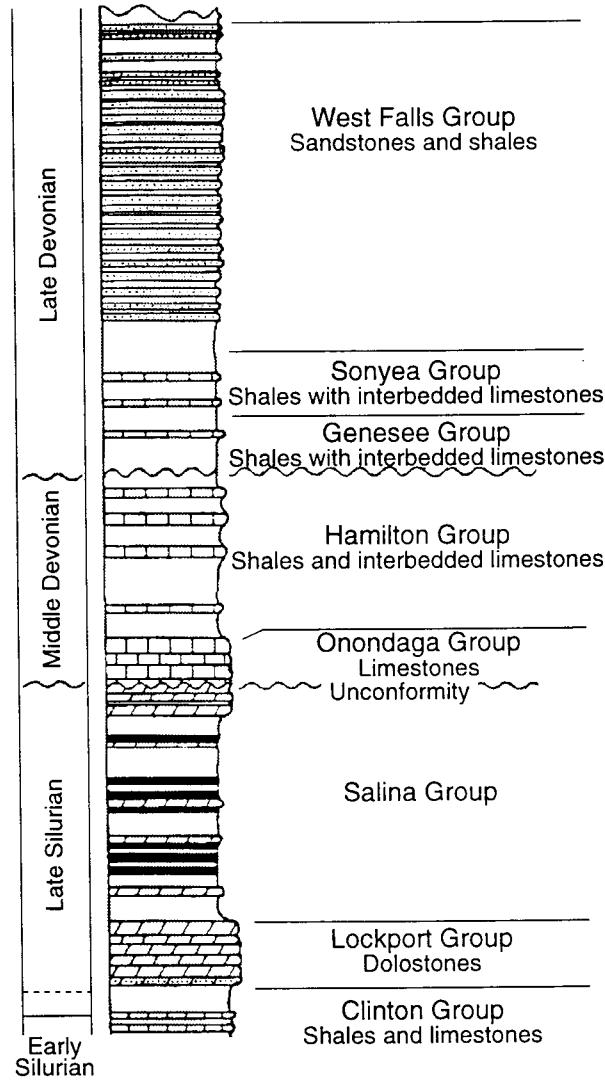
90 What is the *minimum* number of seismic stations needed to locate most earthquake epicenters?

- | | |
|-------|-------|
| (1) 1 | (3) 3 |
| (2) 2 | (4) 4 |

Group 8

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

Base your answers to questions 91 through 95 on the *Earth Science Reference Tables*, the geologic cross section of bedrock shown below, and your knowledge of Earth science. The cross section shows bedrock exposed along part of the Genesee River in New York State. The rock has not been overturned.



91 Which rock group contains the oldest layers?

- | | |
|--------------|------------|
| 1 West Falls | 3 Lockport |
| 2 Hamilton | 4 Clinton |

92 A buried erosional surface indicating a time gap in the rock record is shown between which two groups?

- 1 Clinton and Lockport
- 2 Lockport and Salina
- 3 Salina and Onondaga
- 4 Onondaga and Hamilton

93 A fossil of which animal is most likely to be found in the bedrock of the Hamilton Group?

- | | |
|------------------|--------------|
| 1 early reptile | 3 brachiopod |
| 2 early dinosaur | 4 human |

94 The bedrock shown in the cross section was formed during which geologic era?

- | | |
|---------------|------------|
| 1 Proterozoic | 3 Mesozoic |
| 2 Paleozoic | 4 Cenozoic |

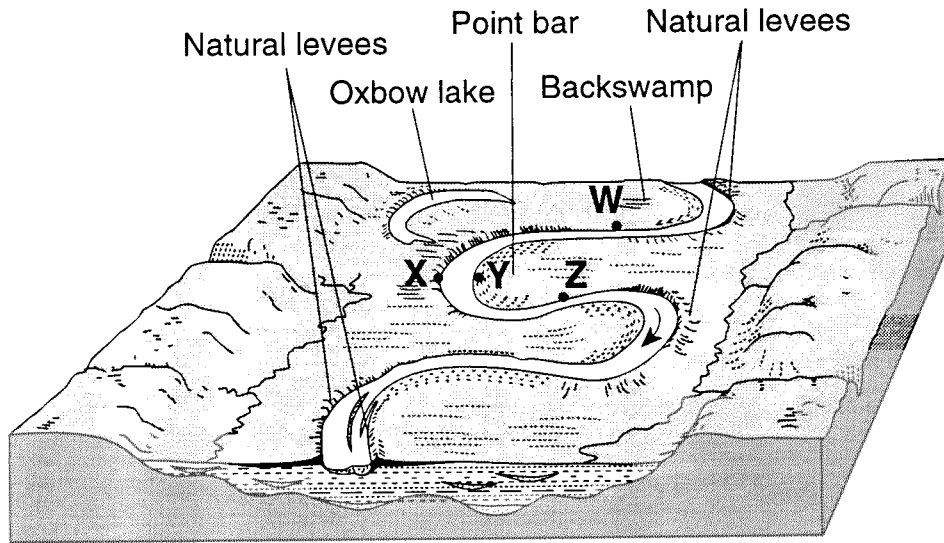
95 Which rock layers in this formation appear to be the most resistant to weathering?

- | | |
|----------|--------------|
| 1 shales | 3 dolostones |
| 2 gypsum | 4 salt |

Group 9

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

Base your answers to questions 96 through 100 on the *Earth Science Reference Tables*, the diagram below, and your knowledge of Earth science. The diagram represents the landscape features associated with a meandering stream. Points W, X, Y, and Z are locations along the stream bank.



96 At which location is erosion greatest?

- (1) W (3) Y
 (2) X (4) Z

97 The oxbow lake most likely formed when a

- 1 stream changed its path
- 2 crater flooded
- 3 cavern roof collapsed
- 4 fault block subsided

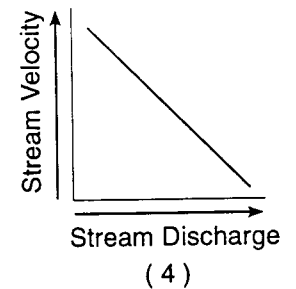
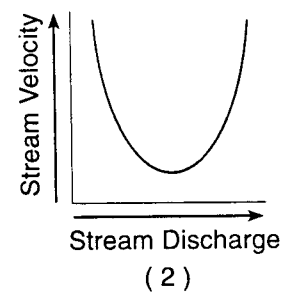
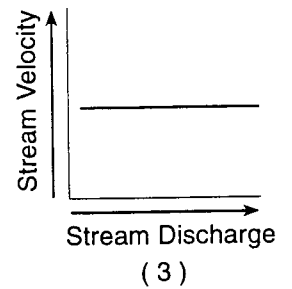
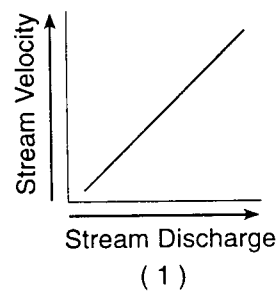
98 Sediment is usually deposited by the stream at locations where the stream

- 1 decreases in velocity
- 2 decreases in width
- 3 increases in potential energy
- 4 increases in slope

99 Which material does the stream carry in solution?

- 1 sand 3 colloids
 2 silt 4 ions

100 Which graph shows how changes in stream discharge usually affect stream velocity?



Group 10

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

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

- 101 Which planet of our solar system has the most eccentric orbit?
- | | |
|---------|----------|
| 1 Venus | 3 Saturn |
| 2 Earth | 4 Pluto |
- 102 Which layer of Earth's atmosphere contains no water vapor, has an atmospheric pressure less than 10^{-4} atmosphere, and has an air temperature that increases with altitude?
- | | |
|----------------|----------------|
| 1 troposphere | 3 mesosphere |
| 2 stratosphere | 4 thermosphere |
- 103 Five-gram samples of granite, basalt, iron, and copper at room temperature are placed in a beaker of boiling water. Which sample would reach a temperature of 60°C first?
- | | |
|----------|-----------|
| 1 copper | 3 granite |
| 2 iron | 4 basalt |
- 104 A 25-gram sample of halite was placed in a jar with five other mineral samples and water. The jar was shaken vigorously for 5 minutes. The halite sample was then found to have a mass of 15 grams. What was the rate of weathering of the halite sample?
- | | |
|----------------|---------------|
| (1) 0.50 g/min | (3) 3.0 g/min |
| (2) 2.0 g/min | (4) 10. g/min |
- 105 At which temperature does an object radiate the *least* amount of electromagnetic energy?
- | | |
|---------------------------|--------------------------|
| (1) 250 K | (3) 45°F |
| (2) -10°C | (4) 50°C |
-

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 4
- 60 1 2 3 4

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, August 13, 1998 — 12:30 to 3:30 p.m., only

ANSWER SHEET

Part I Credits
Part II Credits
Performance Test Credits
Total (Official Regents) Examination Mark
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 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 4
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

Tear Here

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