

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

PHYSICAL SETTING
EARTH SCIENCE

Tuesday, August 17, 2004 — 12:30 to 3:30 p.m., only

This is a test of your knowledge of Earth science. Use that knowledge to answer all questions in this examination. Some questions may require the use of the *Earth Science Reference Tables*. The *Earth Science Reference Tables* are supplied separately. Be certain you have a copy of the 2001 edition of these reference tables before you begin the examination.

Your answer sheet for Part A and Part B–1 is the last page of this examination booklet. Turn to the last page and fold it along the perforations. Then, slowly and carefully, tear off your answer sheet and fill in the heading.

The answers to the questions in Part B–2 and Part C are to be written in your separate answer booklet. Be sure to fill in the heading on the front of your answer booklet.

You are to answer *all* questions in all parts of this examination according to the directions provided in the examination booklet. Record your answers to the Part A and Part B–1 multiple-choice questions on your separate answer sheet. Write your answers to the Part B–2 and Part C questions in your answer booklet. All work should be written in pen, except for graphs and drawings, which should be done in pencil. You may use scrap paper to work out the answers to the questions, but be sure to record all your answers on your separate answer sheet and in your answer booklet.

When you have completed the examination, you must sign the statement printed at the end of your separate 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 and answer booklet cannot be accepted if you fail to sign this declaration.

Notice . . .

A four-function or scientific calculator and a copy of the 2001 *Earth Science Reference Tables* must be available for your use while taking this examination.

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

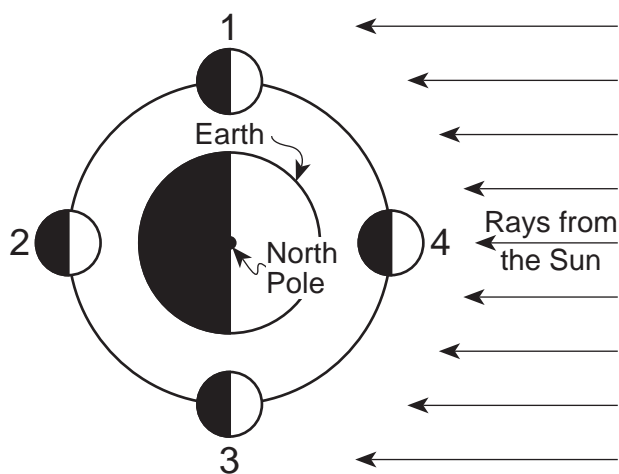
Part A

Answer all questions in this part.

Directions (1–35): For *each* statement or question, write on your separate answer sheet the *number* of the word or expression that, of those given, best completes the statement or answers the question. Some questions may require the use of the *Earth Science Reference Tables*.

- 1 One complete cycle of the phases of the Moon takes approximately one
- | | |
|----------|-----------|
| (1) day | (3) month |
| (2) week | (4) year |

- 2 The diagram below shows the Moon at four positions in its orbit around Earth.

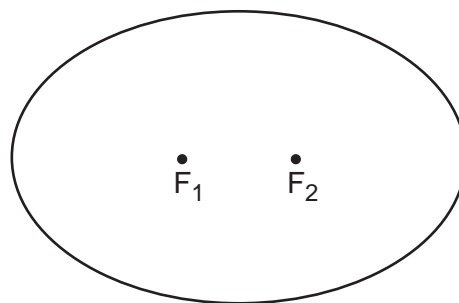


(Not drawn to scale)

An observer on Earth could see a solar eclipse when the Moon is at position

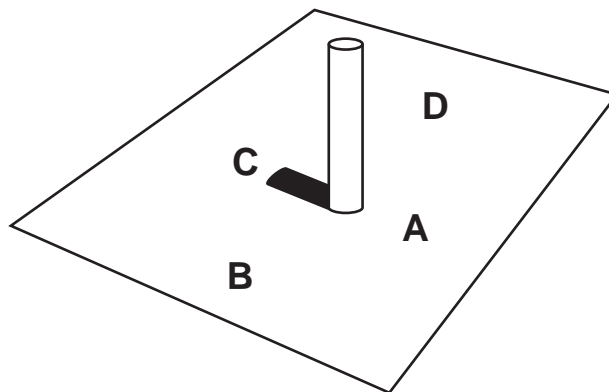
- | | |
|-------|-------|
| (1) 1 | (3) 3 |
| (2) 2 | (4) 4 |
- 3 Which two stars have the most similar luminosity and temperature?
- (1) *Betelgeuse* and *Barnard's Star*
 - (2) *Rigel* and *Betelgeuse*
 - (3) *Alpha Centauri* and the Sun
 - (4) *Sirius* and *Procyon B*
- 4 Which planet would float if it could be placed in water?
- | | |
|-------------|------------|
| (1) Mercury | (3) Saturn |
| (2) Earth | (4) Pluto |

- 5 The diagram below is a constructed ellipse. F_1 and F_2 are the foci of the ellipse.



The eccentricity of this constructed ellipse is closest to the eccentricity of the orbit of which planet?

- | | |
|-------------|------------|
| (1) Mercury | (3) Saturn |
| (2) Earth | (4) Pluto |
- 6 The diagram below shows the noontime shadow cast by a vertical post located in New York State.



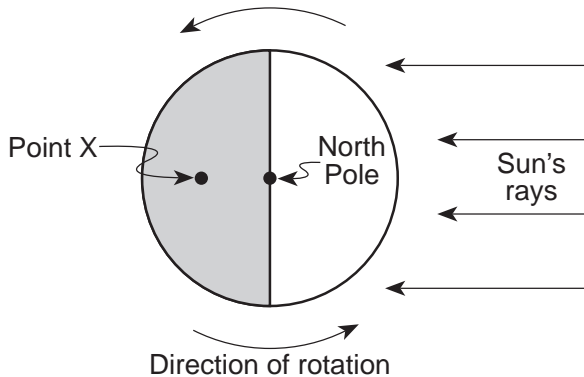
Which letter indicates a location west of the post?

- | | |
|-------|-------|
| (1) A | (3) C |
| (2) B | (4) D |
- 7 On March 21, at which location in New York State would sunrise occur first?
- | | |
|---------------|-------------|
| (1) Riverhead | (3) Buffalo |
| (2) Syracuse | (4) Massena |

8 Earth is farthest from the Sun during the Northern Hemisphere's summer, and Earth is closest to the Sun during the Northern Hemisphere's winter. During which season in the Northern Hemisphere is Earth's orbital velocity greatest?

- (1) winter
- (2) spring
- (3) summer
- (4) fall

9 The diagram below represents the direction of Earth's rotation as it appears from above the North Pole. Point X is a location on Earth's surface.



The time at point X is closest to

- (1) 9 a.m.
- (2) 12 noon
- (3) 9 p.m.
- (4) 12 midnight

10 As a ship crosses the Prime Meridian, an observer on the ship measures the altitude of *Polaris* at 60° . What is the ship's location?

- (1) 60° south latitude and 0° longitude
- (2) 60° north latitude and 0° longitude
- (3) 0° latitude and 60° east longitude
- (4) 0° latitude and 60° west longitude

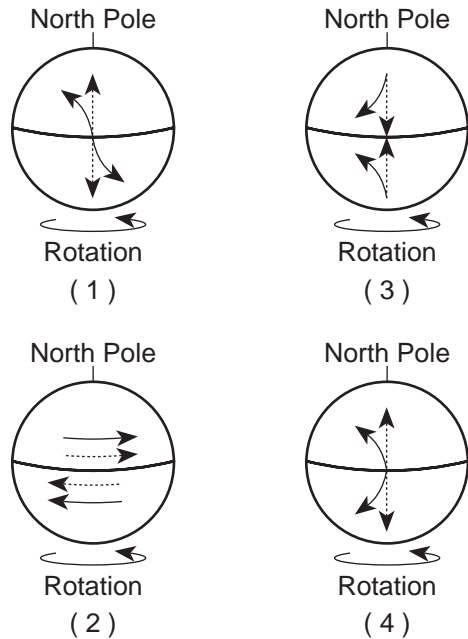
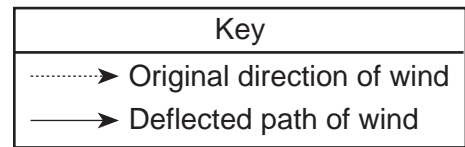
11 Which part of the Sun's electromagnetic spectrum has the longest wavelength?

- (1) radio wave radiation
- (2) infrared radiation
- (3) visible light radiation
- (4) x-ray radiation

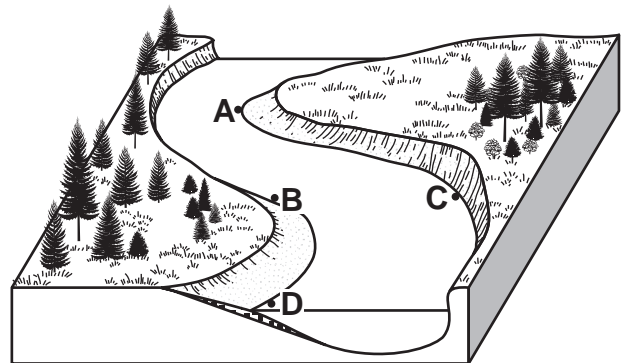
12 Which weather change is most likely indicated by rapidly falling air pressure?

- (1) Humidity is decreasing.
- (2) Temperature is decreasing.
- (3) Skies are clearing.
- (4) A storm is approaching.

13 Which diagram correctly shows how surface winds are deflected (curved) in the Northern and Southern Hemispheres due to Earth's rotation?



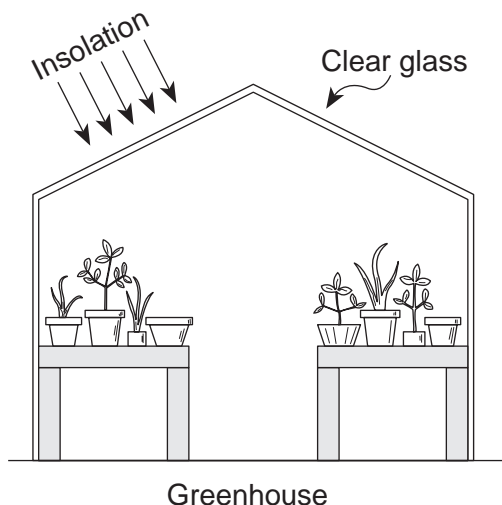
14 The diagram below shows points A, B, C, and D on a meandering stream.



At which point does the greatest stream erosion occur?

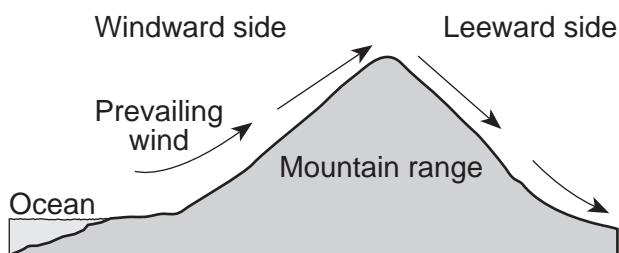
- (1) A
- (2) B
- (3) C
- (4) D

15 The diagram below shows a greenhouse.



What is the primary function of the clear glass of the greenhouse?

- (1) The glass reduces the amount of insolation entering the greenhouse.
 - (2) The glass allows all wavelengths of radiation to enter and all wavelengths of radiation to escape.
 - (3) The glass allows short wavelengths of radiation to enter, but reduces the amount of long-wavelength radiation that escapes.
 - (4) The glass allows long wavelengths of radiation to enter, but reduces the amount of short-wavelength radiation that escapes.
- 16 The cross section below shows the prevailing winds that cause different climates on the windward and leeward sides of this mountain range.



Compared to the climate conditions on the leeward side of this mountain range, the conditions on the windward side are usually

- (1) cooler and wetter
- (2) cooler and drier
- (3) warmer and wetter
- (4) warmer and drier

17 The California Ocean Current, which flows along the west coast of North America, is a

- (1) cool current, flowing north
- (2) cool current, flowing south
- (3) warm current, flowing north
- (4) warm current, flowing south

18 Which change at a particular location in a stream usually causes more sediments to be deposited at that location?

- (1) decrease in stream velocity
- (2) decrease in stream width
- (3) increase in stream slope
- (4) increase in stream discharge

19 Rocks are classified as igneous, sedimentary, or metamorphic based primarily on their

- (1) texture
- (2) crystal or grain size
- (3) method of formation
- (4) mineral composition

20 The internal atomic structure of a mineral most likely determines the mineral's

- (1) color, streak, and age
- (2) origin, exposure, and fracture
- (3) size, location, and luster
- (4) hardness, cleavage, and crystal shape

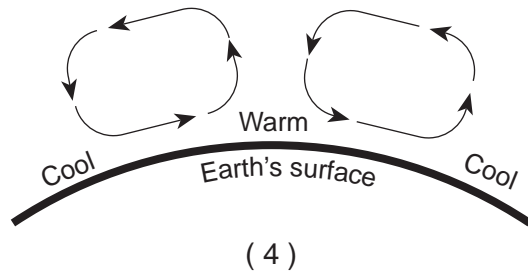
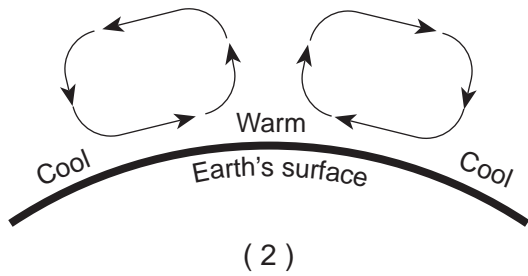
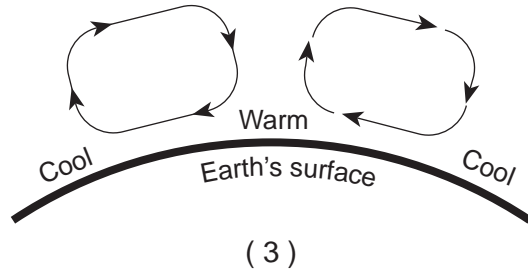
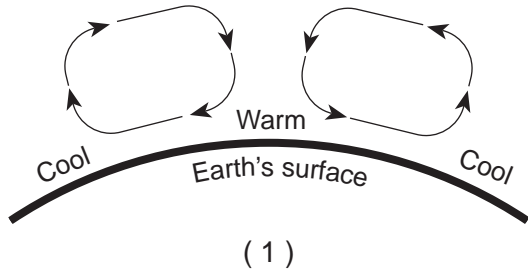
21 How are the minerals biotite mica and muscovite mica different?

- (1) Biotite mica is colorless, but muscovite mica is not.
- (2) Biotite mica contains iron and/or magnesium, but muscovite mica does not.
- (3) Muscovite mica scratches quartz, but biotite mica does not.
- (4) Muscovite mica cleaves into thin sheets, but biotite mica does not.

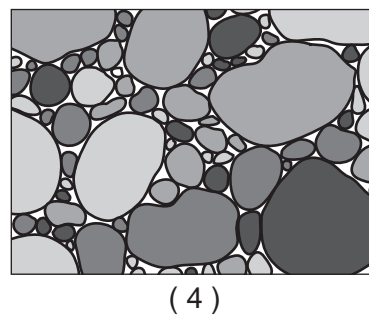
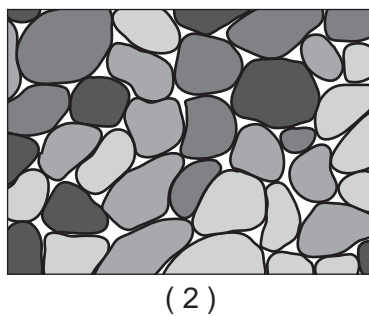
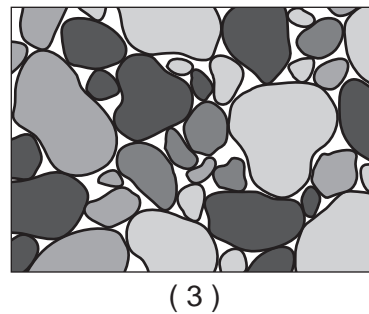
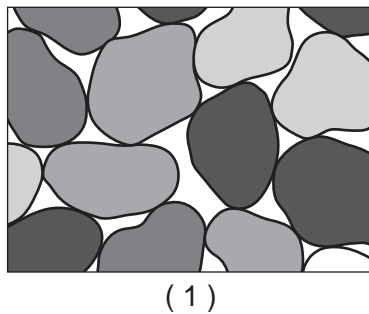
22 Which three minerals are most commonly found in the igneous rock granite?

- (1) amphibole, calcite, and hematite
- (2) amphibole, biotite mica, and gypsum
- (3) plagioclase feldspar, pyroxene, and olivine
- (4) plagioclase feldspar, potassium feldspar, and quartz

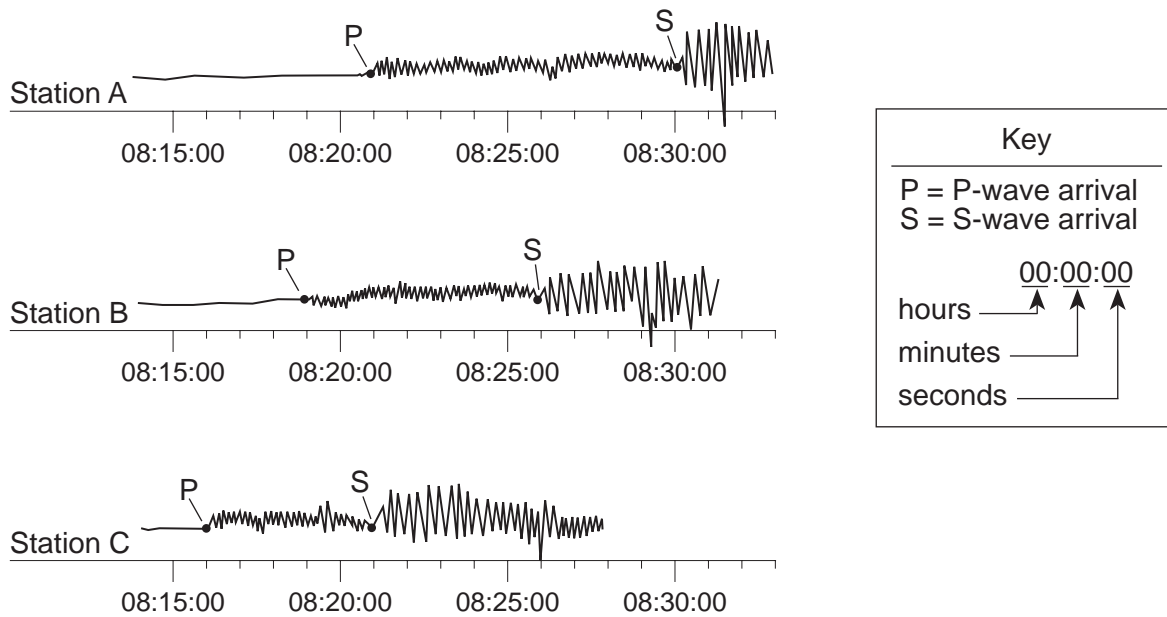
23 The cross sections below show different patterns of air movement in Earth's atmosphere. Air temperatures at Earth's surface are indicated in each cross section. Which cross section shows the most likely pattern of air movement in Earth's atmosphere that would result from the surface air temperatures shown?



24 The diagrams below represent four permeable sediment samples. The sediments are composed of the same material, but differ in particle size and sorting. Which sediment sample will most likely have the fastest ground-water infiltration rate?



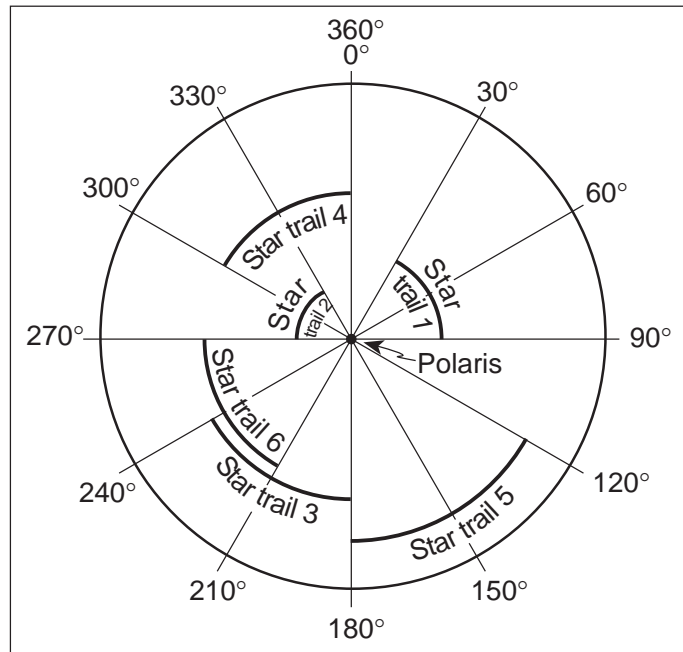
25 The diagram below represents three seismograms showing the same earthquake as it was recorded at three different seismic stations, *A*, *B*, and *C*.



Which statement correctly describes the distance between the earthquake epicenter and these seismic stations?

- (1) *A* is closest to the epicenter, and *C* is farthest from the epicenter.
- (2) *B* is closest to the epicenter, and *C* is farthest from the epicenter.
- (3) *C* is closest to the epicenter, and *A* is farthest from the epicenter.
- (4) *A* is closest to the epicenter, and *B* is farthest from the epicenter.

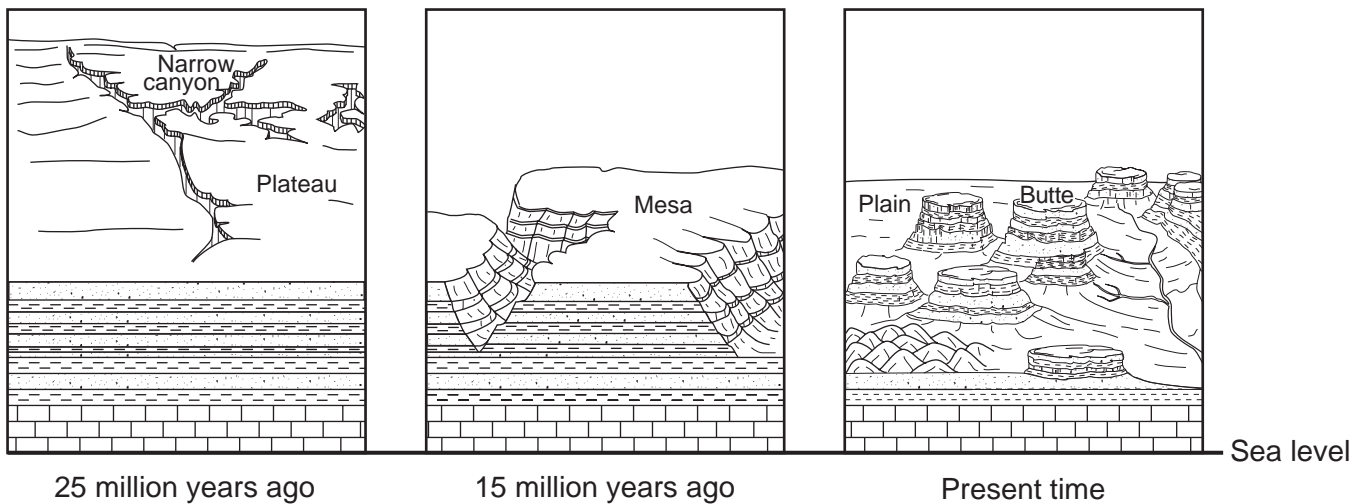
26 A camera was placed outside at night and pointed directly at *Polaris* and several other stars. The lens was kept open and a time-exposure photograph was taken. The diagram below represents that photograph of *Polaris* and star trails, with an angular protractor to measure apparent motion.



How many hours was the lens kept open to create the star trails in this photograph?

- (1) 1 hour
- (2) 6 hours
- (3) 3 hours
- (4) 4 hours

27 The sequence of bedrock cross sections below represents the same landscape region over a period of geologic time.



This sequence best represents

- (1) an arid region that experienced mostly uplifting forces
- (2) an arid region that experienced mostly erosional forces
- (3) a humid region that experienced mostly uplifting forces
- (4) a humid region that experienced mostly erosional forces

28 Which method of energy transfer is primarily responsible for energy being lost from Earth into space?

- (1) conduction
- (2) convection
- (3) solidification
- (4) radiation

29 When a continental crustal plate collides with an oceanic crustal plate, the continental crust is forced to move over the oceanic crust. What is the primary reason that the continental crust stays on top of the oceanic crust?

- (1) Continental crust is less dense.
- (2) Continental crust deforms less easily.
- (3) Continental crust melts at higher temperatures.
- (4) Continental crust contains more mafic minerals.

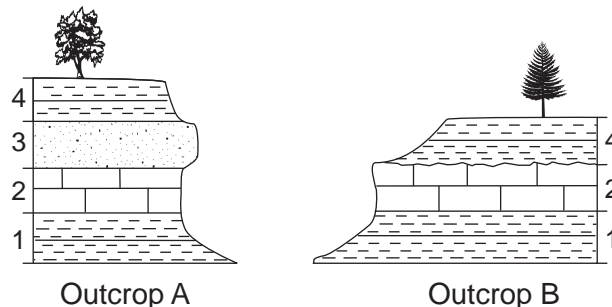
30 Earth's fossil record shows evidence that

- (1) very few life-forms have become extinct
- (2) life-forms existed on land before life-forms existed in water
- (3) more complex life-forms probably have evolved from less complex life-forms
- (4) older bedrock contains a great variety of life-forms, while younger bedrock contains less variety of life-forms

31 Large garnet mineral crystals are found in the metamorphic surface bedrock in which New York State landscape region?

- (1) Catskills
- (2) Adirondacks
- (3) Erie-Ontario Lowlands
- (4) Tug Hill Plateau

32 Bedrock outcrops A and B are located at two different locations along the Genesee River in western New York State. Rock layers 1, 2, and 4 are the same in both outcrops.



Which statement best explains why rock layer 3 is missing from outcrop B?

- (1) A fault exists between outcrops A and B.
- (2) Erosion created an unconformity between rock layers 2 and 4 in outcrop B.
- (3) A volcanic eruption destroyed rock layer 3 in outcrop B.
- (4) Metamorphism of outcrop A created rock layer 3.

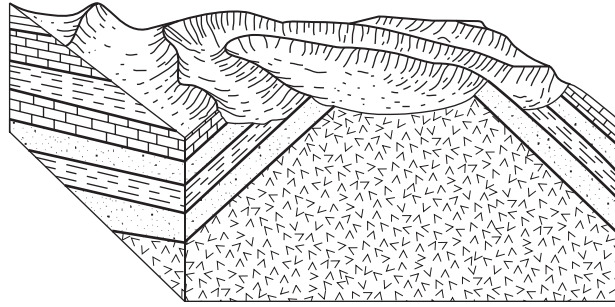
33 Fossilized footprints of *Coelophysis* dinosaurs have been found in bedrock closest to which New York State location?

- (1) New York City
- (2) Old Forge
- (3) Watertown
- (4) Niagara Falls

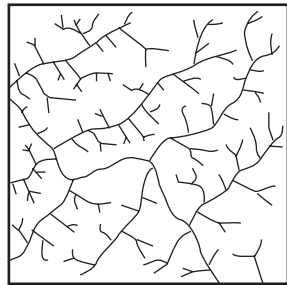
34 A sample of wood that originally contained 100 grams of carbon-14 now contains only 25 grams of carbon-14. Approximately how many years ago was this sample part of a living tree?

- (1) 2,850 years
- (2) 5,700 years
- (3) 11,400 years
- (4) 17,100 years

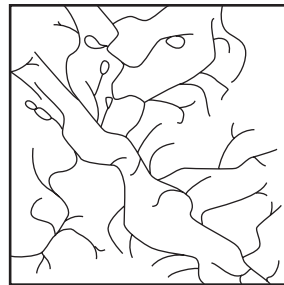
35 The block diagram below represents a deeply eroded dome.



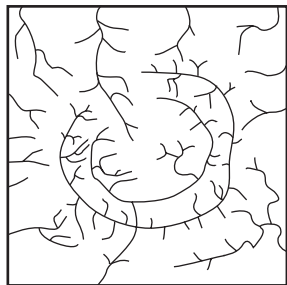
Which map shows the stream drainage pattern that would most likely develop on this deeply eroded dome?



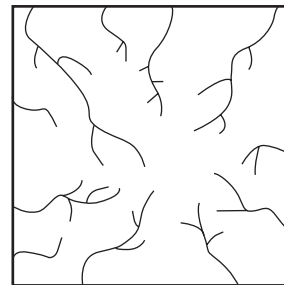
(1)



(3)



(2)



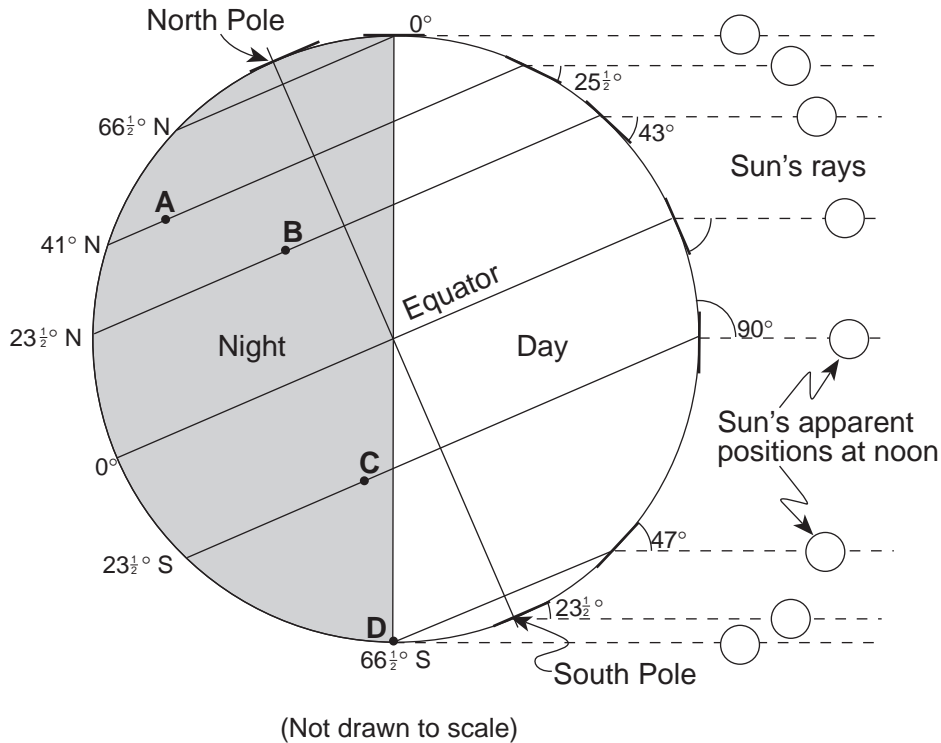
(4)

Part B-1

Answer all questions in this part.

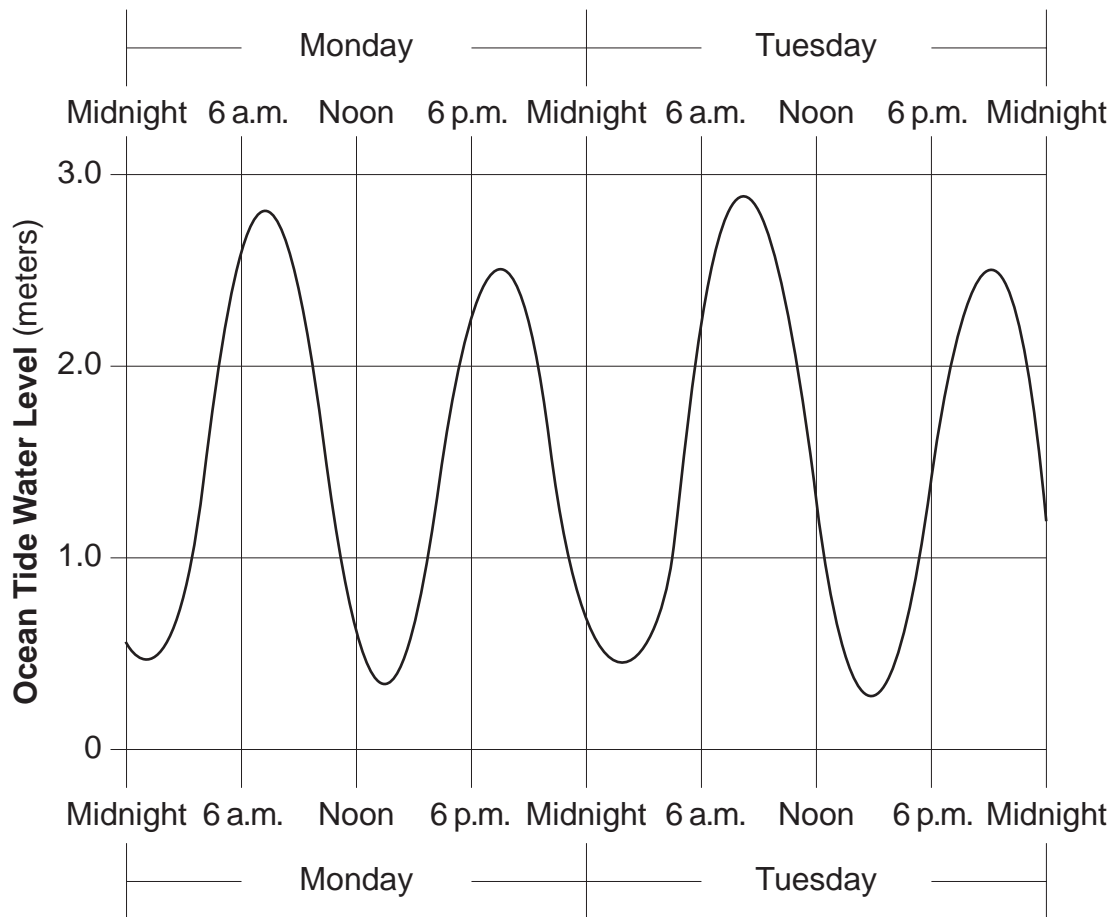
Directions (36–50): For *each* statement or question, write on your separate answer sheet the *number* of the word or expression that, of those given, best completes the statement or answers the question. Some questions may require the use of the *Earth Science Reference Tables*.

Base your answers to questions 36 through 38 on the diagram below, which shows the altitude and apparent position of the noontime Sun, as seen from various latitudes on Earth on a particular day of the year. Letters A through D represent locations on Earth's surface.



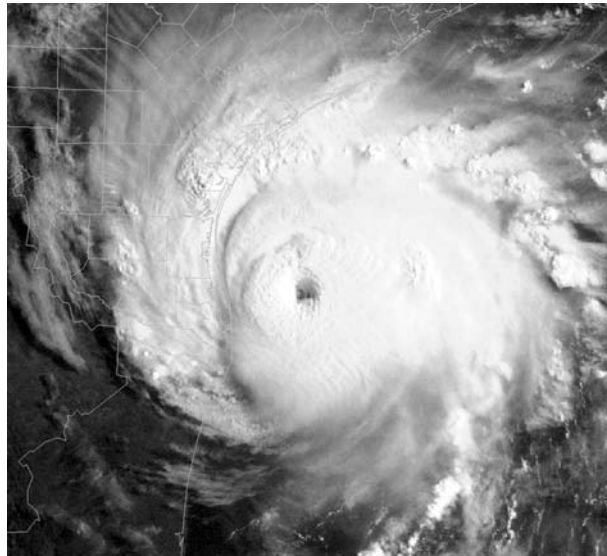
- 36 Which lettered location will experience the *shortest* period of daylight during one Earth rotation on this day?
- | | |
|-------|-------|
| (1) A | (3) C |
| (2) B | (4) D |
- 37 What is the altitude of the noontime Sun at the Equator on this date?
- | | |
|---------------------------|---------------------------|
| (1) $23\frac{1}{2}^\circ$ | (3) $66\frac{1}{2}^\circ$ |
| (2) 43° | (4) 90° |
- 38 Which season will begin at 41° N latitude, three months after the date represented by this diagram?
- | | |
|------------|------------|
| (1) summer | (3) winter |
| (2) fall | (4) spring |

Base your answers to questions 39 through 41 on the graph below, which shows the water levels of ocean tides measured in Boston, Massachusetts, for a 2-day period.



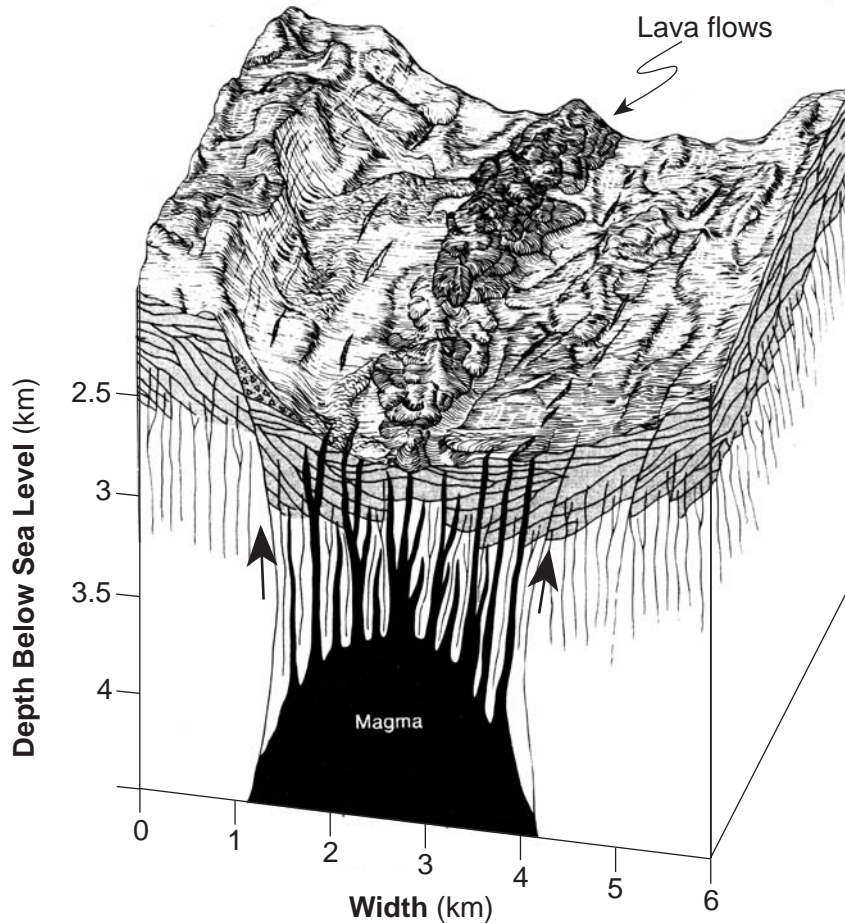
- 39 The graph shows that high tides at Boston occur approximately every
- | | |
|---------------|----------------|
| (1) 3.5 hours | (3) 12.5 hours |
| (2) 6.0 hours | (4) 16.0 hours |
- 40 If the trends shown by the graph continue, which statement best describes the next low tide at Boston that is expected to occur on Wednesday?
- (1) It will occur about 3 a.m. with a 0.4-meter water level.
 - (2) It will occur about 6 a.m. with a 0.6-meter water level.
 - (3) It will occur about 9 p.m. with a 2.6-meter water level.
 - (4) It will occur about 10 p.m. with a 2.8-meter water level.
- 41 The gravitational pull of the Moon has the greatest influence on the water levels of Earth's ocean tides. If the distance between the Moon and Earth were to *decrease* steadily for the week following the time shown on the graph, which water-level changes would be expected to occur?
- (1) High tides would get higher and low tides would get lower.
 - (2) High tides would get lower and low tides would get higher.
 - (3) Both high tides and low tides would get higher.
 - (4) Both high tides and low tides would get lower.

Base your answers to questions 42 through 45 on the satellite image below, which shows a Northern Hemisphere hurricane, and on your knowledge of Earth science.



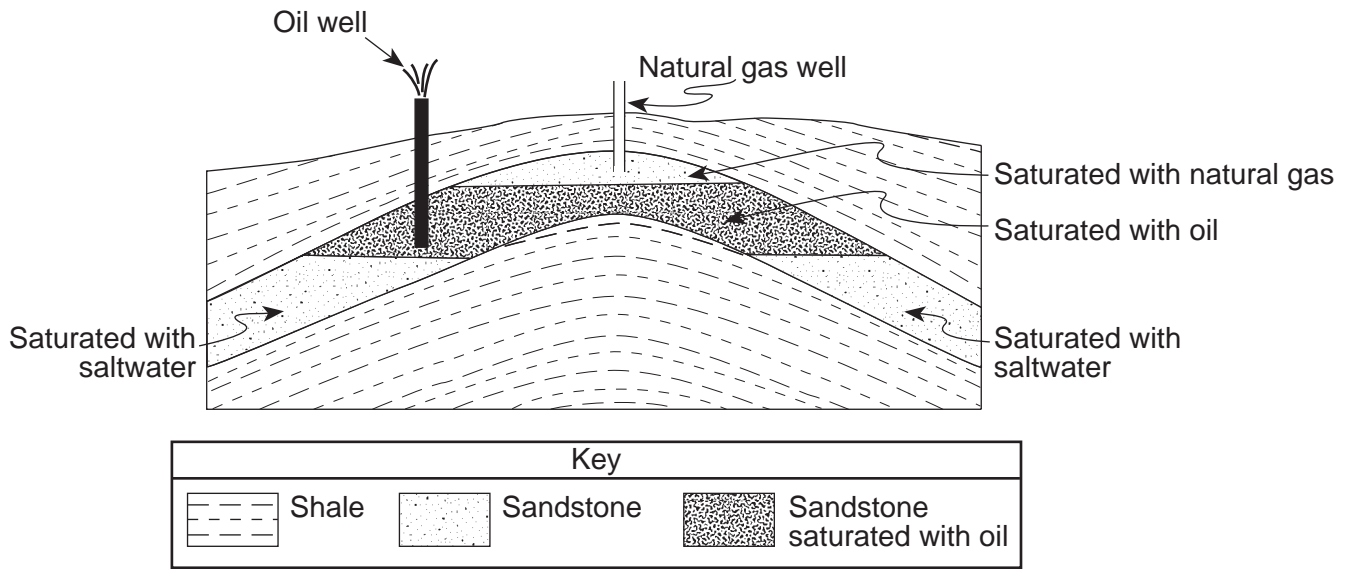
- 42 What is the usual surface wind pattern around the eye of Northern Hemisphere hurricanes?
- | | |
|---------------------------|----------------------------------|
| (1) clockwise and outward | (3) counterclockwise and outward |
| (2) clockwise and inward | (4) counterclockwise and inward |
- 43 Which air mass is normally associated with the formation of hurricanes?
- | | |
|--------------------------|-----------------------|
| (1) continental tropical | (3) continental polar |
| (2) maritime tropical | (4) maritime polar |
- 44 Clouds form in the hurricane because the air is
- | | |
|---------------------------------------|--------------------------------------|
| (1) sinking, expanding, and cooling | (3) rising, expanding, and cooling |
| (2) sinking, compressing, and warming | (4) rising, compressing, and warming |
- 45 When the eye of this hurricane reaches 43° N latitude, this hurricane will most likely be pushed by planetary winds toward the
- | | |
|---------------|---------------|
| (1) northwest | (3) southwest |
| (2) northeast | (4) southeast |
-

Base your answers to questions 46 through 48 on the diagram below, which shows details of a section of a rift valley in the center of a mid-ocean ridge. The vertical lines in the diagram represent faults and fractures within the ocean floor bedrock.



- 46 What will be the primary result of the continuation of the geologic processes indicated at this location?
- (1) Earth's magnetic field will reverse direction.
 - (2) Continental crust will be forced downward.
 - (3) Earth's circumference will increase.
 - (4) New oceanic crust will form.
- 47 Which type of crustal plate boundary is shown in this diagram?
- (1) divergent
 - (2) convergent
 - (3) universal
 - (4) transform
- 48 The dark-colored lava flows shown in the diagram were pushed from the magma chamber onto the surface of the ocean floor. Which characteristics are present in the solid rock that formed when the lava flows cooled?
- (1) generally small grain size and mafic composition
 - (2) generally small grain size and felsic composition
 - (3) generally large grain size and mafic composition
 - (4) generally large grain size and felsic composition

Base your answers to questions 49 and 50 on the cross section below. The cross section shows a typical bedrock structure where oil and natural gas deposits are found.



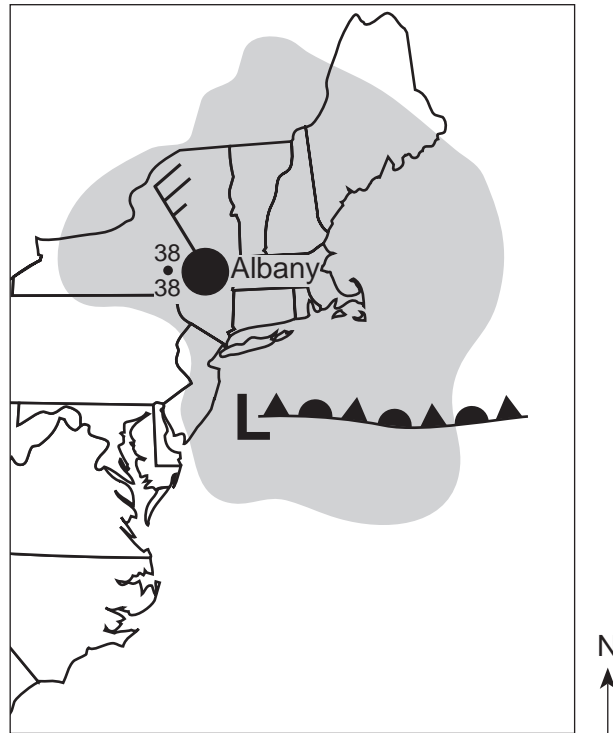
- 49 The natural gas, oil, and saltwater have formed layers at different levels in the same rock layer due to the
- (1) principle of superposition
 - (2) principle of original horizontality
 - (3) differences in the density of the three materials
 - (4) differences in the geologic age of the three materials
- 50 According to the diagram, in which type of rock are these natural gas and oil deposits found?
- (1) coarse-textured igneous rock
 - (2) foliated metamorphic rock
 - (3) porous clastic sedimentary rock
 - (4) intrusive crystalline sedimentary rock
-

Part B-2

Answer all questions in this part.

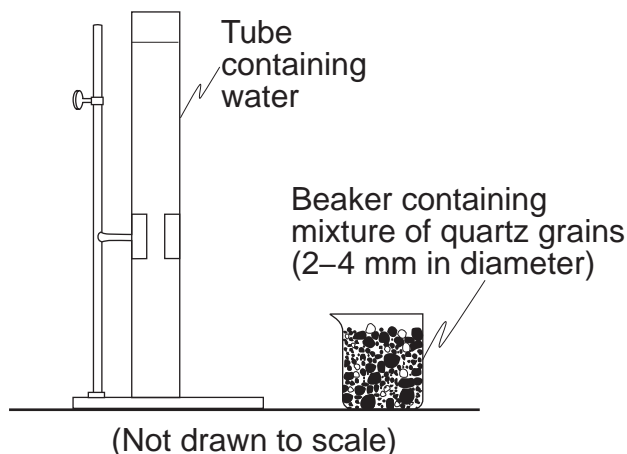
Directions (51-63): Record your answers in the spaces provided in your answer booklet. Some questions may require the use of the *Earth Science Reference Tables*.

Base your answers to questions 51 and 52 on the weather map below, which shows the position of a low-pressure system. The **L** is the center of the low. The shaded portion represents an area of precipitation. A weather station model for Albany, New York, is shown on the map.



- 51 What type of front extends eastward from the low-pressure center? [1]
- 52 *In your answer booklet*, complete the weather data table for Albany, New York, based on the station model shown on the map. [2]
-

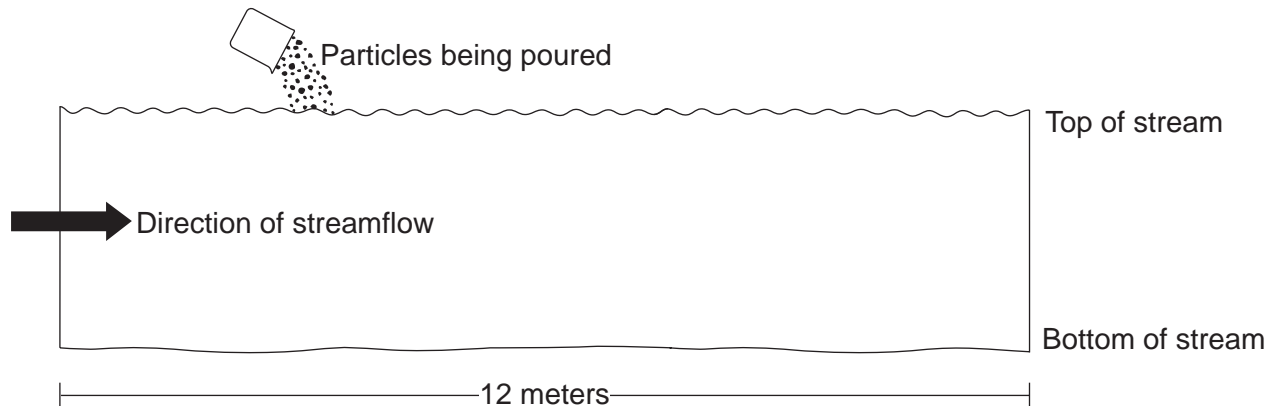
Base your answers to questions 53 and 54 on the diagram below, which shows a clear plastic tube containing water and a beaker containing a mixture of rounded quartz grains of different sizes.



53 When the rounded quartz grains are poured all at once into the tube, the grains will settle to the bottom of the tube. On the cross section provided in *your answer booklet*, draw the approximate grain sizes and pattern of arrangement of the rounded quartz grains at the bottom of the tube. [1]

54 The side-view diagram below shows the same mixture and amount of rounded quartz grains being poured all at once into a moving stream with a depth of 3 meters.

Side View of Stream



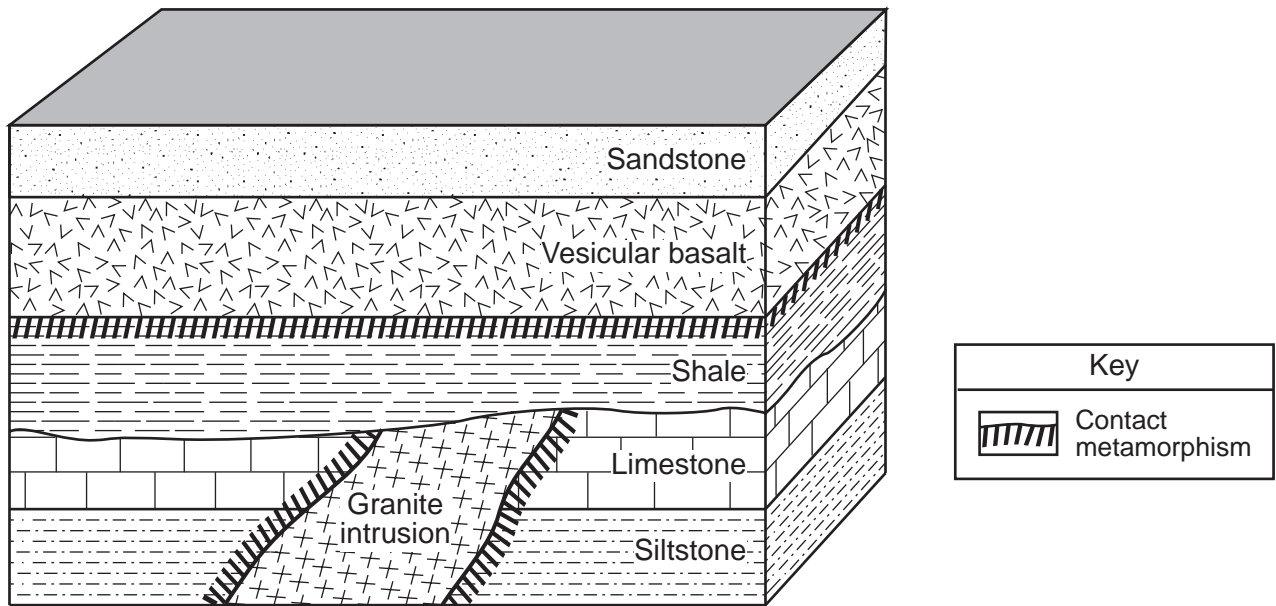
Describe the general location of the 2-mm-diameter rounded quartz grains compared to the 4-mm-diameter rounded quartz grains as they are transported and deposited downstream. [1]

Base your answers to questions 55 and 56 on the weather map provided *in your answer booklet*, which shows surface air-pressure readings, in millibars, at various locations in the United States and Canada. The 1020-millibar isobars have been drawn and labeled.

55 Draw the 1024- and 1028-millibar isobars on the weather map provided *in your answer booklet*. [2]

56 What weather instrument was most likely used to measure these air pressures? [1]

Base your answers to questions 57 through 60 on the geologic cross section below. Radioactive dating indicates that the granite intrusion is 279 million years old and the vesicular basalt is 260 million years old. The rock layers have not been overturned.



57 List the six rock units in the order from the oldest to the youngest. [1]

58 During which geologic time period did the shale layer form? [1]

59 The granite intrusion caused part of the limestone layer to undergo metamorphism. What metamorphic rock would most likely be found in this zone of contact metamorphism? [1]

60 Describe the rate of cooling that must occur for magma to form vesicular basalt. [1]

Base your answers to questions 61 through 63 on the information, table, and photographs below and on your knowledge of Earth science.

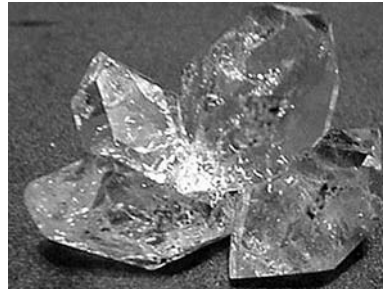
“Herkimer Diamonds”

Gem-quality “Herkimer Diamonds” are hexagonal-shaped quartz crystals found in some of the surface bedrock of Herkimer, New York. Herkimer is located at approximately 43° north latitude and 75° west longitude. The oldest of these gemstones are believed to be approximately 500 million years old. These quartz crystals are magnificent works of nature that have a natural diamondlike geometric shape formed when the quartz crystallized. Natural “Herkimer Diamonds” were not cut or shaped by humans. Due to their appearance, “Herkimer Diamonds” are commonly used in jewelry. These quartz crystals are not true diamonds.

Mineral Characteristics of “Herkimer Diamonds” (Quartz) and True Diamonds

Mineral	Color	Chemical Composition	Luster	Hardness	Dominant Form of Breakage
“Herkimer Diamond” (quartz)	Colorless or variable	SiO ₂	Glassy	7	Fracture
True diamond	Colorless or variable	C	Glassy	10	Cleavage

Photographs of “Herkimer Diamonds” (Quartz)



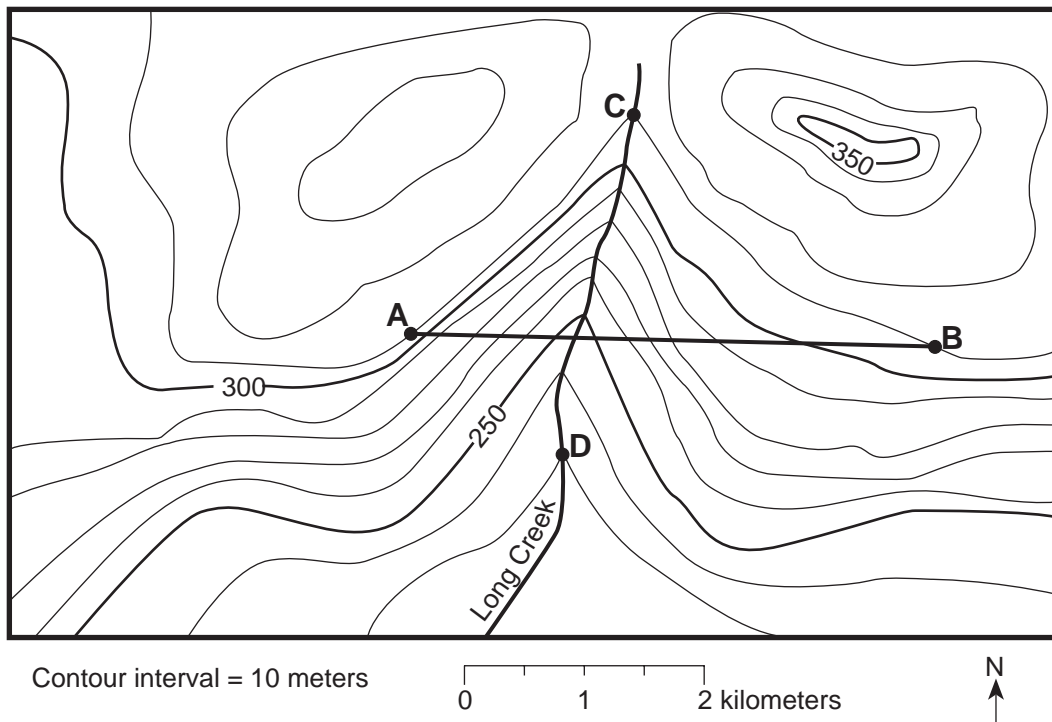
- 61 List *two* mineral characteristics that differ between “Herkimer Diamonds” and true diamonds. [1]
- 62 State one use for “Herkimer Diamonds” (quartz), other than their use in jewelry. [1]
- 63 On the New York State map provided in *your answer booklet*, mark with a dot the location of Herkimer, New York. Draw a small circle around your dot (⊙) to make the dot easily seen. [1]
-

Part C

Answer all questions in this part.

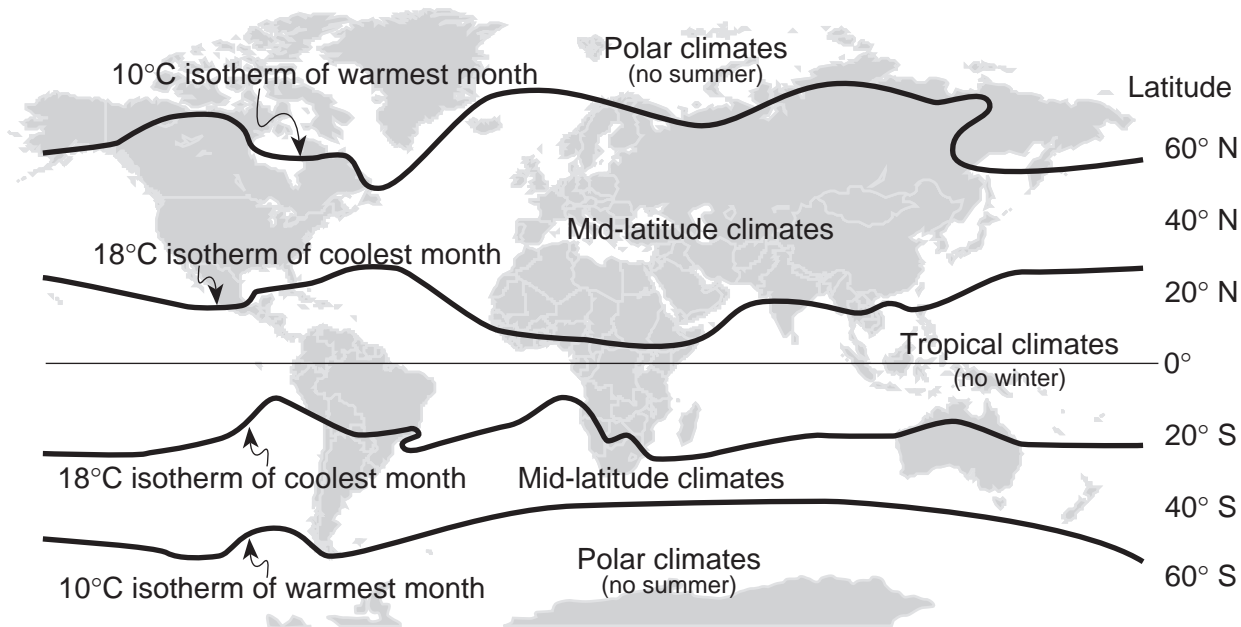
Directions (64–77): Record your answers in the spaces provided in your answer booklet. Some questions may require the use of the *Earth Science Reference Tables*.

Base your answers to questions 64 and 65 on the topographic map shown below. Points A, B, C, and D are reference points on the map. Elevations are measured in meters.



- 64 On the grid provided *in your answer booklet*, construct a topographic profile along line AB, by plotting a point for the elevation of *each* contour line that crosses line AB and connecting the points with a smooth, curved line to complete the profile. [2]
- 65 Calculate the gradient of Long Creek between points C and D and label the answer with the correct units. [2]
-

Base your answers to questions 66 and 67 on the map below, which shows one method of classifying Earth's surface into latitudinal climate belts. In the tropical climate belt, the average monthly temperatures never drop below 18°C. In the polar climate belts, the average monthly temperatures never rise above 10°C. The isotherms show the average monthly temperature of the coolest and warmest months. Effects of elevation have been omitted.



- 66 According to the isotherms on the map, locations in the mid-latitude climate belts have average monthly temperatures between what values? [1]
- 67 Describe a specific characteristic of insolation received in the tropical climate belt region that causes the average monthly temperature to remain warm all year. [1]
-
- 68 New York State's Adirondacks are classified as a mountain landscape region. Describe one bedrock characteristic and one land surface characteristic that were used to classify the Adirondacks as a mountain landscape region. [2]
- 69 The map provided in your answer booklet shows six source regions for different air masses that affect the weather of North America. The directions of movement of the air masses are shown. Using the standard two-letter air-mass symbols from the *Earth Science Reference Tables*, label the air masses by writing the correct symbol in each circle on the map. [2]

Base your answers to questions 70 and 71 on the information below and on your knowledge of Earth science.

Accurate observations of the Sun were made by a New York State observer. This person observed the time of sunrise and the position of sunrise along the eastern horizon for each day during the month of May.

70 Describe how the time of sunrise changed for the observer each day during the month of May. [1]

71 State the actual Earth motion that causes the Sun to appear to rise each day. [1]

Base your answers to questions 72 and 73 on the data table below, which shows the amount of water vapor, in grams per cubic meter, that will saturate 1 cubic meter of air at different temperatures.

**Amount of Water Vapor That Will Saturate
1 Cubic Meter of Air at Different Temperatures**

Air Temperature (°C)	Water Vapor (g/m³)
-20	1
-10	2
0	5
10	9
20	17
30	29
40	50

72 On the grid provided *in your answer booklet*, construct a line graph of the data, following the directions below.

a Place the name of the correct variable along the *y*-axis. Include the correct units. [1]

b Mark an appropriate numerical scale showing equal intervals along the *y*-axis. [1]

c Plot the amount of water that will saturate 1 cubic meter of air at the temperatures shown in the data table. Connect the points with a smooth, curved line. [1]

73 Describe the relationship between the air temperature and the amount of water vapor necessary to saturate the air. [1]

Base your answers to questions 74 through 77 on the information below and on your knowledge of Earth science.

In the 1930s, most scientists believed that Earth's crust and interior were solid and motionless. A small group of scientists were talking about "continental drift," which is the idea that Earth's crust is not stationary, but is constantly shifting and moving.

From seismic data, geophysical evidence, and laboratory experiments, scientists now generally agree that lithospheric plates move at the surface. Both Earth's surface and interior are in motion. Solid rock in the mantle can be softened and shaped when subjected to the heat and pressure within Earth's interior over millions of years.

Subduction processes are believed by many scientists to be the driving force of plate tectonics. At present, this theory cannot be directly observed and confirmed. The lithospheric plates have moved in the past and are still moving today. The details of why and how they move will continue to challenge scientists.

- 74 Earth's crust is described as "constantly shifting and moving." Give one example of geologic evidence that supports the conclusion that continents have drifted apart. [1]
- 75 The information given suggests that "subduction processes are the driving force of plate tectonics." Identify a specific location of a subduction zone on Earth. [1]
- 76 According to the *Earth Science Reference Tables*, at what inferred depth is *mantle* rock partially melted and slowly moving below the lithospheric plates? [1]
- 77 According to the geologic record, during which geologic time period did the lithospheric plates that made up Pangea begin to break up? [1]
-

Tear Here

The University of the State of New York

REGENTS HIGH SCHOOL EXAMINATION

PHYSICAL SETTING
EARTH SCIENCE

Tuesday, August 17, 2004 — 12:30 to 3:30 p.m., only

ANSWER SHEET

Student Sex: Male Female Grade

Teacher School

Record your answers to Part A and Part B-1 on this answer sheet.

Part A

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

Part A Score

Part B-1

- 36 44
- 37 45
- 38 46
- 39 47
- 40 48
- 41 49
- 42 50
- 43

Part B-1 Score

Write your answers to Part B-2 and Part C in your answer booklet.

The declaration below should be signed when you have completed the examination.

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.

Tear Here

Signature

PHYSICAL SETTING EARTH SCIENCE

Tuesday, August 17, 2004 — 12:30 to 3:30 p.m., only

ANSWER BOOKLET

Male

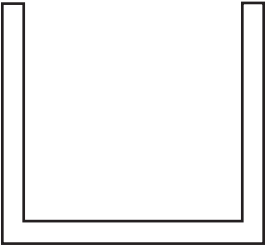
Student Sex: Female

Teacher

School Grade

Answer all questions in Part B-2 and Part C. Record your answers in this booklet.

<input style="width: 50px; height: 20px;" type="text"/>	Performance Test Score (Maximum Score: 23)	
Part	Maximum Score	Student's Score
A	35	
B-1	15	
B-2	15	
C	20	
Total Written Test Score (Maximum Raw Score: 85)		<input style="width: 50px; height: 20px;" type="text"/>
Final Score (from conversion chart)		<input style="width: 50px; height: 20px;" type="text"/>
Raters' Initials: Rater 1 Rater 2		

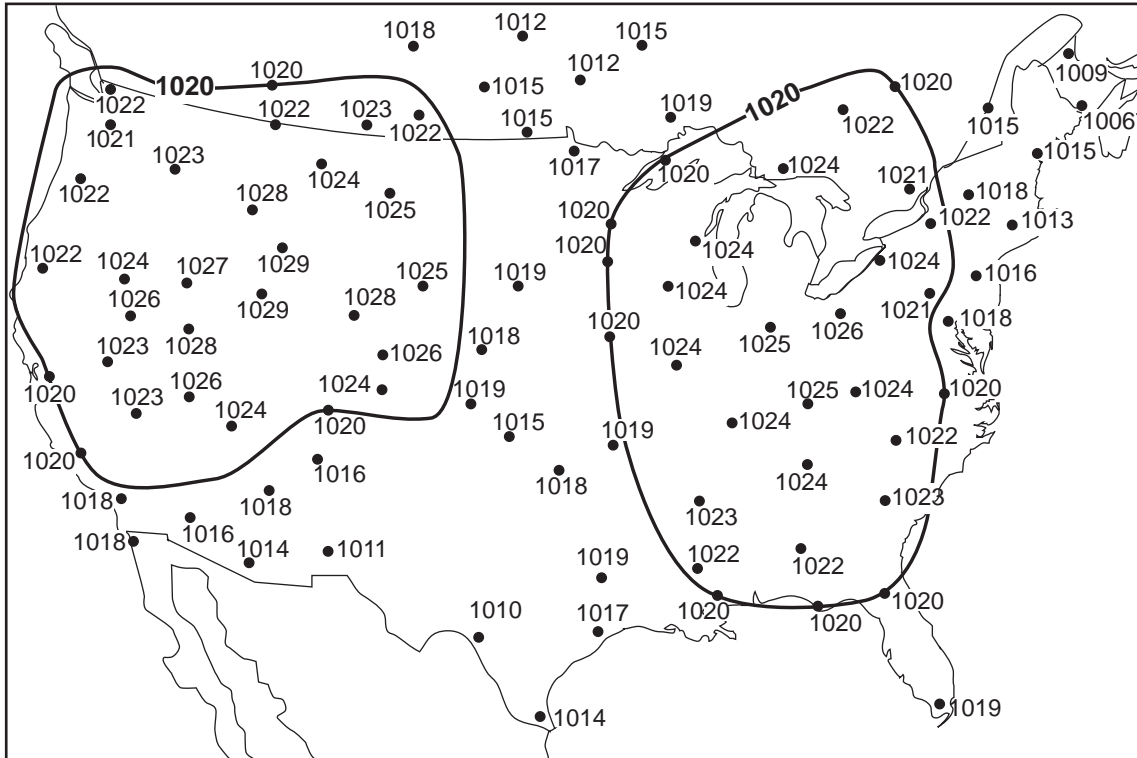
Part B-2		For Raters Only								
51	_____ front	<input style="width: 40px; height: 20px;" type="text"/>								
52	<p>Weather Data Table for Albany</p> <table border="1" style="margin-left: auto; margin-right: auto; border-collapse: collapse;"> <tr> <td style="padding: 5px;">Relative humidity (%)</td> <td style="width: 100px;"></td> </tr> <tr> <td style="padding: 5px;">Wind direction from</td> <td></td> </tr> <tr> <td style="padding: 5px;">Wind speed (knots)</td> <td></td> </tr> <tr> <td style="padding: 5px;">Present weather</td> <td></td> </tr> </table>	Relative humidity (%)		Wind direction from		Wind speed (knots)		Present weather		<input style="width: 40px; height: 20px;" type="text"/>
Relative humidity (%)										
Wind direction from										
Wind speed (knots)										
Present weather										
53	<p style="text-align: center;">Cross Section of the Bottom of the Tube</p> <div style="display: flex; align-items: center; justify-content: center;">  <div style="margin-left: 20px;"> <table border="1" style="border-collapse: collapse;"> <tr> <th style="padding: 5px;">Key</th> </tr> <tr> <td style="padding: 5px;">Approximate size</td> </tr> <tr> <td style="padding: 5px;">○ 2-mm diameter</td> </tr> <tr> <td style="padding: 5px;">○ 3-mm diameter</td> </tr> <tr> <td style="padding: 5px;">○ 4-mm diameter</td> </tr> </table> </div> </div>	Key	Approximate size	○ 2-mm diameter	○ 3-mm diameter	○ 4-mm diameter	<input style="width: 40px; height: 20px;" type="text"/>			
Key										
Approximate size										
○ 2-mm diameter										
○ 3-mm diameter										
○ 4-mm diameter										

54 _____

54

55

Surface Air Pressures



55

56 _____

56

57 Oldest (1) _____



(2) _____

(3) _____

(4) _____

(5) _____

Youngest (6) _____

57

For Raters Only

58 _____ **Period**

58

59 _____

59

60 _____

60

61 (1) _____

61

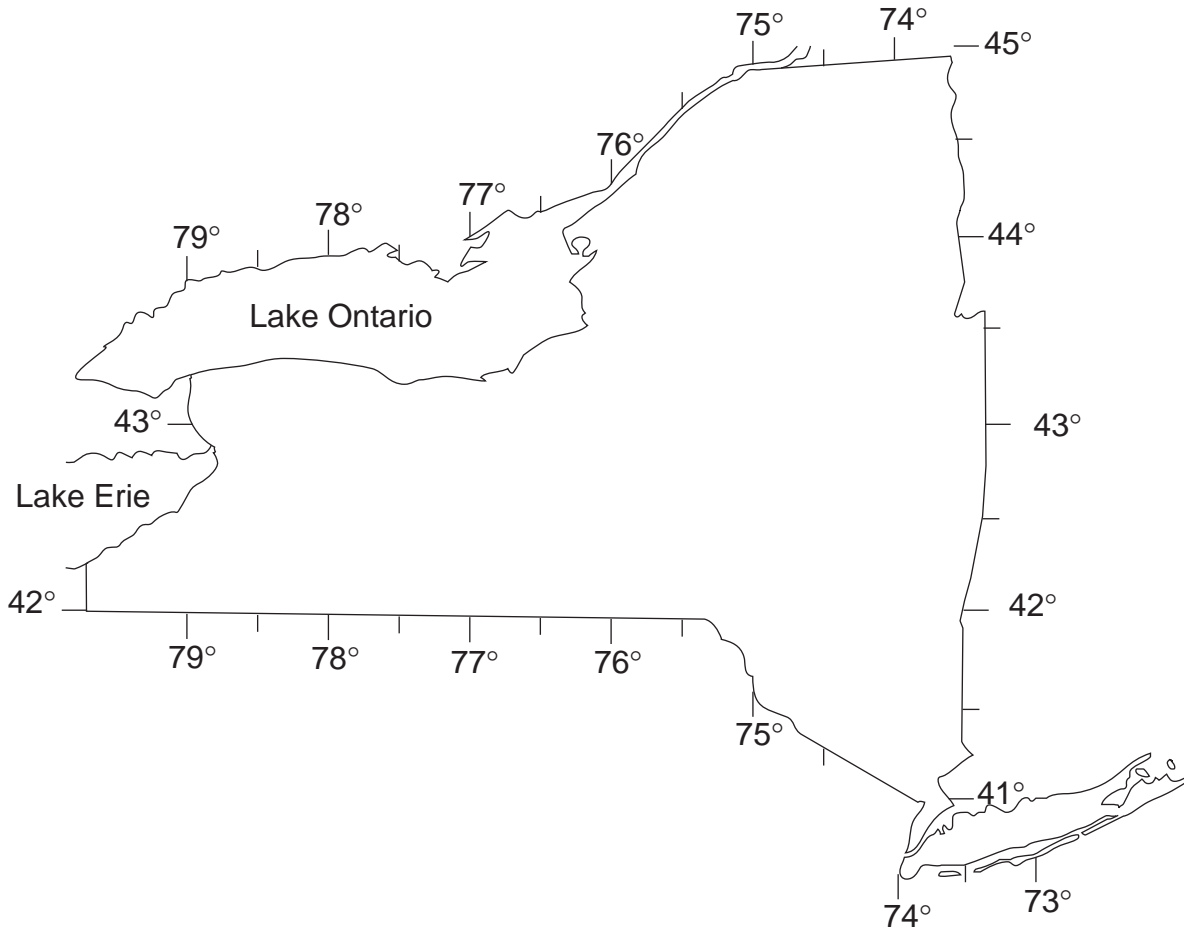
(2) _____

62 _____

62

63

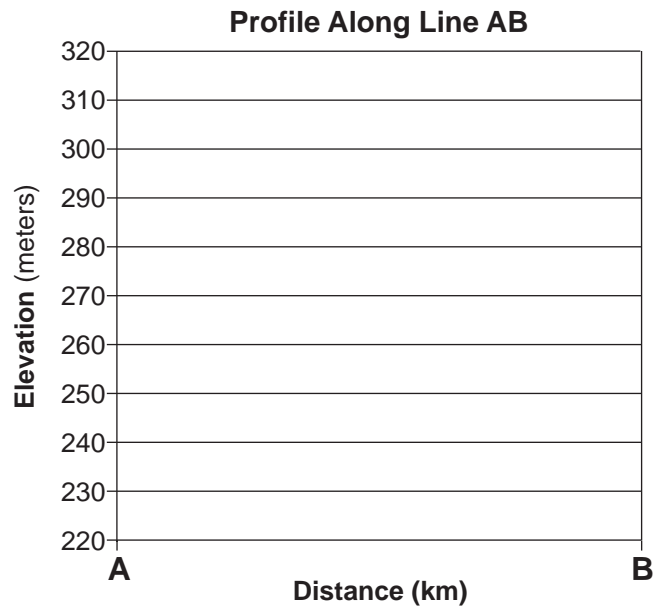
63



Total Score for Part B-2

Part C

64



64

65 Gradient = _____

65

66 Between _____ °C and _____ °C

66

67 _____

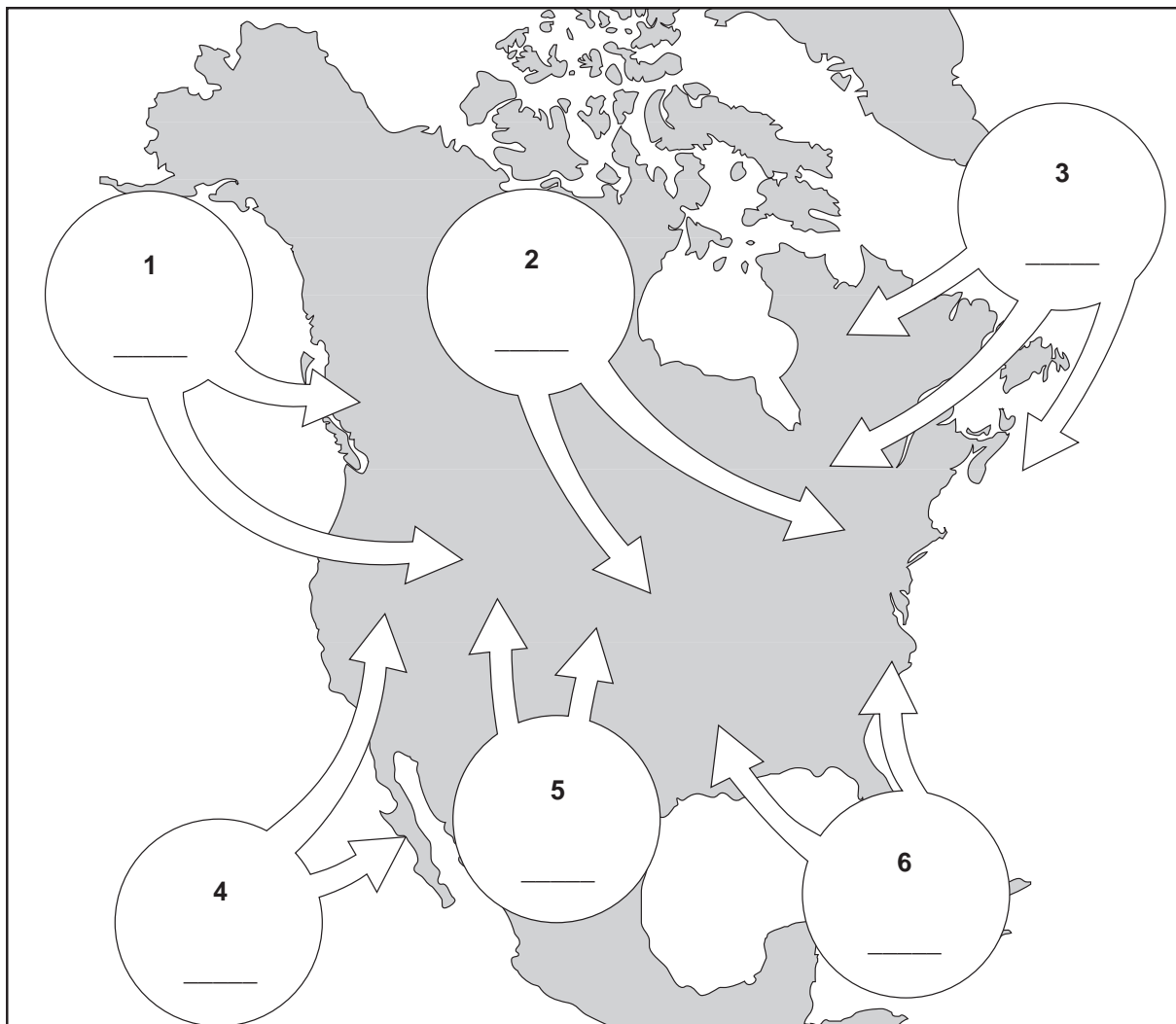
67

68 Bedrock characteristic: _____

68

Land surface characteristic: _____

69



69

70 _____

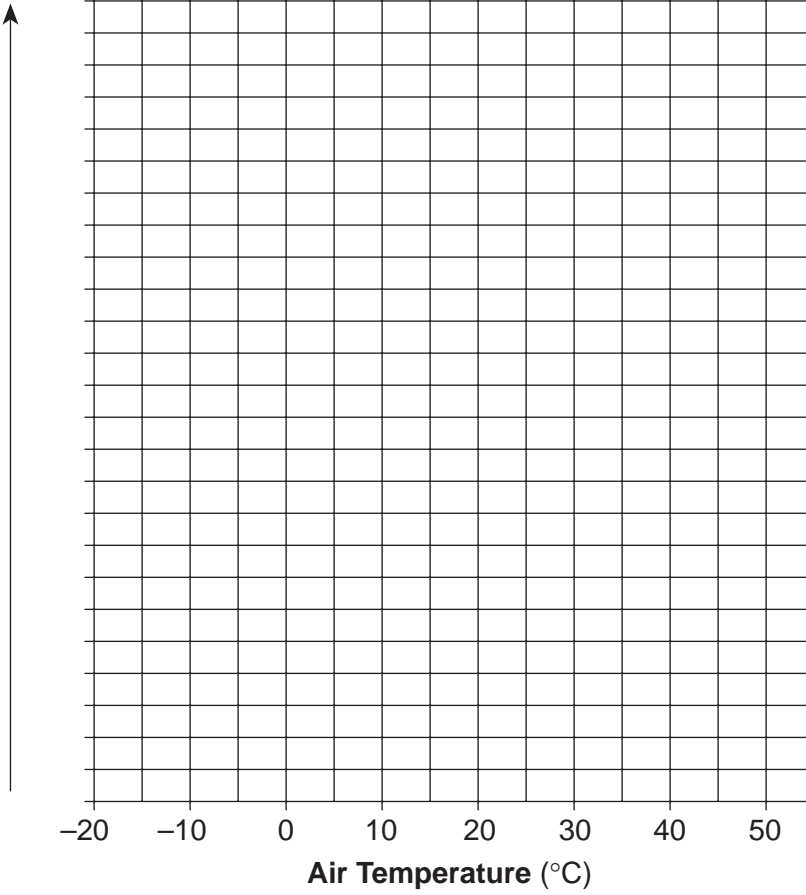
70

71 _____

71

For Raters Only

72



72

73

73

74

74

75

75

76

_____ km

76

77

_____ Period

77

FOR TEACHERS ONLY

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

PS-ES PHYSICAL SETTING/EARTH SCIENCE

Tuesday, August 17, 2004 — 12:30 to 3:30 p.m., only

SCORING KEY AND RATING GUIDE

Directions to the Teacher:

Refer to the directions on page 3 before rating student papers.

Updated information regarding the rating of this examination may be posted on the New York State Education Department's web site during the rating period. Visit the site <http://www.emsc.nysed.gov/osa/> and select the link "Latest Information" for any recently posted information regarding this examination. This site should be checked before the rating process for this examination begins and at least one more time before the final scores for the examination are recorded.

Part A and Part B-1

Allow 1 credit for each correct response.

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

Directions to the Teacher

Follow the procedures below for scoring student answer papers for the Physical Setting/Earth Science examination. Additional information about scoring is provided in the publication *Information Booklet for Administering and Scoring Regents Examinations in the Sciences*.

Use only *red* ink or *red* pencil in rating Regents papers. Do *not* correct the student's work by making insertions or changes of any kind.

On the detachable answer sheet for Part A and Part B–1, indicate by means of a checkmark each incorrect or omitted answer. In the box provided at the end of each part, record the number of questions the student answered correctly for that part.

At least two science teachers must participate in the scoring of each student's responses to the Part B–2 and Part C open-ended questions. Each of these teachers should be responsible for scoring a selected number of the open-ended questions on each answer paper. No one teacher is to score all the open-ended questions on a student's answer paper.

Students' responses must be scored strictly according to the Scoring Key and Rating Guide. For open-ended questions, credit may be allowed for responses other than those given in the rating guide if the response is a scientifically accurate answer to the question and demonstrates adequate knowledge as indicated by the examples in the rating guide. In the student's answer booklet, record the number of credits earned for each answer in the box printed to the right of the answer lines or spaces for that question.

Fractional credit is *not* allowed. Only whole-number credit may be given to a response. Units need not be given when the wording of the questions allows such omissions.

Raters should enter the scores earned for Part A, Part B–1, Part B–2, and Part C on the appropriate lines in the box printed on the answer booklet and then should add these four scores and enter the total in the box labeled "Total Written Test Score." The student's score for the Earth Science Performance Test should be entered in the space provided. Then, the student's raw scores on the performance test and written test should be converted to a scaled score by using the conversion chart that will be posted on the Department's web site <http://www.emsc.nysed.gov/osa/> on Tuesday, August 17, 2004. The student's scaled score should be entered in the labeled box on the student's answer booklet. The scaled score is the student's final examination score.

All student answer papers that receive a scaled score of 60 through 64 **must** be scored a second time. For the second scoring, a different committee of teachers may score the student's paper or the original committee may score the paper, except that no teacher may score the same open-ended questions that he/she scored in the first rating of the paper. The school principal is responsible for assuring that the student's final examination score is based on a fair, accurate, and reliable scoring of the student's answer paper.

Because scaled scores corresponding to raw scores in the conversion chart may change from one examination to another, it is crucial that for each administration, the conversion chart provided in the scoring key for that administration be used to determine the student's final score. The chart in this scoring key is usable only for this administration of the examination.

Part B–2

Allow a total of 15 credits for this part. The student must answer all questions in this part.

51 [1] Allow 1 credit for an **occluded** front.

52 [2] The correct responses are shown below.

Weather Data Table for Albany

Relative humidity (%)	100
Wind direction from	NNW or NW or in words
Wind speed (knots)	25 (± 2)
Present weather	Rain

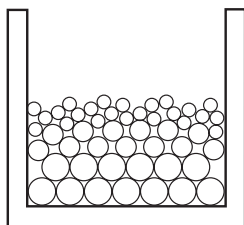
Allow 2 credits if all four weather variables are correct.

Allow only 1 credit if only two or three weather variables are correct.

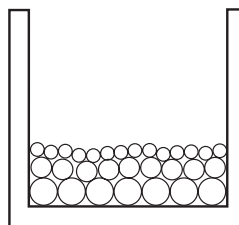
Note: Do *not* allow credit for “precipitation” as the response to present weather because it is too general.

53 [1] Allow 1 credit for a correct response that shows a pattern of sorting from large on the bottom to small on top. Grains do *not* have to be drawn to actual size. The student drawing does *not* have to completely fill the cross section either vertically or horizontally. Acceptable responses include, but are not limited to, these examples:

Cross Section of the Bottom of the Tube



Cross Section of the Bottom of the Tube



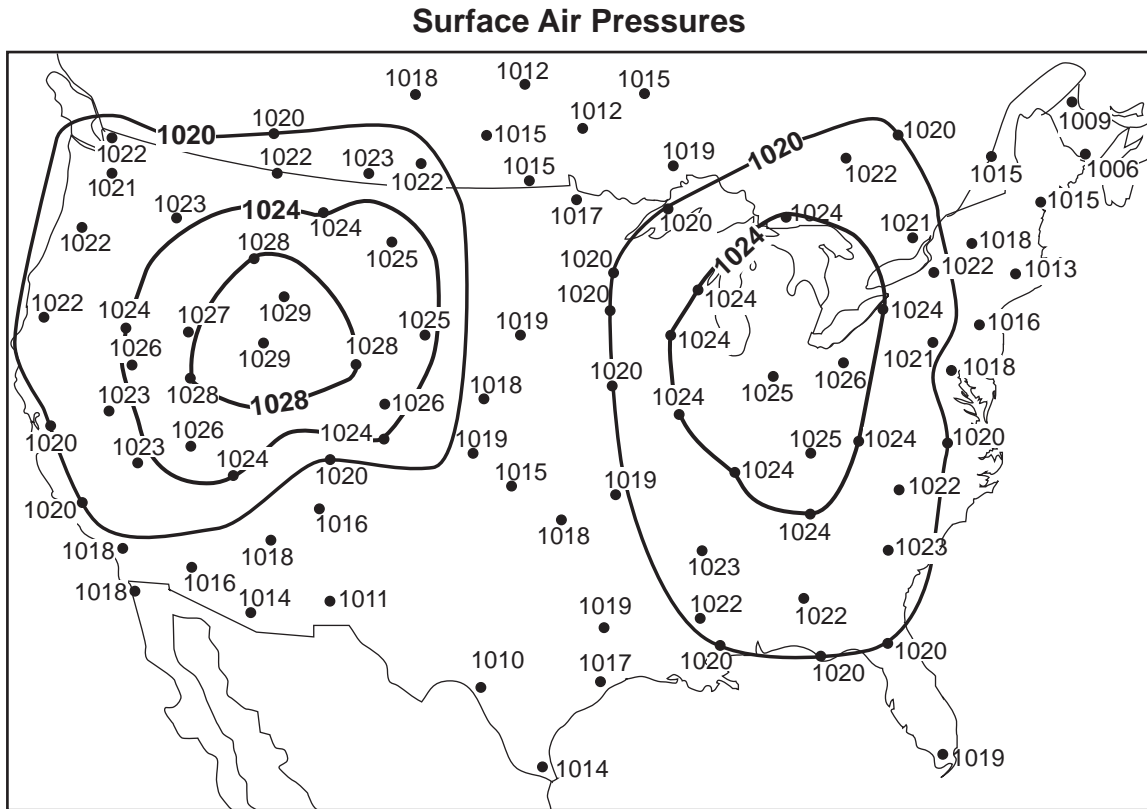
54 [1] Allow 1 credit for a correct response. Acceptable responses include, but are not limited to, these examples:

The 2-millimeter grains settle farther downstream than the 4-millimeter grains.

The 2-millimeter grains settle farther to the right.

The larger grains are not carried as far.

55 [2] An example of correctly drawn isobars is shown below.



Allow 2 credits if all three isobars are drawn correctly. If more than the three required isobars are drawn, *all* isobars must be correct for full credit.

Allow only 1 credit if only one or two isobars are drawn correctly.

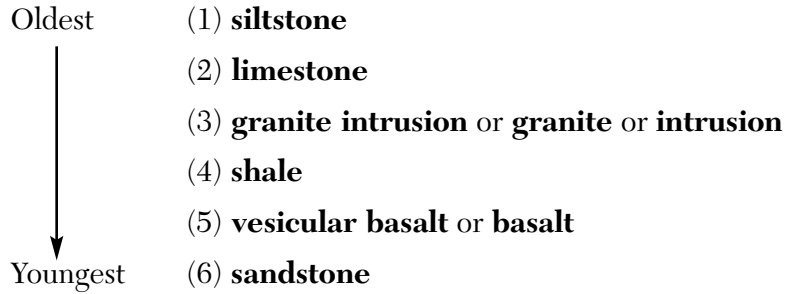
or

Allow only 1 credit if more than the three required isobars are drawn, and the three required isobars are drawn correctly but the additional isobars are drawn incorrectly.

Note: Isobars do *not* have to be labeled. Isobars must touch all equal value points to receive credit.

56 [1] Allow 1 credit for **barometer** or **barograph**.

57 [1] Allow 1 credit for the correct response shown below.



58 [1] Allow 1 credit for **Permian**.

59 [1] Allow 1 credit for **marble** or **hornfels**.

60 [1] Allow 1 credit for a correct response. Acceptable responses include, but are not limited to, these examples:

- fast rate
- rapid cooling

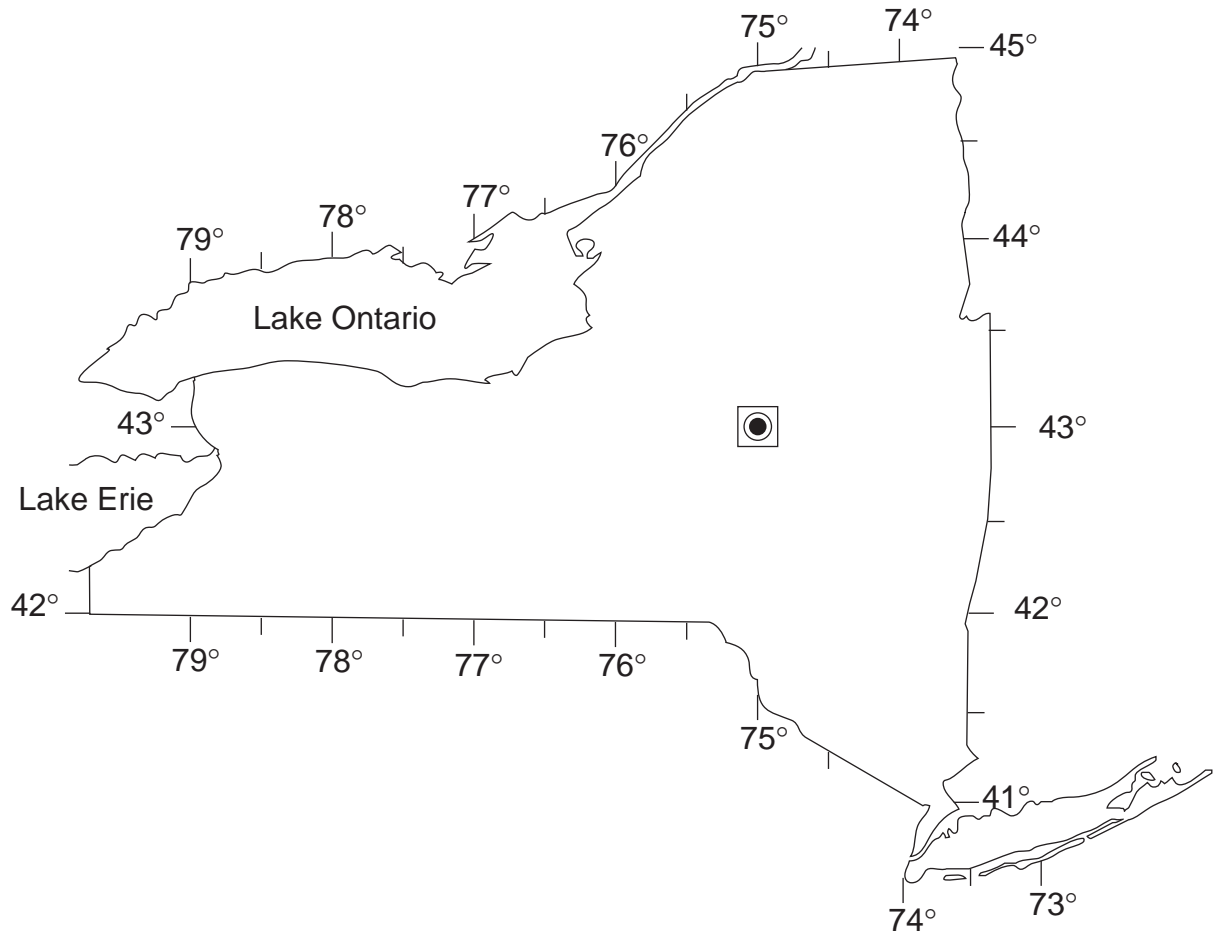
61 [1] Allow 1 credit for two correct responses. Acceptable responses include, but are not limited to, these examples:

- hardness
- chemical composition
- dominant form of breakage or fracture/cleavage

62 [1] Allow 1 credit for a correct response. Acceptable responses include, but are not limited to, these examples:

- production of glass
- electronics
- as an abrasive

- 63 [1] Allow 1 credit for the location of the dot within the box shown on the map. Allow credit even if a circle is not drawn around the dot.

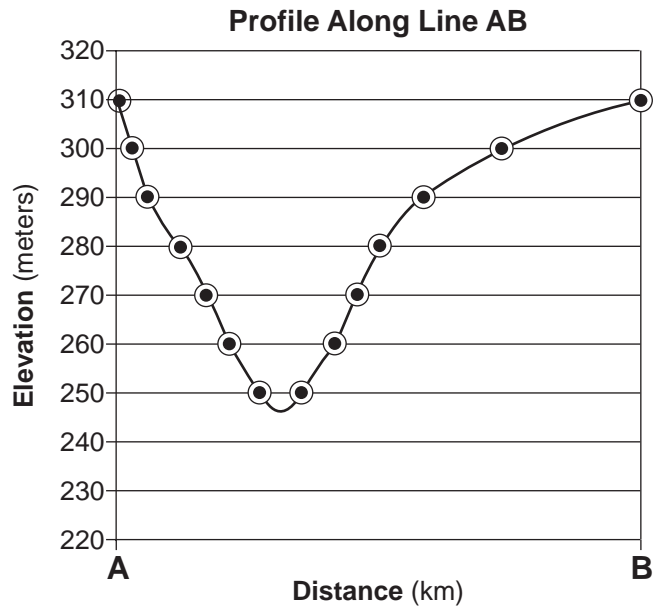


Note: It is recommended that an overlay be used to ensure uniformity in scoring.

Part C

Allow a total of 20 credits for this part. The student must answer all questions in this part.

64 [2] The correct responses are shown below.



Allow 2 credits if 12 to 14 points are plotted correctly and are correctly connected with a smooth, curved line and the line extends below the lowest plotted points to show the valley.

Allow only 1 credit if 12 to 14 points are plotted correctly, but no line is drawn or the line is incorrectly drawn.

or

Allow only 1 credit if only 7 to 11 points are plotted correctly and are correctly connected with a smooth, curved line and the line extends below the lowest plotted points to show the valley.

Note: The center of the plotted point must be on the horizontal line within the circle shown.

Allow credit even if the points are not visible, but the line is visible within the circle.

Allow credit even if the student uses a symbol other than a dot.

Do *not* allow credit if a straight line is drawn between the lowest plotted points or if the valley extends to the next elevation line or below.

It is recommended that an overlay be used to ensure uniformity in scoring.

- 65 [2] Allow 1 credit for **27.6** (± 2.0).

and

Allow 1 credit for $\frac{\mathbf{m}}{\mathbf{km}}$ or $\frac{\mathbf{meters}}{\mathbf{kilometer}}$.

- 66 [1] Allow 1 credit for **10°C** and **18°C** or **18°C** and **10°C**.

- 67 [1] Allow 1 credit for a correct response. Acceptable responses include, but are not limited to, these examples:

This region receives a high angle of insolation each day.

High-intensity insolation is received all year.

The Sun is higher in the sky all year.

The tropical region receives more intense sunlight.

Note: Do *not* allow credit for “The region is near the Equator (0° latitude),” or “receives more sunlight” because the response does not describe a specific characteristic of insolation.

- 68 [2] Allow 1 credit for a correct bedrock characteristic. Acceptable responses include, but are not limited to, these examples:

The Adirondacks have faulted, folded, and deformed bedrock.

The Adirondacks have intensely metamorphosed bedrock.

The oldest bedrock is near the center of the Adirondacks.

and

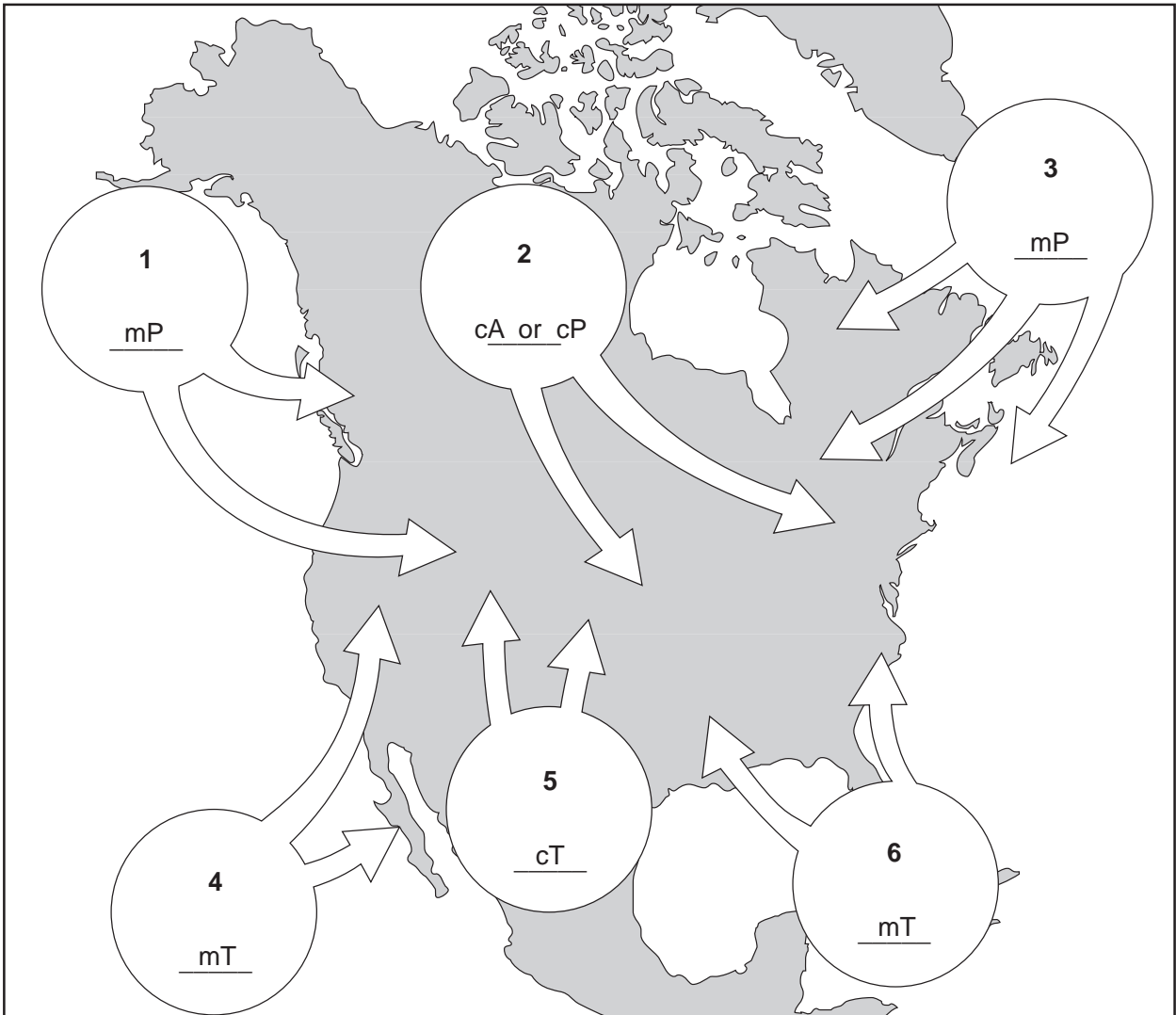
Allow 1 credit for a correct land surface characteristic. Acceptable responses include, but are not limited to, these examples:

The Adirondacks have high elevations.

The Adirondacks have steep slopes.

The Adirondacks are a partially eroded dome.

69 [2] The correct responses are shown below.



Allow 2 credits if five or six air-mass symbols are correct.

Allow only 1 credit if only three or four air-mass symbols are correct.

or

Allow only 1 credit if five or six air masses are correctly labeled with words instead of the two-letter symbol. For example: mT is labeled maritime tropical.

Note: Allow credit for either upper- or lower-case letters because it is difficult to identify some students' lower-case letters. For example, allow credit for MP or Mp or mp or mP. Do *not* allow credit if the letters are reversed.

- 70 [1] Allow credit for a correct response. Acceptable responses include, but are not limited to, this example:

The Sun appeared to rise earlier each day during May.

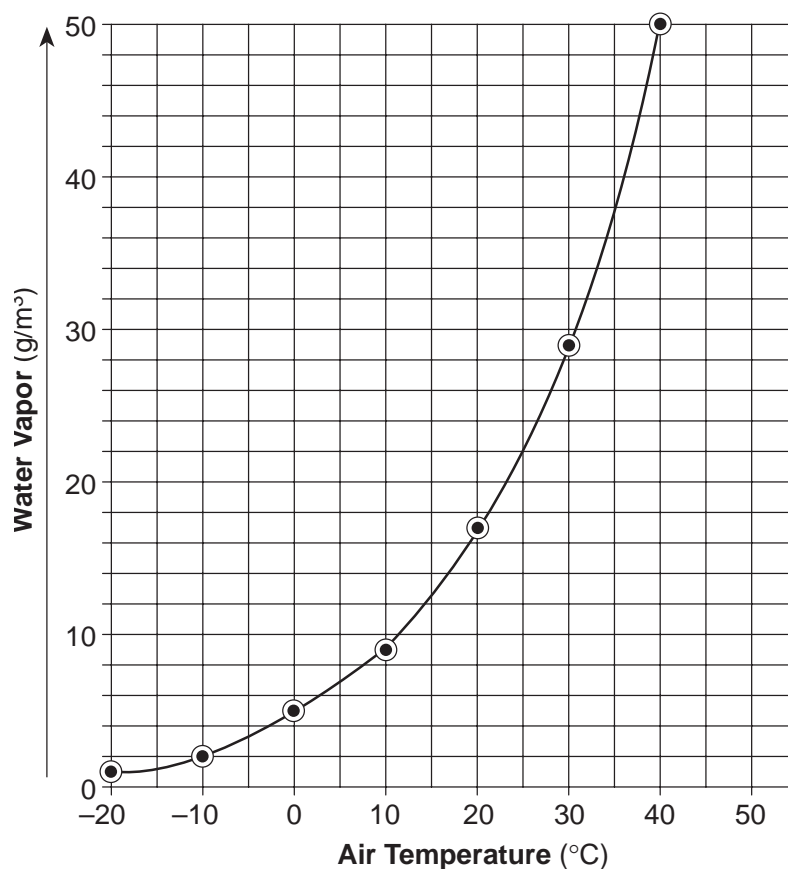
Note: Do not allow credit for “The days get longer” because the response does not describe the time of sunrise.

- 71 [1] Allow 1 credit for a correct response. Acceptable responses include, but are not limited to, these examples:

Earth’s rotation

spinning on its axis

- 72 [3] An example of a correct response is shown below.



a Allow 1 credit for labeling the y-axis **water vapor**, including units (**g/m³**).

b Allow 1 credit for marking an appropriate numerical scale along the y-axis.

c Allow 1 credit for correctly plotting six or seven points and connecting them with a line. Allow credit even if the student uses a symbol other than a dot.

Note: Allow credit for a line that passes through six or seven correct points, even if the points are not visible beneath the line.

- 73** [1] Allow 1 credit for a correct response. Acceptable responses include, but are not limited to, these examples:
- As air temperature increases, the amount of water vapor that the air can hold increases.
 - Warm air can hold more water vapor than cool air.
 - It is a direct relationship.
 - The higher the air temperature, the greater the amount of water vapor required to saturate the air.
- 74** [1] Allow 1 credit for a correct response. Acceptable responses include, but are not limited to, these examples:
- Continent shapes fit together like puzzle parts.
 - Sea-floor spreading occurs at mid-ocean ridges.
 - Bedrock can be correlated on the opposite sides of some oceans.
 - Fossil evidence is found in the matching bedrock of South America and Africa.
 - matching mountain ranges between continents
- 75** [1] Allow 1 credit for a correct response. Acceptable responses include, but are not limited to, these examples:
- west coast of South America
 - Aleutian Trench
 - boundary of Juan de Fuca Plate and North American Plate
- 76** [1] Allow 1 credit for any response from 70 to 700 kilometers.
- 77** [1] Allow 1 credit for **Triassic** Period.

Map to Core Curriculum

August 2004 Physical Setting/Earth Science			
Question Numbers			
Key Ideas/Performance Indicators	Part A	Part B	Part C
Standard 1			
Math Key Idea 1	4,5		65
Math Key Idea 2	8,25,26,34	37,41,55, 58,63	64,72,73
Math Key Idea 3			
Sci. Inq. Key Idea 1		44,49,53,57	67,73,74
Sci. Inq. Key Idea 2			
Sci. Inq. Key Idea 3			
Eng. Des. Key Idea 1		56	
Standard 2			
Key Idea 1			
Key Idea 2			
Key Idea 3			
Standard 6			
Key Idea 1			68, 69
Key Idea 2	2,5,6,9,11, 13,15,16,17, 21,22,23,27	36,37,54	66,72,76,77
Key Idea 3	3,5,11,25		
Key Idea 4	18		
Key Idea 5	6,12,23	38,39,40,41, 42,45,46,49, 54,59,60	70,71
Key Idea 6			
Standard 7			
Key Idea 1			
Key Idea 2			
Standard 4			
Performance Indicator 1	1,2,3,4,5,6,7, 8,9,10,13,24, 26,30,32,33	37,39,40, 41,57,58	70,71
Performance Indicator 2	11,12,14,15,16, 17,18,23,25,27 28,29,31,35	36,38,42,44,45, 46,47,48,49,51, 52,53,54,55,56	64,65,66,67, 68,69,72,73, 74,75,76,77
Performance Indicator 3	19,20,21,22	48,59,60,61,62	
Reference Tables			
ESRT 2001 Edition	3,4,5,11,13,17, 21,22,23,25,29, 30,31,33,34	43,47,48,49,51, 52,58,59,60,62	68,69,75,76,77

Regents Examination in Earth Science – August 2004

Chart for Converting Total Test Raw Scores to Final Examination Scores (Scaled Scores)

To determine the student's final score, locate the student's Total Performance Test Score across the top of the chart and the Total Written Test Score down the side of the chart. The point where the two scores intersect is the student's final examination score. For example, a student receiving a Total Performance Test Score of 10 and Total Written Test Score of 72 would receive a final examination score of 85.

		Total Performance Test Score																							
		23	22	21	20	19	18	17	16	15	14	13	12	11	10	9	8	7	6	5	4	3	2	1	0
Total Written Test Score	85	100	99	98	97	97	97	97	96	96	95	95	94	94	93	92	92	91	90	89	89	88	87	86	85
	84	99	98	97	97	96	96	96	95	95	94	94	93	93	92	92	91	90	89	89	88	87	86	85	84
	83	99	98	97	97	96	96	96	95	95	94	94	93	93	92	92	91	90	89	89	88	87	86	85	84
	82	98	97	96	96	96	95	95	94	94	94	93	93	92	91	91	90	89	89	88	87	86	85	84	83
	81	97	96	95	95	95	94	94	94	93	93	92	92	91	90	90	89	88	88	87	86	85	84	83	82
	80	97	96	95	95	95	94	94	94	93	93	92	92	91	90	90	89	88	88	87	86	85	84	83	82
	79	97	96	94	94	94	93	93	93	92	92	91	91	90	90	89	88	88	87	86	85	84	83	83	82
	78	96	95	94	93	93	93	92	92	91	91	91	90	89	89	88	87	87	86	85	84	84	83	82	81
	77	96	95	94	93	93	93	92	92	91	91	91	90	89	89	88	87	87	86	85	84	84	83	82	81
	76	95	94	93	92	92	92	91	91	91	90	90	89	89	88	87	87	86	85	84	84	83	82	81	80
	75	94	93	92	92	91	91	91	90	90	89	89	88	88	87	86	86	85	84	84	83	82	81	80	79
	74	93	92	91	91	90	90	90	89	89	88	88	87	87	86	86	85	84	83	83	82	81	80	79	78
	73	93	92	91	91	90	90	90	89	89	88	88	87	87	86	86	85	84	83	83	82	81	80	79	78
	72	92	91	90	90	90	89	89	88	88	88	87	87	86	85	85	84	83	83	82	81	80	79	78	77
	71	92	90	89	89	89	88	88	88	87	87	86	86	85	85	84	83	83	82	81	80	79	78	77	77
	70	91	90	88	88	88	88	87	87	86	86	85	85	84	84	83	82	82	81	80	79	78	78	77	76
	69	91	90	88	88	88	88	87	87	86	86	85	85	84	84	83	82	82	81	80	79	78	78	77	76
	68	90	89	88	87	87	87	86	86	86	85	85	84	83	83	82	82	81	80	79	78	78	77	76	75
	67	89	88	87	86	86	86	85	85	85	84	84	83	83	82	81	81	80	79	78	78	77	76	75	74
	66	88	87	86	86	85	85	85	84	84	83	83	82	82	81	80	80	79	78	78	77	76	75	74	73
	65	87	86	85	85	84	84	84	83	83	82	82	81	81	80	80	79	78	78	77	76	75	74	73	72
	64	86	85	84	84	84	83	83	83	82	82	81	81	80	79	79	78	77	77	76	75	74	73	72	71
	63	86	85	84	84	84	83	83	83	82	82	81	81	80	79	79	78	77	77	76	75	74	73	72	71
62	86	85	83	83	83	82	82	82	81	81	80	80	79	79	78	77	77	76	75	74	73	72	72	71	
61	85	84	82	82	82	82	81	81	80	80	79	79	78	78	77	76	76	75	74	73	72	72	71	70	
60	84	83	82	81	81	81	80	80	80	79	79	78	77	77	76	76	75	74	73	72	72	71	70	69	
59	83	82	81	80	80	80	80	79	79	78	78	77	77	76	75	75	74	73	72	72	71	70	69	68	
58	82	81	80	80	79	79	79	78	78	77	77	76	76	75	75	74	73	72	72	71	70	69	68	67	
57	81	80	79	79	79	78	78	77	77	77	76	76	75	74	74	73	72	72	71	70	69	68	67	66	
56	80	79	78	78	78	77	77	77	76	76	75	75	74	73	73	72	71	71	70	69	68	67	66	65	
55	80	79	77	77	77	76	76	76	75	75	74	74	73	73	72	71	71	70	69	68	67	66	65	65	
54	79	78	77	76	76	76	75	75	74	74	74	73	72	72	71	70	70	69	68	67	66	65	64	64	
53	78	77	76	75	75	75	74	74	74	73	73	72	72	71	70	70	69	68	67	67	66	65	64	63	
52	77	76	75	75	74	74	74	73	73	72	72	71	71	70	69	69	68	67	67	66	65	64	63	62	
51	76	75	74	74	73	73	73	72	72	71	71	70	70	69	69	68	67	66	66	65	64	63	62	61	
50	75	74	73	73	73	72	72	71	71	71	70	70	69	68	68	67	66	66	65	64	63	62	61	60	
49	75	73	72	72	72	71	71	71	70	70	69	69	68	68	67	66	66	65	64	63	62	61	60	60	
48	74	73	71	71	71	71	70	70	69	69	68	68	67	67	66	65	65	64	63	62	61	61	60	59	
47	73	72	71	70	70	70	69	69	69	68	68	67	66	66	65	65	64	63	62	61	61	60	59	58	
46	72	71	70	69	69	69	68	68	68	67	67	66	66	65	64	64	63	62	61	61	60	59	58	57	
45	70	69	68	68	67	67	67	66	66	66	65	65	64	64	63	63	62	61	61	60	59	58	57	55	
44	69	68	67	67	67	66	66	66	65	65	64	64	63	62	62	61	60	60	59	58	57	56	55	54	

August 2004 Regents Examination in Earth Science – continued

		Total Performance Test Score																							
		23	22	21	20	19	18	17	16	15	14	13	12	11	10	9	8	7	6	5	4	3	2	1	0
Total Written Test Score	43	69	68	66	66	66	65	65	65	64	64	63	63	62	62	61	60	60	59	58	57	56	55	55	54
	42	68	67	65	65	65	65	64	64	63	63	62	62	61	61	60	59	59	58	57	56	55	55	54	53
	41	67	66	65	64	64	64	63	63	63	62	62	61	60	60	59	59	58	57	56	55	55	54	53	52
	40	66	65	64	63	63	63	63	62	62	61	61	60	60	59	58	58	57	56	55	55	54	53	52	51
	39	64	63	62	62	62	61	61	60	60	60	59	59	58	57	57	56	55	55	54	53	52	51	50	49
	38	63	62	61	61	61	60	60	60	59	59	58	58	57	56	56	55	54	54	53	52	51	50	49	48
	37	63	62	60	60	60	59	59	59	58	58	57	57	56	56	55	54	54	53	52	51	50	49	49	48
	36	62	61	60	59	59	59	58	58	57	57	57	56	55	55	54	53	53	52	51	50	50	49	48	47
	35	60	59	58	58	57	57	57	56	56	55	55	54	54	53	52	52	51	50	50	49	48	47	46	45
	34	59	58	57	57	56	56	56	55	55	54	54	53	53	52	52	51	50	49	49	48	47	46	45	44
	33	58	57	56	56	56	55	55	54	54	54	53	53	52	51	51	50	49	49	48	47	46	45	44	43
	32	57	56	54	54	54	54	53	53	52	52	51	51	50	49	48	48	47	46	45	44	44	43	42	41
	31	56	55	54	53	53	53	52	52	52	51	51	50	49	49	48	48	47	46	45	44	44	43	42	41
	30	55	54	53	52	52	52	51	51	51	50	50	49	49	48	47	47	46	45	44	44	43	42	41	40
	29	53	52	51	51	50	50	50	49	49	48	48	47	47	46	46	45	44	44	43	42	41	40	39	38
	28	52	51	50	50	50	49	49	49	48	48	47	47	46	45	45	44	43	43	42	41	40	39	38	37
	27	52	51	49	49	49	48	48	48	47	47	46	46	45	45	44	43	43	42	41	40	39	38	38	37
	26	50	49	48	47	47	47	46	46	46	45	45	44	43	43	42	42	41	40	39	38	38	37	36	35
	25	49	48	47	46	46	46	46	45	45	44	44	43	43	42	41	41	40	39	38	38	37	36	35	34
	24	47	46	45	45	45	44	44	43	43	43	42	42	41	41	40	40	39	38	38	37	36	35	34	33
	23	46	45	44	44	44	43	43	43	42	42	41	41	40	39	39	38	37	37	36	35	34	33	32	31
	22	45	44	43	42	42	42	41	41	40	40	40	39	38	38	37	36	36	35	34	33	33	32	31	30
	21	44	43	42	41	41	41	40	40	40	39	39	38	38	37	36	36	35	34	33	33	32	31	30	29
	20	42	41	40	40	39	39	39	38	38	37	37	36	36	35	35	34	33	32	32	31	30	29	28	27
	19	41	40	39	39	39	38	38	37	37	37	36	36	35	34	34	33	32	32	31	30	29	28	27	26
18	41	39	38	38	38	37	37	37	36	36	35	35	34	34	33	32	32	31	30	29	28	27	26	26	
17	39	38	37	36	36	36	35	35	35	34	34	33	32	32	31	31	30	29	28	27	27	26	25	24	
16	37	36	35	35	34	34	34	33	33	32	32	31	31	30	29	29	28	27	27	26	25	24	23	22	
15	36	35	34	34	33	33	33	32	32	31	31	30	30	29	29	28	27	27	26	25	24	23	22	21	
14	35	34	32	32	32	31	31	31	30	30	29	29	28	28	27	26	26	25	24	23	22	21	21	20	
13	34	33	31	31	31	31	30	30	29	29	28	28	27	27	26	25	25	24	23	22	21	20	19	18	
12	32	31	30	29	29	29	29	28	28	27	27	26	26	25	24	24	23	22	21	21	20	19	18	17	
11	31	30	29	29	28	28	28	27	27	26	26	25	25	24	24	23	22	21	21	20	19	18	17	16	
10	29	28	27	27	27	26	26	26	25	25	24	24	23	22	22	21	20	20	19	18	17	16	15	14	
9	28	27	26	25	25	25	24	24	23	23	23	22	21	21	20	19	19	18	17	16	16	15	14	13	
8	27	26	25	24	24	24	23	23	23	22	22	21	21	20	19	19	18	17	16	16	15	14	13	12	
7	25	24	23	23	22	22	22	21	21	20	20	19	19	18	18	17	16	15	15	14	13	12	11	10	
6	24	22	21	21	21	20	20	20	19	19	18	18	17	17	16	15	14	14	13	12	11	10	9	9	
5	23	22	20	20	20	20	19	19	18	18	17	17	16	16	15	14	14	13	12	11	10	9	8	8	
4	21	20	19	18	18	18	17	17	17	16	16	15	15	14	13	13	12	11	10	10	9	8	7	6	
3	19	18	17	17	16	16	16	15	15	14	14	13	13	12	12	11	10	10	9	8	7	6	5	4	
2	18	17	16	16	16	15	15	14	14	14	13	13	12	12	11	11	10	9	8	7	6	5	4	3	
1	17	16	14	14	14	14	13	13	12	12	11	11	10	10	9	8	8	7	6	5	4	4	3	2	
0	15	14	13	12	12	12	12	11	11	10	10	9	9	8	7	7	6	5	4	4	3	2	1	0	