

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

# EARTH SCIENCE

Wednesday, January 27, 1999 — 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: (X) 2 3 4

The *Earth Science Reference Tables*, which you may need to answer some questions in this examination, are supplied separately. Be certain you have a copy of the 1994 edition of these reference tables before you begin the examination.

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

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

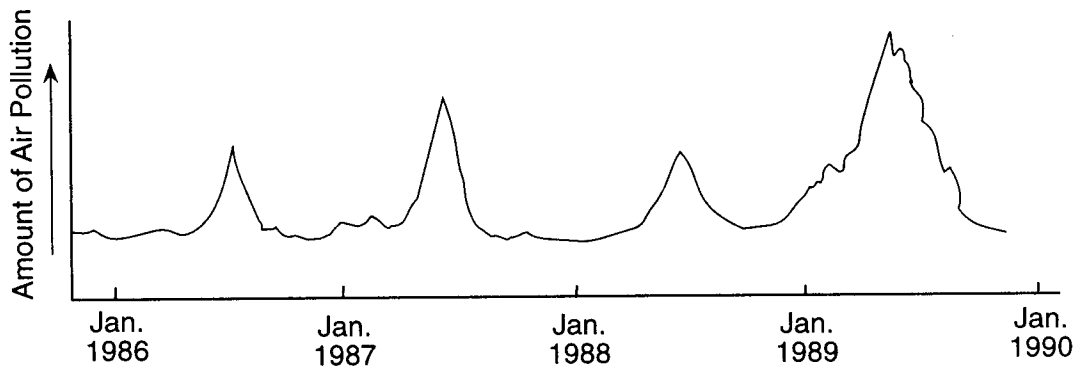
Part I

Answer all 55 questions in this part. [55]

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

1 The graph below shows the relative amount of air pollution over a city for a period of several years.

Air Pollution in a City



Which statement about air pollution over this city is best supported by the graph?

- |  |                         |
|--|-------------------------|
| 1 It is decreasing at a constant rate. | 3 It is a cyclic event. |
| 2 It is increasing at a constant rate. | 4 It has no pattern.    |

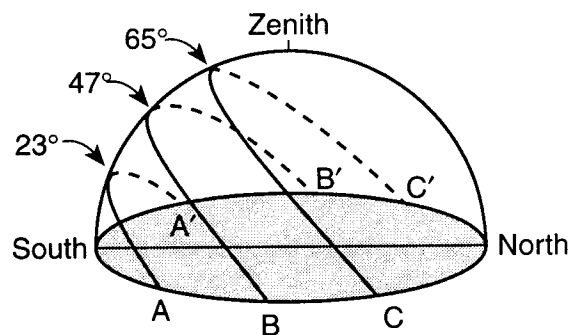
2 Which statement about a major hurricane is an inference?

- 1 The windspeed is measured at 200 km/hr.
- 2 The central air pressure is recorded at 946.0 mb.
- 3 A rain gauge records three inches of rain in less than one hour.
- 4 Damage from the storm is expected to be extensive.

3 Which reference line passes through both the geographic North Pole and the geographic South Pole?

- (1) 0° latitude
- (2) 0° longitude
- (3) Tropic of Cancer
- (4) Tropic of Capricorn

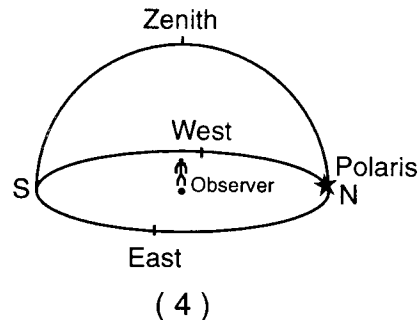
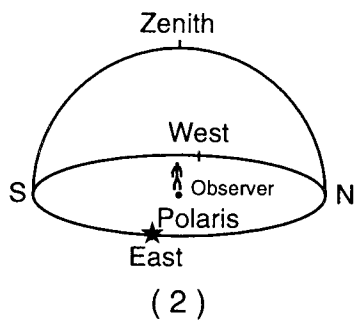
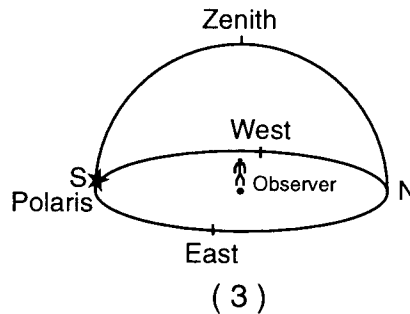
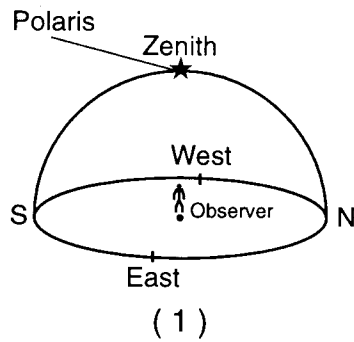
4 The model below shows the apparent path of the Sun on 3 days at a certain location in New York State.



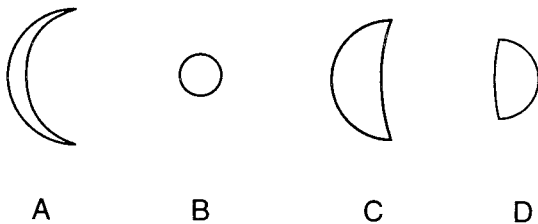
What could be the Sun's apparent path at this location on March 21?

- |                      |                      |
|----------------------|----------------------|
| 1 along path A–A'    | 3 along path B–B'    |
| 2 south of path A–A' | 4 north of path C–C' |

5 Which diagram best represents the location of Polaris for an observer located at the Equator?



6 The diagrams below represent photographs of Venus at four different positions in its orbit, as taken from Earth.



At which position is Venus closest to Earth?

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

7 The force of gravity between two objects is greatest when

- 1 masses are small and the objects are close together
- 2 masses are small and the objects are far apart
- 3 masses are large and the objects are close together
- 4 masses are large and the objects are far apart

8 Almost all of the water vapor in Earth's atmosphere is contained in the

- |                |                |
|----------------|----------------|
| 1 mesosphere   | 3 troposphere  |
| 2 stratosphere | 4 thermosphere |

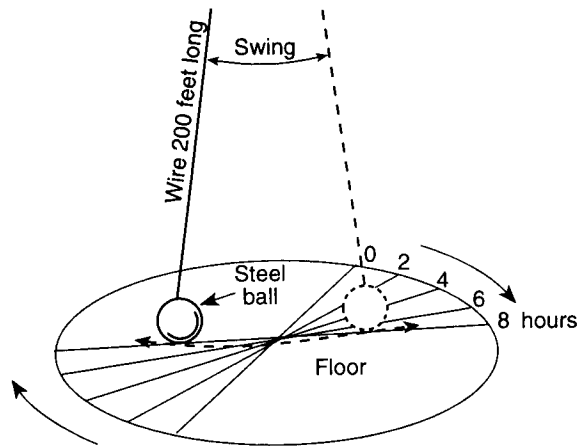
9 When electromagnetic energy travels from air into water, the waves are bent due to the density differences between the air and water. This bending is called

- |              |              |
|--------------|--------------|
| 1 reflection | 3 scattering |
| 2 refraction | 4 absorption |

10 Why are carbon dioxide and water vapor called the greenhouse gases?

- 1 They are found in varying amounts in Earth's atmosphere.
- 2 They are found in fixed amounts in Earth's bedrock.
- 3 They are good reflectors of infrared radiation.
- 4 They are good absorbers of infrared radiation.

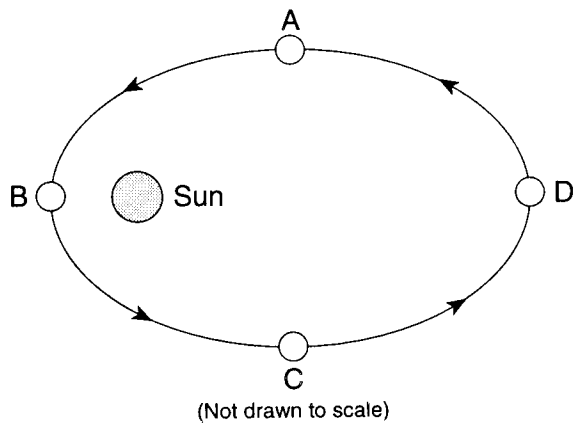
11 The diagram below represents a Foucault pendulum swinging freely for 8 hours.



The pendulum appears to change its direction of swing because of Earth's

- 1 tectonic plate movement
- 2 force of gravity
- 3 rotation
- 4 revolution

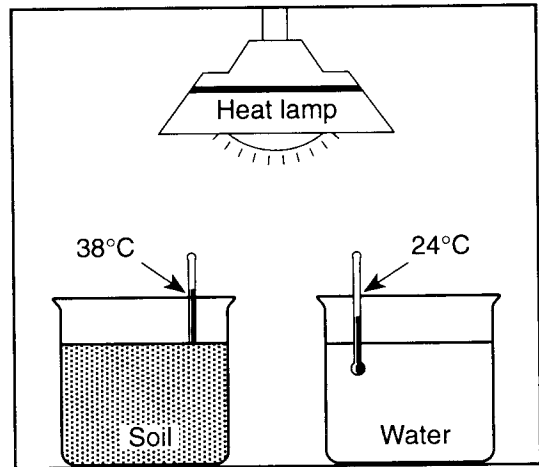
12 The diagram below shows four positions of a planet in its orbit around the Sun.



At which position is the planet's orbital speed greatest?

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

Base your answers to questions 13 and 14 on the diagram below. Soil and water were heated for 10 minutes from a starting temperature of 20°C.



13 What were the rates of heating for the soil and water?

- 1 soil: 1.8 C°/min; water: 0.4 C°/min
- 2 soil: 9 C°/min; water: 2 C°/min
- 3 soil: 20 C°/min; water: 20 C°/min
- 4 soil: 38 C°/min; water: 24 C°/min

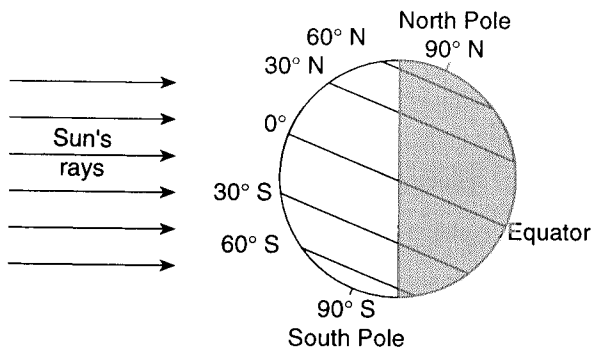
14 After the heat lamp is turned off and removed from the area, how will the cooling rates of the soil and water compare?

- 1 The soil will cool faster because it is a good reflector.
- 2 The soil will cool faster because it has a lower specific heat.
- 3 The water will cool faster because it is a good absorber.
- 4 The water will cool faster because it has a higher specific heat.

15 Insolation is often converted into potential energy by

- 1 evaporation of water from the oceans
- 2 formation of fog in a valley
- 3 freezing of water droplets on a highway
- 4 precipitation of rain from a thunderstorm

16 The diagram below shows Earth as viewed from space on December 21.



The longest duration of insolation on December 21 will occur at

- (1) 90° N                      (3) 30° S  
 (2) 30° N                      (4) 90° S

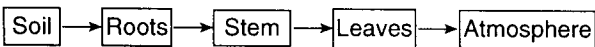
17 The latitude of an observer on Earth's surface can be determined by measuring the altitude of Polaris because Earth has a

- 1 nearly spherical shape
- 2 nearly circular orbit around the Sun
- 3 variable length of day
- 4 fairly constant period of revolution

18 The highest air temperature ever recorded in Albany, New York, was 104°F, which occurred on July 4, 1911. This temperature is equal to

- (1) 35°C                      (3) 45°C  
 (2) 40°C                      (4) 50°C

19 The flowchart below shows one process by which moisture enters the atmosphere.



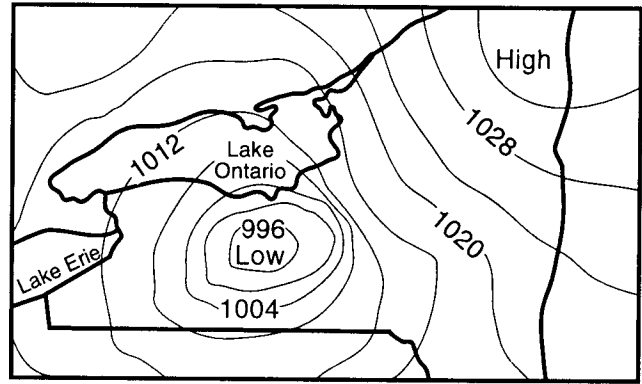
The last step of this process is known as

- 1 condensation              3 radiation  
 2 convection                4 transpiration

20 The primary cause of surface ocean currents is

- 1 atmospheric winds
- 2 atmospheric precipitation
- 3 ocean water evaporation
- 4 ocean floor earthquakes

Base your answers to questions 21 and 22 on the weather map below. The map shows a low-pressure system that is influencing the weather conditions in New York State.



21 Wind velocity is probably greatest at which city?

- 1 Buffalo                      3 Syracuse  
 2 Rochester                  4 Watertown

22 Surface air movements associated with this low-pressure system are best described as

- 1 clockwise toward the center of the low-pressure system
- 2 clockwise away from the center of the low-pressure system
- 3 counterclockwise toward the center of the low-pressure system
- 4 counterclockwise away from the center of the low-pressure system

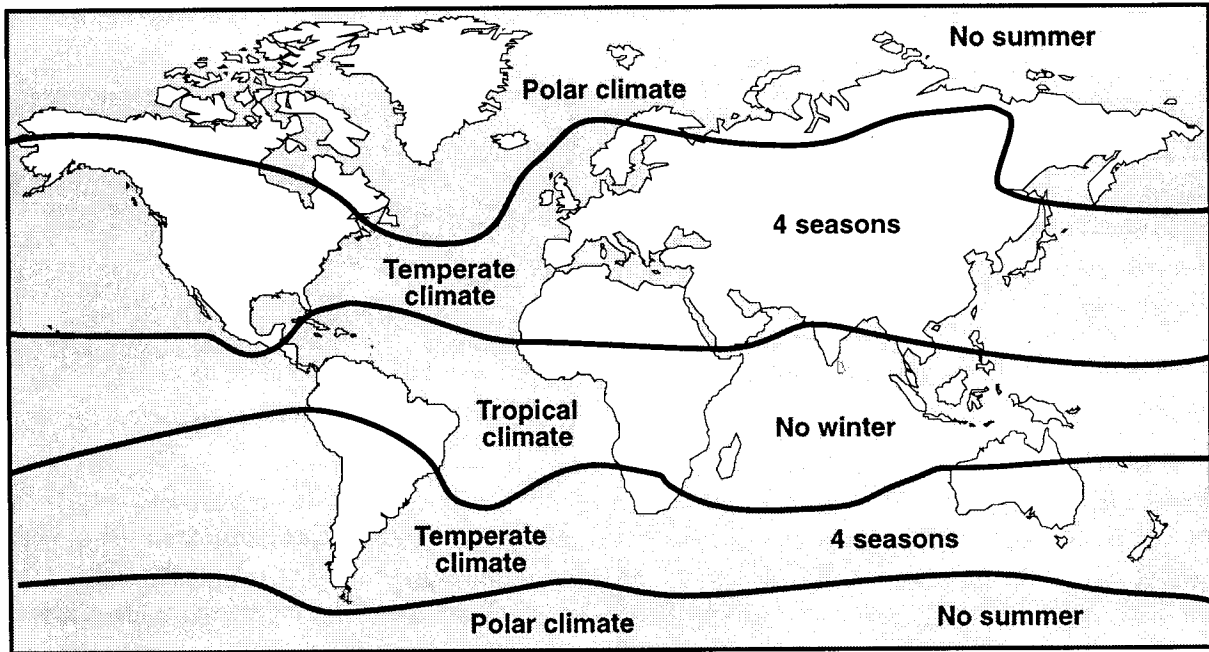
23 The air over the Equator generally rises because the air is

- 1 dry and cool with low density
- 2 moist and hot with low density
- 3 moist and cool with high density
- 4 dry and hot with high density

24 Surface runoff is most likely to be greatest when rainfall lands on a soil surface that is

- 1 porous and flat
- 2 porous and gently sloping
- 3 impermeable and gently sloping
- 4 unsaturated and flat

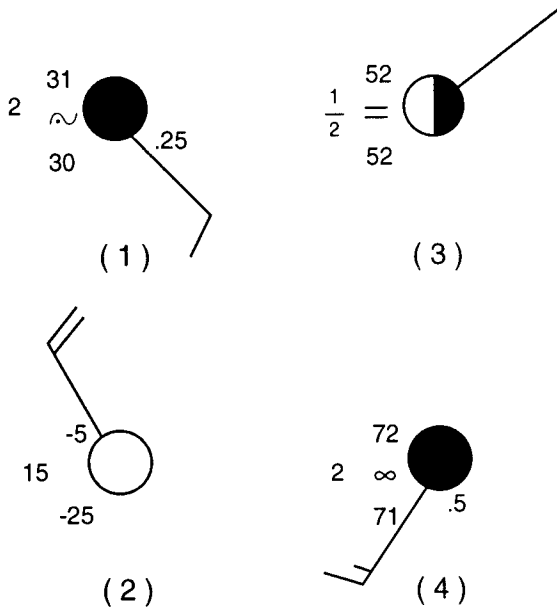
25 The map below shows the major climate zones on Earth.



The primary factor controlling these climate zones is

- |              |             |
|--------------|-------------|
| 1 elevation  | 3 latitude  |
| 2 solar time | 4 longitude |

26 Which station model represents a location that is currently receiving some form of precipitation?



27 High concentrations of anaerobic bacteria (biologic water pollutants) are often caused by a decrease in the

- |   |
|---|
| 1 temperature of ground water             |
| 2 growth of aerobic bacteria in the water |
| 3 amount of organic wastes in the water   |
| 4 amount of oxygen dissolved in the water |

28 Which soil-property measurement usually is greater when particles are fine than when particles are coarse?

- |                |                     |
|----------------|---------------------|
| 1 infiltration | 3 porosity          |
| 2 capillarity  | 4 permeability rate |

29 Which climatic conditions normally produce the greatest amount of chemical weathering?

- |                  |                  |
|------------------|------------------|
| 1 cool and dry   | 3 warm and dry   |
| 2 cool and moist | 4 warm and moist |

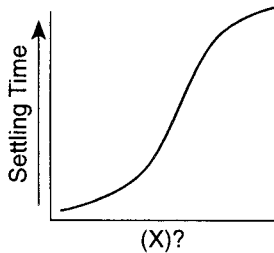
30 Unsorted piles of angular sediments were most likely transported and deposited by

- |            |                 |
|------------|-----------------|
| 1 wind     | 3 ocean waves   |
| 2 glaciers | 4 running water |

31 Which statement best describes the conditions existing at a stream location where the erosional-depositional system is in dynamic equilibrium?

- 1 More erosion than deposition takes place.
- 2 More deposition than erosion takes place.
- 3 Equal amounts of erosion and deposition take place.
- 4 No erosion or deposition takes place.

32 The graph below is incomplete because it does not identify the sediment characteristic (X) that would produce the line plotted on the graph.



Which label should be placed on the horizontal axis to accurately complete the graph?

- |                                    |                                    |
|------------------------------------|------------------------------------|
| (1) Low → High<br>Particle Density | (3) Light → Heavy<br>Particle Mass |
| (2) Small → Large<br>Particle Size | (4) Round → Flat<br>Particle Shape |

33 Which mineral can be found in granite, andesite, gneiss, and hornfels?

- |            |                |
|------------|----------------|
| 1 quartz   | 3 olivine      |
| 2 pyroxene | 4 biotite mica |

34 Which rock is made up of angular fragments of rock held together by a natural cement?

- |           |             |
|-----------|-------------|
| 1 breccia | 3 granite   |
| 2 scoria  | 4 quartzite |

35 Humus, which is formed by the decay of plant and animal matter, is important for the formation of most

- |            |                   |
|------------|-------------------|
| 1 soils    | 3 sediment        |
| 2 minerals | 4 surface bedrock |

36 Which property of the mineral diamond allows diamond powder to be used to shape gems for jewelry?

- |                 |            |
|-----------------|------------|
| 1 crystal shape | 3 luster   |
| 2 cleavage      | 4 hardness |

37 Which relative concentration of elements is found in a mafic rock?

- 1 a high concentration of silicon and a low concentration of iron
- 2 a high concentration of iron and a low concentration of aluminum
- 3 a high concentration of aluminum and a low concentration of iron
- 4 a high concentration of aluminum and a low concentration of magnesium

38 A seismic station recorded the arrival of a P-wave at 10:00:00 a.m. The S-wave arrival was recorded at 10:04:20 a.m. What is the approximate distance between the earthquake epicenter and the seismic station?

- |                          |                          |
|--------------------------|--------------------------|
| (1) $1.1 \times 10^3$ km | (3) $2.9 \times 10^3$ km |
| (2) $2.2 \times 10^3$ km | (4) $7.2 \times 10^3$ km |

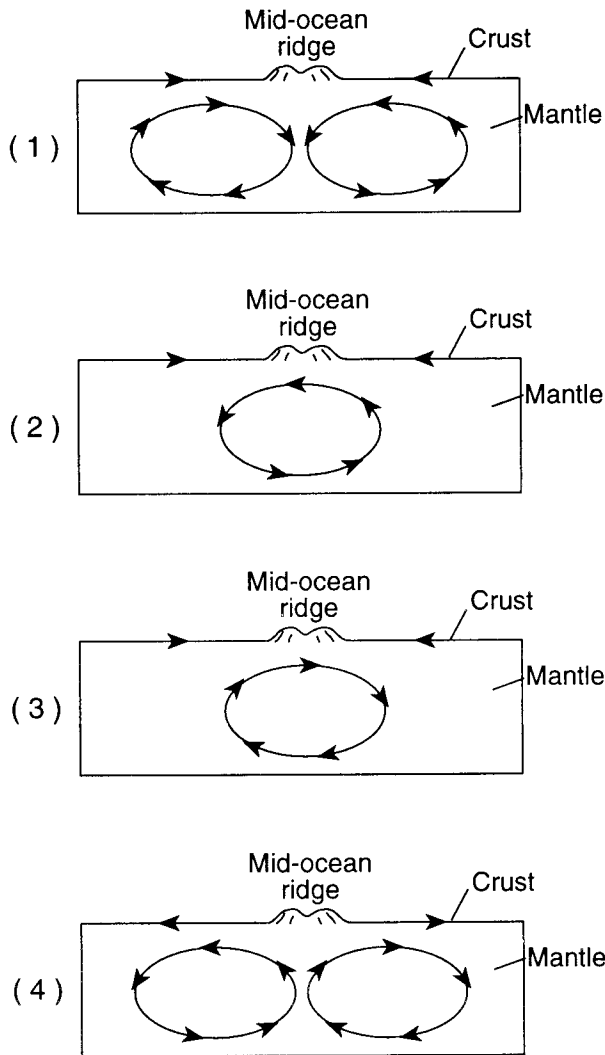
39 Through which materials can P-waves travel?

- 1 solid rock, only
- 2 magma and water, only
- 3 magma, water, and natural gas, only
- 4 solid rock, magma, water, and natural gas

40 Which observed feature would provide the best evidence of crustal stability?

- 1 horizontal sedimentary layers
- 2 changed benchmark elevations
- 3 folded, faulted, and tilted rock strata
- 4 marine fossils at elevations high above sea level

41 Which cross-sectional diagram of a portion of the crust and mantle best shows the pattern of mantle convection currents that are believed to cause the formation of a mid-ocean ridge?



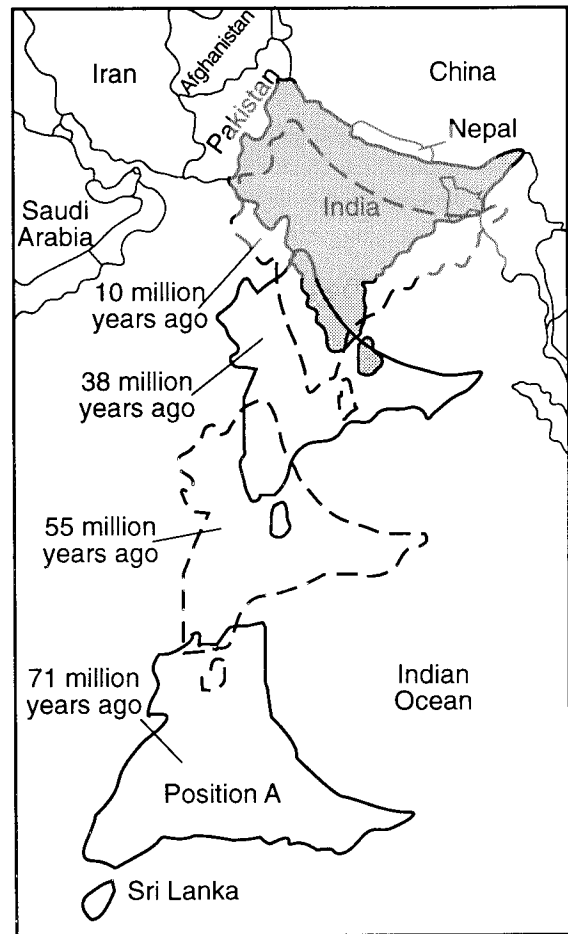
42 New York State has no bedrock from which geologic time period?

- |            |              |
|------------|--------------|
| 1 Cambrian | 3 Permian    |
| 2 Devonian | 4 Cretaceous |

43 An archeologist found an ancient skeleton estimated to be 10,000 to 25,000 years old. Which radioactive isotope would be most useful for finding the age of the skeleton?

- |                |               |
|----------------|---------------|
| 1 carbon-14    | 3 uranium-238 |
| 2 potassium-40 | 4 rubidium-87 |

Base your answers to questions 44 and 45 on the map below. The map represents the movement of tectonic plates that resulted in the collision of India with Asia. Scientists believe that 71 million years ago, India was at position A.



44 Which present-day geologic feature in Nepal resulted from this collision?

- |                    |                     |
|--------------------|---------------------|
| 1 a rift valley    | 3 an oceanic ridge  |
| 2 a mountain range | 4 an oceanic trench |

45 Which life-forms were living on Earth when India was at position A?

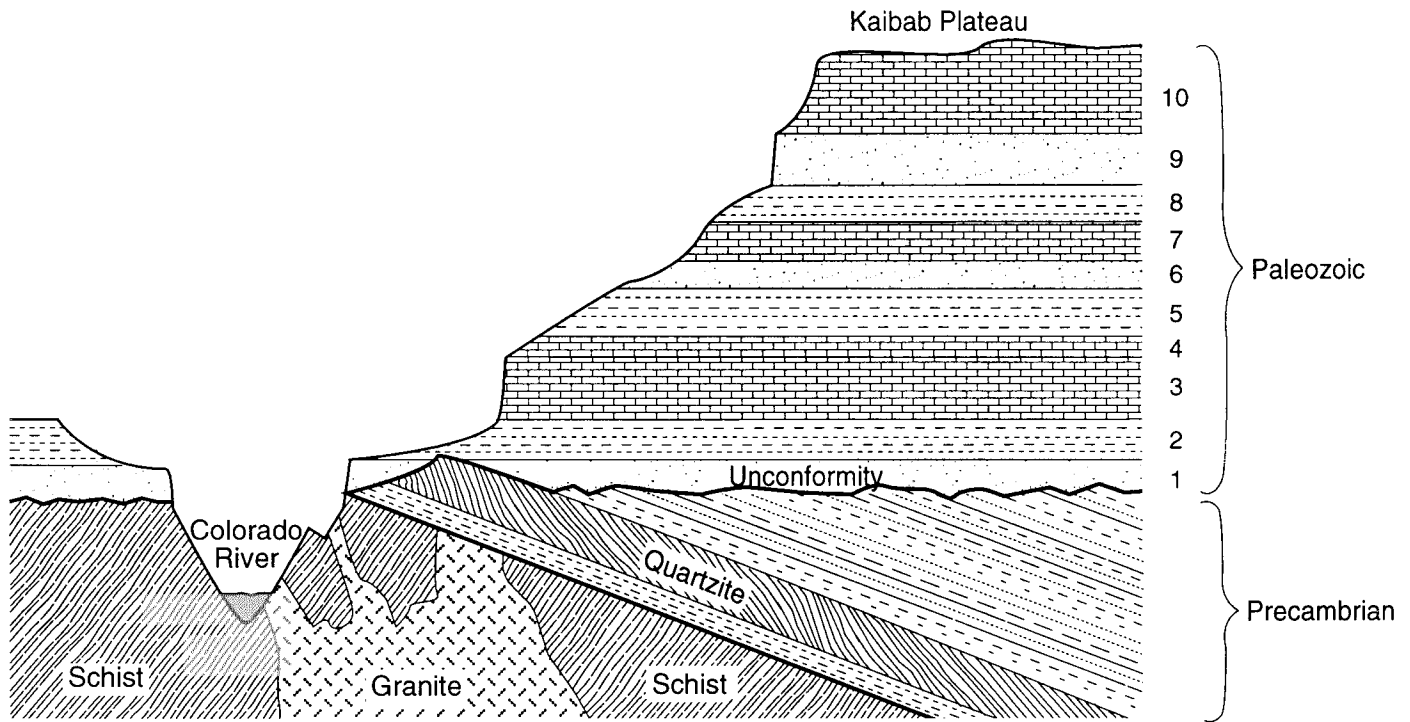
- |             |                  |
|-------------|------------------|
| 1 humans    | 3 trilobites     |
| 2 dinosaurs | 4 armored fishes |

46 What is the estimated age of Earth?

- |                             |                             |
|-----------------------------|-----------------------------|
| (1) $4.6 \times 10^6$ years | (3) $4.6 \times 10^8$ years |
| (2) $4.6 \times 10^7$ years | (4) $4.6 \times 10^9$ years |



Base your answers to questions 47 and 48 on the geologic cross section below of the Grand Canyon. The numbers 1 through 10 represent Paleozoic sedimentary rock layers.



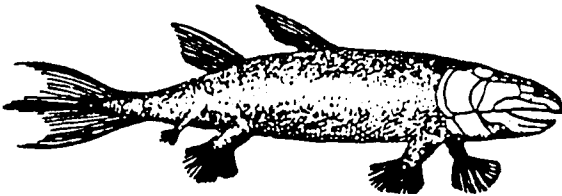
47 The unconformity between the Paleozoic sedimentary rocks and the Precambrian sedimentary rocks represents

- 1 a gap in the geologic time record
- 2 an intrusion of igneous rock
- 3 an abundance of fossils
- 4 a region of metamorphic rock

48 Which Paleozoic rock layer is the oldest?

- |        |       |
|--------|-------|
| (1) 1  | (3) 5 |
| (2) 10 | (4) 4 |

49 The primitive lobe-finned fish shown below is thought to be an ancestor of early amphibians.



This evolutionary development from fish to amphibian is believed to have occurred during the

- |                   |                   |
|-------------------|-------------------|
| 1 Triassic Period | 3 Tertiary Period |
| 2 Devonian Period | 4 Permian Period  |

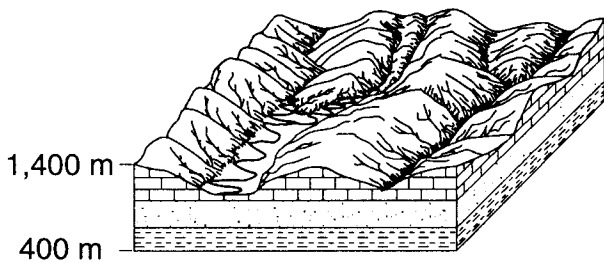
50 Which evidence best indicates that a landscape has been eroded primarily by streams?

- 1 parallel sets of U-shaped valleys
- 2 sand dunes
- 3 thick residual soil
- 4 sorted layers of cobbles and sand

51 Which New York State landscape region contains the oldest surface bedrock?

- 1 Erie-Ontario Lowlands
- 2 Allegheny Plateau
- 3 Adirondack Mountains
- 4 Tug Hill Plateau

52 The diagram below shows a cross section of a portion of Earth's crust. Altitude is shown in meters above sea level.



This landscape region is best classified as an eroded

- |           |                  |
|-----------|------------------|
| 1 plain   | 3 domed mountain |
| 2 plateau | 4 folded lowland |

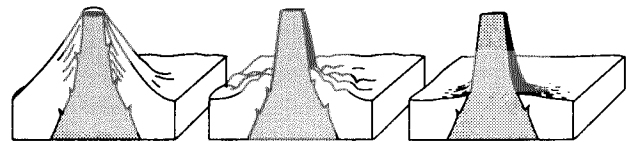
53 The Erie-Ontario Lowlands of New York State are a part of which larger landscape region?

- 1 Interior Lowlands
- 2 St. Lawrence Lowlands
- 3 Allegheny Plateau
- 4 Appalachian Plateau

54 The boundaries of landscape regions are generally well defined by changes in

- 1 vegetation and soil type
- 2 stream size and drainage pattern
- 3 latitude and longitude
- 4 elevation and bedrock structure

55 The block diagrams below show cross sections of the crust in a landscape that has undergone gradual change.



A - Early Stage      B - Middle Stage      C - Late Stage

Upwelling lava fills the original volcano's central pipe and cools.

Erosion attacks the outer slopes.

Only the lava plug remains.

The hardened lava in this volcano's central pipe formed a mountain peak in the late stage because the lava plug was composed of

- 1 soft igneous rock
- 2 soft metamorphic rock
- 3 igneous rock that is resistant to erosion
- 4 metamorphic rock that is resistant to erosion

## Part II

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

### Group 1

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

Base your answers to questions 56 through 60 on the water budget table shown below and on your knowledge of Earth science. The table contains part of the data for the months of May, June, July, and August. The values shown are in millimeters of water. Maximum storage is 100 millimeters.

	May	June	July	August
Precipitation ( $P$ )	127	94	85	84
Potential Evapotranspiration ( $E_p$ )	112	151	176	160
$P - E_p$	15	-57	-91	-76
Change in Storage	0	-57	-43	0
Storage	100	43	0	
Actual Evapotranspiration	112	151		
Deficit	0	0		
Surplus	15	0		

56 The major moisture source for all water budgets is

- |                 |                    |
|-----------------|--------------------|
| 1 vegetation    | 3 ground water     |
| 2 precipitation | 4 stream discharge |

57 Which month has the potential for evaporating and transpiring the most water?

- |        |          |
|--------|----------|
| 1 May  | 3 July   |
| 2 June | 4 August |

58 The difference between precipitation and potential evapotranspiration in May is shown as a surplus of 15 millimeters. This 15-millimeter surplus of water usually becomes part of the

- |              |                    |
|--------------|--------------------|
| 1 bedrock    | 3 soil storage     |
| 2 vegetation | 4 stream discharge |

59 What is the actual evapotranspiration at this location during July?

- |           |            |
|-----------|------------|
| (1) 0 mm  | (3) 128 mm |
| (2) 85 mm | (4) 176 mm |

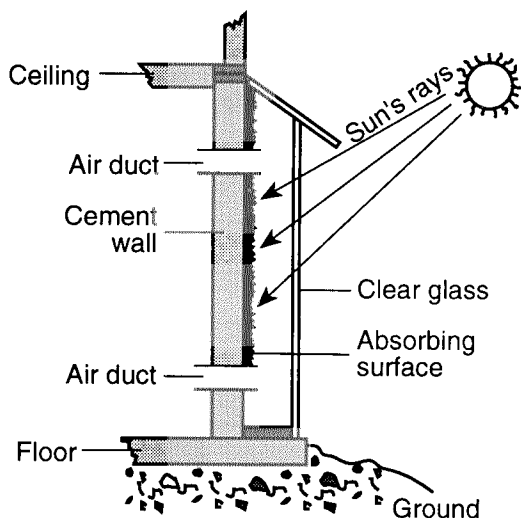
60 What is a characteristic of the water budget at this location in the month of August?

- 1 A deficit occurs.
- 2 Soil moisture is recharged.
- 3 Change in storage is 76 mm of water.
- 4 Actual evapotranspiration is equal to potential evapotranspiration.

## Group 2

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

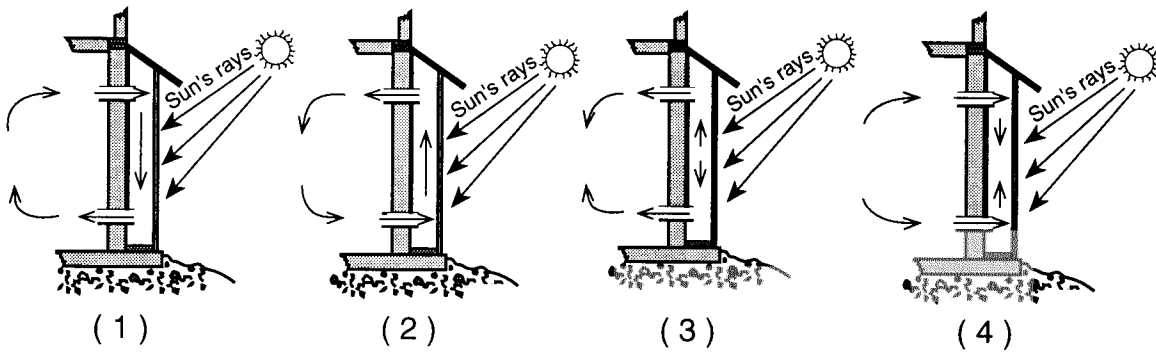
Base your answers to questions 61 through 65 on the *Earth Science Reference Tables*, the diagram and table below, and your knowledge of Earth science. The diagram shows a cross section of a solar-energy collecting system constructed as a portion of a wall of a house. It consists of an energy-absorbing surface, a clear glass covering, and air ducts through the wall into the house. The table gives the house temperatures during a spring day. No other heat source is available for the house.



Time of Day	House Air Temperature (°C)
6 a.m.	12
8 a.m.	14
10 a.m.	16
noon	19
2 p.m.	22
4 p.m.	20

- 61 For maximum absorption of solar radiation, the energy-absorbing surface should be
- 1 smooth and light colored
  - 2 smooth and dark colored
  - 3 rough and light colored
  - 4 rough and dark colored
- 62 What is the purpose of the clear glass covering of this solar collector?
- 1 The glass radiates infrared energy.
  - 2 The glass radiates ultraviolet energy.
  - 3 The glass allows short-wave radiation to enter and traps long-wave reradiation.
  - 4 The glass allows long-wave radiation to enter and traps short-wave reradiation.
- 63 In New York State, on which exterior wall should the solar collector be placed to receive the most insolation?
- 1 a north-facing wall
  - 2 a south-facing wall
  - 3 an east-facing wall
  - 4 a west-facing wall
- 64 When did the maximum air temperature occur in the house?
- 1 just before sunrise
  - 2 just before the time of the maximum angle of insolation for the day
  - 3 just after the time of the maximum angle of insolation for the day
  - 4 just after sunset

65 Which diagram best represents the direction of air flow through the system under normal solar heating conditions?



### 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 data table below, and your knowledge of Earth science. The data table shows a classification system for hurricanes. A storm surge is a dome of water 65 to 80 kilometers wide that sweeps ashore at the coast near the point where the storm center (eye) hits the land.

**Safir-Simpson Hurricane Scale**

Hurricane Category	Central Air Pressure (mb)	Windspeed (km/hr)	Expected Storm Surge Height (m)	Expected Damage
1	over 979	119–153	1.2–1.5	Minimal
2	965–979	154–177	1.6–2.4	Moderate
3	945–964	178–209	2.5–3.6	Extensive
4	920–944	210–250	3.7–5.4	Extreme
5	below 920	over 250	over 5.4	Catastrophic

66 Which characteristic must a tropical storm have to be classified as a hurricane on the Safir-Simpson scale?

- 1 enough strength to cause catastrophic damage
- 2 a storm surge of at least 2.0 m
- 3 central air pressure over 980 mb
- 4 a windspeed of at least 119 km/hr

67 Which type of air mass is usually the source of the moisture that causes the strong winds and heavy rain found in hurricanes?

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

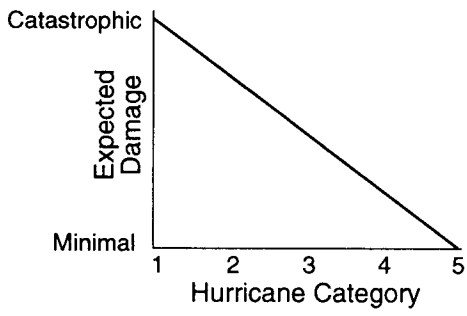
68 The difference between the windspeed of a category-1 hurricane and the windspeed of a category-5 hurricane is primarily caused by the differences in

- 1 types of clouds
- 2 amounts of precipitation
- 3 air-pressure gradients
- 4 air-temperature gradients

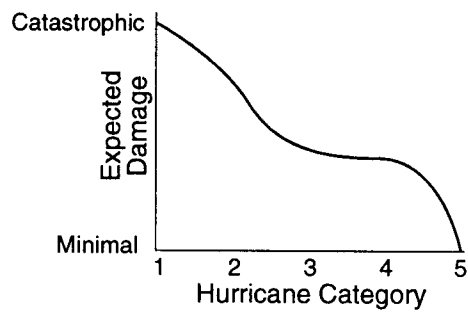
69 A hurricane with a central air pressure recorded at 28.70 inches has an expected storm surge of

- |           |           |
|-----------|-----------|
| (1) 1.3 m | (3) 3.3 m |
| (2) 2.0 m | (4) 4.0 m |

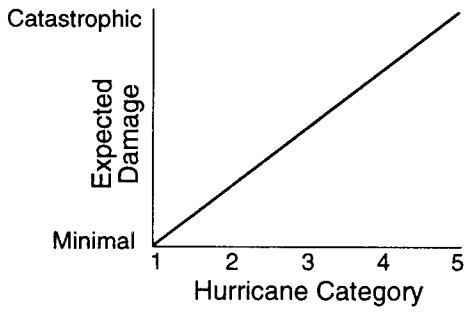
70 Which graph best shows the relationship between the category number of a hurricane and the expected damage from the storm?



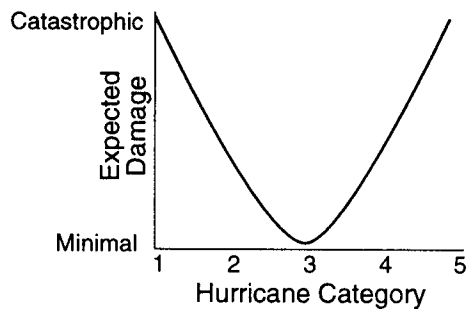
( 1 )



( 3 )



( 2 )

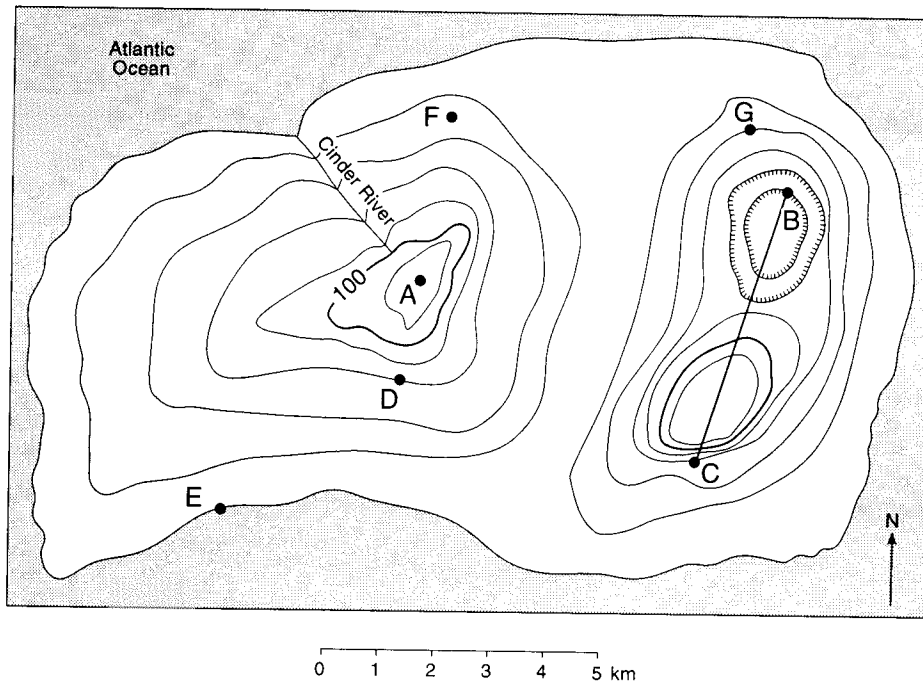


( 4 )

### Group 4

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

Base your answers to questions 71 through 75 on the contour map of an island below and on your knowledge of Earth science. Points A through G represent locations on the island. Elevations are in meters.



71 Which point is located on the steepest slope?

- |              |              |
|--------------|--------------|
| (1) <i>F</i> | (3) <i>C</i> |
| (2) <i>B</i> | (4) <i>D</i> |

72 In which direction does the Cinder River flow?

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

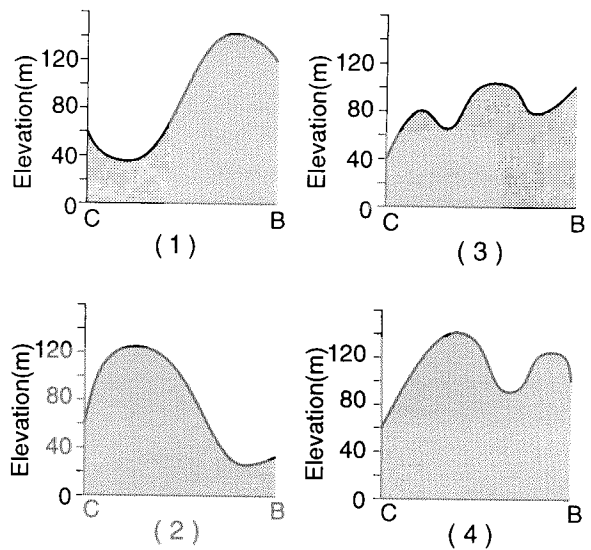
73 What is the contour interval for this map?

- |          |          |
|----------|----------|
| (1) 10 m | (3) 20 m |
| (2) 15 m | (4) 25 m |

74 Which two points have the same elevation?

- |                           |                           |
|---------------------------|---------------------------|
| (1) <i>G</i> and <i>F</i> | (3) <i>C</i> and <i>D</i> |
| (2) <i>B</i> and <i>D</i> | (4) <i>G</i> and <i>C</i> |

75 Which diagram best represents the topographic profile from location C to location B?

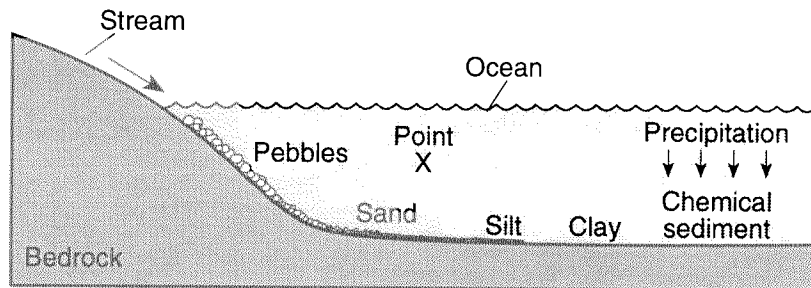




**Group 5**

**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 profile shown below, and your knowledge of Earth science. The profile shows the pattern of horizontal sorting produced at a particular time when a sediment-laden stream enters the ocean.



76 Why is this pattern of horizontal sorting produced?

- 1 Sediments with a flatter shape settle faster.
- 2 Lower density particles settle faster.
- 3 Dissolved minerals are deposited first.
- 4 Larger particles are deposited first.

77 Deposition of these sediments occurs when a stream enters the ocean because the stream current

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

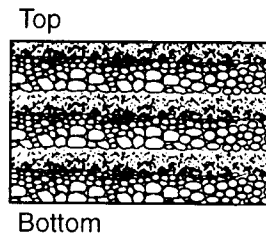
78 What is the approximate velocity of the remaining stream current at point X?

- |                |               |
|----------------|---------------|
| (1) 100 cm/sec | (3) 30 cm/sec |
| (2) 70 cm/sec  | (4) 5 cm/sec  |

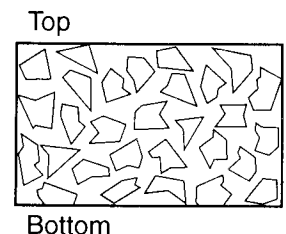
79 Which change in the stream would cause pebbles to be deposited farther offshore?

- 1 a decrease in the stream's gradient
- 2 a decrease in the amount of sediment in the stream
- 3 an increase in the stream's discharge
- 4 an increase in the density of the sediment

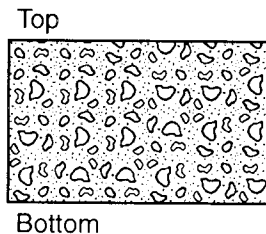
80 Which cross-sectional diagram best represents the appearance of the sediment deposition in this region over time?



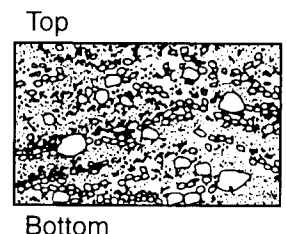
(1)



(3)



(2)

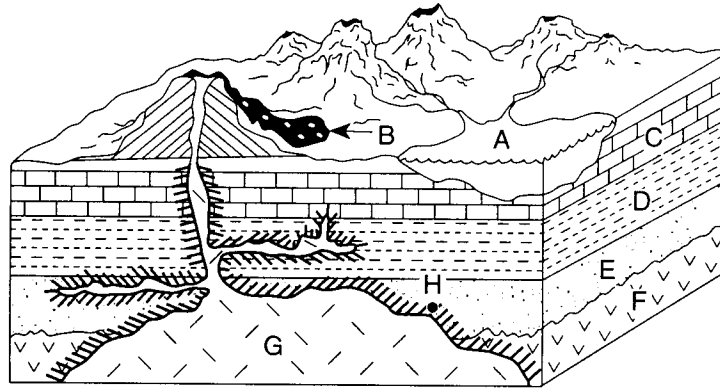


(4)

Group 6

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

Base your answers to questions 81 through 85 on the *Earth Science Reference Tables*, the block diagram below, and your knowledge of Earth science. The diagram shows a cross section of Earth's crust. Letter A identifies a lake, and letters B through G represent different types of bedrock.



Key:

Limestone C

Shale D

Fine-grain sandstone E

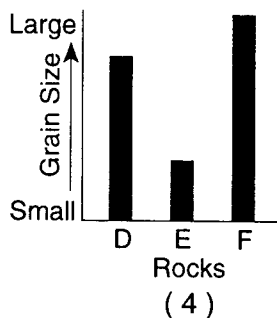
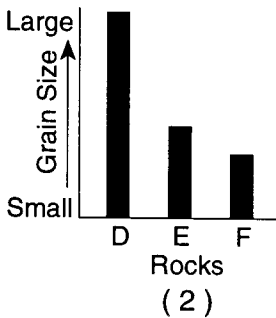
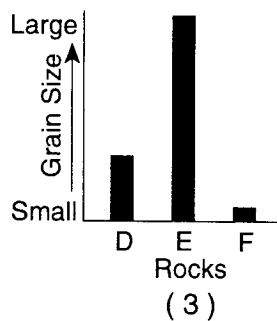
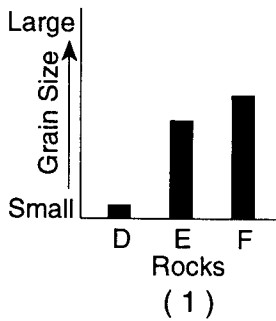
Contact metamorphism

Intrusive igneous rock F

Intrusive igneous rock G

Lava flow B

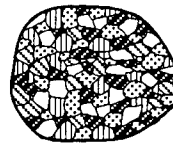
81 Which graph best represents a possible comparison of the average grain sizes for rocks D, E, and F?



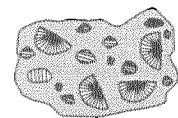
82 The rock produced at point H is most likely

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

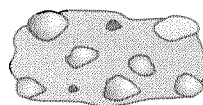
83 Which diagram best represents a sample of rock G?



(1)



(3)



(2)



(4)

84 Rock *B* is a dark-colored crystalline rock that formed when a lava flow cooled and solidified quickly on the surface of Earth.

Rock *B* is classified as an

- 1 extrusive igneous rock with a coarse texture and felsic composition
- 2 extrusive igneous rock with a fine texture and a mafic composition
- 3 intrusive igneous rock with a coarse texture and a felsic composition
- 4 intrusive igneous rock with a fine texture and a mafic composition

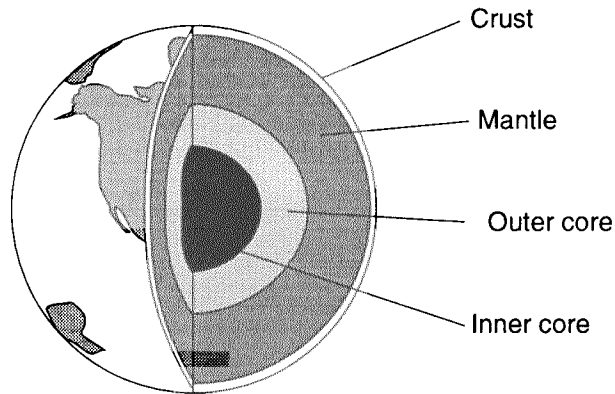
85 Rock *C* most likely resulted from the

- 1 rapid cooling of lava from volcanic eruptions
- 2 regional metamorphism of a previously existing rock
- 3 compaction and cementation of angular quartz fragments
- 4 precipitation of minerals from evaporating water

## 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 diagram below, and your knowledge of Earth science. The diagram represents Earth's interior zones.



( Not drawn to scale )

86 The thinnest section of Earth's crust is found beneath

- |                  |                    |
|------------------|--------------------|
| 1 oceans         | 3 coastal plains   |
| 2 desert regions | 4 mountain regions |

87 In which layer of Earth's interior is the inferred temperature 6,000°C?

- |          |              |
|----------|--------------|
| 1 crust  | 3 outer core |
| 2 mantle | 4 inner core |

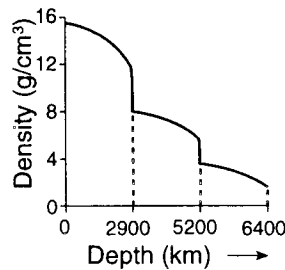
88 Scientists have classified Earth's interior into the zones shown based primarily on evidence gained by studying

- 1 deep drill cores
- 2 volcanic eruptions
- 3 gravity measurements
- 4 earthquake seismic waves

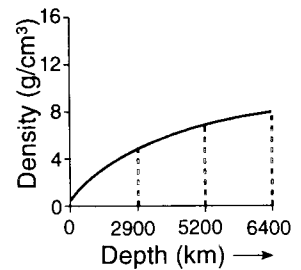
89 The composition of Earth's core is thought to be the same as the composition of many

- |                  |            |
|------------------|------------|
| 1 meteorites     | 3 granites |
| 2 volcanic ashes | 4 basalts  |

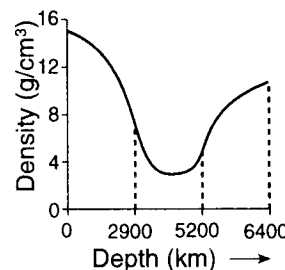
90 Which graph best represents the relationship between depth below Earth's surface and density?



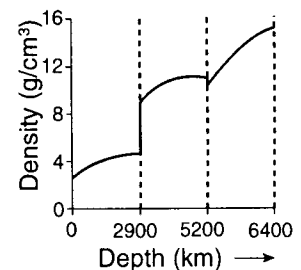
( 1 )



( 3 )



( 2 )

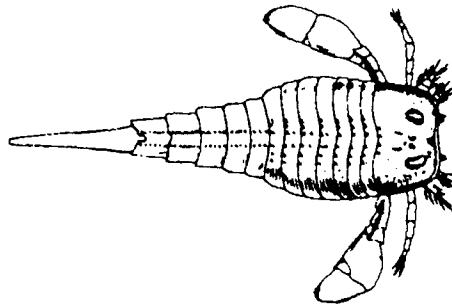


( 4 )

## Group 8

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

Base your answers to questions 91 through 95 on the *Earth Science Reference Tables*, the index fossil diagram below, and your knowledge of Earth science. This index fossil was found in surface bedrock in New York State.



91 This index fossil is representative of a group of invertebrate animals known as

- |                 |               |
|-----------------|---------------|
| 1 trilobites    | 3 brachiopods |
| 2 stromatolites | 4 eurypterids |

92 During which geologic time period was this particular species alive and most abundant?

- |            |            |
|------------|------------|
| 1 Cambrian | 3 Silurian |
| 2 Jurassic | 4 Tertiary |

93 Index fossils, such as the one in the diagram, are useful to geologists for correlating rocks because each species

- 1 was narrowly distributed and became extinct after a long geologic existence
- 2 was widely distributed and became extinct after a short geologic existence
- 3 is easily found and is living today
- 4 is rarely found and is no longer living

94 Which information could scientists most easily infer about the location where this index fossil was found?

- 1 environmental conditions that existed when the animal lived
- 2 change in the seafloor-spreading rates from the time this animal lived to the present
- 3 length of time necessary to form the igneous rock in which this fossil was found
- 4 amount of radioactive carbon-14 in Earth's atmosphere when this animal lived

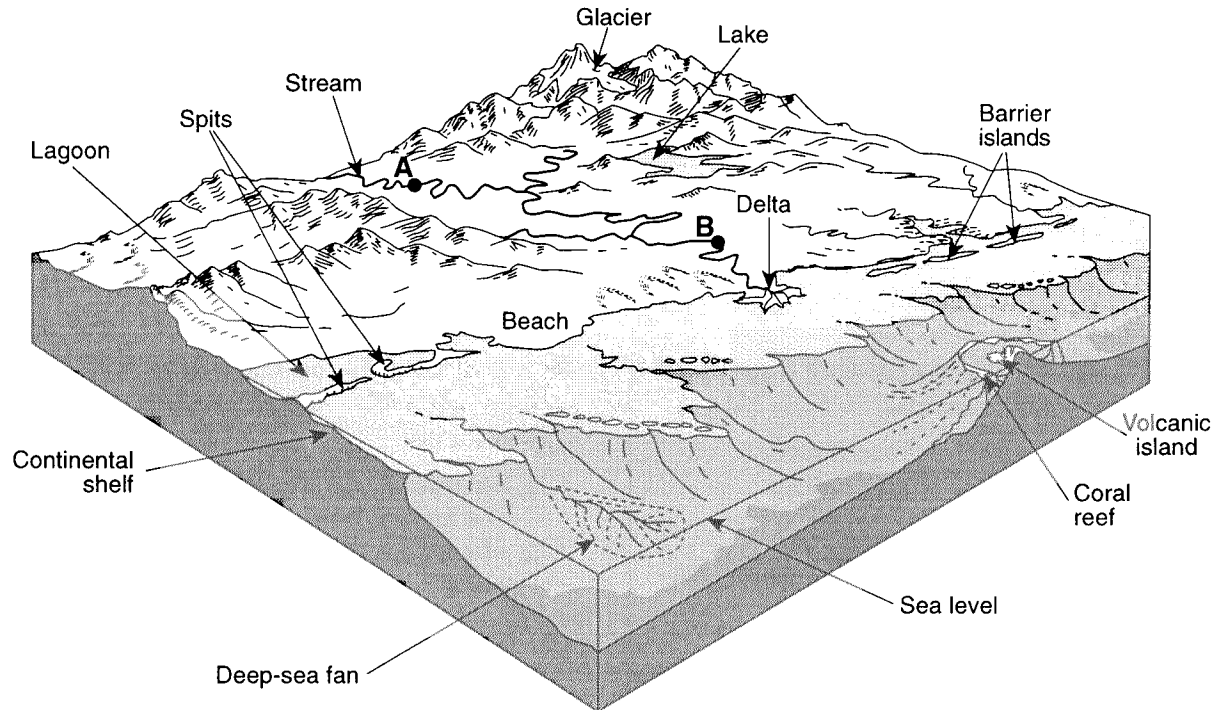
95 The surface bedrock in which this index fossil was found is most likely composed of

- |           |                   |
|-----------|-------------------|
| 1 basalt  | 3 limestone       |
| 2 granite | 4 anthracite coal |

## Group 9

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

Base your answers to questions 96 through 100 on the *Earth Science Reference Tables*, the diagram below, and your knowledge of Earth science. The diagram shows a coastal area with a variety of landforms. Points A and B are reference points along a meandering stream.



96 The primary force controlling the movement of the stream and the glacier is

- |              |           |
|--------------|-----------|
| 1 deposition | 3 gravity |
| 2 insolation | 4 climate |

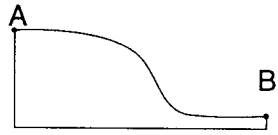
97 Which feature indicates an area with a warm climate?

- |              |                     |
|--------------|---------------------|
| 1 spits      | 3 continental shelf |
| 2 coral reef | 4 deep-sea fan      |

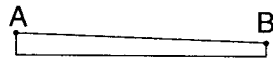
98 The environment of this area would be polluted *least* by

- 1 building fossil-fuel power plants along the stream
- 2 constructing sewage-treatment plants and landfills on the edge of the lagoon
- 3 developing vacation homes on the barrier islands
- 4 establishing a wildlife refuge around the lake

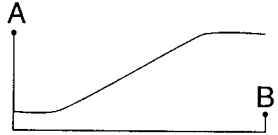
99 Which profile best represents the slope of the meandering stream between points A and B?



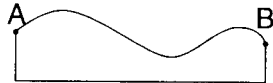
(1)



(3)

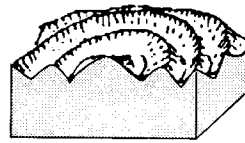


(2)

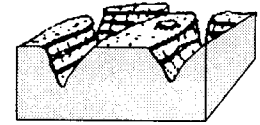


(4)

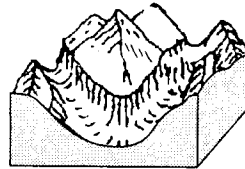
100 Which landscape best represents the shape of the valleys occupied by glaciers?



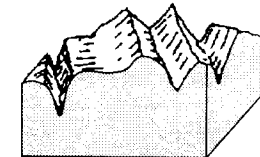
(1)



(3)



(2)



(4)

**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 A student measures the volume of water as 72 milliliters when the true volume is 75 milliliters. Which equation should be used to determine the student's percent deviation?

(1) % deviation =  $\frac{72}{75} \times 100$

(2) % deviation =  $\frac{72 + 75}{75} \times 100$

(3) % deviation =  $\frac{75 - 72}{75} \times 100$

(4) % deviation =  $\frac{75 - 72}{72} \times 100$

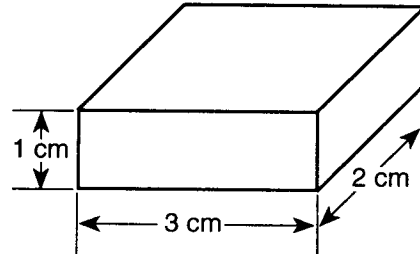
102 Which planet's orbit is most nearly circular?

- |         |           |
|---------|-----------|
| 1 Earth | 3 Neptune |
| 2 Venus | 4 Pluto   |

103 What is the dewpoint when the dry-bulb temperature is 16°C and the wet-bulb temperature is 12°C?

- |           |         |
|-----------|---------|
| (1) -19°C | (3) 7°C |
| (2) -16°C | (4) 9°C |

104 The diagram below represents a solid object with a density of 3 grams per cubic centimeter.



(Not drawn to scale)

What is the mass of this object?

- |           |          |
|-----------|----------|
| (1) 0.5 g | (3) 18 g |
| (2) 2 g   | (4) 36 g |

105 Point A and point B are locations 0.24 mile apart on a ski slope in northern New York. Point A has an elevation of 1,560 feet and point B has an elevation of 1,800 feet. What is the gradient between these points?

- |               |                 |
|---------------|-----------------|
| (1) 60 ft/mi  | (3) 500 ft/mi   |
| (2) 240 ft/mi | (4) 1,000 ft/mi |



The University of the State of New York

REGENTS HIGH SCHOOL EXAMINATION

EARTH SCIENCE

Wednesday, January 27, 1999 — 1:15 to 4:15 p.m., only

ANSWER SHEET

Part I Credits . . . . .	.....
Part II Credits . . . . .	.....
Performance Test Credits . .	.....
<b>Total (Official Regents)</b>	
<b>Examination Mark . . . . .</b>	.....
<b>Reviewer's Initials:</b>	.....

Tear Here

Student ..... Sex:  Male  Female

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

Grade (circle one)      8      9      10      11      12

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

Part I (55 credits)

- |    |   |   |   |   |    |   |   |   |   |    |   |   |   |   |    |   |   |   |   |
|----|---|---|---|---|----|---|---|---|---|----|---|---|---|---|----|---|---|---|---|
| 1  | 1 | 2 | 3 | 4 | 16 | 1 | 2 | 3 | 4 | 31 | 1 | 2 | 3 | 4 | 46 | 1 | 2 | 3 | 4 |
| 2  | 1 | 2 | 3 | 4 | 17 | 1 | 2 | 3 | 4 | 32 | 1 | 2 | 3 | 4 | 47 | 1 | 2 | 3 | 4 |
| 3  | 1 | 2 | 3 | 4 | 18 | 1 | 2 | 3 | 4 | 33 | 1 | 2 | 3 | 4 | 48 | 1 | 2 | 3 | 4 |
| 4  | 1 | 2 | 3 | 4 | 19 | 1 | 2 | 3 | 4 | 34 | 1 | 2 | 3 | 4 | 49 | 1 | 2 | 3 | 4 |
| 5  | 1 | 2 | 3 | 4 | 20 | 1 | 2 | 3 | 4 | 35 | 1 | 2 | 3 | 4 | 50 | 1 | 2 | 3 | 4 |
| 6  | 1 | 2 | 3 | 4 | 21 | 1 | 2 | 3 | 4 | 36 | 1 | 2 | 3 | 4 | 51 | 1 | 2 | 3 | 4 |
| 7  | 1 | 2 | 3 | 4 | 22 | 1 | 2 | 3 | 4 | 37 | 1 | 2 | 3 | 4 | 52 | 1 | 2 | 3 | 4 |
| 8  | 1 | 2 | 3 | 4 | 23 | 1 | 2 | 3 | 4 | 38 | 1 | 2 | 3 | 4 | 53 | 1 | 2 | 3 | 4 |
| 9  | 1 | 2 | 3 | 4 | 24 | 1 | 2 | 3 | 4 | 39 | 1 | 2 | 3 | 4 | 54 | 1 | 2 | 3 | 4 |
| 10 | 1 | 2 | 3 | 4 | 25 | 1 | 2 | 3 | 4 | 40 | 1 | 2 | 3 | 4 | 55 | 1 | 2 | 3 | 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.

Tear Here

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 4
- 77 1 2 3 4
- 78 1 2 3 4
- 79 1 2 3 4
- 80 1 2 3 4

Group 6

- 81 1 2 3 4
- 82 1 2 3 4
- 83 1 2 3 4
- 84 1 2 3 4
- 85 1 2 3 4

Group 7

- 86 1 2 3 4
- 87 1 2 3 4
- 88 1 2 3 4
- 89 1 2 3 4
- 90 1 2 3 4

Group 8

- 91 1 2 3 4
- 92 1 2 3 4
- 93 1 2 3 4
- 94 1 2 3 4
- 95 1 2 3 4

Group 9

- 96 1 2 3 4
- 97 1 2 3 4
- 98 1 2 3 4
- 99 1 2 3 4
- 100 1 2 3 4

Group 10

- 101 1 2 3 4
- 102 1 2 3 4
- 103 1 2 3 4
- 104 1 2 3 4
- 105 1 2 3 4

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