

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

# EARTH SCIENCE

## PROGRAM MODIFICATION EDITION

Thursday, June 18, 1998 — 1:15 to 4:15 p.m., only

The answer paper is stapled in the center of this examination booklet. Open the examination booklet, carefully remove the answer paper, and close the examination booklet. Then fill in the heading of your answer paper.

All of your answers are to be recorded on the separate answer paper. For each question in Part I and Part II, decide which of the choices given is the best answer. Then on the answer paper, 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 all three parts of 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 paper. 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

For questions in Part III, record your answers in accordance with the directions given in the examination booklet.

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 paper, 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 paper cannot be accepted if you fail to sign this declaration.

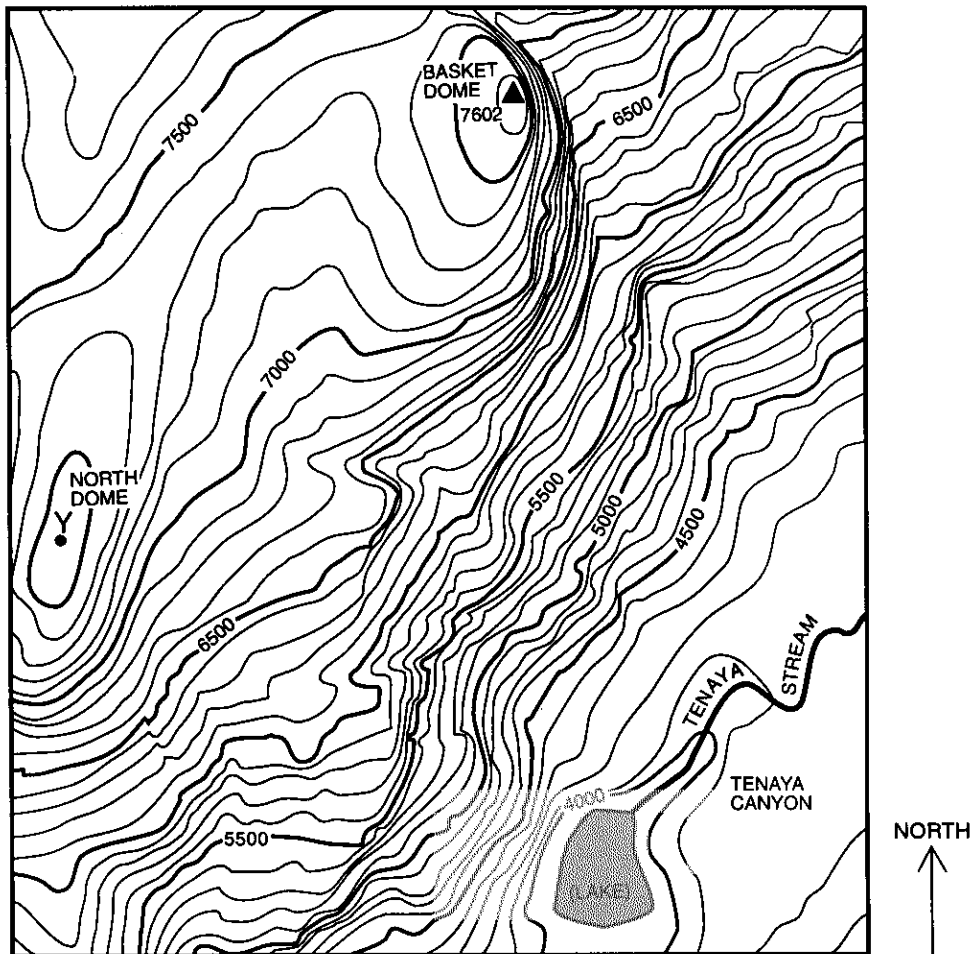
**DO NOT OPEN THIS EXAMINATION BOOKLET UNTIL THE SIGNAL IS GIVEN.**

## Part I

Answer all 40 questions in this part.

*Directions (1–40):* 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 paper in accordance with the directions on the front page of this booklet. Some questions may require the use of the *Earth Science Reference Tables*. [40]

Base your answers to questions 1 through 3 on the contour map below. Elevations are expressed in feet. The ▲ indicates the exact elevation of the top of Basket Dome.



1 What is the highest possible elevation of point Y on North Dome?

- (1) 7,500 ft
- (2) 7,590 ft
- (3) 7,599 ft
- (4) 7,601 ft

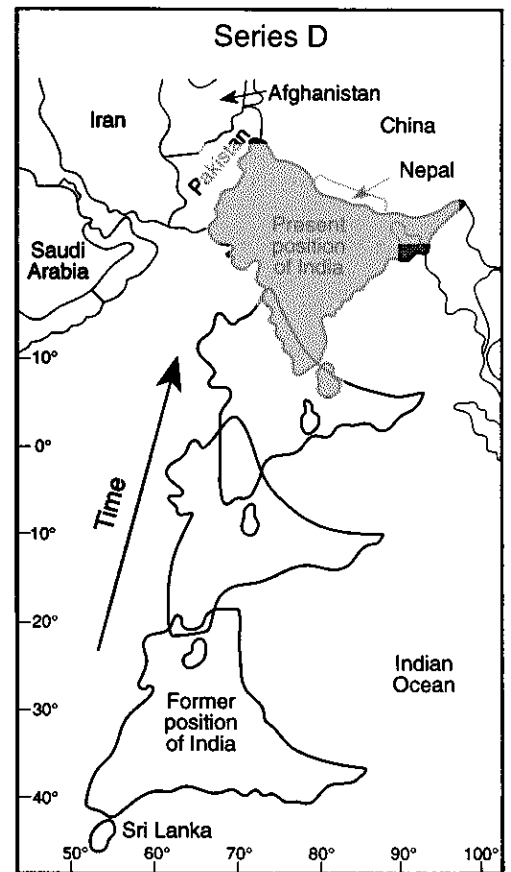
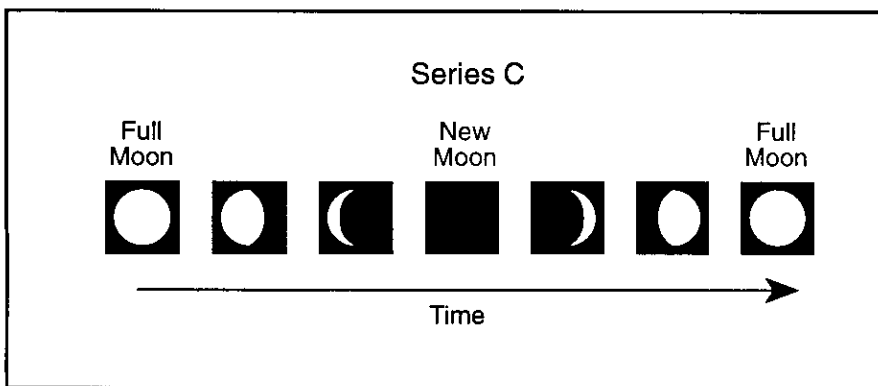
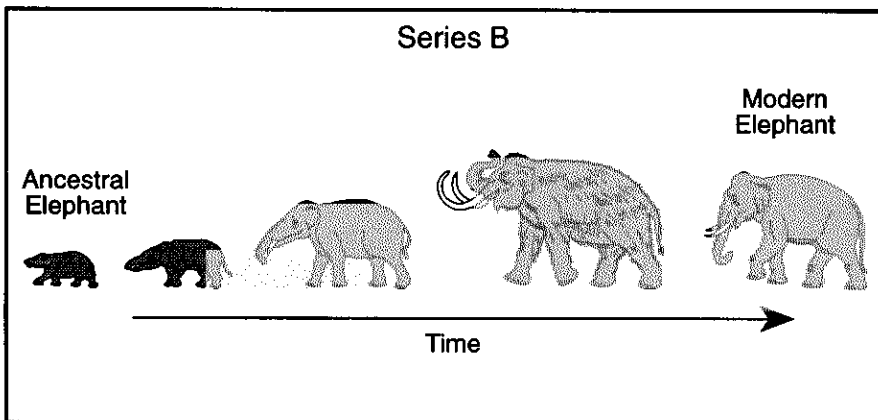
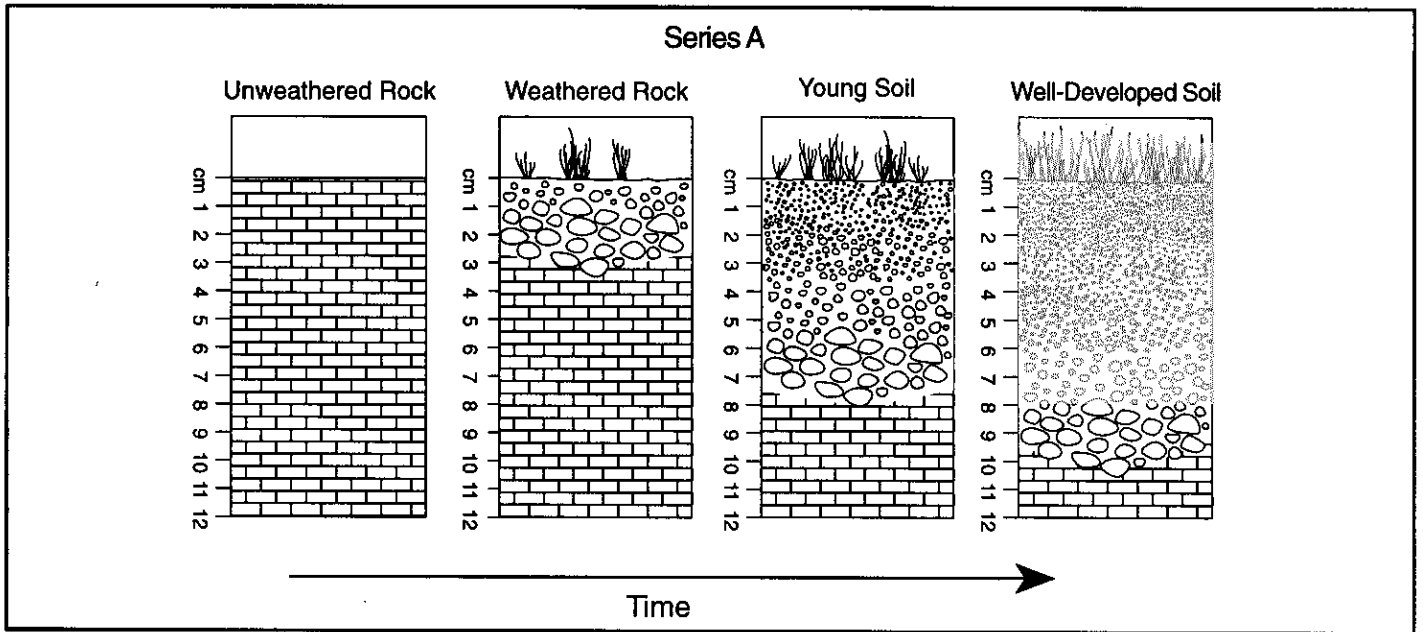
2 Forty years ago, the highest elevation of Basket Dome was 7,600 feet. What is the rate of crustal uplift for Basket Dome?

- (1) 0.05 ft/yr
- (2) 2 ft/yr
- (3) 0.5 ft/yr
- (4) 20 ft/yr

3 In which general direction does Tenaya Stream flow?

- 1 southeast to northwest
- 2 northwest to southeast
- 3 southwest to northeast
- 4 northeast to southwest

4 Each series below, labeled A through D, represents a sequence of events over the passage of time



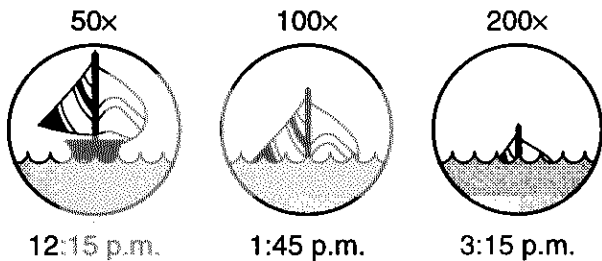
Which series would take the *least* amount of time to complete?

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

5 Which New York State landscape region is located at 42° N 75° W?

- 1 Erie-Ontario Lowlands
- 2 the Catskills
- 3 Hudson-Mohawk Lowlands
- 4 Tug Hill Plateau

6 The diagrams below represent photographs of a large sailboat taken through telescopes over time as the boat sailed away from shore out to sea. The number above each diagram shows the magnification of the telescope lens.



Which statement best explains the apparent sinking of this sailboat?

- 1 The sailboat is moving around the curved surface of Earth.
- 2 The sailboat appears smaller as it moves farther away.
- 3 The change in density of the atmosphere is causing refraction of light rays.
- 4 The tide is causing an increase in the depth of the ocean.

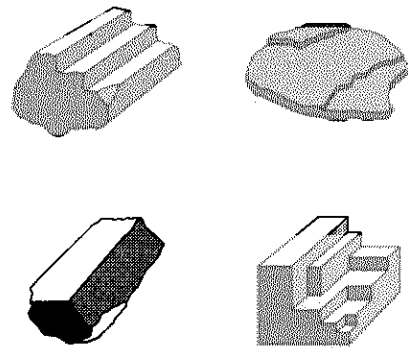
7 Which rocks usually have the mineral quartz as part of their composition?

- 1 conglomerate, gabbro, rock salt, and schist
- 2 breccia, fossil limestone, bituminous coal, and siltstone
- 3 shale, scoria, gneiss, and marble
- 4 granite, rhyolite, sandstone, and hornfels

8 Which sedimentary rock may have both a chemical origin and an organic origin?

- |               |             |
|---------------|-------------|
| 1 limestone   | 3 rock salt |
| 2 rock gypsum | 4 shale     |

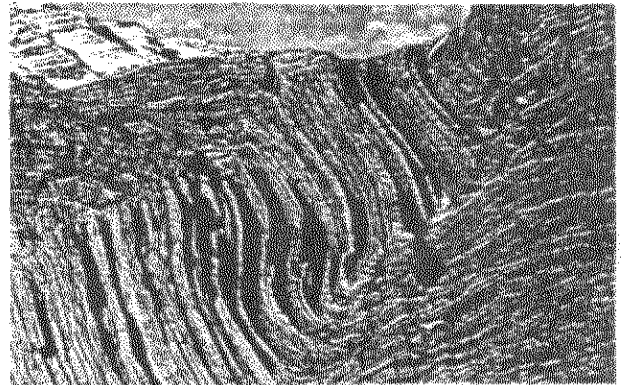
9 The diagrams below represent four different mineral samples.



Which mineral property is best represented by the samples?

- |            |            |
|------------|------------|
| 1 density  | 3 hardness |
| 2 cleavage | 4 streak   |

10 The photograph below represents a mountainous area in the Pacific Northwest.



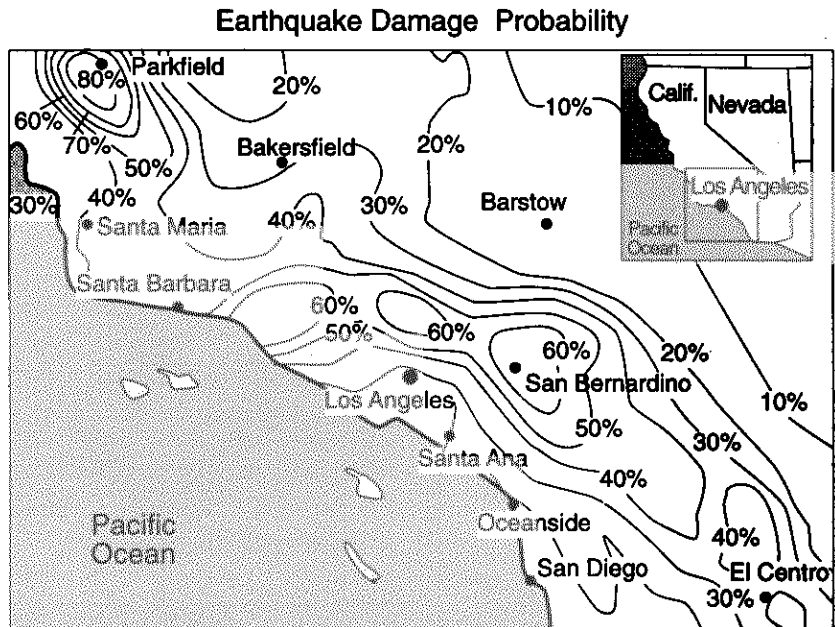
Scientists believe that sedimentary rocks like these represent evidence of crustal change because these rocks were

- 1 formed by igneous intrusion
- 2 faulted during deposition
- 3 originally deposited in horizontal layers
- 4 changed from metamorphic rocks

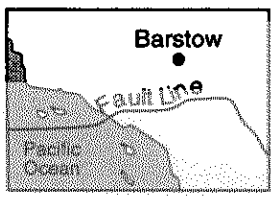
11 Which feature is commonly formed at a plate boundary where oceanic crust converges with continental crust?

- |                     |                     |
|---------------------|---------------------|
| 1 a mid-ocean ridge | 3 a transform fault |
| 2 an ocean trench   | 4 new oceanic crust |

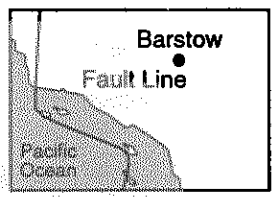
Base your answers to questions 12 and 13 on the map below, which shows a portion of California along the San Andreas Fault zone. The map gives the probability (percentage chance) that an earthquake strong enough to damage buildings and other structures will occur between the present time and the year 2024.



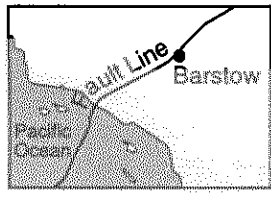
12 Which map represents the most likely location of the San Andreas Fault line?



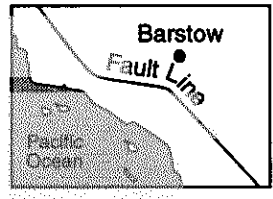
(1)



(3)



(2)

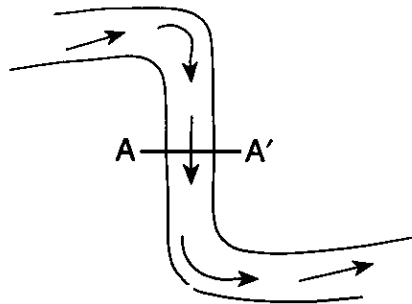


(4)

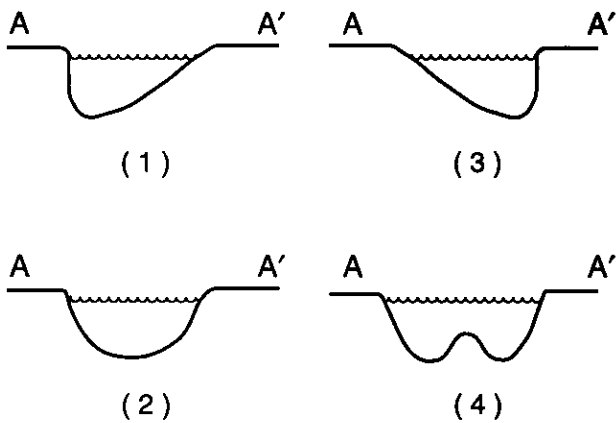
13 Which city has the greatest danger of damage from an earthquake?

- 1 Parkfield
- 2 San Diego
- 3 Santa Barbara
- 4 San Bernardino

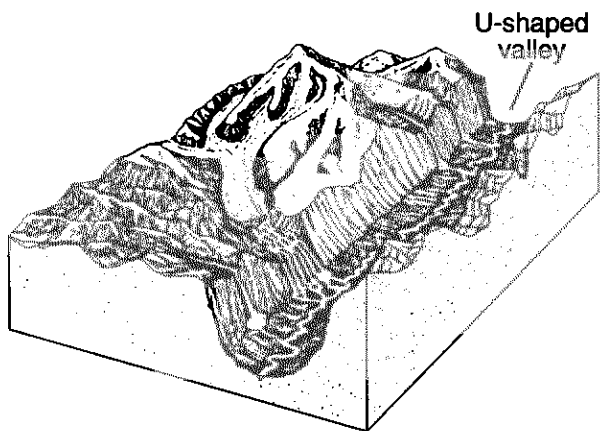
14 The diagram below is a map view of a stream flowing through an area of loose sediments. Arrows show the location of the strongest current.



Which stream profile best represents the cross section from A to A'?



15 The diagram below represents a landscape area.



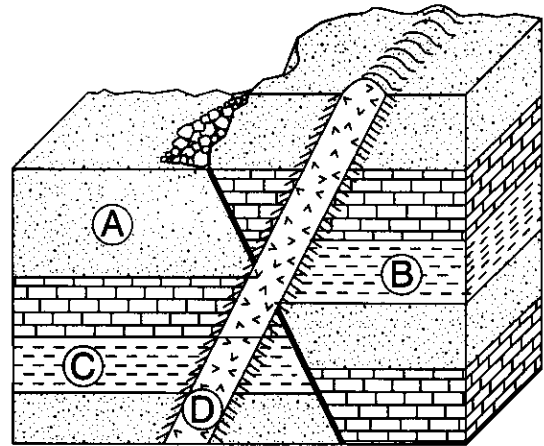
The main valley in this landscape area resulted mostly from

- 1 chemical weathering
- 2 volcanic activity
- 3 glacial erosion
- 4 stream erosion

16 Which New York State landscape region is composed mostly of intensely metamorphosed surface bedrock?

- 1 Hudson Highlands
- 2 Allegheny Plateau
- 3 Atlantic Coastal Plain
- 4 Erie-Ontario Lowlands

17 A geologic cross section is shown below.



Key	
	Sandstone
	Limestone
	Shale
	Contact metamorphism
	Igneous rock

The most recently formed rock unit is at location

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

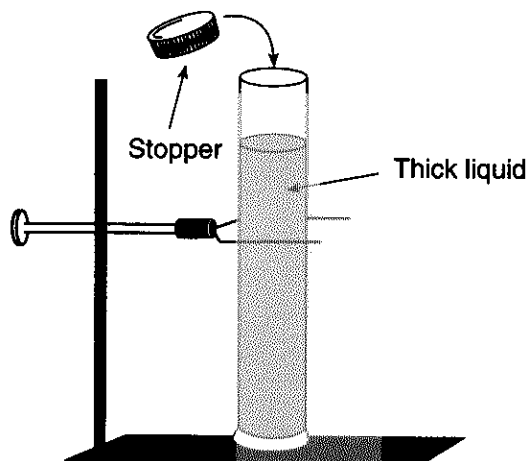
18 Based on studies of fossils found in subsurface rocks near Buffalo, New York, scientists have inferred that the climate of this area during the Ordovician Period was much warmer than the present climate. Which statement best explains this change in climate?

- 1 The Sun emitted less sunlight during the Ordovician Period.
- 2 Earth was farther from the Sun during the Ordovician Period.
- 3 The North American Continent was nearer to the Equator during the Ordovician Period.
- 4 Many huge volcanic eruptions occurred during the Ordovician Period.

Base your answers to questions 19 and 20 on the diagram and data table for the laboratory activity described below. Diagrams are not drawn to scale.

### Laboratory Activity

Different combinations of the particles shown in the data table were placed in a tube filled with a thick liquid and allowed to fall to the bottom. The tube was then stoppered and quickly turned upside down, allowing the particles to settle.



	Diameter	Density
	15 mm Al (aluminum)	2.7 g/cm <sup>3</sup>
	15 mm Fe (iron)	7.9 g/cm <sup>3</sup>
	15 mm Pb (lead)	11.4 g/cm <sup>3</sup>

19 Which diagram represents the sorting that most likely occurred when the tube was turned upside down and the particles of the three different metals were allowed to settle?

Top —

Bottom —

(1)

Top —

Bottom —

(3)

Top —

Bottom —

(2)

Top —

Bottom —

(4)

20 In another activity, round, oval, and flat aluminum particles with identical masses were dropped individually into the tube. Which table shows the most likely average settling times of the different-shaped particles?

Particle Shape	Average Settling Time
Round	5.1 sec
Oval	5.1 sec
Flat	5.1 sec

(1)

Particle Shape	Average Settling Time
Round	6.7 sec
Oval	5.1 sec
Flat	3.2 sec

(3)

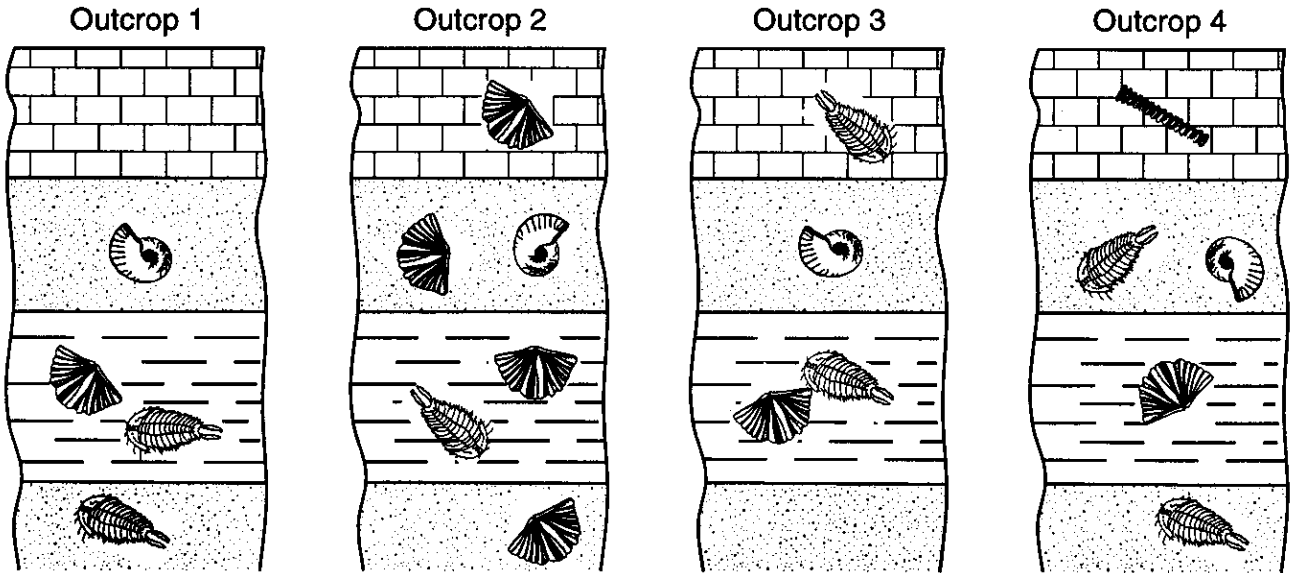
Particle Shape	Average Settling Time
Round	5.1 sec
Oval	3.2 sec
Flat	6.7 sec

(2)

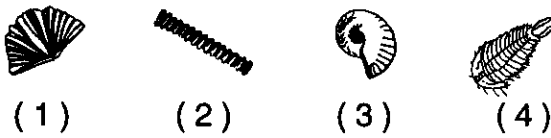
Particle Shape	Average Settling Time
Round	3.2 sec
Oval	5.1 sec
Flat	6.7 sec

(4)

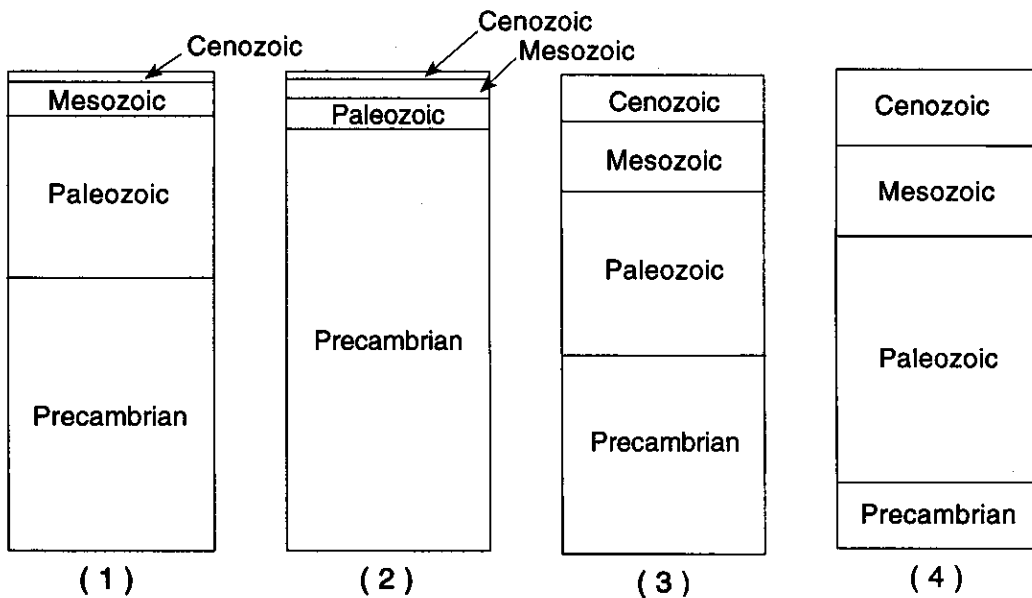
21 The diagrams below represent the rock layers and fossils found at four widely separated rock outcrops.



Which fossil appears to be the best index fossil?



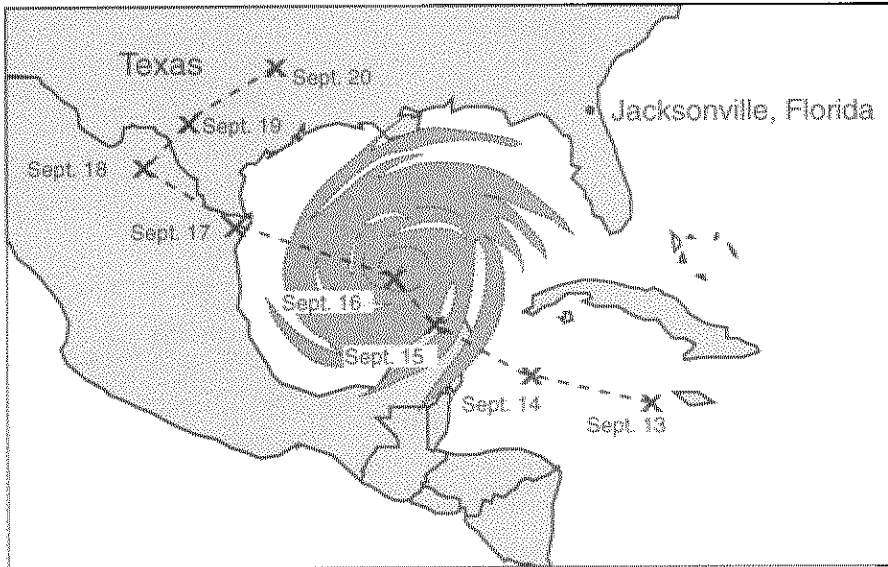
22 Which column best represents the relative lengths of time of the major intervals of geologic history?





Note that question 23 has only three choices.

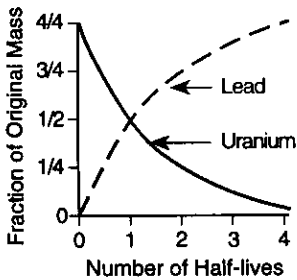
23 The map below represents a satellite image of Hurricane Gilbert in the Gulf of Mexico. Each X represents the position of the center of the storm on the date indicated.



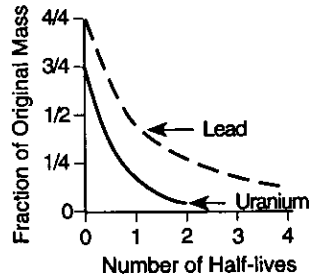
Compared to its strength on September 16, the strength of Hurricane Gilbert on September 18 was

- 1 less
- 2 greater
- 3 the same

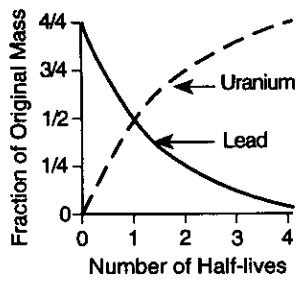
24 Which graph best represents the radioactive decay of uranium-238 into lead-206?



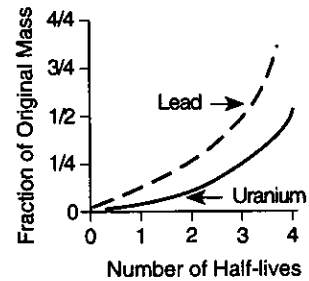
(1)



(3)

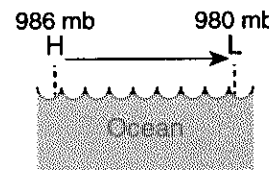


(2)

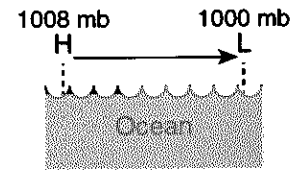


(4)

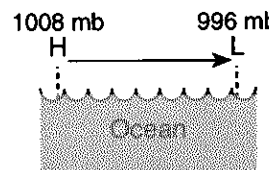
25 Winds are blowing from high-pressure to low-pressure systems over identical ocean surfaces. Which diagram represents the area of greatest windspeed? [Arrows represent wind direction.]



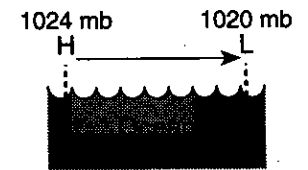
(1)



(3)

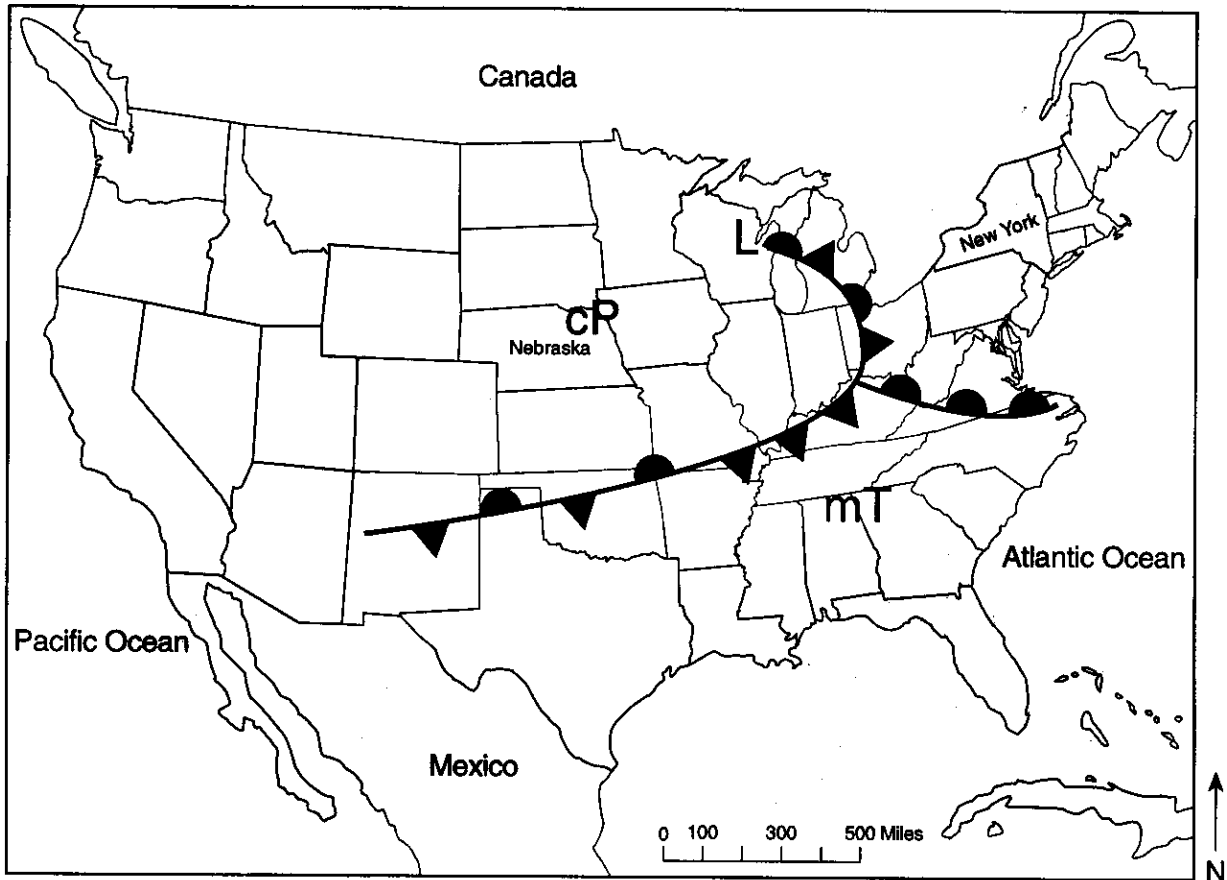


(2)

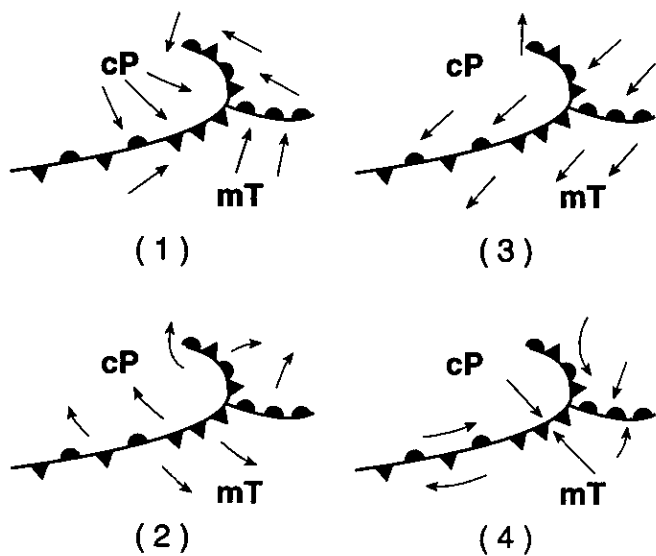


(4)

Base your answers to questions 26 through 29 on the weather map below. The map shows a weather system that is affecting part of the United States.



26 Which diagram shows the surface air movements most likely associated with the low-pressure system?



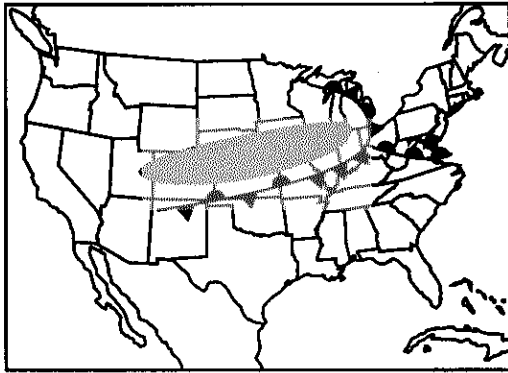
27 What is the total number of different kinds of weather fronts shown on this weather map?

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

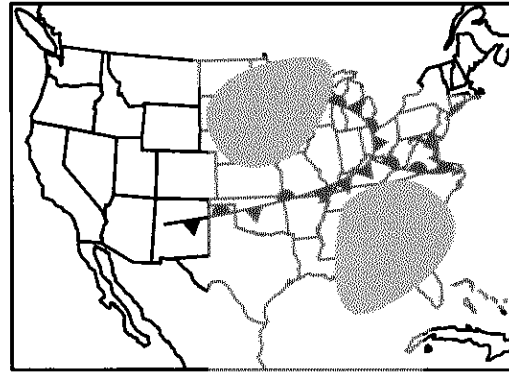
28 The air mass influencing the weather of Nebraska most likely originated in

- 1 the northern Pacific Ocean
- 2 the northern Atlantic Ocean
- 3 central Canada
- 4 central Mexico

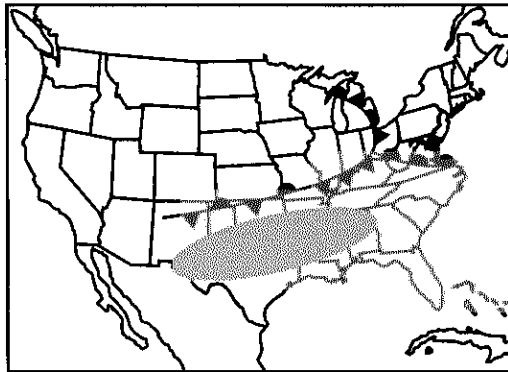
29 Which map shows the area where precipitation is most likely occurring? [Shaded areas represent precipitation.]



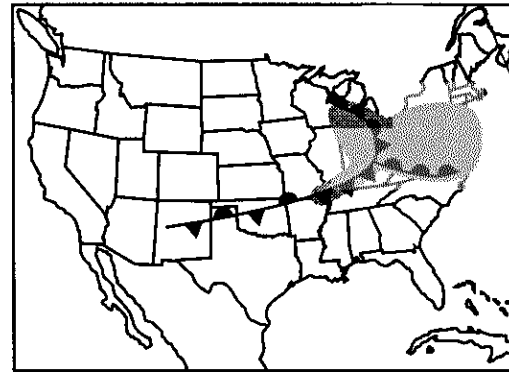
(1)



(3)



(2)



(4)

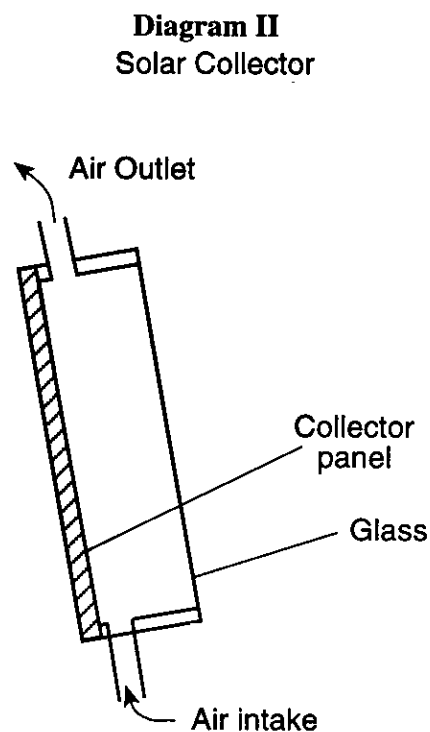
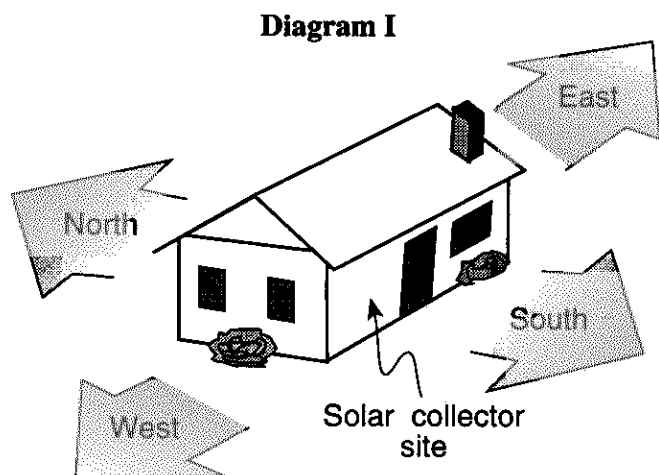
30 Locations in New York State are warmer in summer than in winter because in summer

- 1 the solar radiation reaching Earth's surface is more intense, and the number of daylight hours is fewer
- 2 the solar radiation reaching Earth's surface is more intense, and the number of daylight hours is greater
- 3 the solar radiation reaching Earth's surface is less intense, and the number of daylight hours is fewer
- 4 the solar radiation reaching Earth's surface is less intense, and the number of daylight hours is greater

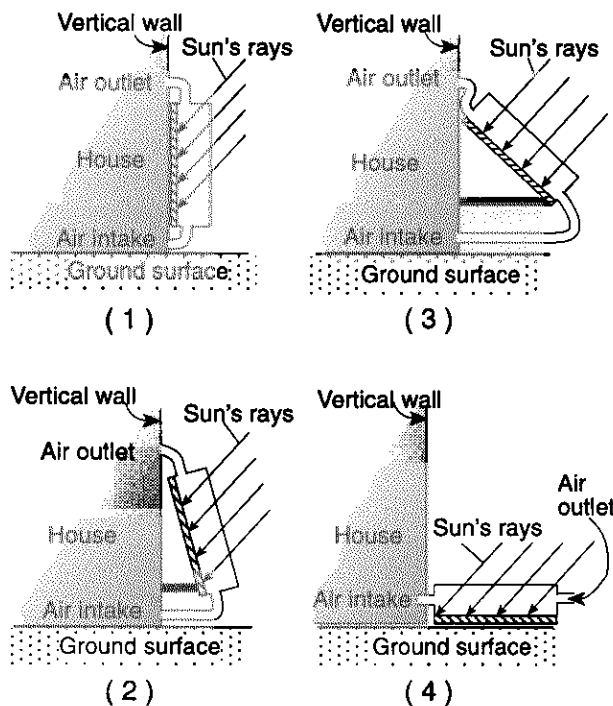
31 A parcel of air has a dry-bulb temperature of  $16^{\circ}\text{C}$  and a wet-bulb temperature of  $10^{\circ}\text{C}$ . What are the dewpoint and relative humidity readings of the air?

- (1)  $-10^{\circ}\text{C}$  dewpoint and 14% relative humidity
- (2)  $-10^{\circ}\text{C}$  dewpoint and 45% relative humidity
- (3)  $4^{\circ}\text{C}$  dewpoint and 14% relative humidity
- (4)  $4^{\circ}\text{C}$  dewpoint and 45% relative humidity

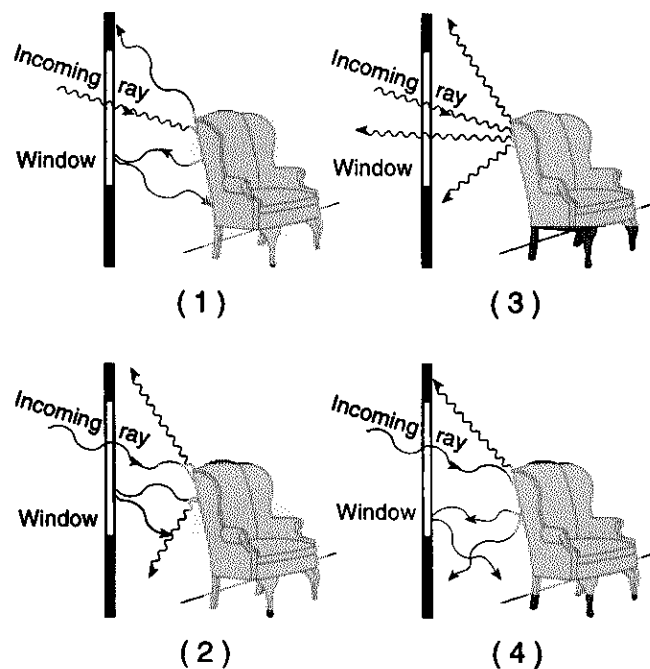
Base your answers to questions 32 and 33 on the diagrams below. Diagram I shows a house located in New York State. Diagram II shows a solar collector that the homeowner is using to help heat the house.



32 Which side view shows the correct placement of the solar collector on the side of this house to collect the maximum amount of sunlight?

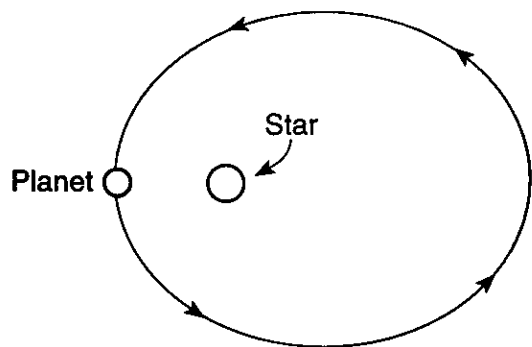


33 Which diagram best represents both the wavelength of visible light entering this house through a window and the wavelength of infrared rays being given off by a chair?



- 34 Which fact provides the best evidence that Earth's axis is tilted?
- 1 Locations on Earth's Equator receive 12 hours of daylight every day.
  - 2 The apparent diameter of the Sun shows predictable changes in size.
  - 3 Planetary winds are deflected to the right in the Northern Hemisphere and to the left in the Southern Hemisphere.
  - 4 Winter occurs in the Southern Hemisphere at the same time that summer occurs in the Northern Hemisphere.

- 35 The diagram below represents a planet revolving in an elliptical orbit around a star.

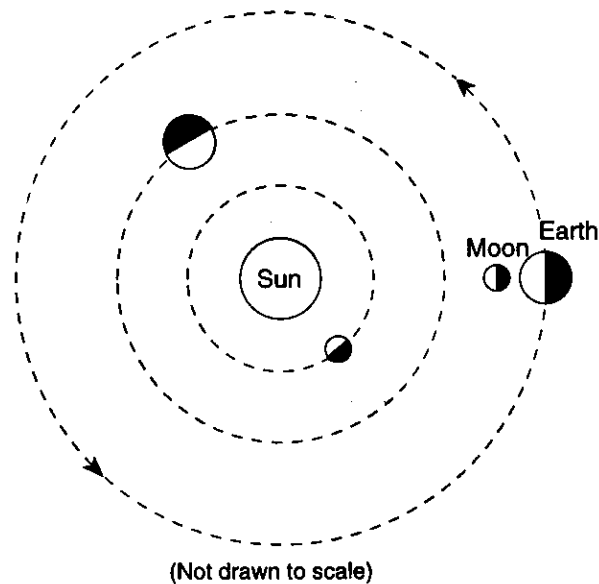


As the planet makes one complete revolution around the star, starting at the position shown, the gravitational attraction between the star and the planet will

- 1 decrease, then increase
  - 2 increase, then decrease
  - 3 continually decrease
  - 4 remain the same
- 36 A student in New York State observed that the altitude of the Sun at noon is decreasing each day. During which month could the student have made these observations?
- 1 January
  - 2 March
  - 3 May
  - 4 October

- 37 Which member of the solar system has a diameter of  $3.48 \times 10^3$  kilometers?
- 1 Pluto
  - 2 Earth
  - 3 Earth's Moon
  - 4 the Sun

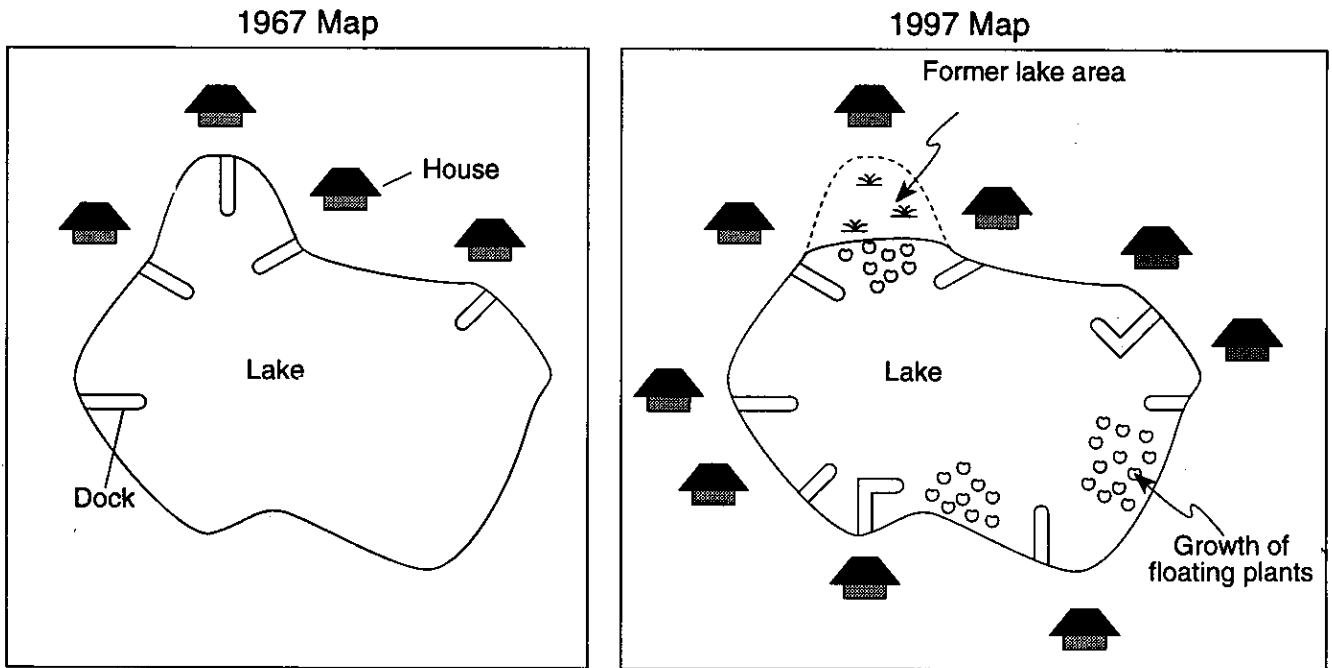
- 38 The diagram below represents a portion of the solar system.



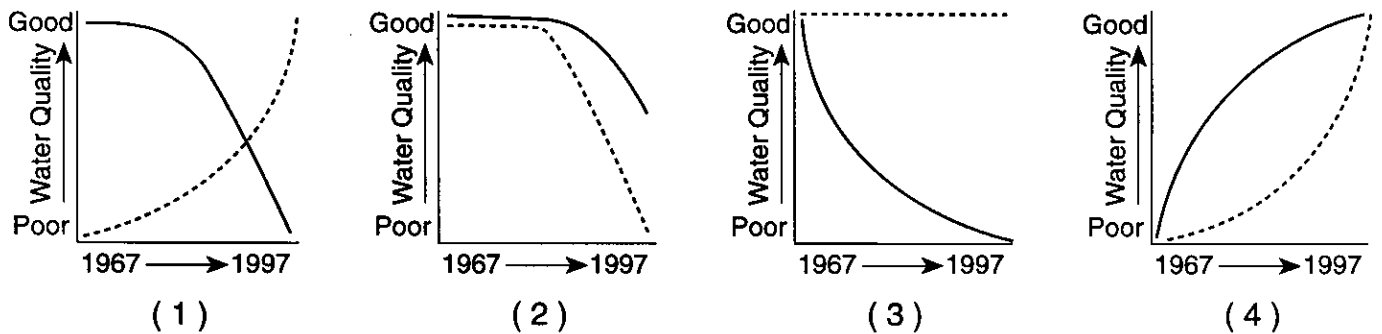
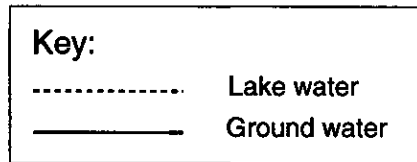
In addition to Earth, which planets are represented by the diagram?

- 1 Saturn and Pluto
  - 2 Mercury and Venus
  - 3 Uranus and Neptune
  - 4 Jupiter and Mars
- 39 Tropical rain forests remove carbon dioxide gas from Earth's atmosphere. The destruction of the rain forests could affect Earth's overall average temperature because
- 1 more of Earth's reradiation would be absorbed by the atmosphere
  - 2 more sunlight would be reflected back to space by Earth's atmosphere
  - 3 more visible light would be absorbed by Earth's atmosphere
  - 4 more ultraviolet light would be transmitted through Earth's atmosphere

40 The maps below show changes occurring around a small New York State lake over a 30-year period.



Which graph shows the probable changes in the quality of ground water and lake water in this region from 1967 to 1997? [Ground water is water that has infiltrated beneath Earth's surface.]



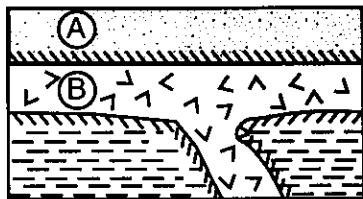
## Part II

This part consists of six groups, each containing five questions. Choose any *two* of these six groups. Be sure that you answer all five questions in each of the two groups chosen. Record the answers to these questions on the separate answer paper in accordance with the directions on the front cover of this booklet. Some questions may require the use of the *Earth Science Reference Tables*. [10]

### Group A — Rocks and Minerals

If you choose this group, be sure to answer questions 41–45.

- 41 Slate is formed by the
- 1 deposition of chlorite and mica
  - 2 foliation of schist
  - 3 metamorphism of shale
  - 4 folding and faulting of gneiss
- 42 Which property of a mineral most directly results from the internal arrangement of its atoms?
- 1 volume
  - 2 color
  - 3 crystal shape
  - 4 streak
- 43 The diagram below shows a cross section through a portion of Earth's crust.



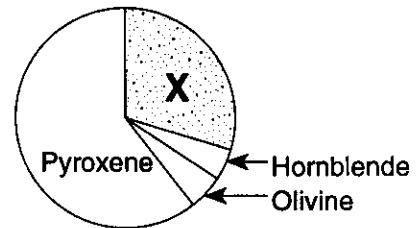
Key

	Sandstone
	Shale
	Granite
	Contact metamorphism

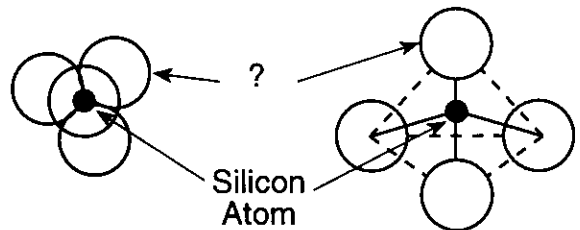
Rock found in the zone between A and B is non-foliated and fine grained. This rock is most likely

- 1 metaconglomerate
- 2 gneiss
- 3 marble
- 4 quartzite

- 44 The graph below represents the percentage of each mineral found in a sample of igneous rock. Which mineral is represented by the letter X in the graph?



- 1 potassium feldspar
  - 2 plagioclase feldspar
  - 3 quartz
  - 4 biotite
- 45 The diagram below represents top and side views of models of the silicate tetrahedron.



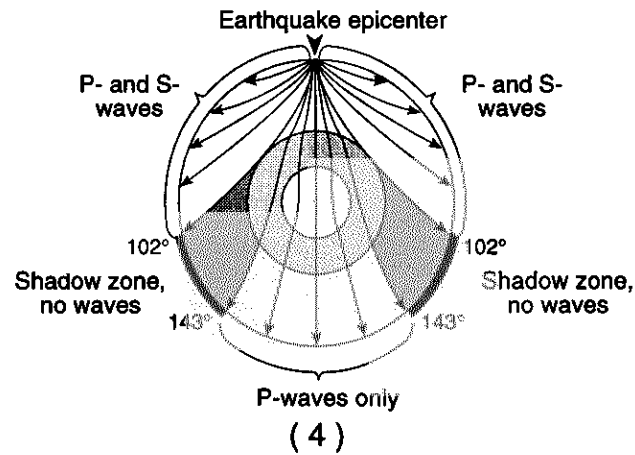
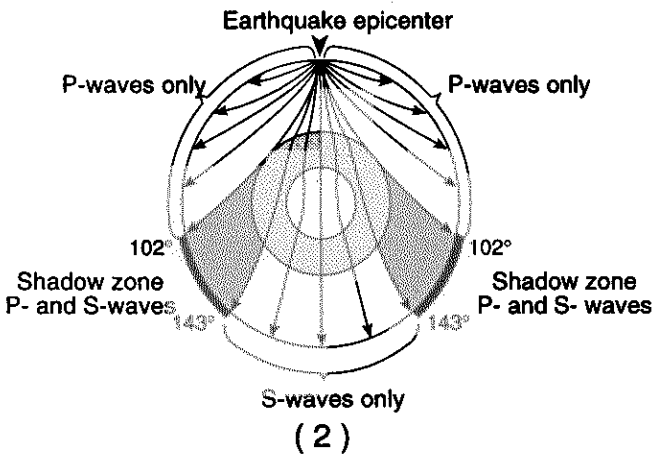
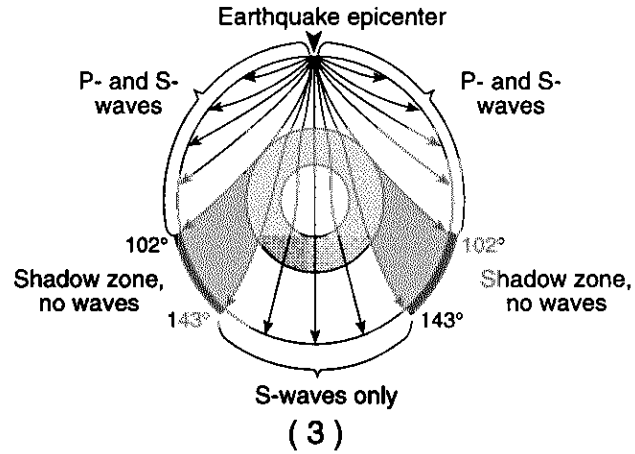
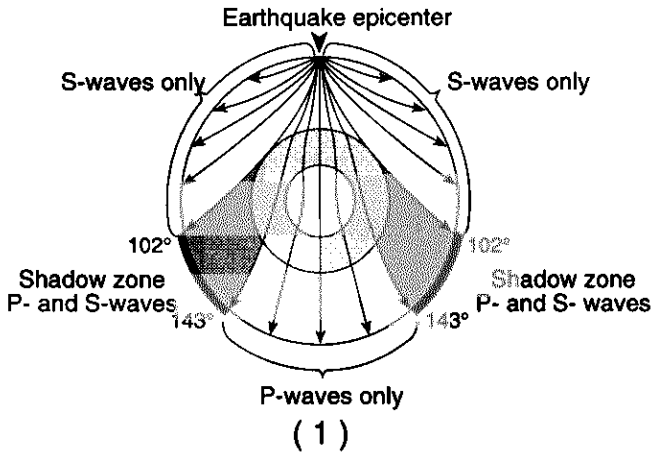
Which element combines with silicon to form the tetrahedron?

- 1 oxygen
- 2 nitrogen
- 3 potassium
- 4 hydrogen

## Group B — Plate Tectonics

If you choose this group, be sure to answer questions 46–50.

46 Which cross-sectional diagram of Earth correctly shows the paths of seismic waves from an earthquake traveling through Earth's interior?



47 The actual temperature at the boundary between the stiffer mantle and the outer core is estimated to be approximately

- |           |            |
|-----------|------------|
| (1) 1.5°C | (3) 3000°C |
| (2) 250°C | (4) 5000°C |

48 How far from an earthquake epicenter is a city where the difference between the *P*-wave and *S*-wave arrival times is 6 minutes and 20 seconds?

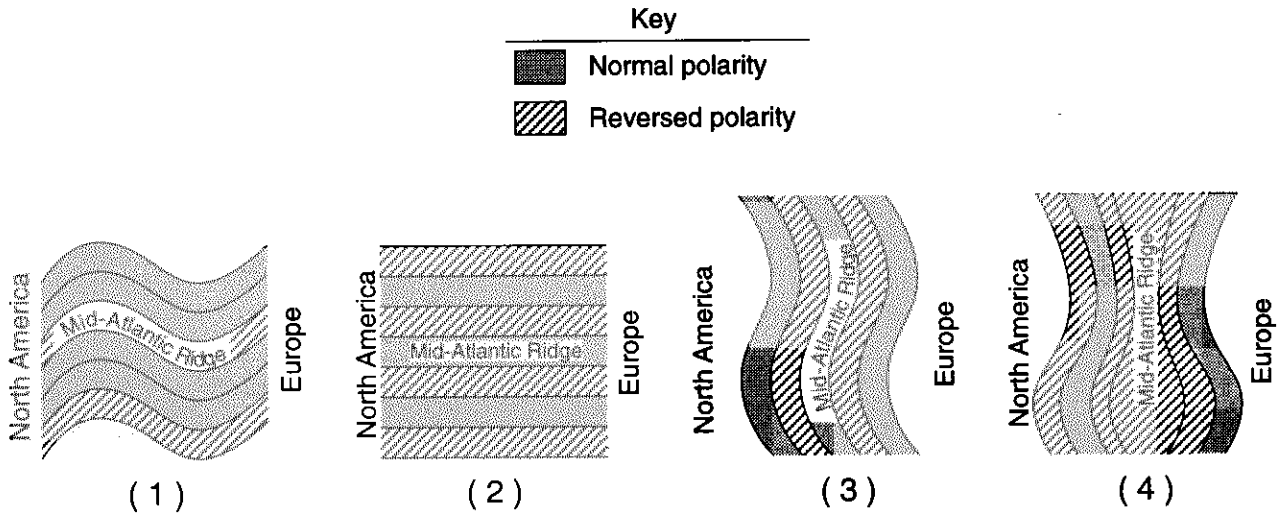
- |                          |                          |
|--------------------------|--------------------------|
| (1) $1.7 \times 10^3$ km | (3) $3.5 \times 10^3$ km |
| (2) $9.9 \times 10^3$ km | (4) $4.7 \times 10^3$ km |

49 Compared to oceanic crust, continental crust is generally

- 1 older and thinner
- 2 older and thicker
- 3 younger and thinner
- 4 younger and thicker



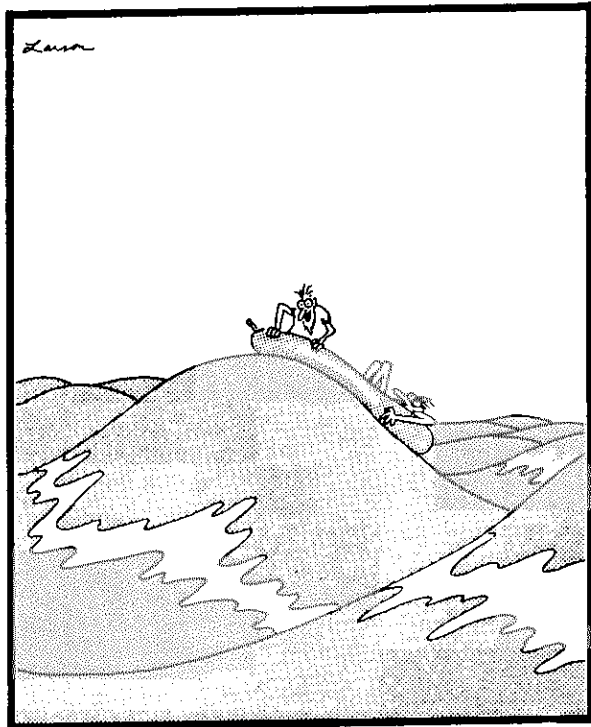
50 Which map best represents the general pattern of magnetism in the oceanic bedrock near the mid-Atlantic Ridge?



Group C — Oceanography

If you choose this group, be sure to answer questions 51–55.

51 The cartoon below presents a humorous look at ocean wave action.



"Here comes another big one, Roy, and here — we — gooooooowheeeeeeeooool"

The ocean waves that are providing enjoyment for Roy's companion are the result of the

- 1 interaction of the hydrosphere with the moving atmosphere
- 2 interaction of the lithosphere with the moving troposphere
- 3 absorption of short-wave radiation in the stratosphere
- 4 absorption of energy in the asthenosphere

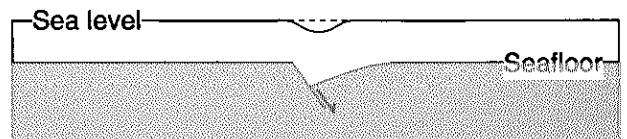
52 What is the main source of dissolved salts in the ocean?

- 1 human activities
- 2 minerals carried from the land by rivers
- 3 precipitation from storm fronts
- 4 weathered basalts at mid-ocean ridges

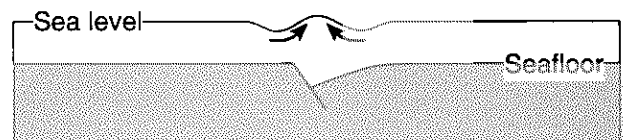
53 Diagrams A, B, C, and D below represent a sequence of events that occurred in the deep ocean and that resulted in a tsunami. Diagram A represents the first event of the sequence, and diagram D represents the fourth event.



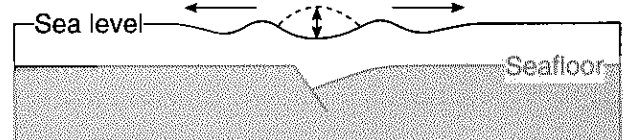
A



B



C



D

The surface waves shown in diagram D were most likely caused by

- 1 a submarine landslide
- 2 folding of the ocean floor
- 3 displacement by a fault
- 4 strong winds from a hurricane

Base your answers to questions 54 and 55 on the table below, which lists the four main classes of ocean-floor sediments and shows the origin and an example of each sediment.

**Ocean-Floor Sediments**

Classification	Origin	Examples
Lithogenic	Land-derived	Muds and clays
Biogenic	Shells of microscopic organisms	Oozes
Turbigenic	Turbidity currents	Graded beds in the deep ocean
Authigenic	Ocean water by chemical precipitation directly on the ocean floor	Manganese nodules

54 Which statement best explains why turbigenic sediments are found in graded beds?

- 1 The Moon's gravitational force causes the cyclic pattern of sediment deposition.
- 2 Ocean-floor organisms sort fresh sediments into layers of similar sizes.
- 3 During cementation, smaller particles rise to the top, leaving larger particles at the bottom of each layer.
- 4 During deposition, larger particles usually settle to the bottom faster than smaller particles do.

55 Icebergs carry material that has been eroded from the land by a moving glacier. When this material is deposited in the ocean by a melting iceberg, it is classified as

- |              |              |
|--------------|--------------|
| 1 lithogenic | 3 authigenic |
| 2 biogenic   | 4 turbigenic |

## Group D — Glacial Processes

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

56 At the end of the last period of glaciation, the natural environment of New York State probably looked like the present environment in

- |                  |         |
|------------------|---------|
| 1 Alaska         | 3 Texas |
| 2 North Carolina | 4 Ohio  |

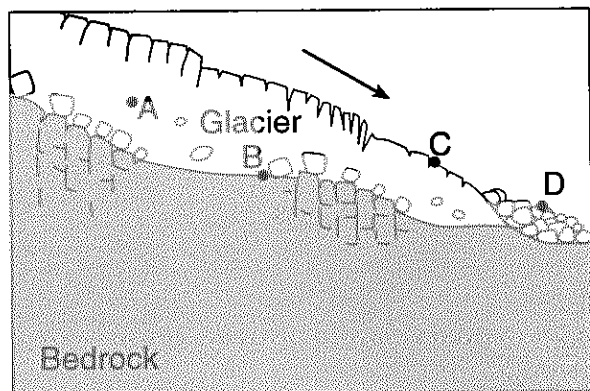
57 Which geological resource in New York State resulted from glaciation?

- 1 coal and oil deposits
- 2 sand and gravel deposits
- 3 iron and zinc ores
- 4 garnet and quartz crystals

58 Evidence that several periods of glaciation occurred in the geologic past is provided by

- 1 glacial erratics in New York State
- 2 glacial erosion in the high regions of the Adirondack Mountains
- 3 layers of glacial till deposited on top of each other
- 4 discovery of mastodont fossils in the surface bedrock of the Adirondack Mountains

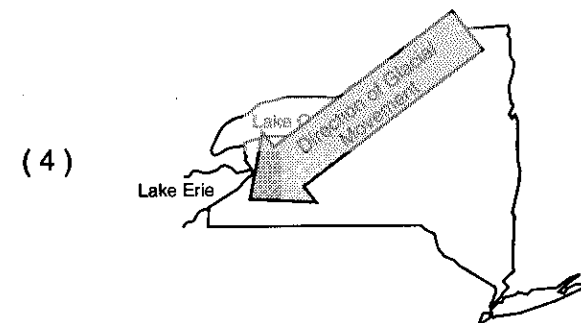
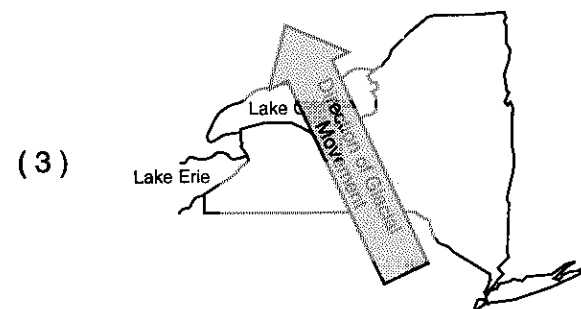
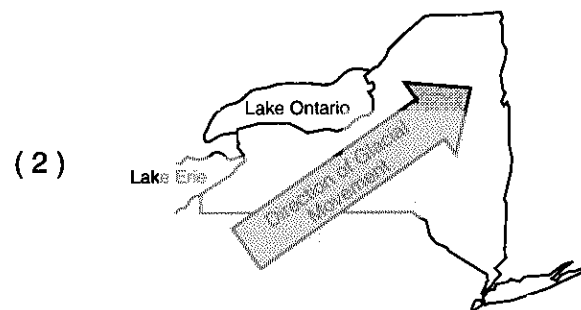
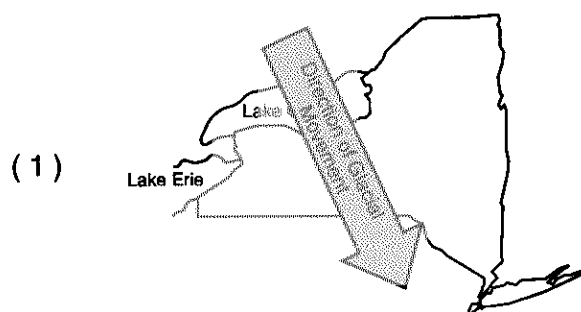
59 The cross section below represents the transport of sediments by an advancing glacier. The arrow shows the direction of movement.



At which location are striations and glacial grooves most likely being carved?

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

60 On which New York State map does the arrow indicate the most likely direction of advance of the last continental ice sheet?



## Group E — Atmospheric Energy

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

61 At 1 p.m. at a location in New York State, the surface air temperature was  $20^{\circ}\text{C}$  and the dew-point temperature was  $10^{\circ}\text{C}$ . At 3 p.m. at the same location, the altitude of the cloud base was 1.2 kilometers. Compared to the altitude of the cloud base at 1 p.m., the altitude of the cloud base at 3 p.m. was

- (1) 0.5 km lower
- (2) 2.0 km lower
- (3) 0.5 km higher
- (4) nearly the same

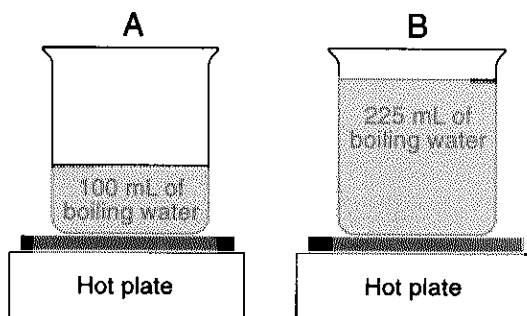
62 On a very hot summer afternoon, the air over Long Island is warmer than the air over the nearby ocean. As a result, the air over Long Island tends to

- 1 sink and cool, causing clouds to form
- 2 sink and warm, causing clouds to disappear
- 3 rise and cool, causing clouds to form
- 4 rise and warm, causing clouds to disappear

63 Why have weather predictions become more accurate and reliable in recent years?

- 1 Weather conditions now change more slowly than they did in the past.
- 2 More people today watch televised weather reports.
- 3 Scientists have developed better methods of controlling the weather.
- 4 Scientists have developed better technology to observe weather conditions.

Base your answers to questions 64 and 65 on the diagrams below. Beaker A contains 100 milliliters of boiling water. Beaker B contains 225 milliliters of boiling water. The hot plates are adding equal amounts of heat to each beaker each minute.



64 What is the total number of calories that must be added to completely change the 100 milliliters of boiling water (mass = 100 grams) in beaker A into water vapor?

- (1) 54,000 cal
- (2) 8,000 cal
- (3) 640 cal
- (4) 5.4 cal

**Note that question 65 has only three choices.**

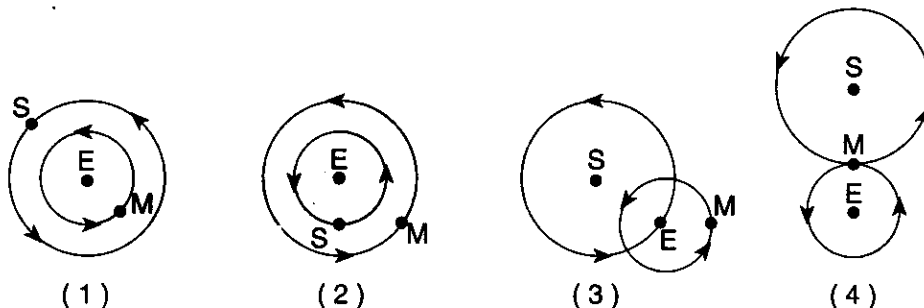
65 Thermometers are placed in both beakers and allowed to adjust as the water boils. The thermometers will show that, compared to the temperature of the water in beaker A, the temperature of the water in beaker B is

- 1 lower
- 2 higher
- 3 the same

## Group F — Astronomy

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

66 Which diagram best represents the heliocentric model of a portion of the solar system? [S = Sun, E = Earth, and M = Moon. The diagrams are not drawn to scale.]



67 The planets known as “gas giants” include Jupiter, Uranus, and

- |          |         |
|----------|---------|
| 1 Pluto  | 3 Mars  |
| 2 Saturn | 4 Earth |

68 A comparison of the age of Earth obtained from radioactive dating and the age of the universe based on galactic Doppler shifts suggests that

- 1 Earth is about the same age as the universe
- 2 the universe is much younger than Earth
- 3 the solar system and Earth formed billions of years after the universe began
- 4 the two dating methods contradict one another

69 The Moon has more surface craters than Earth does because the Moon has

- 1 no significant atmosphere
- 2 a surface more sensitive to impacts
- 3 a smaller diameter than Earth
- 4 a stronger gravitational force

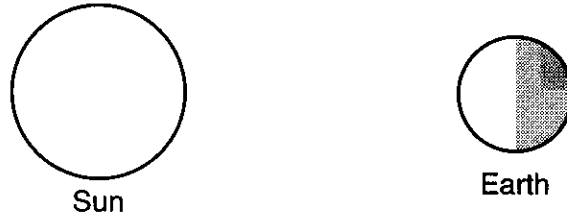
70 With respect to one another, galaxies have been found to be

- 1 moving closer together
- 2 moving farther apart
- 3 moving in random directions
- 4 stationary

### Part III

This part consists of questions 71 through 88. Be sure that you answer *all* questions in this part. Record your answers in the spaces provided on the separate answer paper. You may use pen or pencil. Some questions may require the use of the *Earth Science Reference Tables*. [25]

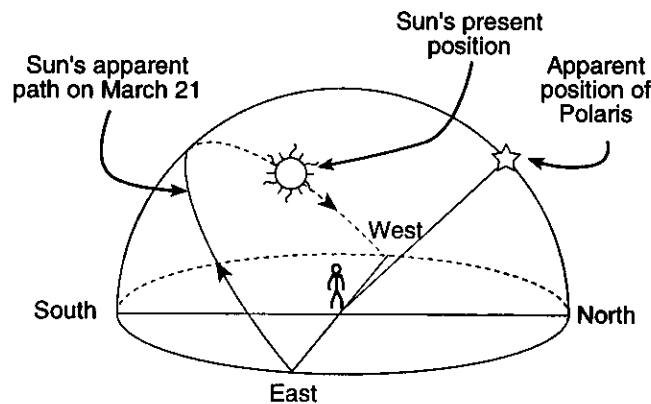
- 71 A total solar eclipse was visible to observers in the southeastern United States on February 26, 1998. The diagram below shows the Sun and Earth as they were viewed from space on that date. The same diagram appears on your answer paper.



( Not drawn to scale )

On the diagram provided *on your answer paper*, draw the Moon (○), showing its position at the time of the solar eclipse. [1]

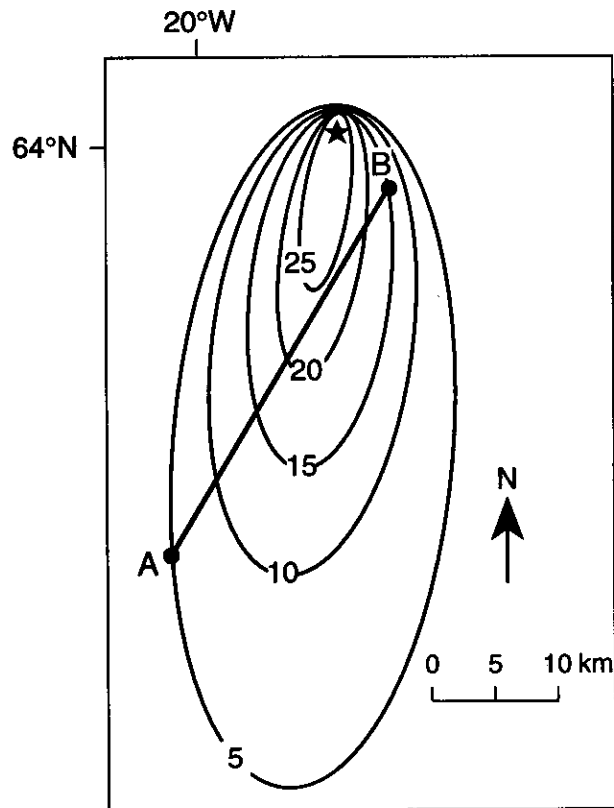
Base your answers to questions 72 through 74 on the diagram below, which shows the Sun's apparent path as viewed by an observer in New York State on March 21.



( Not drawn to scale )

- 72 State how the apparent position of Polaris is related to the latitude of the observer. [1]
- 73 At approximately what hour of the day would the Sun be at the position shown in the diagram? [1]
- 74 On the diagram provided *on your answer paper*, draw the Sun's apparent path as viewed by the observer on December 21. [1]

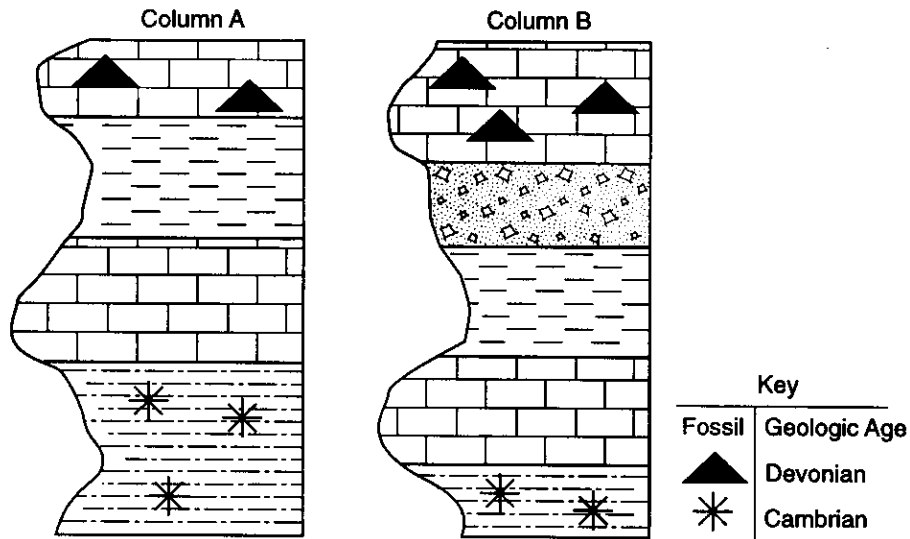
Base your answers to questions 75 through 77 on the map below. The star symbol represents a volcano located on the mid-Atlantic Ridge in Iceland. The isolines represent the thickness, in centimeters, of volcanic ash deposited from an eruption of this volcano. Points A and B represent locations in the area.



- 75 On the grid provided *on your answer paper*, construct a profile of the ash thickness between point A and point B, following the directions below.
- Plot the thickness of the volcanic ash along line AB by marking with a dot each point where an isoline is crossed by line AB. [2]
  - Connect the dots to complete the profile of the thickness of the volcanic ash. [1]
- 76 State one factor that could have produced this pattern of deposition of the ash. [1]
- 77 State why volcanic eruptions are likely to occur in Iceland. [1]
-



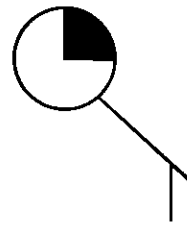
Base your answers to questions 78 through 81 on the diagrams below. Columns A and B represent two widely separated outcrops of rocks. The symbols show the rock types and the locations of fossils found in the rock layers. The rock layers have not been overturned.



- 78 State one method used to correlate rock layers found in the outcrop represented by column A with rock layers found in the outcrop represented by column B. [1]
- 79 An unconformity (buried erosional surface) exists between two layers in the outcrop represented by column A. Identify the location of the unconformity by drawing a thick wavy line (~~~~) at the correct position on column A *on your answer paper*. [1]
- 80 *In one or more sentences*, state the evidence that limestone is the most resistant layer in these outcrops. [2]
- 81 State the oldest possible age, in millions of years, for the fossils in the siltstone layer. [1]
- 

Base your answers to questions 82 and 83 on the meteorological conditions shown in the table and partial station model below, as reported by the weather bureau in the city of Oswego, New York. The diagram of the station model also appears on your answer paper.

Air temperature: 65°F Wind direction: from the southeast Windspeed: 20 knots Barometric pressure: 1017.5 mb Dewpoint: 53°F
--



- 82 Using the meteorological conditions given, complete the station model provided *on your answer paper* by recording the air temperature, dewpoint, and barometric pressure in the proper format. [2]
- 83 State the sky conditions or amount of cloud cover over Oswego as shown by the station model. [1]
-

Base your answers to questions 84 through 87 on the information and data table below.

The snowline is the lowest elevation at which snow remains on the ground all year. The data table below shows the elevation of the snowline at different latitudes in the Northern Hemisphere.

Latitude (°N)	Elevation of Snowline (m)
0	5400
10	4900
25	3800
35	3100
50	1600
65	500
80	100
90	0

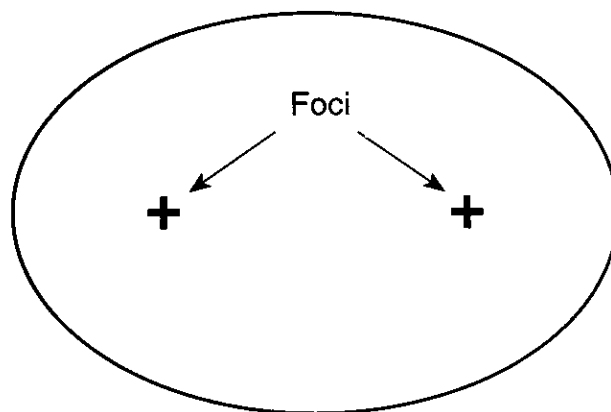
84 On the grid provided on your answer paper, plot the latitude and elevation of the snowline for the locations in the data table. Use a dot for each point and connect the dots with a line. [2]

85 Mt. Mitchell, in North Carolina, is located at 36° N and has a peak elevation of 2037 meters. Plot the latitude and elevation of Mt. Mitchell on your graph. Use a plus sign (+) to mark this point. [1]

86 Using your graph, determine, to the nearest whole degree, the lowest latitude at which a peak with the same elevation as Mt. Mitchell would have permanent snow. [1]

87 State the relationship between latitude and elevation of the snowline. [1]

88 The diagram below represents the elliptical orbit of a spacecraft around the Sun.



(Drawn to scale)

In the space provided on your answer paper, calculate the eccentricity of the spacecraft's orbit following the directions below:

a Write the equation for eccentricity. [1]

b Substitute measurements of the diagram into the equation. [1]

c Calculate the eccentricity and record your answer in decimal form. [1]

The University of the State of New York

REGENTS HIGH SCHOOL EXAMINATION

EARTH SCIENCE  
PROGRAM MODIFICATION EDITION

Thursday, June 18, 1998 — 1:15 to 4:15 p.m., only

ANSWER PAPER

Part I Credits	.....	.....
Part II Credits	.....	.....
Part III Credits	.....	.....
Performance Test Credits	....	.....
Local Project Credits	.....	<u>.....</u>
Total (Official Regents) Examination Mark	.....	.....
Reviewer's Initials:	_____	

Student ..... Sex:  Male  Female

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

Grade (circle one)      8      9      10      11      12

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

Part I (40 credits)

- |    |   |   |   |   |    |   |   |   |   |    |   |   |   |   |
|----|---|---|---|---|----|---|---|---|---|----|---|---|---|---|
| 1  | 1 | 2 | 3 | 4 | 15 | 1 | 2 | 3 | 4 | 29 | 1 | 2 | 3 | 4 |
| 2  | 1 | 2 | 3 | 4 | 16 | 1 | 2 | 3 | 4 | 30 | 1 | 2 | 3 | 4 |
| 3  | 1 | 2 | 3 | 4 | 17 | 1 | 2 | 3 | 4 | 31 | 1 | 2 | 3 | 4 |
| 4  | 1 | 2 | 3 | 4 | 18 | 1 | 2 | 3 | 4 | 32 | 1 | 2 | 3 | 4 |
| 5  | 1 | 2 | 3 | 4 | 19 | 1 | 2 | 3 | 4 | 33 | 1 | 2 | 3 | 4 |
| 6  | 1 | 2 | 3 | 4 | 20 | 1 | 2 | 3 | 4 | 34 | 1 | 2 | 3 | 4 |
| 7  | 1 | 2 | 3 | 4 | 21 | 1 | 2 | 3 | 4 | 35 | 1 | 2 | 3 | 4 |
| 8  | 1 | 2 | 3 | 4 | 22 | 1 | 2 | 3 | 4 | 36 | 1 | 2 | 3 | 4 |
| 9  | 1 | 2 | 3 | 4 | 23 | 1 | 2 | 3 |   | 37 | 1 | 2 | 3 | 4 |
| 10 | 1 | 2 | 3 | 4 | 24 | 1 | 2 | 3 | 4 | 38 | 1 | 2 | 3 | 4 |
| 11 | 1 | 2 | 3 | 4 | 25 | 1 | 2 | 3 | 4 | 39 | 1 | 2 | 3 | 4 |
| 12 | 1 | 2 | 3 | 4 | 26 | 1 | 2 | 3 | 4 | 40 | 1 | 2 | 3 | 4 |
| 13 | 1 | 2 | 3 | 4 | 27 | 1 | 2 | 3 | 4 |    |   |   |   |   |
| 14 | 1 | 2 | 3 | 4 | 28 | 1 | 2 | 3 | 4 |    |   |   |   |   |

**Part II (10 credits)**

**Answer the questions in two of the six groups in this part. Be sure to mark the answers to the groups you choose in accordance with the instructions on the front cover of the test booklet. Leave blank the spaces for the four groups of questions you do not choose to answer.**

<b>Group A</b>					
<b>Rocks and Minerals</b>					
<b>41</b>	1	2	3	4	
<b>42</b>	1	2	3	4	
<b>43</b>	1	2	3	4	
<b>44</b>	1	2	3	4	
<b>45</b>	1	2	3	4	

<b>Group B</b>					
<b>Plate Tectonics</b>					
<b>46</b>	1	2	3	4	
<b>47</b>	1	2	3	4	
<b>48</b>	1	2	3	4	
<b>49</b>	1	2	3	4	
<b>50</b>	1	2	3	4	

<b>Group C</b>					
<b>Oceanography</b>					
<b>51</b>	1	2	3	4	
<b>52</b>	1	2	3	4	
<b>53</b>	1	2	3	4	
<b>54</b>	1	2	3	4	
<b>55</b>	1	2	3	4	

<b>Group D</b>					
<b>Glacial Processes</b>					
<b>56</b>	1	2	3	4	
<b>57</b>	1	2	3	4	
<b>58</b>	1	2	3	4	
<b>59</b>	1	2	3	4	
<b>60</b>	1	2	3	4	

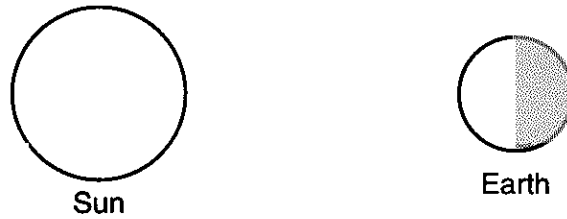
<b>Group E</b>					
<b>Atmospheric Energy</b>					
<b>61</b>	1	2	3	4	
<b>62</b>	1	2	3	4	
<b>63</b>	1	2	3	4	
<b>64</b>	1	2	3	4	
<b>65</b>	1	2	3		

<b>Group F</b>					
<b>Astronomy</b>					
<b>66</b>	1	2	3	4	
<b>67</b>	1	2	3	4	
<b>68</b>	1	2	3	4	
<b>69</b>	1	2	3	4	
<b>70</b>	1	2	3	4	

Part III (25 credits)

Answer *all* questions in this part.

71



( Not drawn to scale )

72

---



---



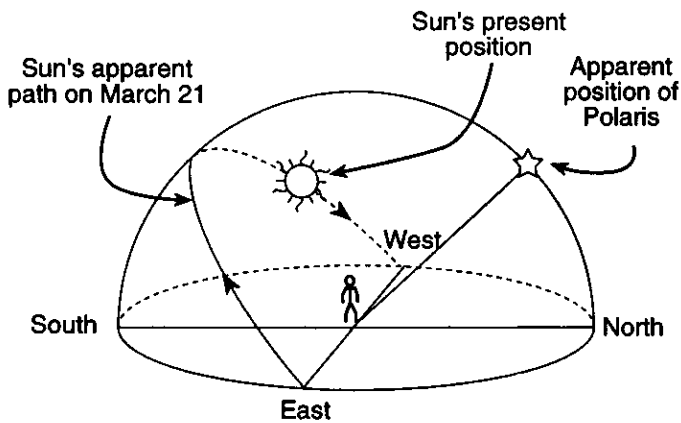
---



---

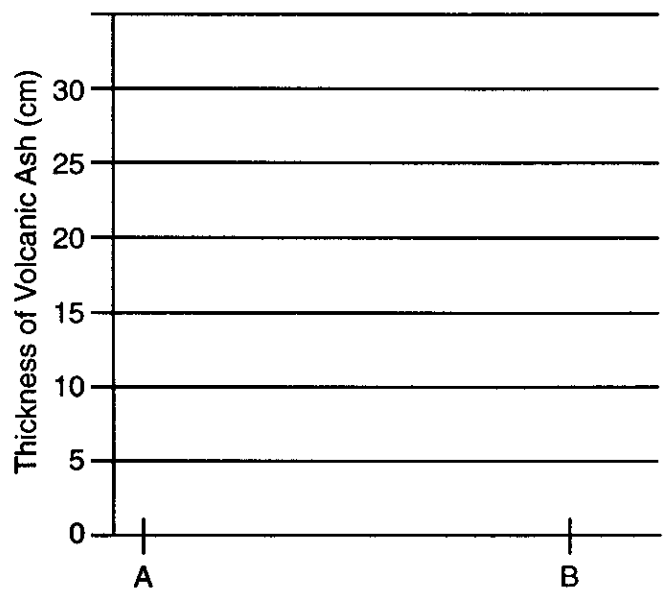
73 \_\_\_\_\_ p.m.

74



( Not drawn to scale )

75 a-b



76

---



---



---

77

---

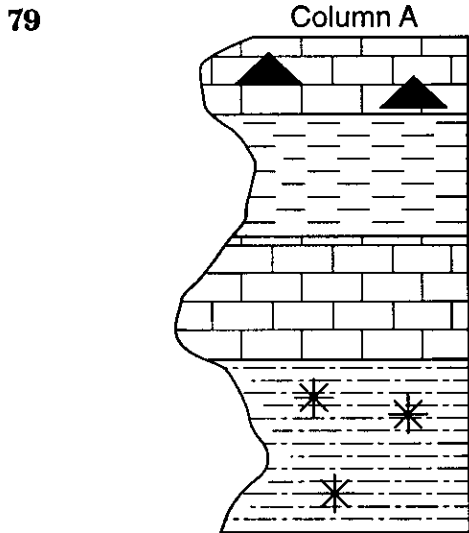


---



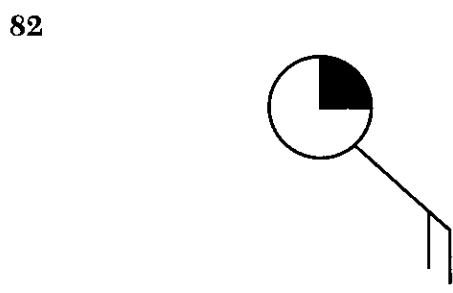
---

78 \_\_\_\_\_  
\_\_\_\_\_  
\_\_\_\_\_

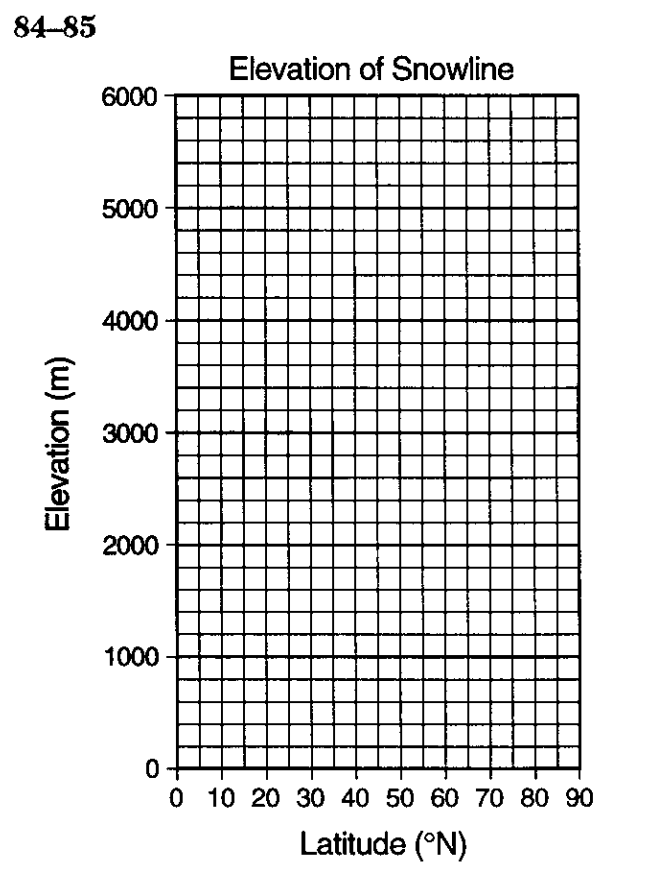


80 \_\_\_\_\_  
\_\_\_\_\_  
\_\_\_\_\_  
\_\_\_\_\_

81 \_\_\_\_\_ million years



83 \_\_\_\_\_



86 \_\_\_\_\_ °N  
87 \_\_\_\_\_  
\_\_\_\_\_  
\_\_\_\_\_  
\_\_\_\_\_

88 a \_\_\_\_\_  
\_\_\_\_\_  
b \_\_\_\_\_  
\_\_\_\_\_  
c \_\_\_\_\_  
\_\_\_\_\_

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