

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

EARTH SCIENCE

Thursday, June 18, 1998 — 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 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.

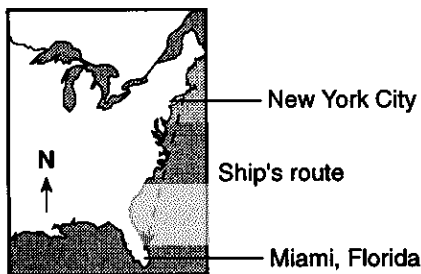
DO NOT OPEN THIS EXAMINATION BOOKLET UNTIL THE SIGNAL IS GIVEN.

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*.

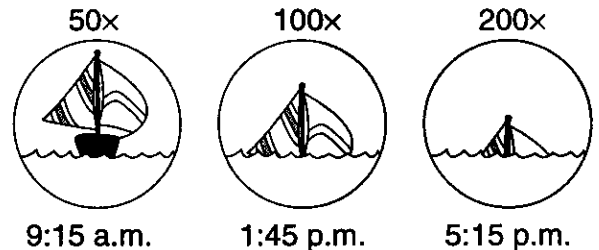
- 1 A student examined a patch of mud and recorded several statements about footprints in the mud. Which statement is most likely an inference?
 - 1 There are five footprints in the mud.
 - 2 The depth of the deepest footprint is 3 centimeters.
 - 3 The footprints were made by a dog.
 - 4 The footprints are oriented in an east-west direction.
- 2 Which statement best explains why water in a glass becomes colder when ice cubes are added?
 - 1 The water changes into ice.
 - 2 Heat flows from the water to the ice cubes.
 - 3 Water is less dense than ice.
 - 4 Ice has a higher specific heat than water.
- 3 The diagram below represents the route of a ship traveling from New York City to Miami, Florida. Each night, a passenger on the ship observes Polaris.



Which statement best describes the observed changes in the altitude of Polaris made by the passenger during the voyage?

- 1 Each night the altitude decreases in the northern sky.
- 2 Each night the altitude decreases in the southern sky.
- 3 Each night the altitude increases in the northern sky.
- 4 Each night the altitude increases in the southern sky.

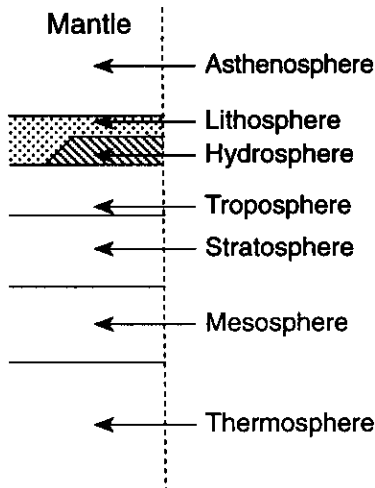
- 4 The diagrams below represent photographs of a large sailboat taken through a telescope over time as the boat sailed away from shore out to sea. Each diagram shows the magnification of the lenses and the time of day.



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.
- 5 Which observation is a direct result of the $23\frac{1}{2}^\circ$ tilt of Earth's axis as Earth orbits the Sun?
 - 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 A Foucault pendulum shows predictable shifts in its direction of swing.
 - 4 Winter occurs in the Southern Hemisphere at the same time that summer occurs in the Northern Hemisphere.

6 The diagram below shows spheres associated with Earth.

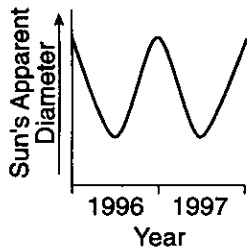


(Not drawn to scale)

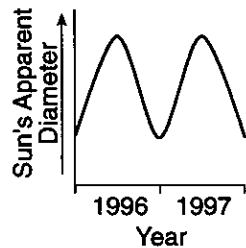
Which spheres are zones of Earth's atmosphere?

- 1 lithosphere, hydrosphere, and troposphere
- 2 stratosphere, mesosphere, and thermosphere
- 3 asthenosphere, lithosphere, and hydrosphere
- 4 hydrosphere, troposphere, and stratosphere

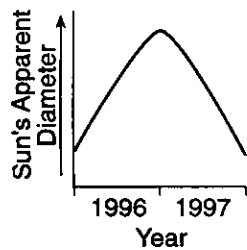
7 An observer on Earth measured the apparent diameter of the Sun over a period of 2 years. Which graph best represents the Sun's apparent diameter during the 2 years?



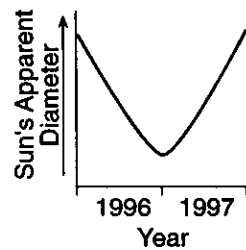
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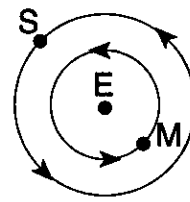


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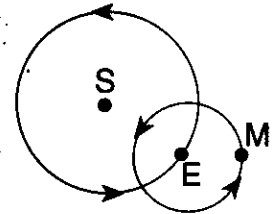


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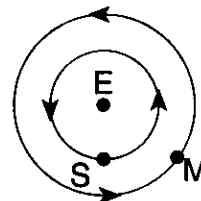
8 Which diagram best represents a portion of the heliocentric model of the solar system? [S = Sun, E = Earth, and M = Moon]



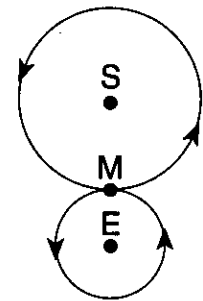
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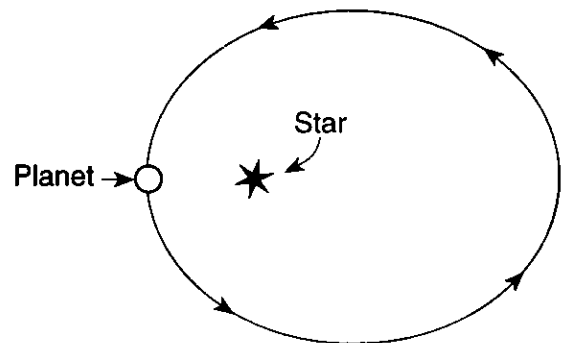


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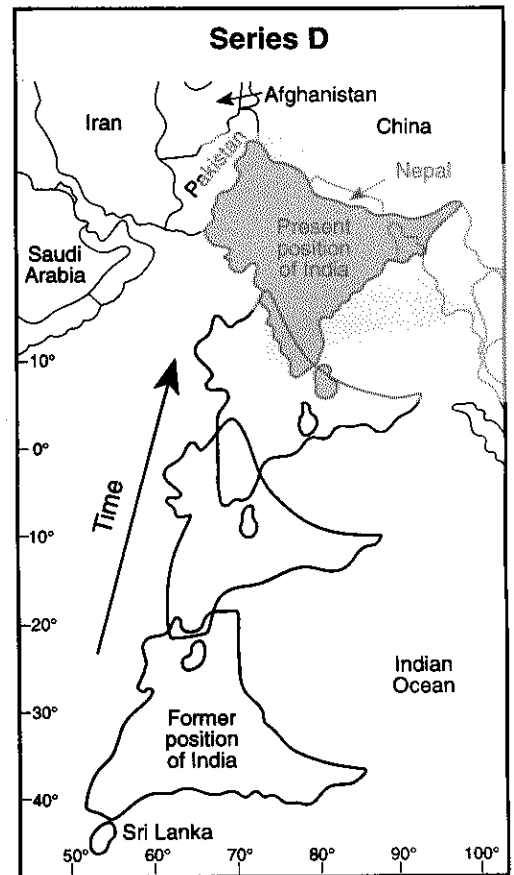
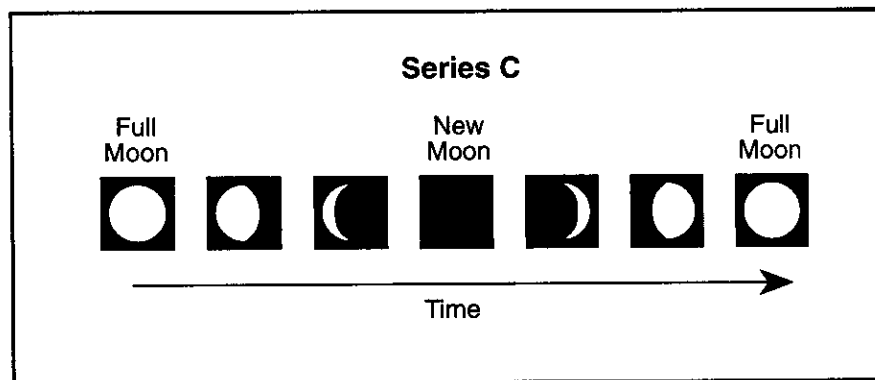
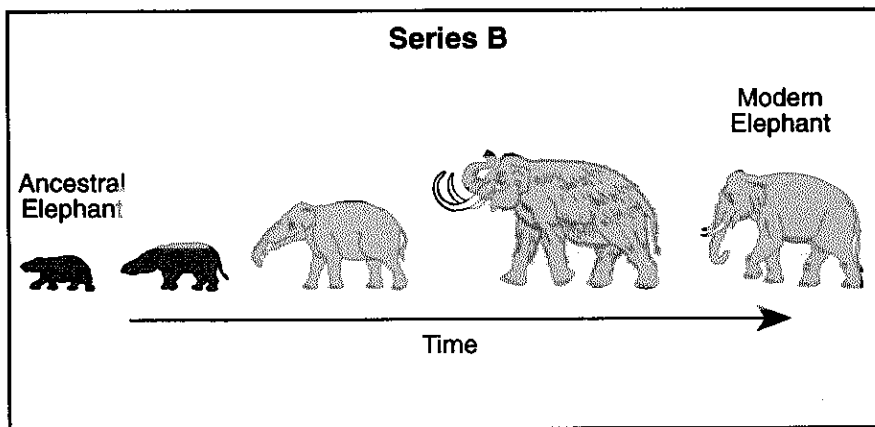
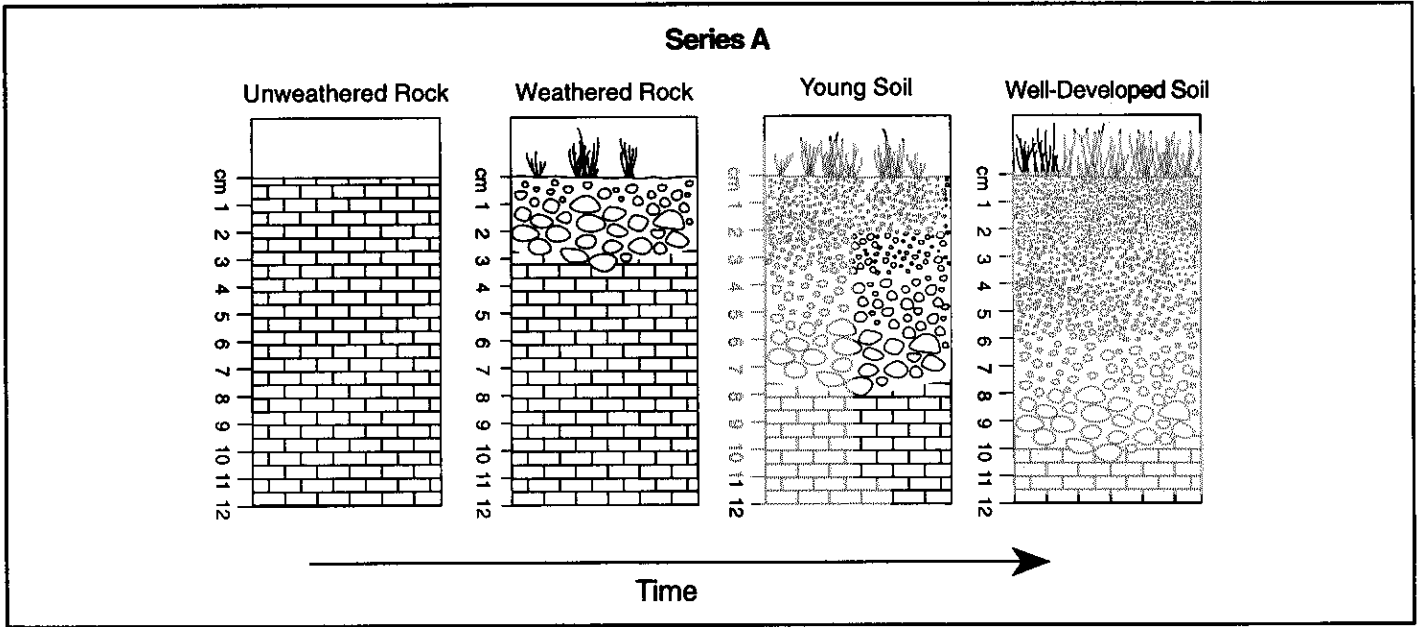
9 The diagram below represents a planet revolving in an elliptical orbit around a star.



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

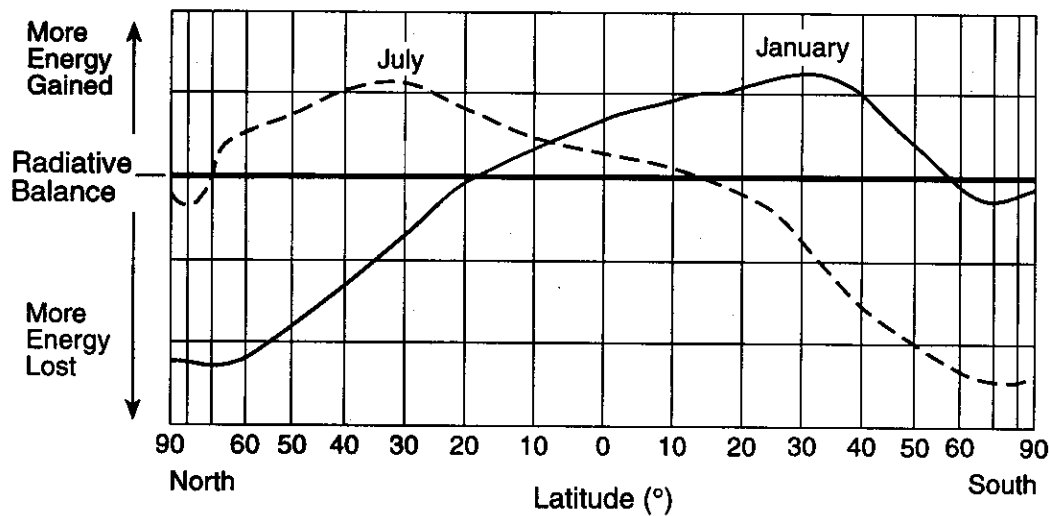
10 The diagrams below represent four series of events over the passage of time.



Which series of events took the *least* amount of time to complete?

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

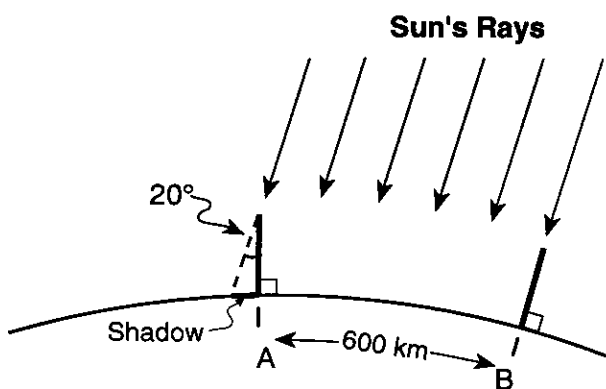
- 11 The graph below shows the relative amount of radiation energy gained and lost by Earth's surface at all latitudes in July and January.



Which statement best explains the differences between the July and January values shown on the graph?

- 1 The ozone layer changes position.
- 2 The temperature of Earth remains constant.
- 3 The position of maximum insolation on Earth's surface changes.
- 4 The location of heat flow from Earth's interior changes.

- 12 Locations A and B are 600 kilometers apart on the equator of a planet's spherical moon. When the Sun is directly over point B, a shadow is cast by a pole at point A as shown below.



According to Eratosthenes' method, the circumference of the moon would be calculated as

- | | |
|--------------|---------------|
| (1) 2,400 km | (3) 5,400 km |
| (2) 3,300 km | (4) 10,800 km |

- 13 Friction occurring at an interface always produces a

- 1 transformation of energy
- 2 form of pollution
- 3 chemical change
- 4 phase change

- 14 Pieces of lead, copper, iron, and granite, each having a mass of 1 kilogram and a temperature of 100°C, were removed from a container of boiling water and allowed to cool under identical conditions. Which piece most likely cooled to room temperature first?

- | | |
|----------|-----------|
| 1 copper | 3 iron |
| 2 lead | 4 granite |

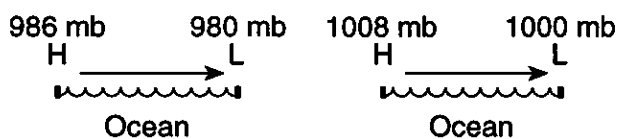
- 15 Earth's surface air temperatures change less during cloudy nights than during clear nights because clouds reflect and water vapor absorbs

- | | |
|---------------------|----------------------|
| 1 visible light | 3 infrared radiation |
| 2 ultraviolet light | 4 gamma radiation |

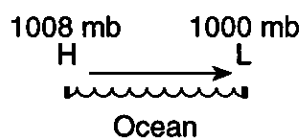
- 16 Locations in New York State are warmest in summer because sunlight in summer is
- 1 least intense and of shortest duration
 - 2 least intense and of longest duration
 - 3 most intense and of shortest duration
 - 4 most intense and of longest duration

- 17 A parcel of air has a dry-bulb temperature of 16°C and a wet-bulb temperature of 10°C . What are the dewpoint and relative humidity of the air?
- (1) -5°C dewpoint and 33% relative humidity
 - (2) -5°C dewpoint and 45% relative humidity
 - (3) 4°C dewpoint and 33% relative humidity
 - (4) 4°C dewpoint and 45% relative humidity

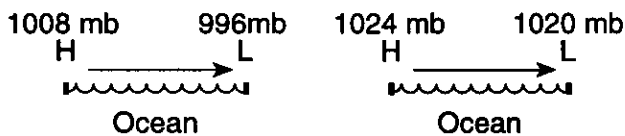
- 18 Winds are blowing from high-pressure to low-pressure systems over identical ocean surfaces. Which diagram represents the area of greatest windspeed? [Arrows indicate wind direction.]



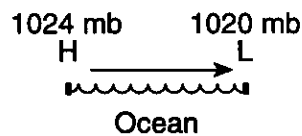
(1)



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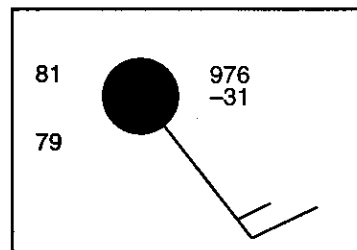


(4)

- 19 Under which set of atmospheric conditions does water usually evaporate at the fastest rate?
- 1 warm temperatures, calm winds, and high humidity
 - 2 warm temperatures, high winds, and low humidity
 - 3 cold temperatures, calm winds, and low humidity
 - 4 cold temperatures, high winds, and high humidity

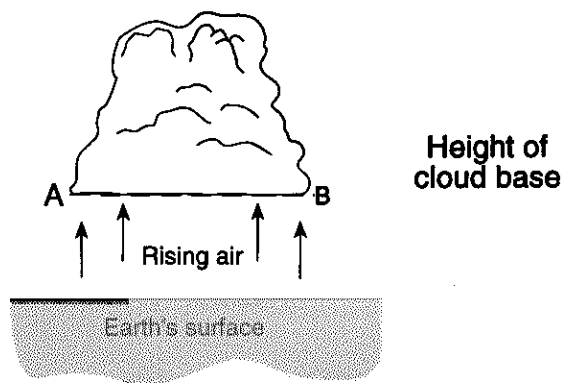
- 20 A storm system centered over Elmira, New York, will most often track toward
- | | |
|-------------|-----------------|
| 1 Albany | 3 Rochester |
| 2 Jamestown | 4 New York City |

- 21 A weather station model for a location in New York State is shown below.

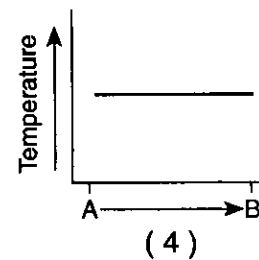
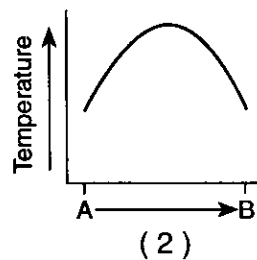
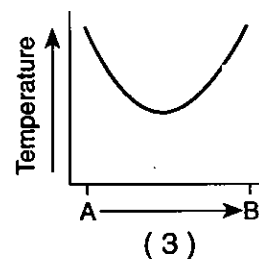
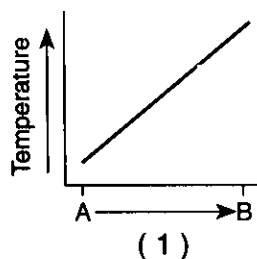


- The air mass over this location is best described as
- 1 cold with low humidity and high air pressure
 - 2 cold with high humidity and low air pressure
 - 3 warm with high humidity and low air pressure
 - 4 warm with low humidity and high air pressure

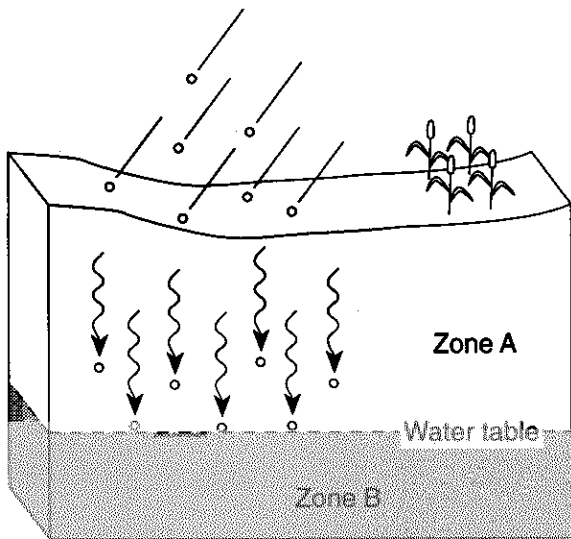
- 22 The diagram below shows a cross section of a cumulus cloud. Line AB indicates the base of the cloud.



- Which graph best represents the temperature measured along line AB?



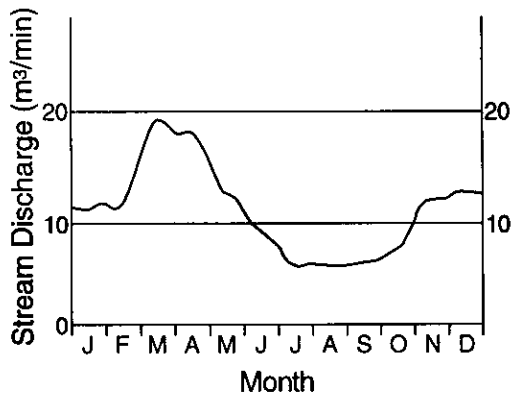
23 The diagram below is a cross-sectional view of rain falling on a farm field and then moving to the water table.



Which word best describes the movement of the rainwater through zone A?

- 1 runoff
- 2 saturation
- 3 infiltration
- 4 precipitation

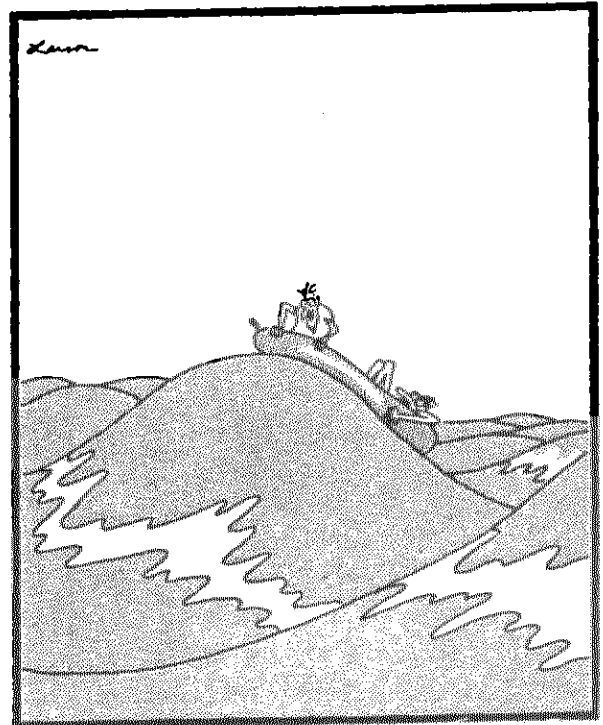
24 The graph below shows the discharge rate of a stream during a 1-year period.



During which time span did a water deficit most likely exist in the water budget for the surrounding area?

- 1 January and February
- 2 May and June
- 3 August and September
- 4 November and December

25 The cartoon below presents a humorous look at wave action.



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

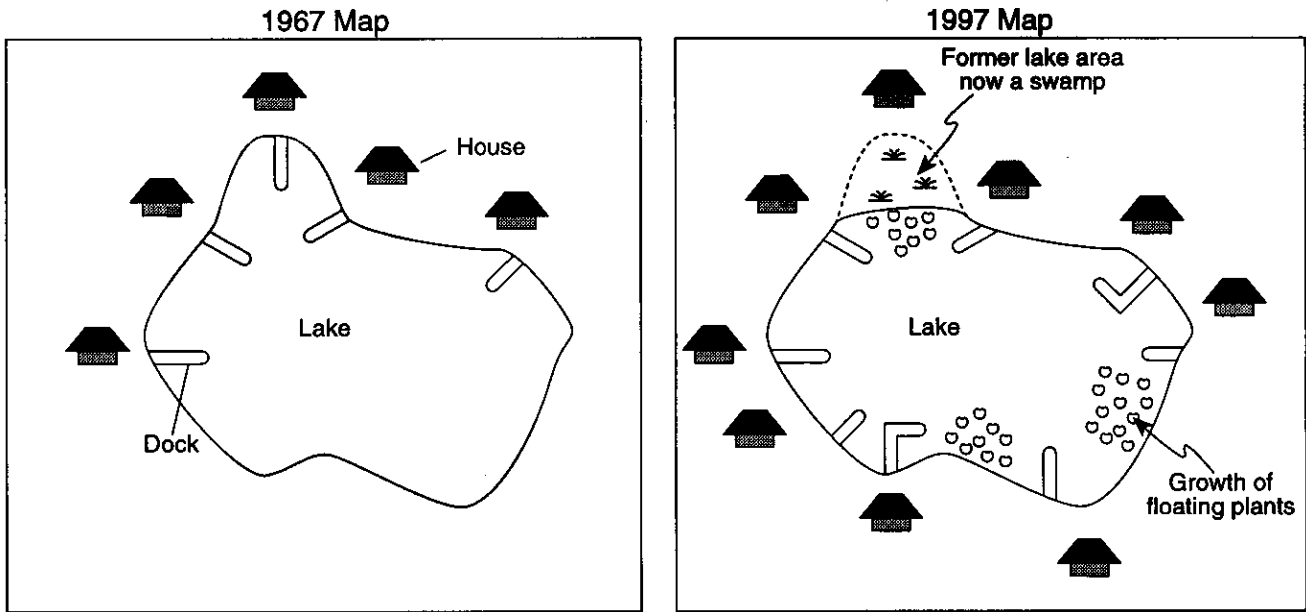
The ocean waves that are providing enjoyment for Roy's companion are the result of the

- 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

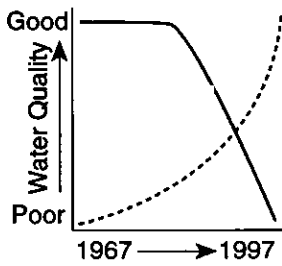
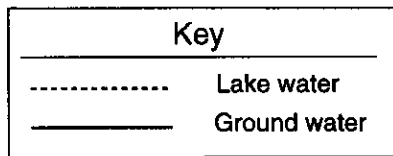
26 Which conditions produce the most surface water runoff?

- 1 steep slope, heavy rain, and frozen ground
- 2 steep slope, gentle rain, and unfrozen ground
- 3 gentle slope, heavy rain, and frozen ground
- 4 gentle slope, gentle rain, and unfrozen ground

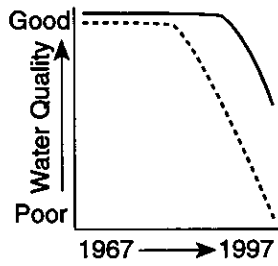
27 The maps below show changes occurring around a small New York State lake over a 30-year period.



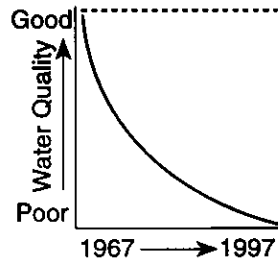
Which graph best shows the probable changes in the quality of ground water and lake water in this region as the changes indicated in the maps took place from 1967 to 1997?



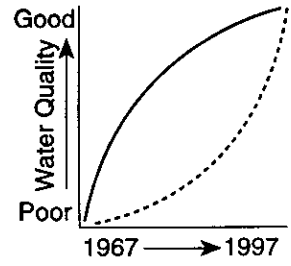
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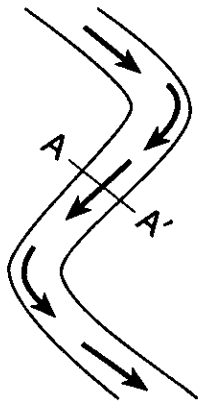


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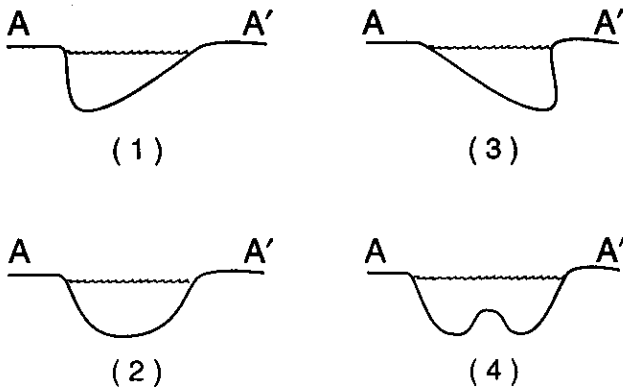


(4)

28 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'?



29 What occurs when a rock is crushed into a pile of fragments?

- 1 The total surface area decreases and chemical composition changes.
- 2 The total surface area decreases and chemical composition remains the same.
- 3 The total surface area increases and chemical composition changes.
- 4 The total surface area increases and chemical composition remains the same.

30 In which group do the rocks usually have the mineral quartz as part of their composition?

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

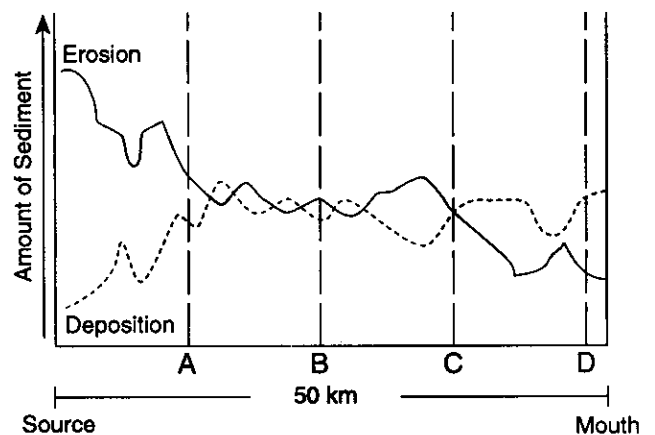
31 The diagram below shows a hand-sized rock sample with parallel sets of grooves. This rock sample was found in a gravel bank in central New York State.



The grooves were most likely caused by

- | | |
|------------------|-------------------|
| 1 stream erosion | 3 a landslide |
| 2 wind erosion | 4 glacial erosion |

32 The graph below shows the general pattern of erosion and deposition for a small tributary stream. Points A, B, C, and D represent locations along the stream.



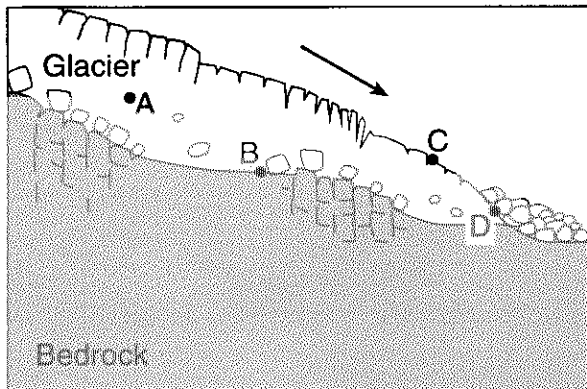
At which location is the erosional-depositional system of the stream in dynamic equilibrium?

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

33 Which kind of sedimentary rock may be formed both chemically and organically?

- | | |
|---------------|-------------------|
| 1 limestone | 3 rock salt |
| 2 rock gypsum | 4 bituminous coal |

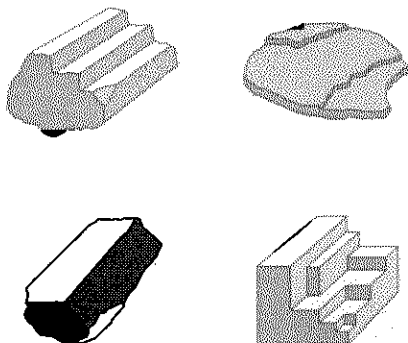
34 The cross section below represents the transport of sediments by a glacier.



At which location is deposition most likely the dominant process?

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

35 The diagrams below represent fractured samples of four minerals.



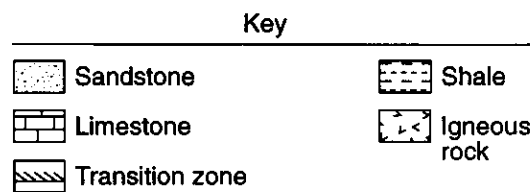
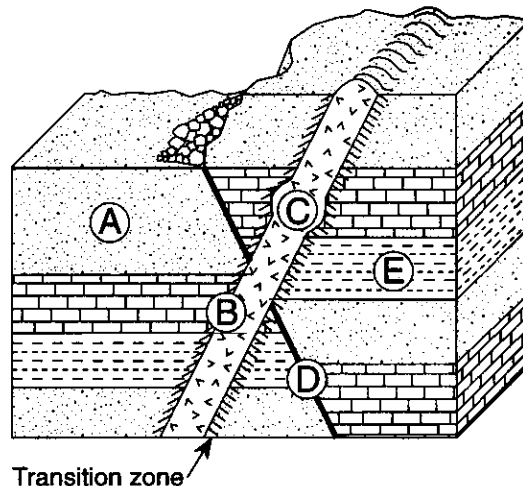
Which mineral property is best illustrated by the samples?

- 1 hardness 3 cleavage
 2 streak 4 density

36 Which New York State landscape region is composed mainly of metamorphosed surface bedrock?

- 1 Taconic Mountains
 2 Allegheny Plateau
 3 Atlantic Coastal Plain
 4 Erie-Ontario Lowlands

Base your answers to questions 37 through 39 on the geologic cross section shown below.



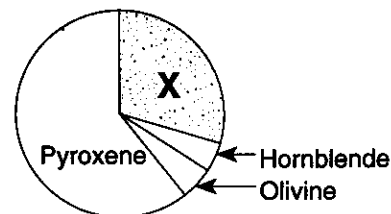
37 At which location is metamorphic rock most likely to be found?

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

38 The most recently formed rock unit is at location

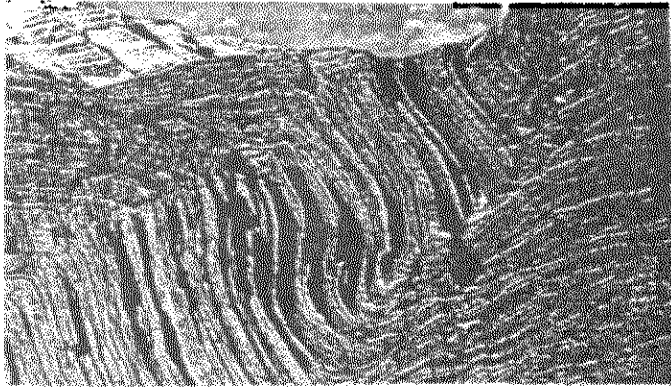
- (1) A (3) C
 (2) E (4) D

39 The graph below represents the percentage of each mineral found in a sample of rock C. Which mineral is most likely represented by the letter X in the graph?



- 1 potassium feldspar 3 quartz
 2 plagioclase feldspar 4 biotite

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



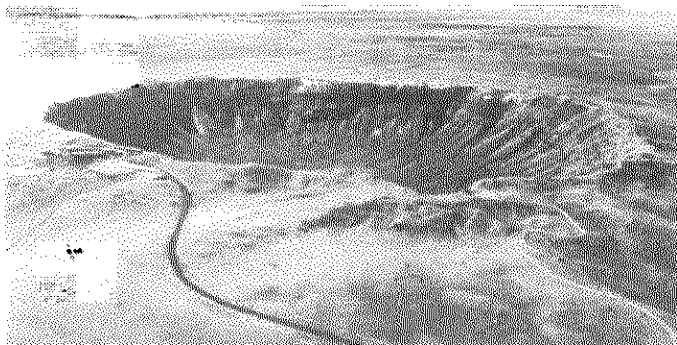
Scientists believe that sedimentary rocks like these represent evidence of crustal change because these rocks were

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

41 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) 1.7×10^3 km | (3) 3.5×10^3 km |
| (2) 9.9×10^3 km | (4) 4.7×10^3 km |

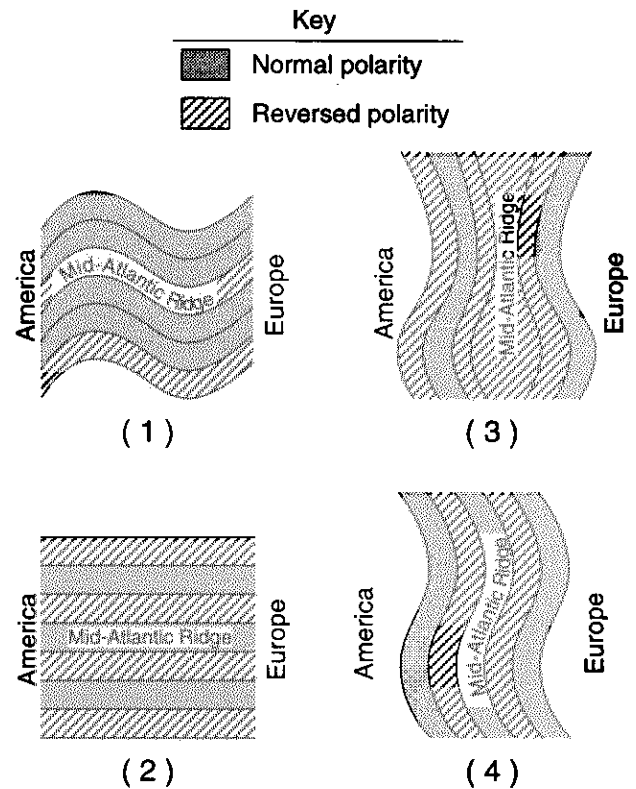
42 The photograph below shows a large crater located in the southwestern United States.



Some fragments taken from the site have a nickel-iron composition. This evidence indicates that the crater probably was formed by

- 1 the impact of a meteorite from space
- 2 the collapse of a cavern roof
- 3 an eruption of a volcano
- 4 an underwater explosion of steam

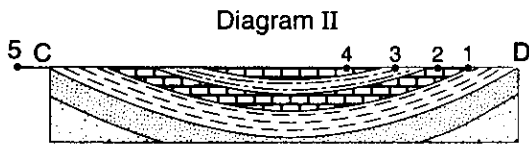
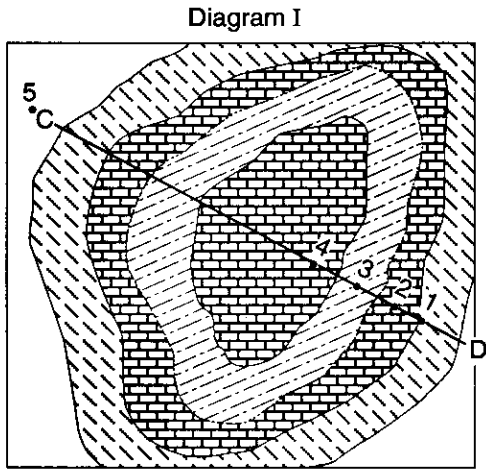
43 Which map best represents the general pattern of magnetism in the oceanic bedrock near the mid-Atlantic Ridge?



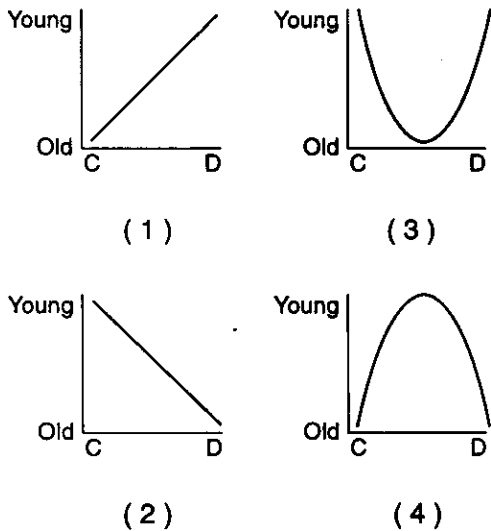
44 Which features are commonly formed at the plate boundaries where continental crust converges with oceanic crust?

- 1 large volcanic mountain ranges parallel to the coast at the center of the continents
- 2 a deep ocean trench and a continental volcanic mountain range near the coast
- 3 an underwater volcanic mountain range and rift valley on the ocean ridge near the coast
- 4 long chains of mid-ocean volcanic islands perpendicular to the coast

Base your answers to questions 45 and 46 on the diagrams below. Diagram I shows part of a geologic map. Diagram II shows a geologic cross section taken along line CD. The rock layers shown have not been overturned. Numbers 1 through 5 represent locations on the surface bedrock.



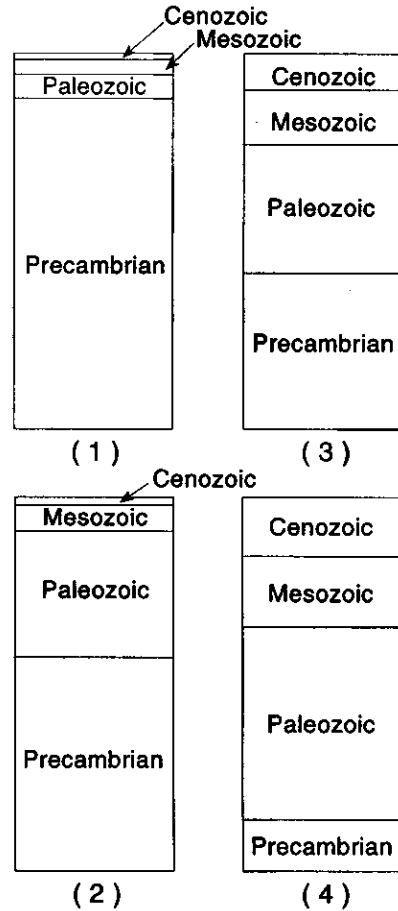
45 Which graph best represents the age of the surface bedrock along line CD?



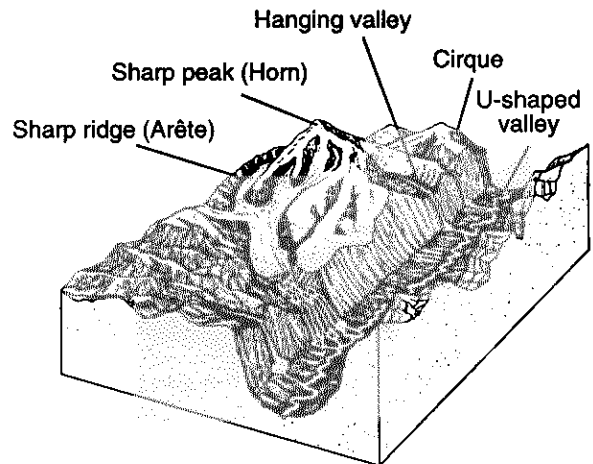
46 Which type of surface bedrock would most likely be found at location 5?

- 1 shale
- 2 sandstone
- 3 chemical limestone
- 4 siltstone

47 Which column best represents the relative duration of the major intervals of geologic history?



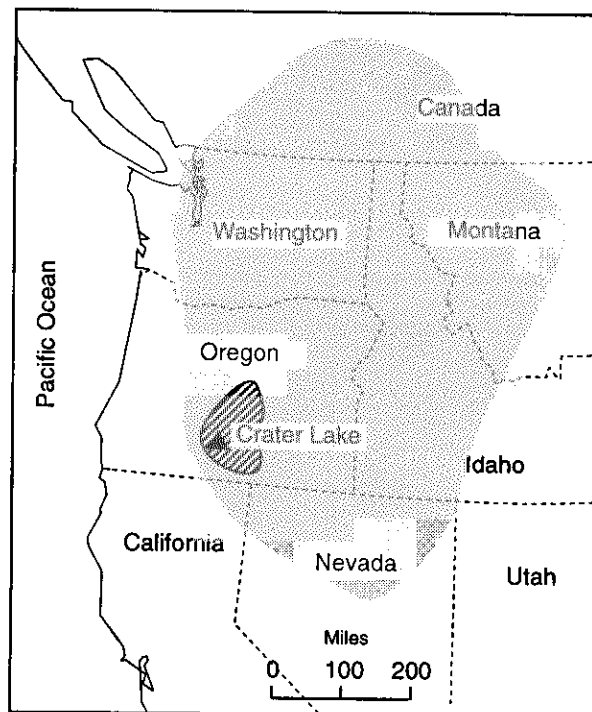
48 The diagram below represents a landscape area.





The labeled surface features of this landscape area resulted mainly from

- 1 wind erosion
- 2 wave erosion
- 3 stream erosion
- 4 glacial erosion

Base your answers to questions 49 through 51 on the map below, which shows an area of the northwestern United States affected by a major volcanic eruption at Crater Lake during the Holocene Epoch.



Key

-  Ashfall greater than 6 inches
-  Ashfall less than 6 inches

49 The pattern of distribution of the ash from the volcano was most likely caused by the direction of the

- 1 magnetic field
- 2 force of the volcanic eruption
- 3 flow of surface water
- 4 atmospheric air movements

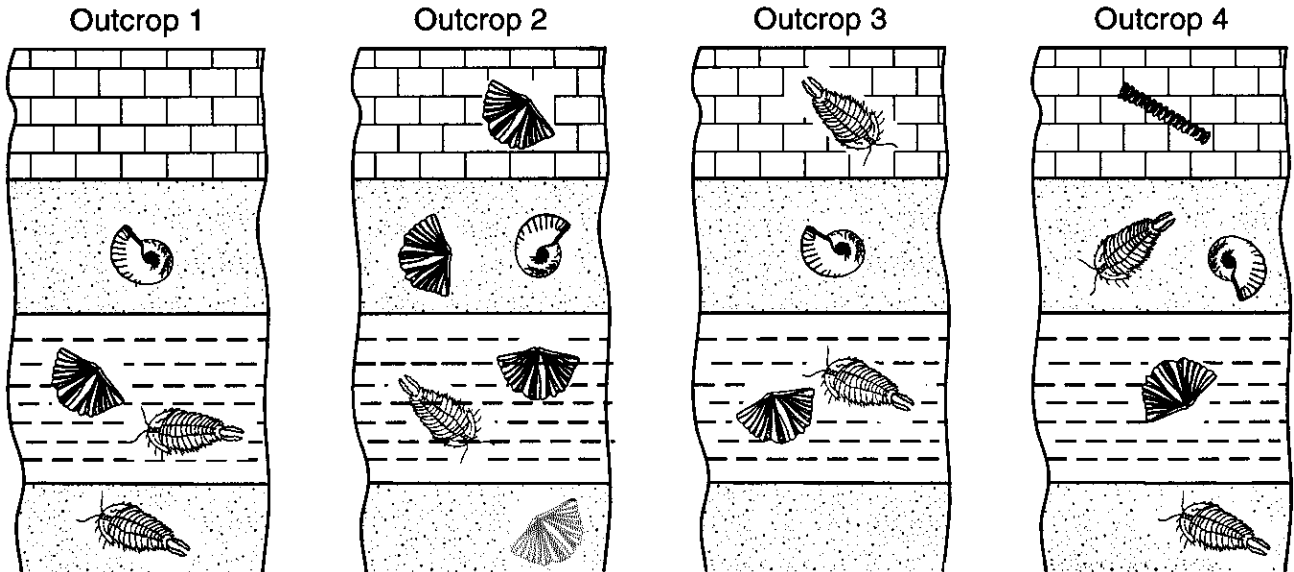
50 The age of this volcanic eruption was most accurately determined to be Holocene by measuring the radioactive

- 1 potassium in the fine-grained volcanic rock
- 2 carbon in trees buried by the ash
- 3 uranium in the volcanic ash
- 4 rubidium in the igneous glass

51 This volcanic eruption is most useful to scientists today as a relative time marker in the geologic record of this map region because the

- 1 lava cooled quickly at the surface
- 2 lava contained radioactive rubidium-87
- 3 volcanic ash spread quickly over a large area
- 4 volcanic ash fell to Earth more quickly near the volcano than far from the volcano

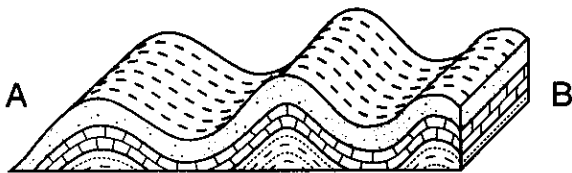
52 The diagrams below represent the rock layers and fossils found at four widely separated rock outcrops.



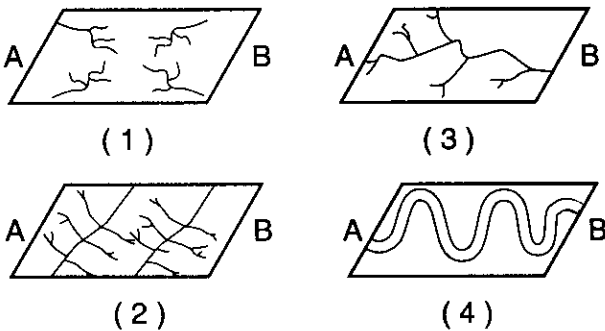
Which fossil appears to be the best index fossil?



53 The diagram below represents a landscape region and its underlying bedrock structure.



Which stream pattern is most likely present in this area?



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

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

55 Which geologic processes produced the present surface landscape features of most New York State landscapes?

- 1 crustal movement and erosion
- 2 subsidence and metamorphism
- 3 faulting and folding
- 4 volcanism and igneous activity

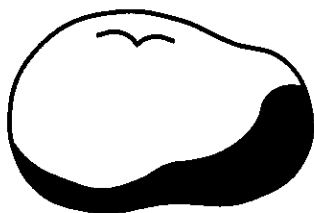
Part II

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 diagrams below, and your knowledge of Earth science. The diagrams represent particles of the same type of sedimentary rock material collected from a streambed. The diagrams are drawn actual size.



Particle A



Particle B



Particle C

(Actual size)

56 Particle C is classified as

- | | |
|------------|-------------|
| 1 sand | 3 a boulder |
| 2 a cobble | 4 a pebble |

57 A student finds the mass of particle B to be 2.8 grams. The actual mass of the particle is 2.6 grams. What is the student's percent deviation (percent error)?

- | | |
|----------|----------|
| (1) 7.1% | (3) 7.7% |
| (2) 2.0% | (4) 8.0% |

58 Equal masses of each of the three particles are placed in a container of weak acid and shaken. Which particle size will weather most rapidly?

- (1) A
- (2) B
- (3) C
- (4) All samples will weather at the same rate

59 Which inference about the density of particle A and particle B is most accurate?

- 1 Particle A and particle B have the same density because they are made of the same material.
- 2 Particle A has a greater density than particle B because particle A has a greater volume.
- 3 Particle A has a greater density than particle B because particle A has a greater mass.
- 4 Particle B has a greater density than particle A because particle B has been worn to a smaller size.

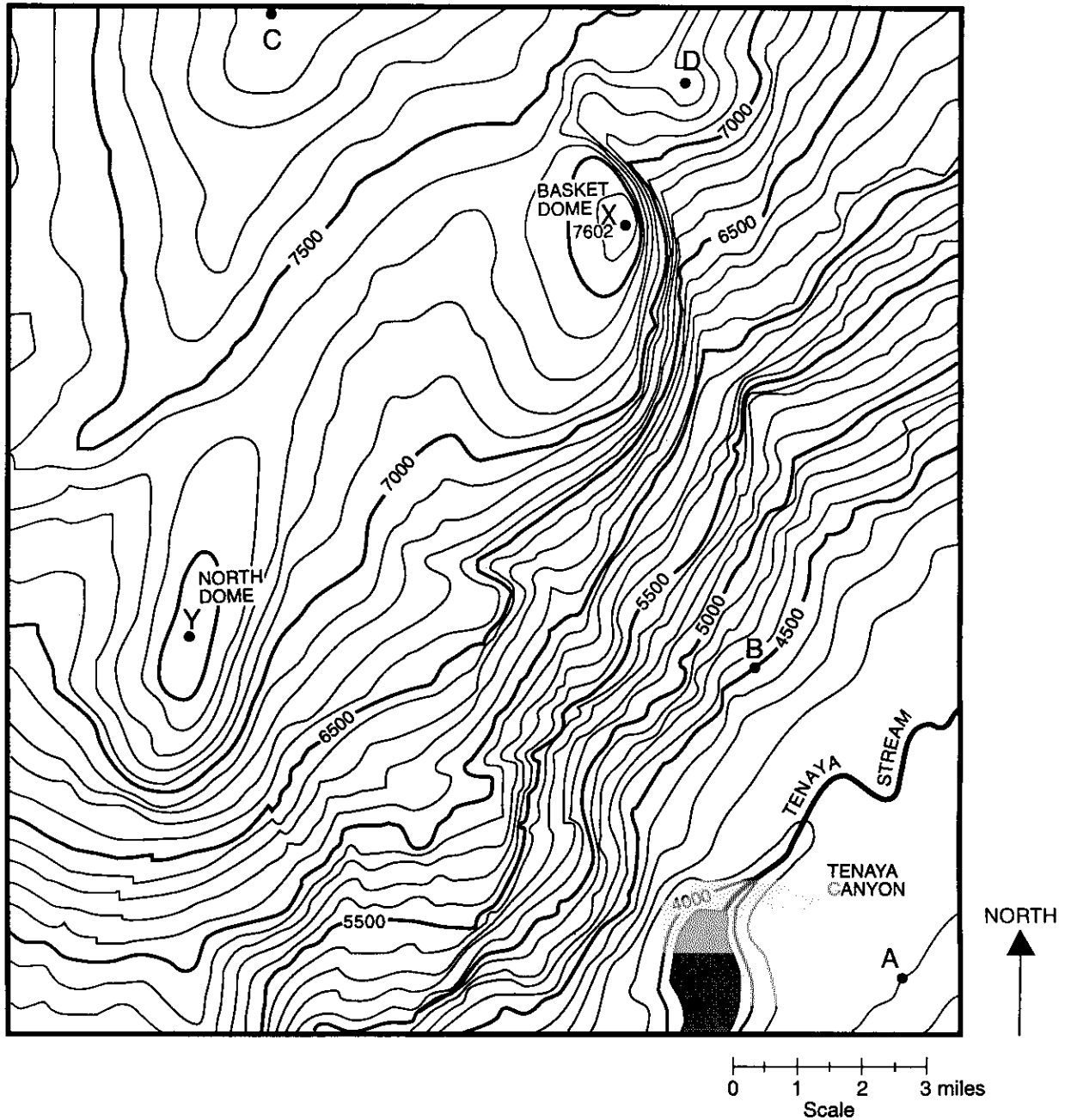
60 Particle A has a density of 2.7 grams per cubic centimeter and a volume of 15.0 cubic centimeters. What is the mass of this particle?

- | | |
|------------|-------------|
| (1) 5.5 g | (3) 40.5 g |
| (2) 15.0 g | (4) 109.3 g |

Group 2

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

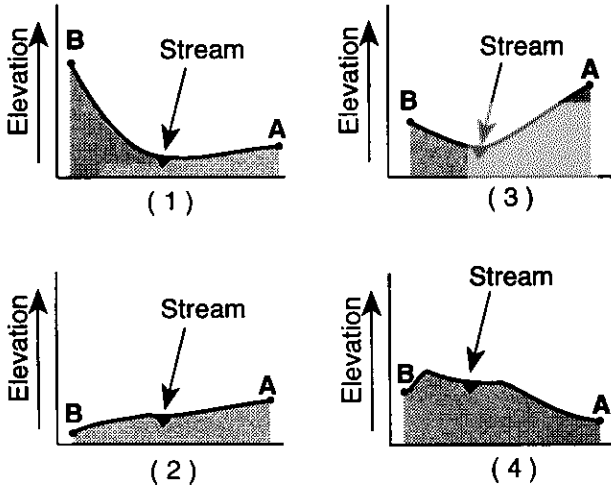
Base your answers to questions 61 through 65 on the *Earth Science Reference Tables*, the contour map below, and your knowledge of Earth science. Points A, B, C, D, X, and Y are locations on the map. Elevations are expressed in feet. The maximum elevation of Basket Dome is indicated at point X.



61 In which general direction does Tenaya Stream flow?

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

62 Which graph best represents the profile along a line between point B and point A?



63 The highest elevation on the map is at point

- | | |
|-------|-------|
| (1) X | (3) C |
| (2) Y | (4) D |

64 The highest elevation of Basket Dome 40 years ago was measured at 7,600 feet. What is the rate of change in elevation for this area?

- | | |
|---------------|--------------|
| (1) 0.6 in/yr | (3) 24 in/yr |
| (2) 1.7 in/yr | (4) 40 in/yr |

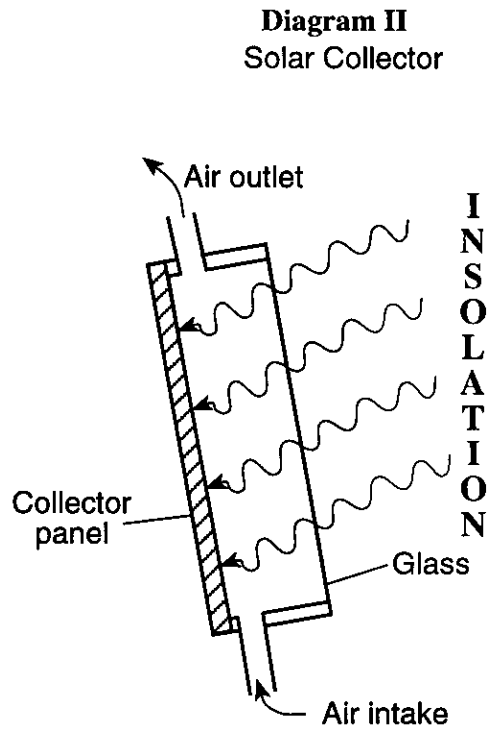
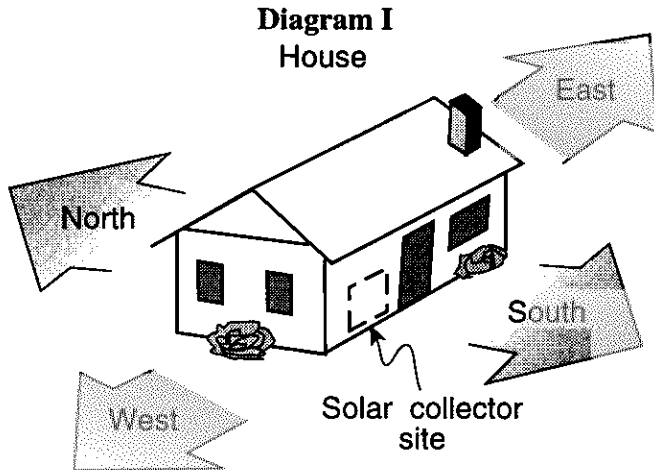
65 Fossils of trilobites and eurypterids found in the rock near the top of Basket Dome provide evidence that this map area has most likely undergone

- 1 metamorphism from crustal plate collision
- 2 uplift from crustal plate movement
- 3 recent flooding from changes in worldwide sea level
- 4 volcanism from seafloor spreading

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 diagrams below, and your knowledge of Earth science. 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.



66 Air leaves the outlet of the solar collector because the air within the solar collector becomes

- 1 cooler and less dense
- 2 cooler and more dense
- 3 warmer and less dense
- 4 warmer and more dense

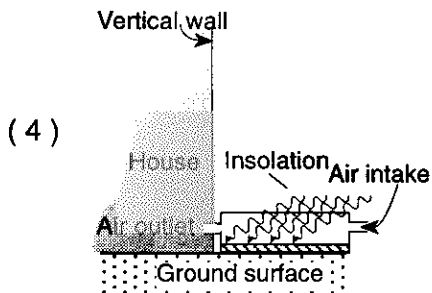
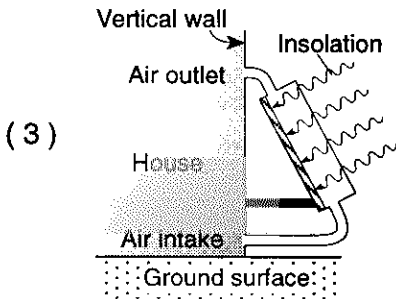
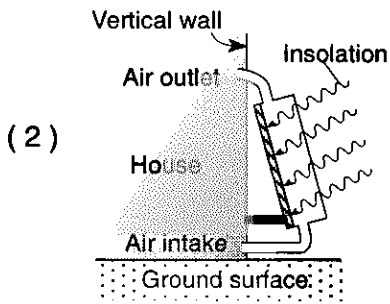
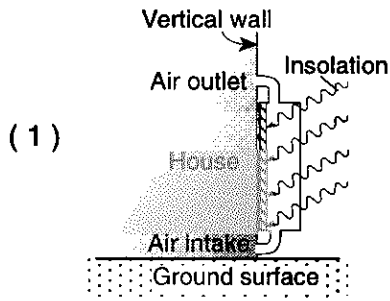
67 The homeowner decides to install carpet on the floor in the room that receives the most sunlight. A carpet with which characteristics would absorb the most insolation?

- 1 smooth texture and light color
- 2 smooth texture and dark color
- 3 rough texture and light color
- 4 rough texture and dark color

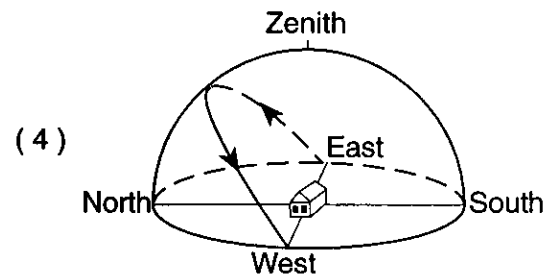
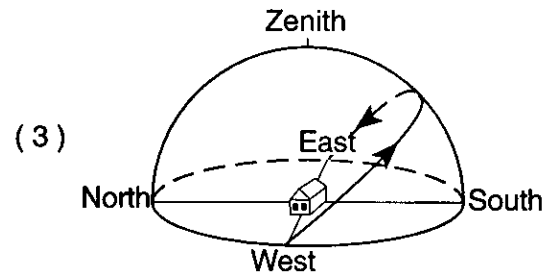
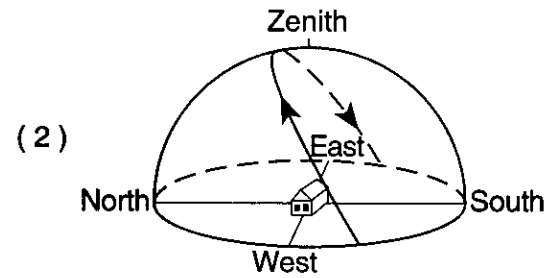
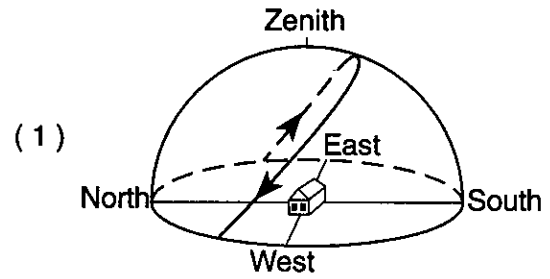
68 Which sequence best describes the pattern of energy transfer affecting the solar collector?

- 1 Sun (radiation) → collector panel (conduction and radiation) → air in collector (convection)
- 2 Sun (convection) → collector panel (convection and radiation) → air in collector (radiation)
- 3 Sun (conduction) → collector panel (conduction and convection) → air in collector (conduction)
- 4 Sun (conduction and convection) → collector panel (radiation) → air in collector (radiation)

69 For the angle of the Sun's rays shown, which side view best represents the correct placement of the solar collector to absorb the maximum amount of insolation?



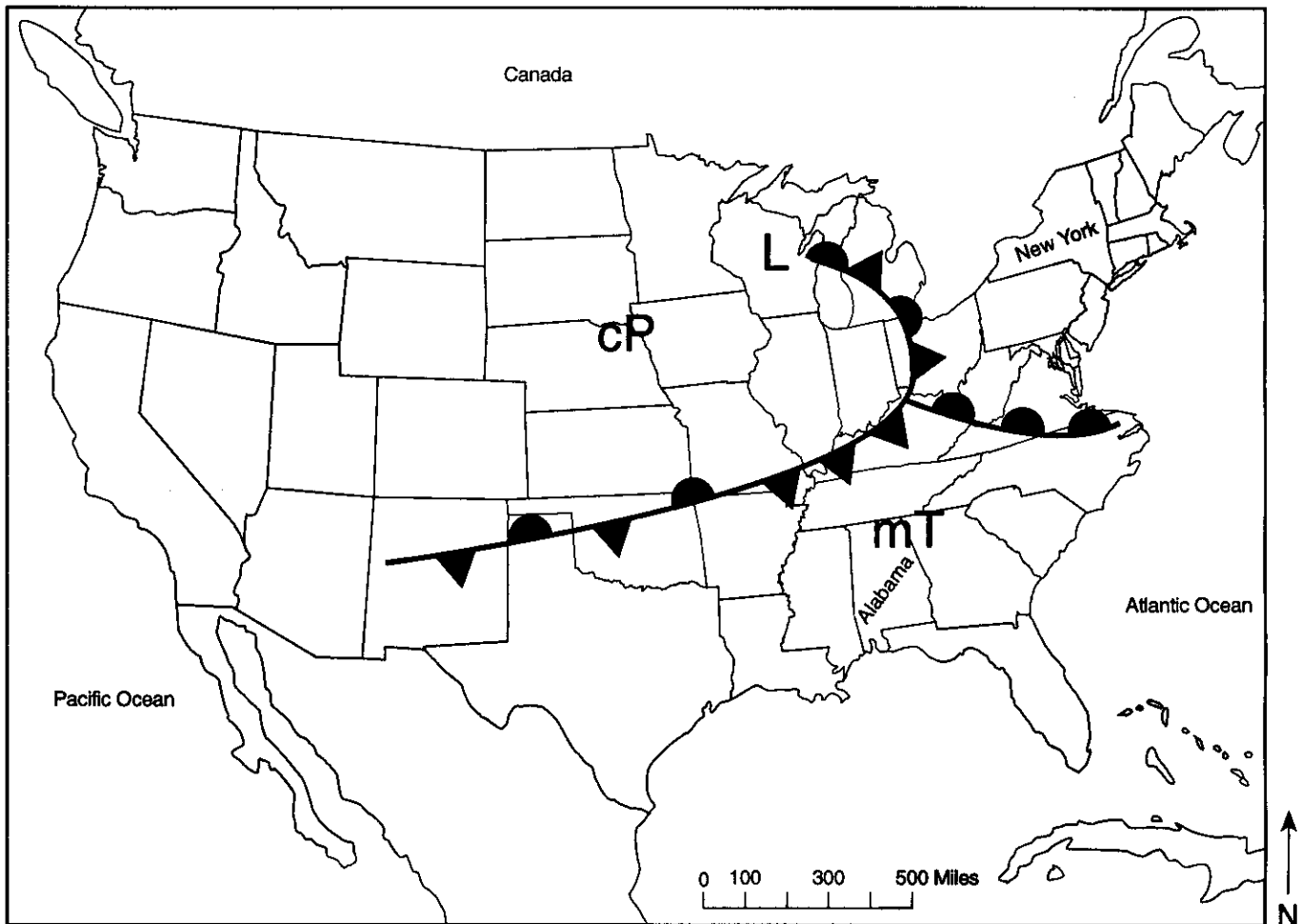
70 Which diagram best represents the apparent path of the Sun on June 21 for this location?



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 weather map below, and your knowledge of Earth science. The map shows a weather system that is affecting part of the United States.



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

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

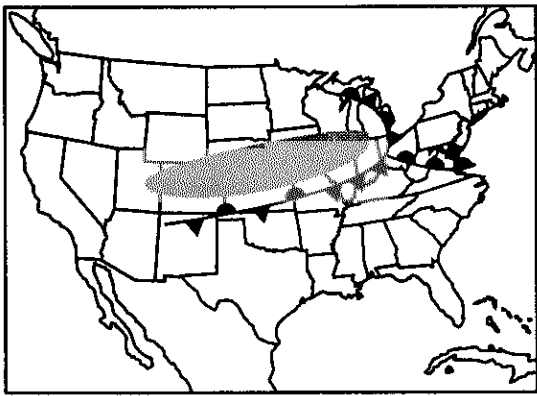
72 Compared to the air over most of the map region, the air mass centered over Alabama is

- 1 warmer and more humid
- 2 warmer and drier
- 3 colder and more humid
- 4 colder and drier

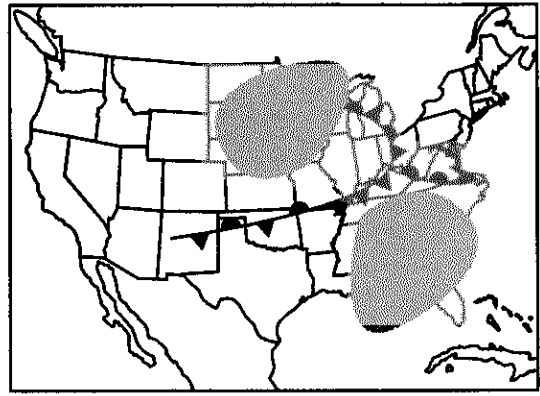
73 Which sequence of events forms the clouds associated with this weather system?

- 1 Moist air rises and becomes saturated in clean air.
- 2 Moist air rises, becomes saturated, and condenses on microscopic particles.
- 3 Moist air falls and reaches the dewpoint in clean air.
- 4 Moist air falls, reaches the dewpoint, and condenses on microscopic particles.

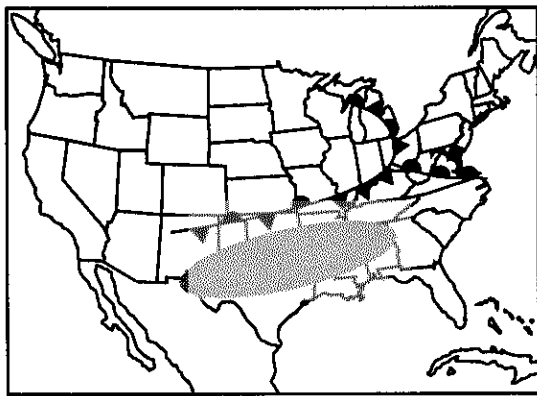
74 Which map best shows the areas in which precipitation is most likely occurring? [Darkened areas represent precipitation.]



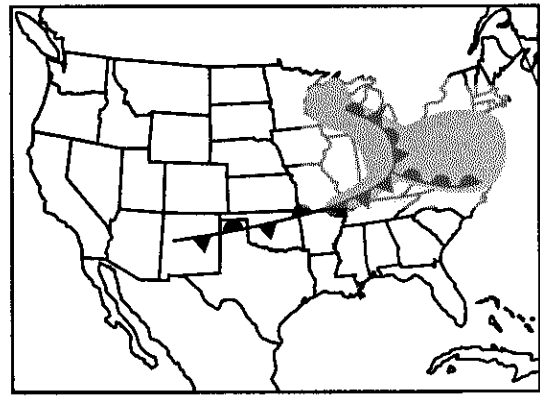
(1)



(3)

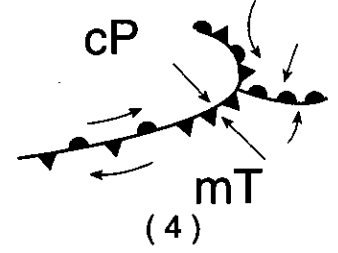
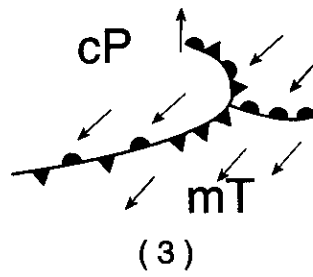
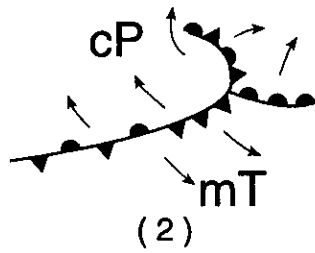
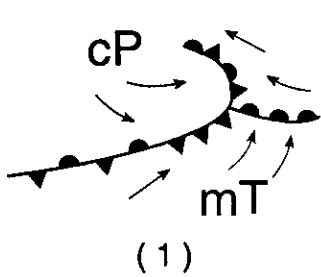


(2)



(4)

75 Which diagram shows the surface air movements most likely associated with the fronts?








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 diagrams and descriptions of the two laboratory activities below, and your knowledge of Earth science. The particles used in these activities are described below.

Particles Used in Activities

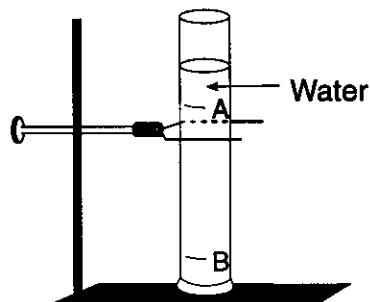
Particle	Diameter	Density	Particle	Diameter	Density
	15 mm Al (aluminum)	2.7 g/cm ³		15 mm Fe (iron)	7.9 g/cm ³
	10 mm Al (aluminum)	2.7 g/cm ³		15 mm Pb (lead)	11.4 g/cm ³
	5 mm Al (aluminum)	2.7 g/cm ³			

Activity 1

Three aluminum particles of different sizes were released in a plastic tube filled with water. The length of time each particle took to drop from point A to point B is shown in data table 1.

Data Table 1

Particle Size	Time of Settling
15 mm Al	3.2 sec
10 mm Al	5.4 sec
5 mm Al	7.2 sec

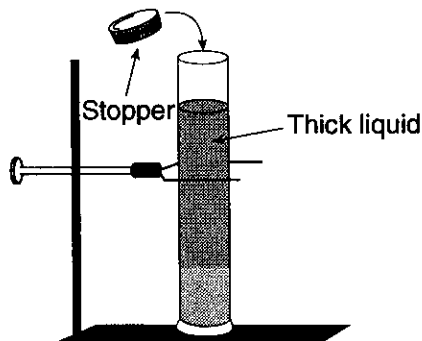


Activity 2

Different combinations of particles 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. The different combinations of particles are shown in data table 2. The diagram of the particle sorting in data table 2 has been omitted intentionally.

Data Table 2

Combination	Particles Mixed	Diagram of Sorting
A	15 mm Al 10 mm Al 5 mm Al	
B	15 mm Al 15 mm Fe 15 mm Pb	

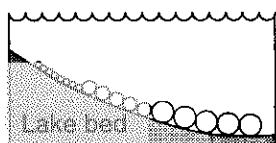


Note that question 76 has only three choices.

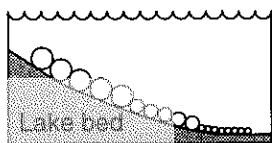
76 During Activity 1, as the 10-millimeter aluminum particle drops from A to B, the potential energy of the particle

- 1 decreases
- 2 increases
- 3 remains the same

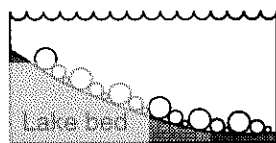
77 In Activity 1, the three sizes of aluminum particles are placed in a stream with a velocity that will carry them all to a lake. Which cross section shows how the three sizes of particles are sorted when the stream slows as it empties into the lake?



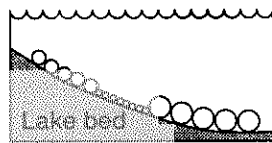
(1)



(3)

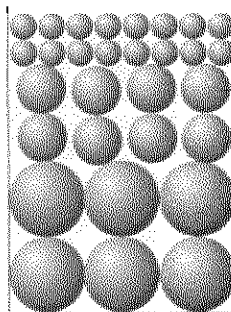


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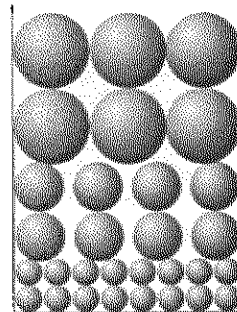


(4)

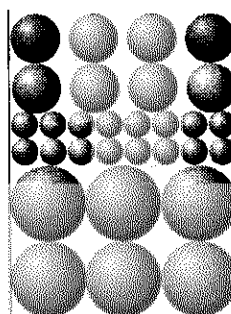
78 In Activity 2, when the tube is turned upside down, the aluminum particles, labeled "Combination A," are allowed to settle. Which diagram represents the sorting that is most likely to occur?



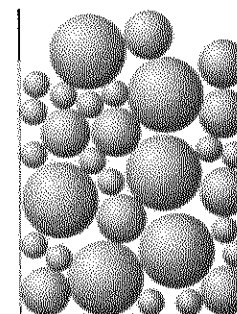
(1)



(3)



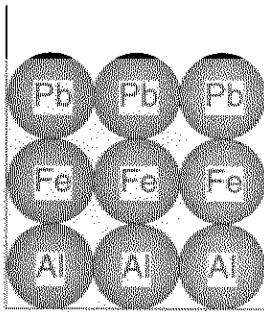
(2)



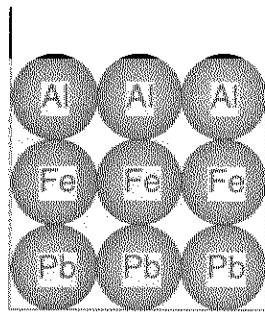
(4)

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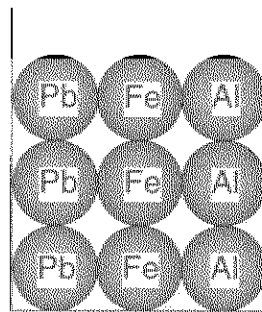
79 In Activity 2, when the tube is turned upside down, the particles of three different metals, labeled “Combination B,” are allowed to settle. Which diagram represents the sorting that is most likely to occur?



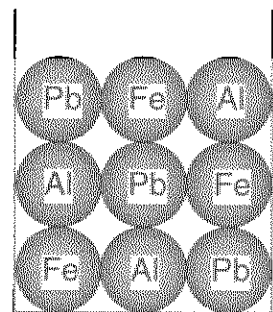
(1)



(2)



(3)



(4)

80 A third activity, similar in setup to Activity 1, was done using flat, oval, and round aluminum particles with identical masses. Which table shows the most likely results of this third activity?

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

(1)

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

(3)

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

(2)

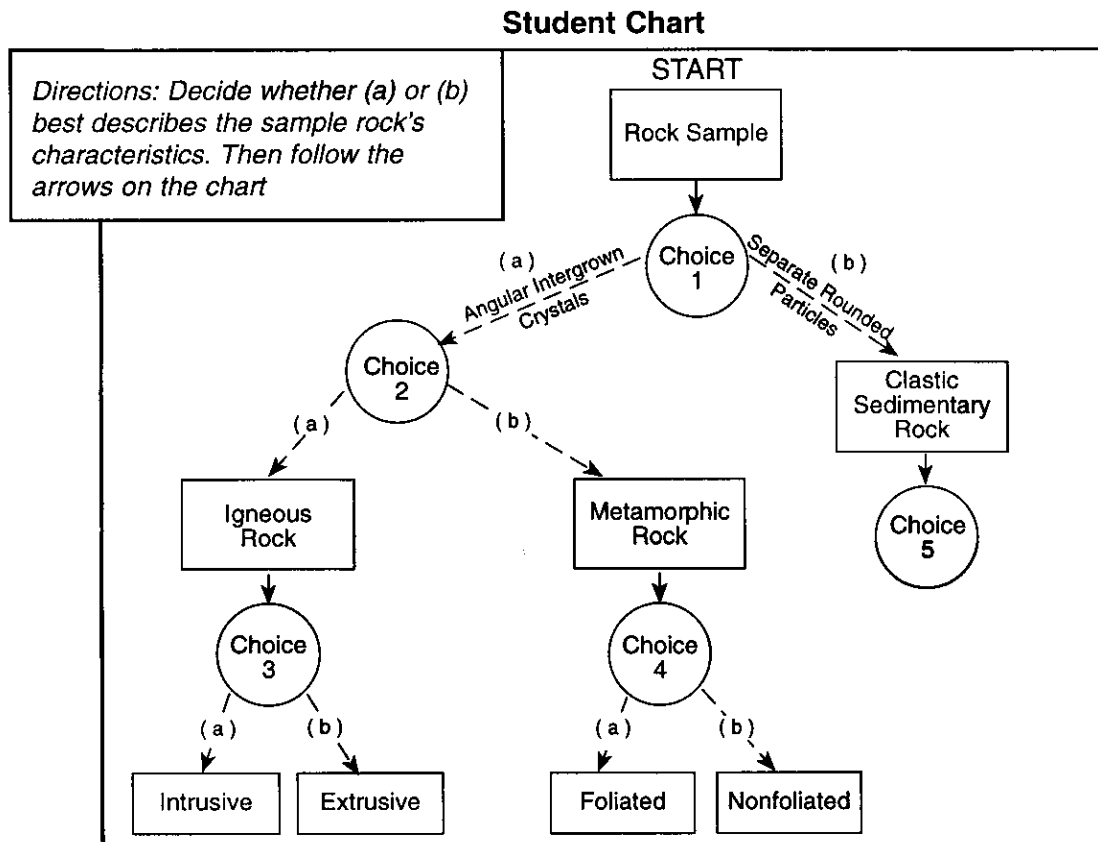
Particle Shape	Settling Time
Round	3.2 sec
Oval	5.1 sec
Flat	6.7 sec

(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 shows the structure of a student-developed chart for identifying some rock samples. The circles labeled choice 1 through choice 4 represent decisionmaking steps leading either to path (a) or path (b). Choice 5 has not been completed.



81 Before the student can select either path (a) or path (b) at choice 1, the student must make a decision about

- 1 mineral composition
- 2 crystal size
- 3 the temperature at which rocks form
- 4 the appearance of the rock grains

82 At choice 2, the student should generally select path (a) if the student observes

- 1 a random arrangement of mineral crystals
- 2 distorted structure and crystal alignment
- 3 bands of mineral crystals
- 4 layers of same-sized crystals

83 Which rock specimen should lead the student to choice 4, path (a)?

- | | |
|--------------|-------------|
| 1 peridotite | 3 gneiss |
| 2 quartzite | 4 dolostone |

84 Which characteristic should be used at choice 5 to further identify the types of clastic sedimentary rocks?

- | | |
|------------------|-----------------------|
| 1 grain size | 3 mineral color |
| 2 mineral cement | 4 horizontal layering |

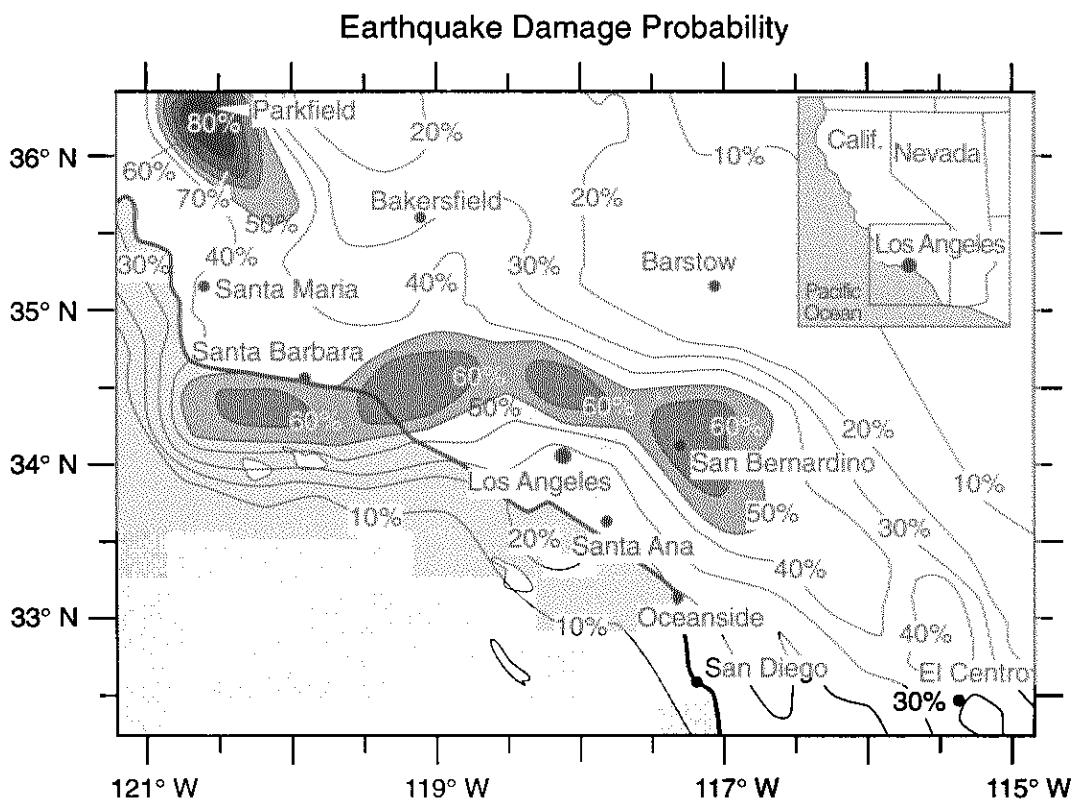
85 The chart is best described as

- 1 a rock cycle diagram
- 2 a classification system
- 3 an erosional-depositional system
- 4 a mineral identification diagram

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 below, and your knowledge of Earth science. The map shows a portion of California along the San Andreas Fault zone. The map shows the probability (percentage chance) that an earthquake strong enough to damage buildings and other structures will occur between now and the year 2024.



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

- | | |
|-------------|------------------|
| 1 Barstow | 3 Oceanside |
| 2 Parkfield | 4 San Bernardino |

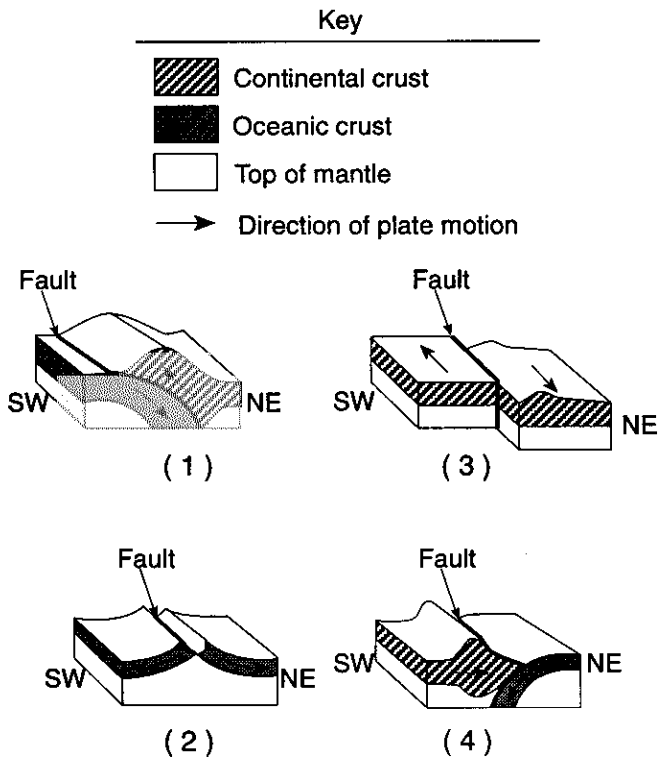
87 This fault zone is located along the boundary between which two crustal plates?

- 1 Cocos plate and Pacific plate
- 2 North American plate and Pacific plate
- 3 Nazca plate and Cocos plate
- 4 North American plate and South American plate

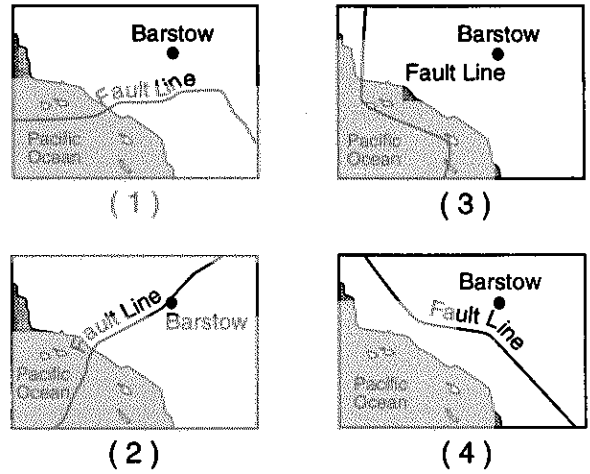
88 If a large earthquake were to occur at San Diego, the earliest indication at another California location of the occurrence of that earthquake would be the arrival of the

- (1) S-waves at Oceanside
- (2) S-waves at San Bernardino
- (3) P-waves at Oceanside
- (4) P-waves at San Bernardino

89 Which diagram best represents the relative movements of the crustal plates along the San Andreas Fault in the map area?



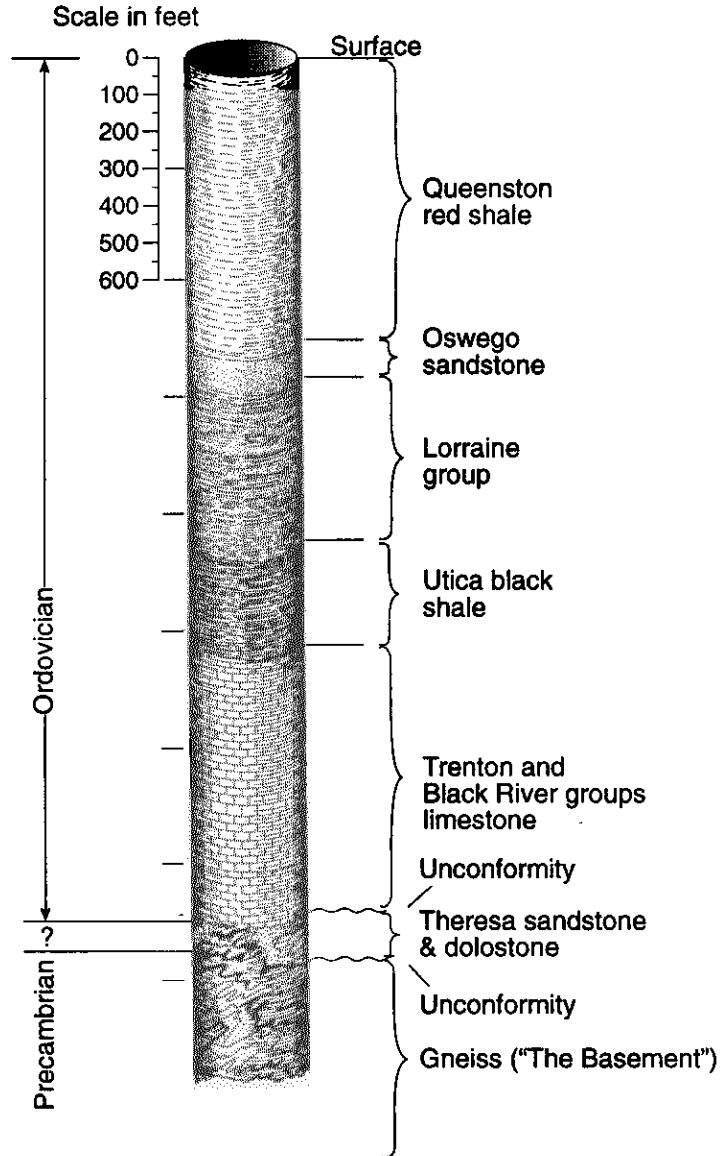
90 Which map best represents the location of the primary San Andreas Fault line?



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 core section below, and your knowledge of Earth science. The core section shows the subsurface bedrock geology for a location north of Buffalo, New York.



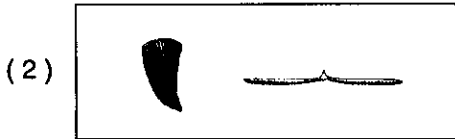
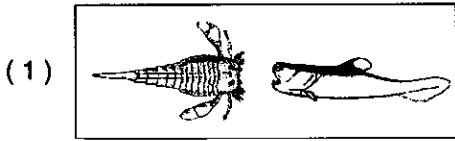
91 Which rock type is found at a depth of 1,800 feet at this location?

- | | |
|---------------------|---------------------|
| 1 Oswego sandstone | 3 Trenton limestone |
| 2 "Basement" gneiss | 4 Theresa sandstone |

92 What do the unconformities shown near the base of the drill core indicate?

- 1 The continental plates were separated for a long period of time.
- 2 Part of the geologic rock record has been destroyed.
- 3 This area was covered by a warm, shallow sea.
- 4 Extinction of many kinds of living things was widespread.

93 Which "Important Fossils of New York" are most likely to be found in the Utica black shale or the Black River limestone?



94 Which statement best explains why more fossils are found in outcrops of Black River rocks than in outcrops of Utica shales?

- 1 Life-forms lacked hard parts at the time of Black River deposition.
- 2 Many fossils of the Utica shales were destroyed by metamorphism.
- 3 The Black River group was deposited in an environment that supported more life-forms.
- 4 The Utica shales were deposited over a wider geographic area.

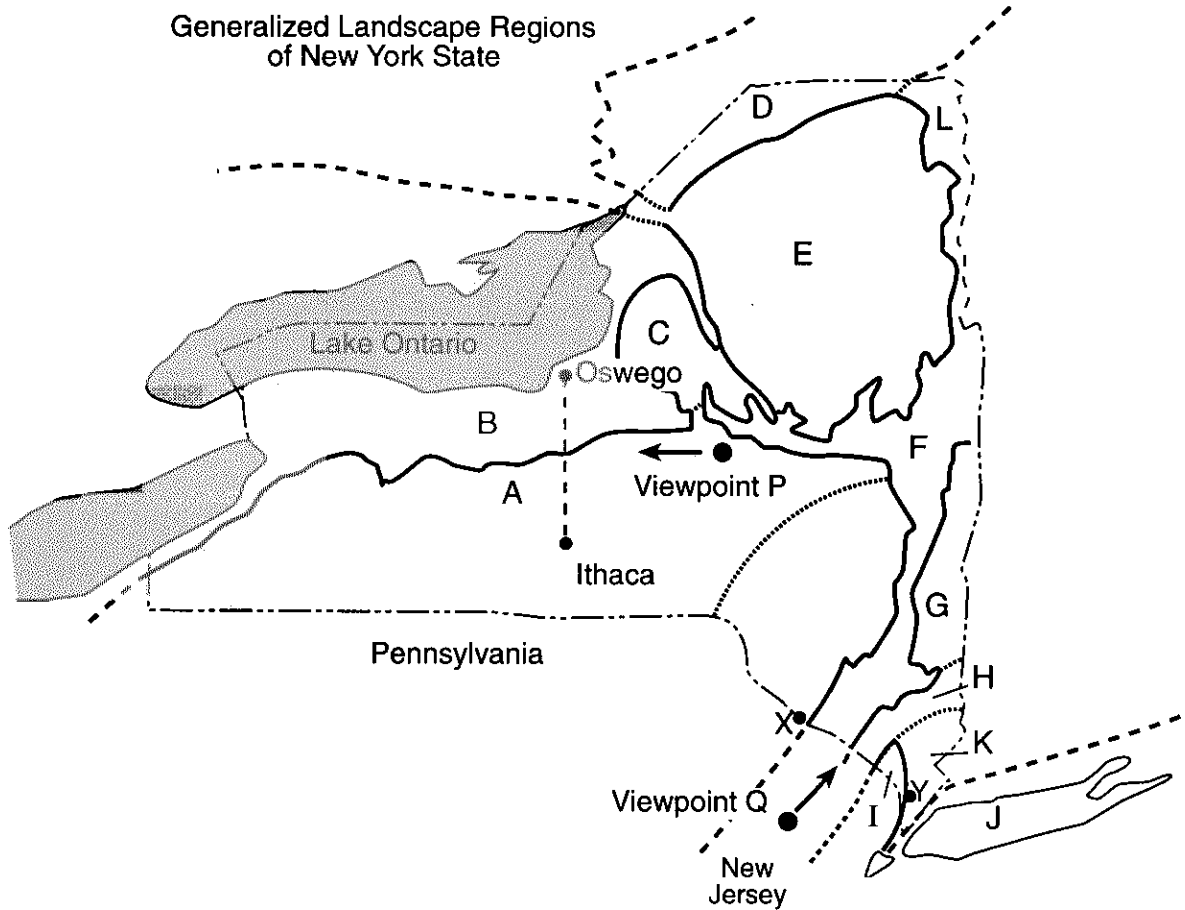
95 Based on studies of fossils found in the Trenton group, scientists have estimated that the climate of New York State during this part of the Ordovician Period was much warmer than the present climate. Which statement best explains this change in climate?

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

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 map below, and your knowledge of Earth science. The map shows the Generalized Landscape Regions of New York State as they appear in the *Earth Science Reference Tables*. Letters A through K represent the different landscape regions. Letters P and Q indicate viewpoints for interpreting landscape cross sections. Letters X and Y are two points along the New York–New Jersey border.



96 Which letter represents the Manhattan Prong landscape region?

- (1) H
- (2) I
- (3) J
- (4) K

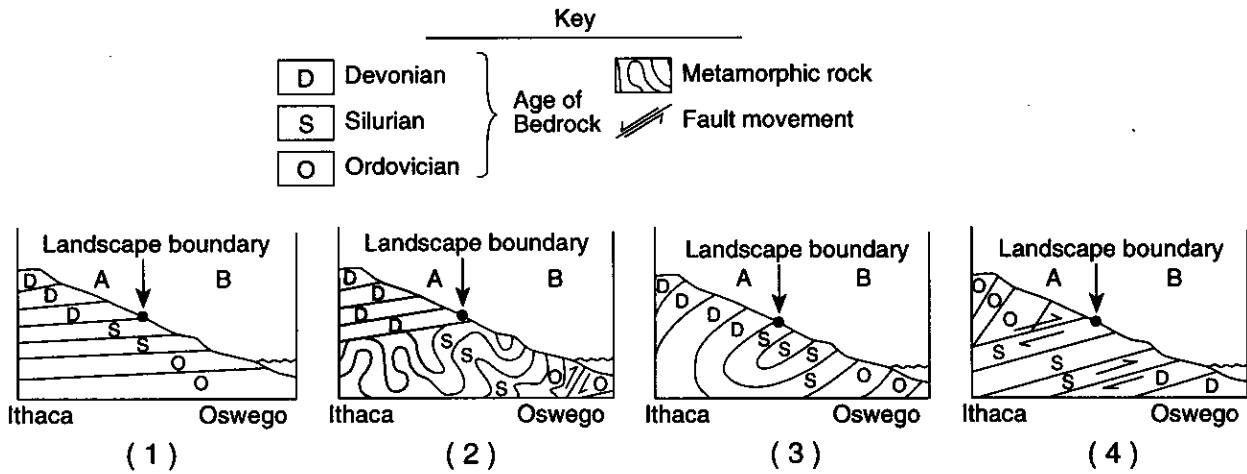
97 The location of these landscape regions within New York State is mostly determined by differences in regional

- 1 human population densities
- 2 climate characteristics
- 3 bedrock structure and composition
- 4 rock age and stream-drainage patterns

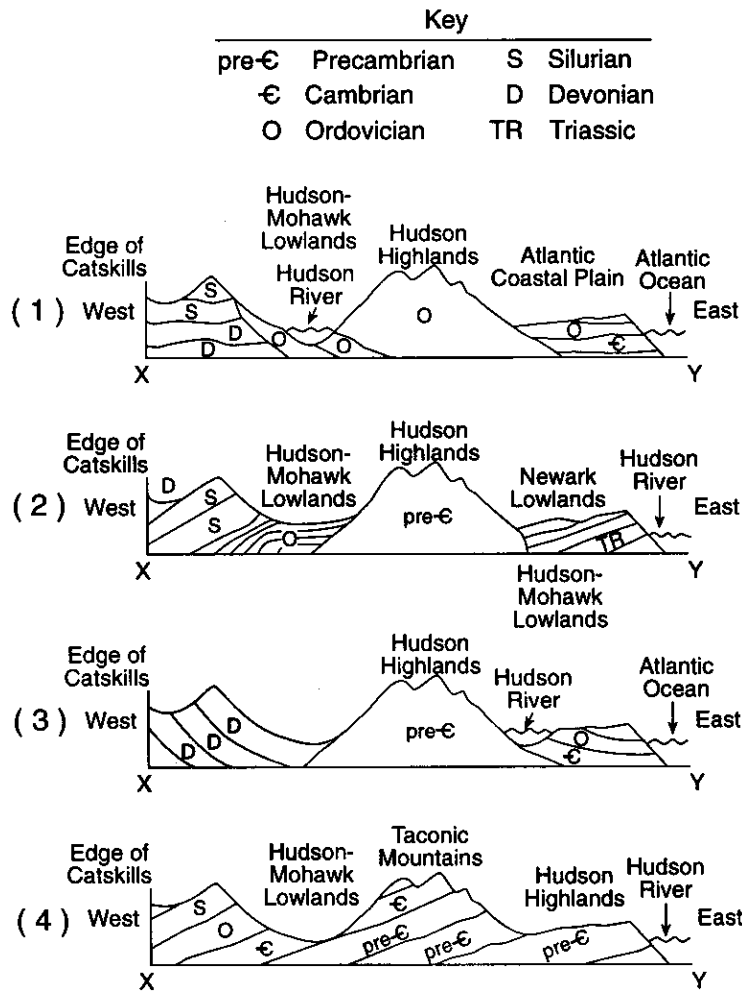
98 Which features within these landscape regions have developed primarily because the underlying rock is resistant to weathering and erosion?

- 1 lowlands and plains
- 2 hilltops and plains
- 3 valleys and hilltops
- 4 escarpments and highlands

99 As seen from viewpoint *P*, which bedrock cross section best illustrates the geologic changes that occur between Ithaca in landscape region A and Oswego in landscape region B? [Cross sections are not drawn to scale.]



100 Which cross section best illustrates the surface landscape and the underlying bedrock across line *XY* as seen from viewpoint *Q*?

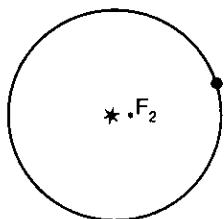
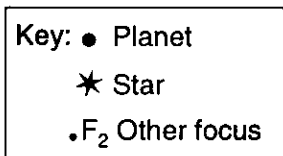


Group 10

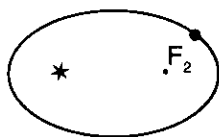
If you choose this group, be sure to answer questions 101–105.

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

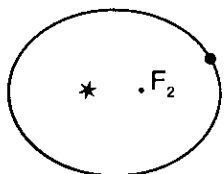
- 101 Which model of a planet's orbit best represents the actual eccentricity of the orbit of Mars?
[Models are drawn to scale.]



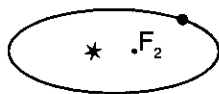
(1)



(3)



(2)



(4)

- 102 What is the total number of calories required to melt 100 grams of ice at 0°C to liquid water at 0°C?

- (1) 5,400 cal (3) 54,000 cal
(2) 8,000 cal (4) 80,000 cal

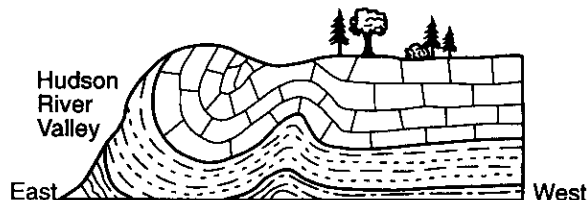
- 103 Which member of the solar system has an equatorial diameter of 3.48×10^3 kilometers?

- 1 Moon 3 Sun
2 Earth 4 Pluto

- 104 What is the approximate age of an igneous rock that contains only one-fourth of its original potassium-40 content due to radioactive decay?

- (1) 1.3×10^9 years (3) 3.9×10^9 years
(2) 2.6×10^9 years (4) 5.2×10^9 years

- 105 The diagram below shows a cross section of some Devonian-age rocks along the western side of the mid-Hudson River Valley.



Which two mountain-building episodes could have been responsible for deforming these rock layers?

- 1 Grenville and Taconian orogenies
2 Taconian and Acadian orogenies
3 Acadian and Appalachian orogenies
4 Appalachian and Grenville orogenies

The University of the State of New York

REGENTS HIGH SCHOOL EXAMINATION

EARTH SCIENCE

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

ANSWER SHEET

Part I Credits
Part II Credits
Performance Test Credits
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 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 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 | |

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

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.

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	
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

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