

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

**PHYSICAL SETTING**  
**EARTH SCIENCE**

**Friday, June 18, 2004 — 1:15 to 4:15 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 The motion of a Foucault pendulum provides evidence of

- (1) the Sun's rotation      (3) Earth's rotation  
(2) the Sun's revolution    (4) Earth's revolution

2 Which form of electromagnetic radiation has a wavelength of  $1.0 \times 10^{-3}$  centimeter?

- (1) ultraviolet              (3) radio waves  
(2) infrared                  (4) microwaves

3 The time required for the Moon to show a complete cycle of phases when viewed from Earth is approximately

- (1) 1 day                      (3) 1 month  
(2) 1 week                    (4) 1 year

4 Which planet has an orbital eccentricity most like the orbital eccentricity of the Moon?

- (1) Pluto                      (3) Mars  
(2) Saturn                    (4) Mercury

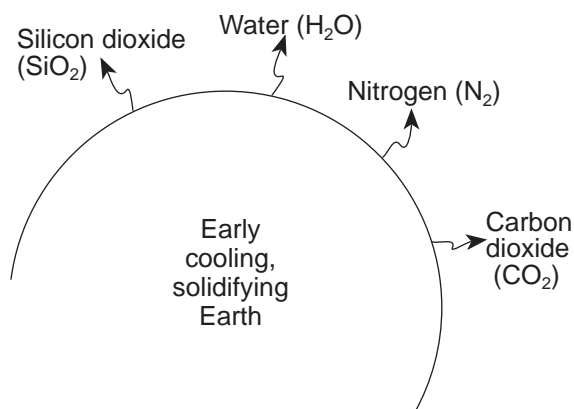
5 On June 21, where will the Sun appear to rise for an observer located in New York State?

- (1) due west                  (3) north of due east  
(2) due east                  (4) south of due east

6 Which statement best describes sediments deposited by glaciers and rivers?

- (1) Glacial deposits and river deposits are both sorted.  
(2) Glacial deposits are sorted, and river deposits are unsorted.  
(3) Glacial deposits are unsorted, and river deposits are sorted.  
(4) Glacial deposits and river deposits are both unsorted.

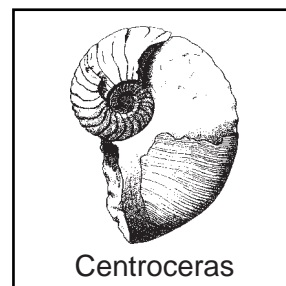
7 The diagram below shows four different chemical materials escaping from the interior of early Earth.



Which material contributed *least* to the early composition of the atmosphere?

- (1) SiO<sub>2</sub>                      (3) N<sub>2</sub>  
(2) H<sub>2</sub>O                      (4) CO<sub>2</sub>

8 The diagram below shows a fossil found in the surface bedrock of New York State.



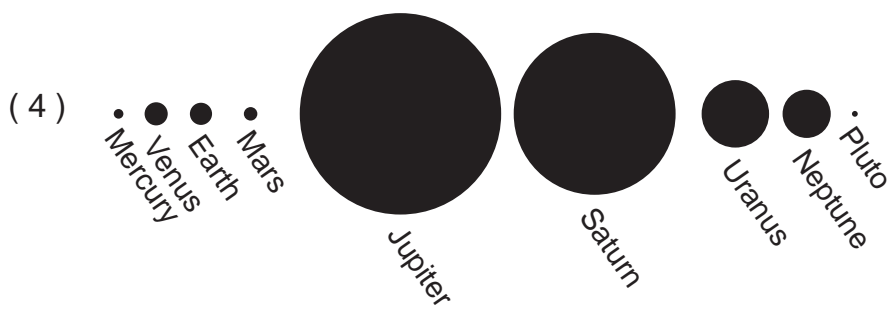
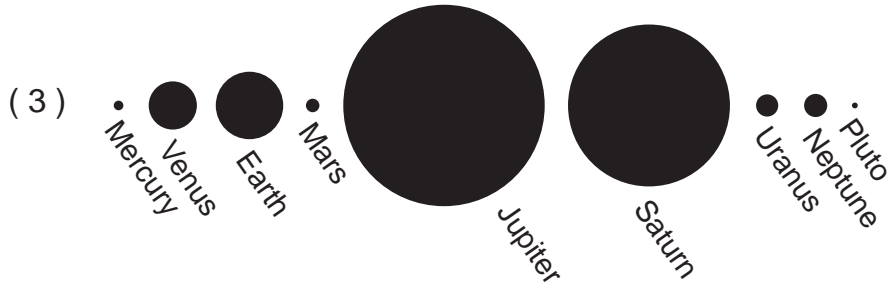
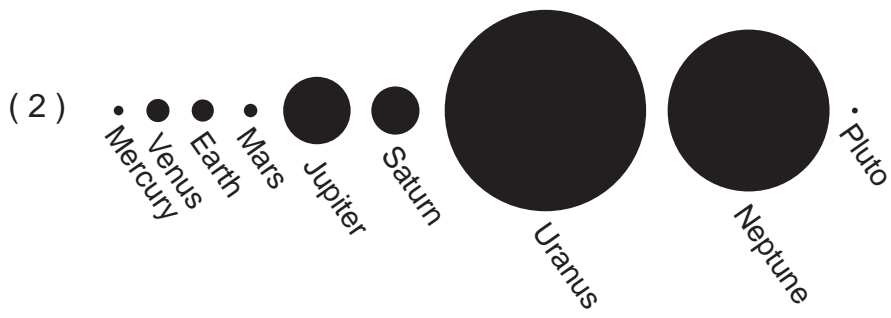
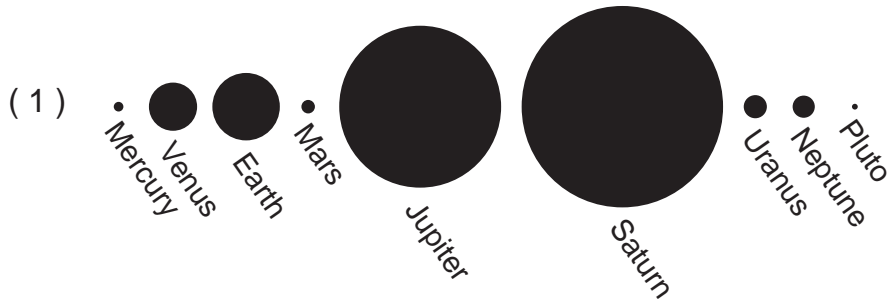
Which other fossil is most likely to be found in the same age bedrock?

- (1) *Phacops*                      (3) *Coelophysis*  
(2) condor                      (4) *Tetraraptor*

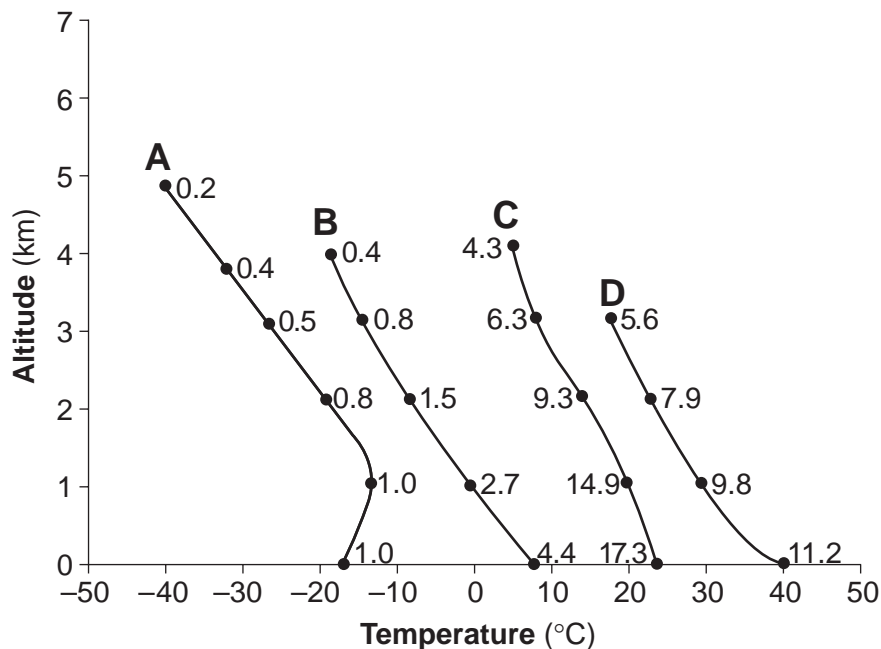
9 Soil composed of which particle size usually has the greatest capillarity?

- (1) silt                          (3) coarse sand  
(2) fine sand                      (4) pebbles

10 Which sequence correctly shows the relative size of the nine planets of our solar system?



- 11 The graph below shows changes in the atmosphere occurring above typical air-mass source regions *A*, *B*, *C*, and *D*. Changes in air temperature and altitude are shown as the graphed lines. Changes in water-vapor content, in grams of vapor per kilogram of air, are shown as numbers on each graphed line.



Which list best identifies each air-mass source region?

- (1) *A* — cT, *B* — cP, *C* — mP, *D* — mT      (3) *A* — mP, *B* — mT, *C* — cT, *D* — cP  
 (2) *A* — cP, *B* — mP, *C* — mT, *D* — cT      (4) *A* — mT, *B* — cT, *C* — cP, *D* — mP

- 12 Earth's outer core and inner core are both inferred to be

- (1) liquid  
 (2) solid  
 (3) composed of a high percentage of iron  
 (4) under the same pressure

- 13 Surface winds on Earth are primarily caused by differences in

- (1) air density due to unequal heating of Earth's surface  
 (2) ocean wave heights during the tidal cycle  
 (3) rotational speeds of Earth's surface at various latitudes  
 (4) distances from the Sun during the year

- 14 Which nonfoliated rock forms only in a zone of contact metamorphism?

- (1) conglomerate                      (3) pegmatite  
 (2) hornfels                              (4) quartzite

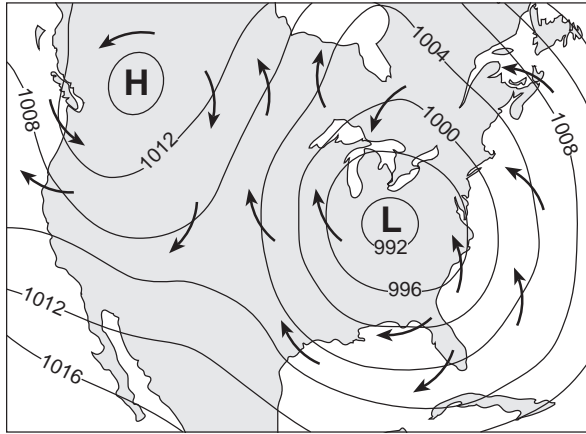
- 15 During a dry summer, the flow of most large New York State streams generally

- (1) continues because some groundwater seeps into the streams  
 (2) increases due to greater surface runoff  
 (3) remains unchanged due to transpiration from grasses, shrubs, and trees  
 (4) stops completely because no water runs off into the streams

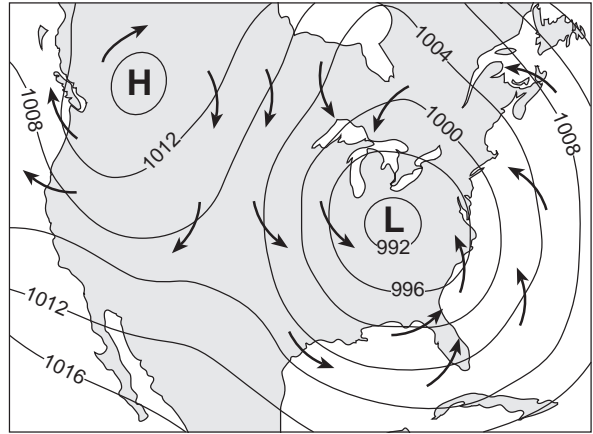
- 16 The density of Earth's crust is

- (1) less than the density of the outer core but greater than the density of the mantle  
 (2) greater than the density of the outer core but less than the density of the mantle  
 (3) less than the density of both the outer core and the mantle  
 (4) greater than the density of both the outer core and the mantle

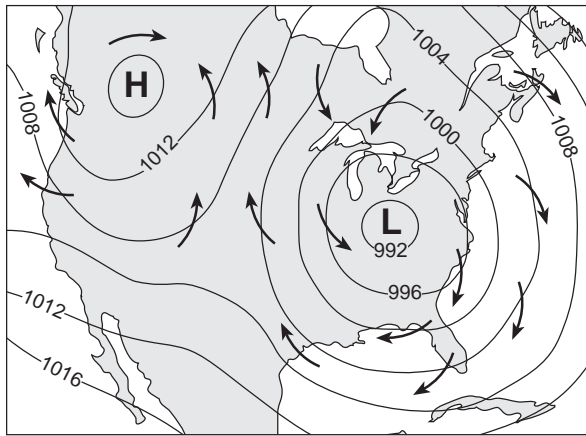
17 Which map best represents the direction of surface winds associated with the high- and low-pressure systems?



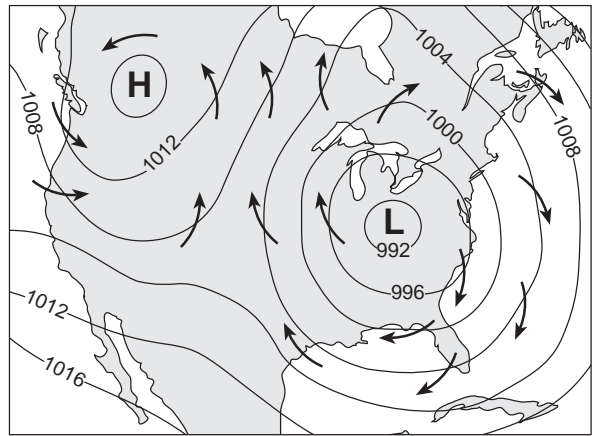
(1)



(3)

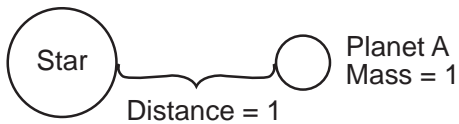


(2)

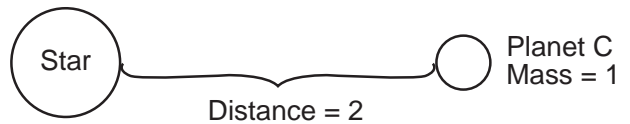


(4)

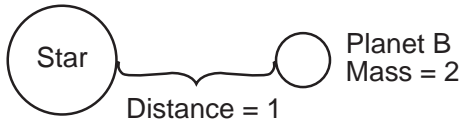
18 In each diagram below, the mass of the star is the same. In which diagram is the force of gravity greatest between the star and the planet shown?



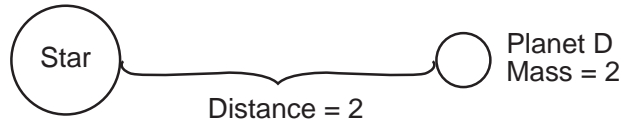
(1)



(3)

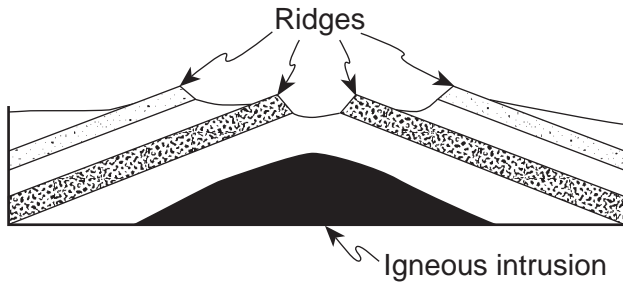


(2)



(4)

- 19 The cross section below shows rock layers that underwent crustal movement during an igneous intrusion in the Cretaceous Period.



Which statement best describes the cause of the ridges shown?

- (1) The rock layers were evenly weathered.
  - (2) Some rock layers were more resistant to weathering and erosion.
  - (3) The igneous intrusion flowed over the surface.
  - (4) More deposition occurred at the ridge sites after uplift.
- 20 The picture below shows a geological feature in the Kalahari Desert of southwestern Africa.

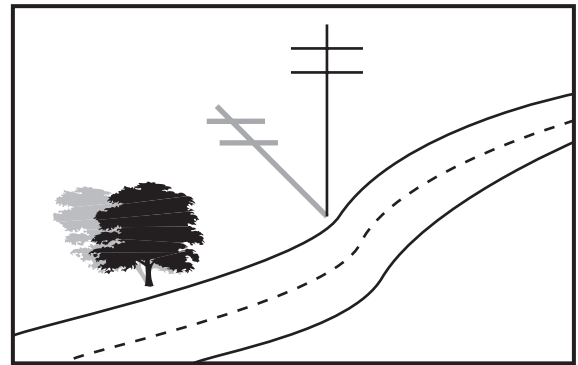


Which process most likely produced the present appearance of this feature?

- (1) wind erosion
  - (2) volcanic eruption
  - (3) earthquake vibrations
  - (4) plate tectonics
- 21 Which group of organisms, some of which were preserved as fossils in early Paleozoic rocks, are still in existence today?

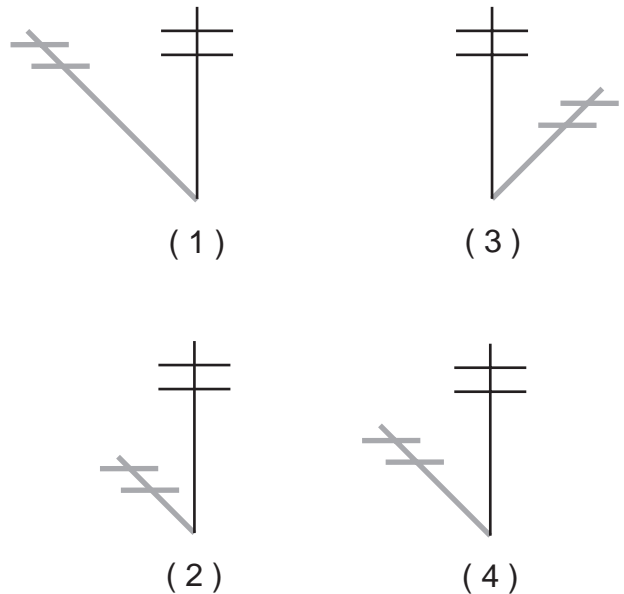
- (1) brachiopods
- (2) eurypterids
- (3) graptolites
- (4) trilobites

- 22 The diagram below shows the shadow cast by a telephone pole on March 21 at solar noon at a location in New York State.



Shadow Cast on March 21

Which shadow was cast by the same telephone pole on June 21 at solar noon?

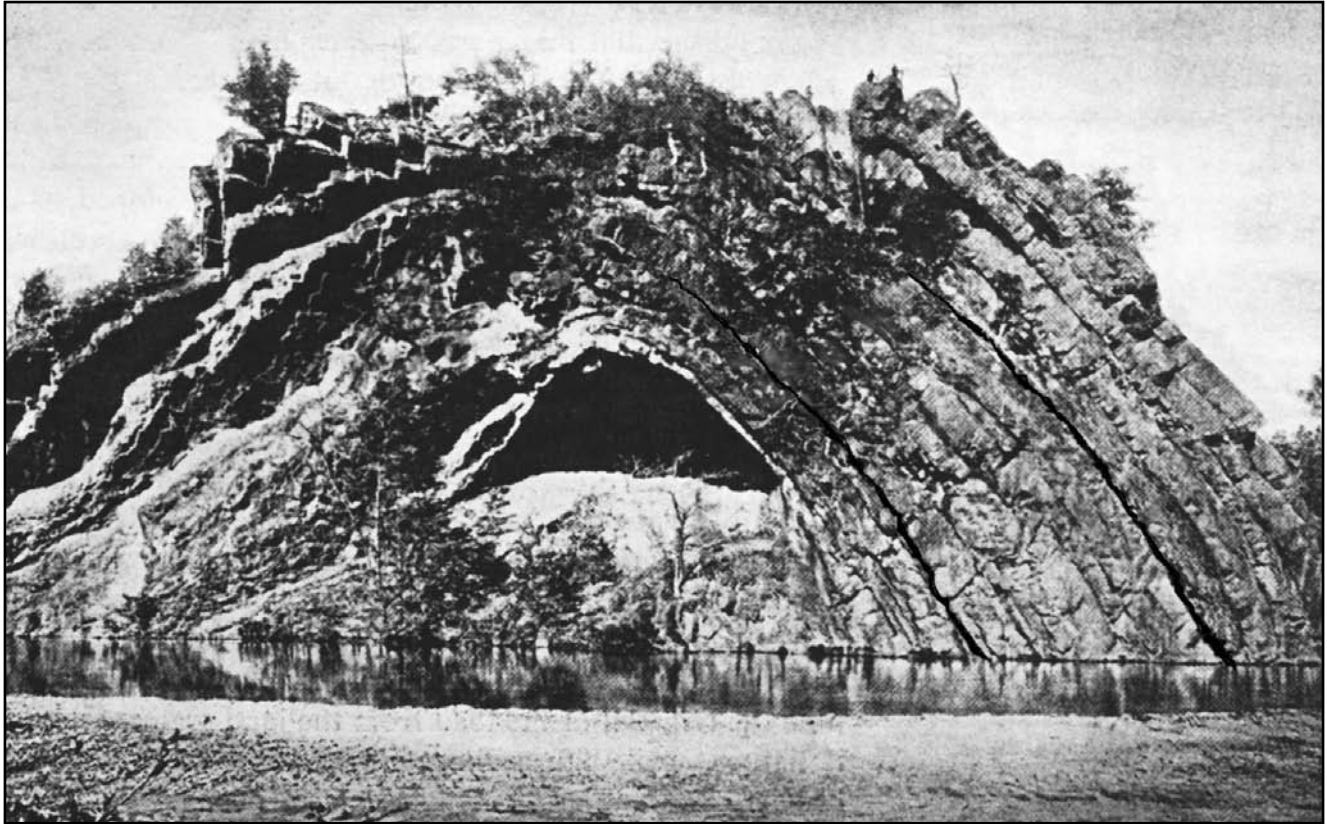


- 23 Which two New York State landscape regions are formed mostly of surface bedrock that is approximately the same geologic age?

- (1) Manhattan Prong and Atlantic Coastal Plain
- (2) Erie-Ontario Lowlands and Adirondack Mountains
- (3) Adirondack Mountains and Allegheny Plateau
- (4) Tug Hill Plateau and St. Lawrence Lowlands



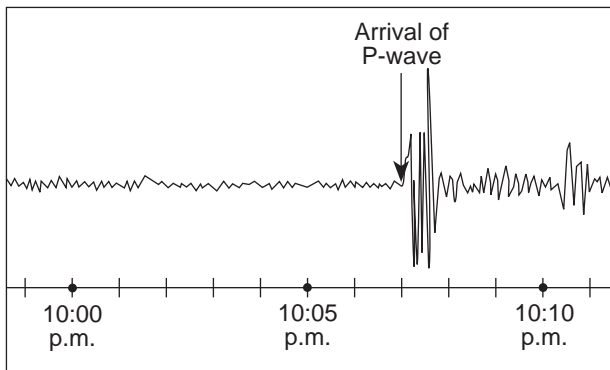
24 The photograph below shows deformed rock structure found on Earth's surface.



Deformed rock structure like this is most often caused by

- (1) crustal plate collisions
- (2) deposition of sediments
- (3) extrusion of magma
- (4) glacial movement

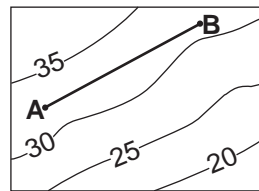
25 The seismogram below shows the time that an earthquake *P*-wave arrived at a seismic station in Albany, New York.



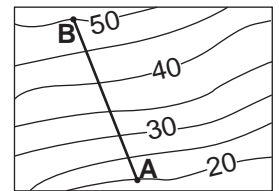
If the earthquake occurred at exactly 10:00 p.m., approximately how far from the earthquake epicenter was Albany, New York?

- (1) 1,900 km
- (2) 3,200 km
- (3) 4,000 km
- (4) 5,200 km

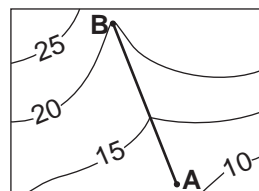
26 On each topographic map below, the straight-line distance from point A to point B is 5 kilometers. Which topographic map shows the steepest gradient between A and B?



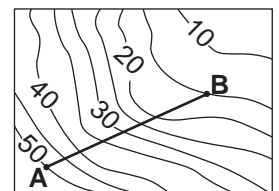
(1)



(3)

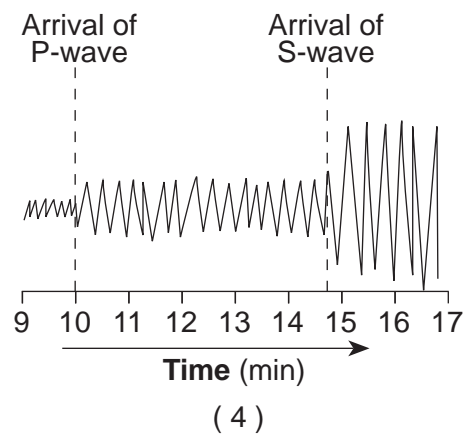
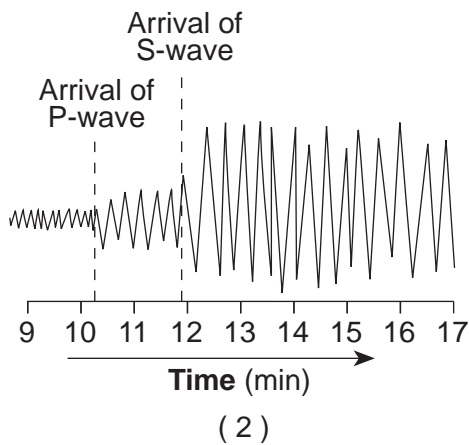
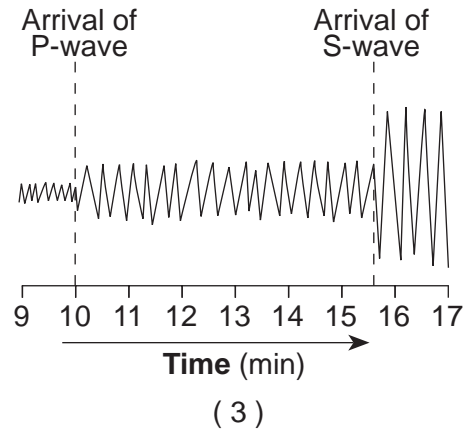
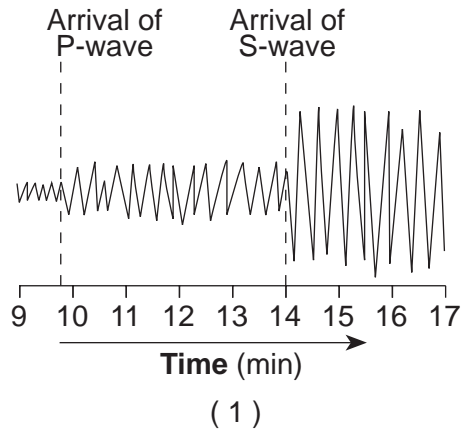


(2)



(4)

27 Which seismogram was recorded approximately 4,000 kilometers from an earthquake epicenter?



28 When the velocity of a stream suddenly *decreases*, the sediment being transported undergoes an increase in

- (1) particle density
- (2) erosion
- (3) deposition
- (4) mass movement

29 When granite melts and then solidifies, it becomes

- (1) a sedimentary rock
- (2) an igneous rock
- (3) a metamorphic rock
- (4) sediments

30 During the Permian Period, sedimentary bedrock in the Appalachian Region was subjected to high temperature and pressure. Calcite deposits that had existed in this environment would most likely have formed

- (1) schist
- (2) gabbro
- (3) marble
- (4) gneiss

31 The satellite photograph below shows a geologic feature composed of silt, sand, and clay.

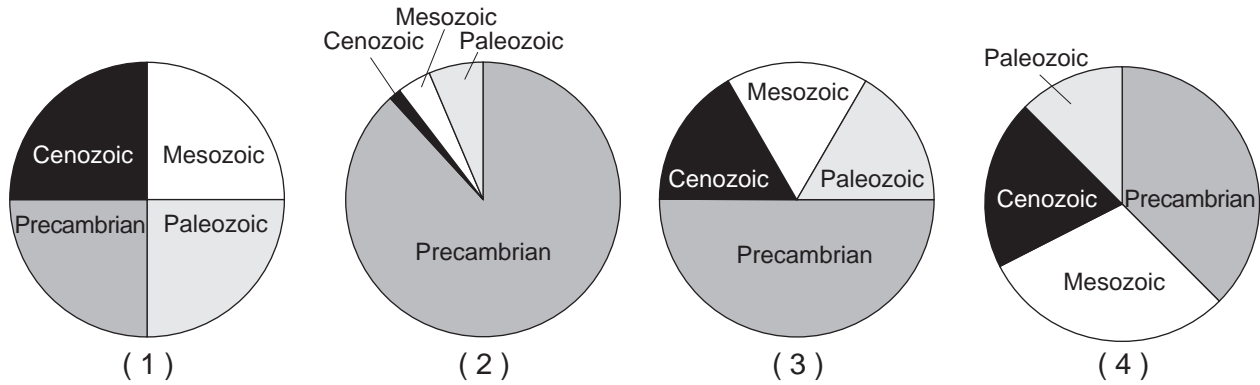


The geologic feature shown in the photograph was primarily deposited by which agent of erosion?

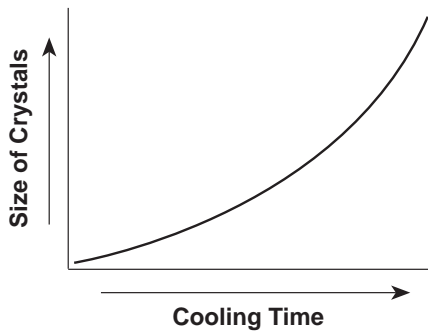
- (1) glaciers
- (2) wind
- (3) wave action
- (4) running water



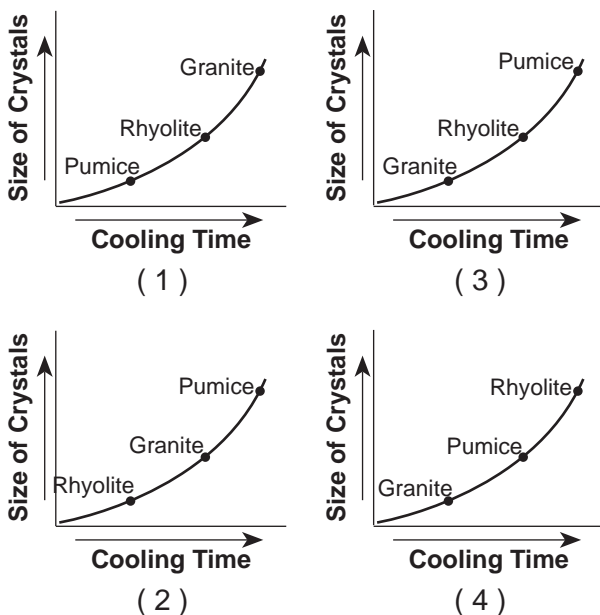
32 Which graph shows the relative duration of geologic time for the Precambrian, Paleozoic, Mesozoic, and Cenozoic time intervals?



33 The graph below shows the relationship between the cooling time of magma and the size of the crystals produced.



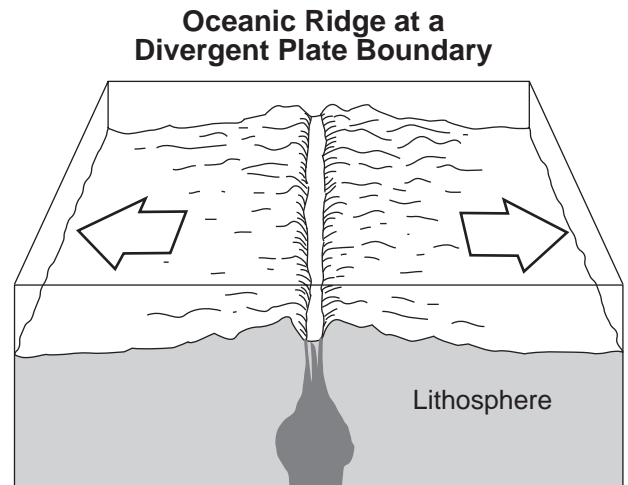
Which graph correctly shows the relative positions of the igneous rocks granite, rhyolite, and pumice?



34 According to the Geologic History of New York State in the *Earth Science Reference Tables*, the inferred latitude of New York State 362 million years ago was closest to

- (1) where it is now
- (2) the North Pole
- (3) the Equator
- (4) 45° south

35 The diagram below shows a tectonic plate boundary.



Which mantle hot spot is at a plate boundary like the one shown in this diagram?

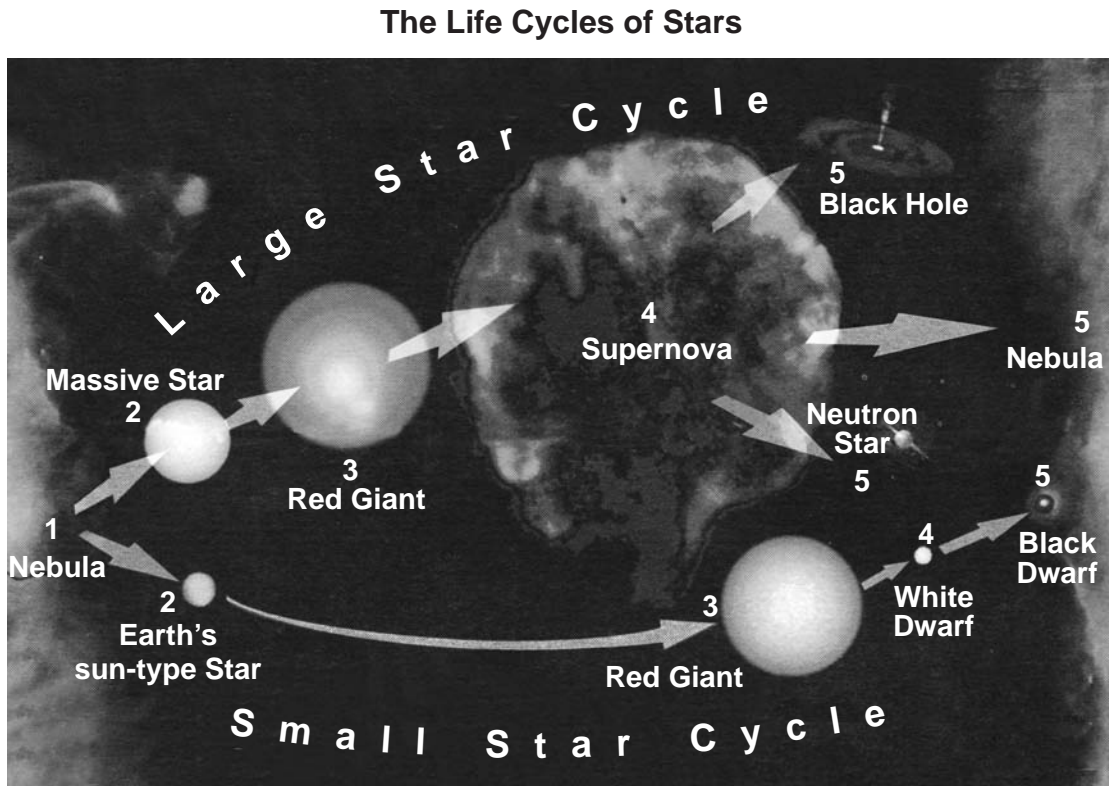
- (1) Hawaii Hot Spot
- (2) Yellowstone Hot Spot
- (3) Galapagos Hot Spot
- (4) Canary Hot Spot

**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 two possible sequences in the life cycle of stars, beginning with their formation from nebular gas clouds in space.



- 36 According to the diagram, the life-cycle path followed by a star is determined by the star's initial
- (1) mass and size
  - (2) temperature and origin
  - (3) luminosity and color
  - (4) luminosity and structure

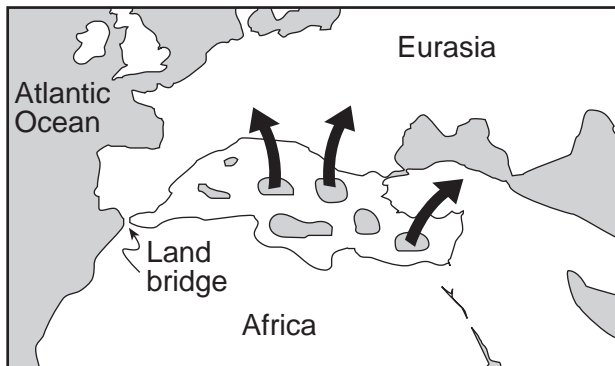
- 37 Stars like Earth's Sun most likely formed directly from a
- (1) nebula
  - (2) supernova
  - (3) red giant
  - (4) black dwarf

- 38 According to the diagram, a star like Earth's Sun will eventually
- (1) explode in a supernova
  - (2) become a black hole
  - (3) change into a white dwarf
  - (4) become a neutron star

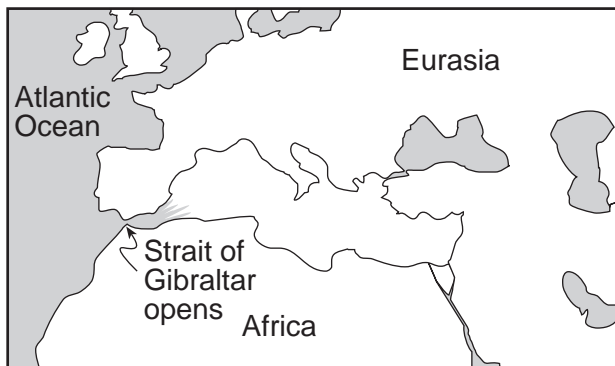
Base your answers to questions 39 and 40 on the maps below, which show changes in the distribution of land and water in the Mediterranean Sea region that scientists believe took place over a period of 6 million years.



**About 10 Million Years Ago**



**About 8 to 5.5 Million Years Ago  
Evaporation from Mediterranean Sea**



**About 4 Million Years Ago  
Mediterranean Sea Refills  
with Atlantic Ocean Water**

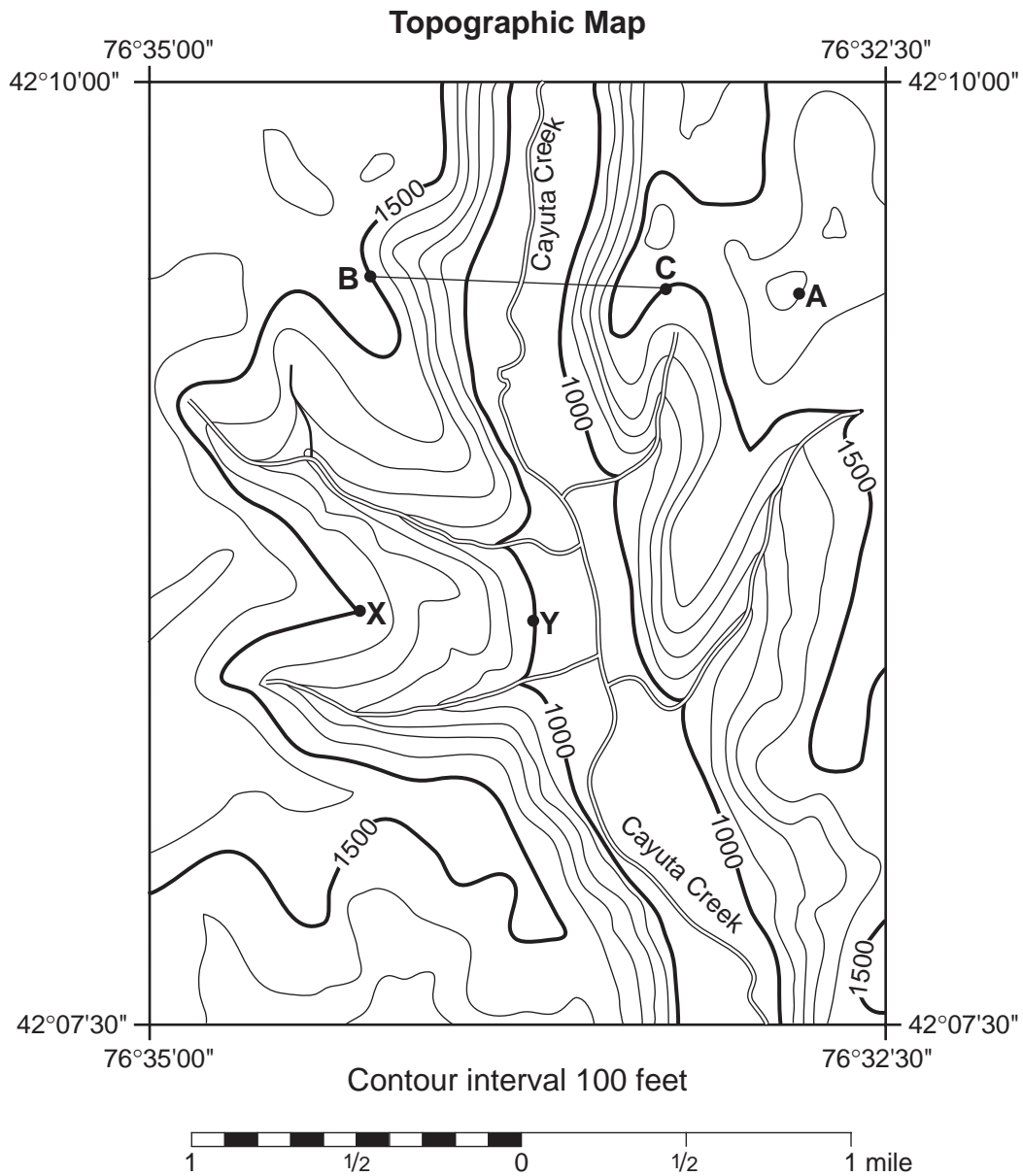
39 Which type of rock was precipitated from seawater as the Mediterranean Sea evaporated between 8 million years ago and 5.5 million years ago?

- (1) rock salt
- (2) basalt
- (3) sandstone
- (4) metaconglomerate

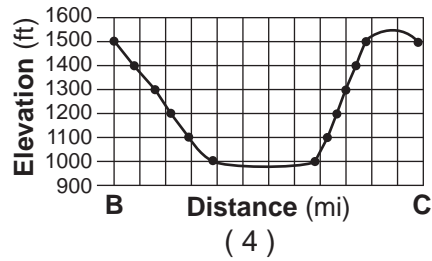
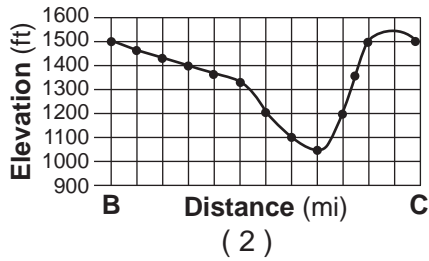
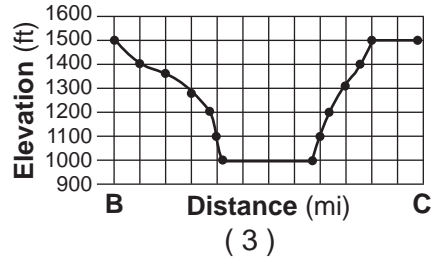
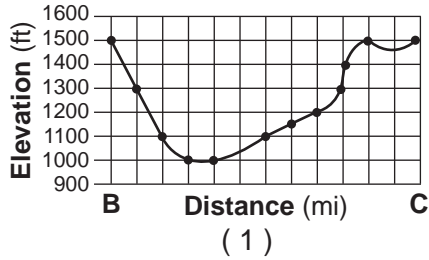
40 During which geologic time period did the changes shown in the maps take place?

- (1) Cambrian
- (2) Cretaceous
- (3) Permian
- (4) Neogene

Base your answers to questions 41 through 45 on the maps below. Points A, B, C, X, and Y are locations on the topographic map. The small map identifies the New York State region shown in the topographic map.



41 Which graph best represents the profile from point B to point C?



42 What is the elevation of point A on the topographic map?

- (1) 1,700 ft
- (2) 1,650 ft
- (3) 1,600 ft
- (4) 1,550 ft

43 What is the approximate gradient between point X and point Y?

- (1) 100 ft/mi
- (2) 250 ft/mi
- (3) 500 ft/mi
- (4) 1,000 ft/mi

44 At the end of the Ice Age, the valley now occupied by Cayuta Creek was a channel for southward flowing glacial meltwater. Into which present-day river valley did this meltwater most likely flow?

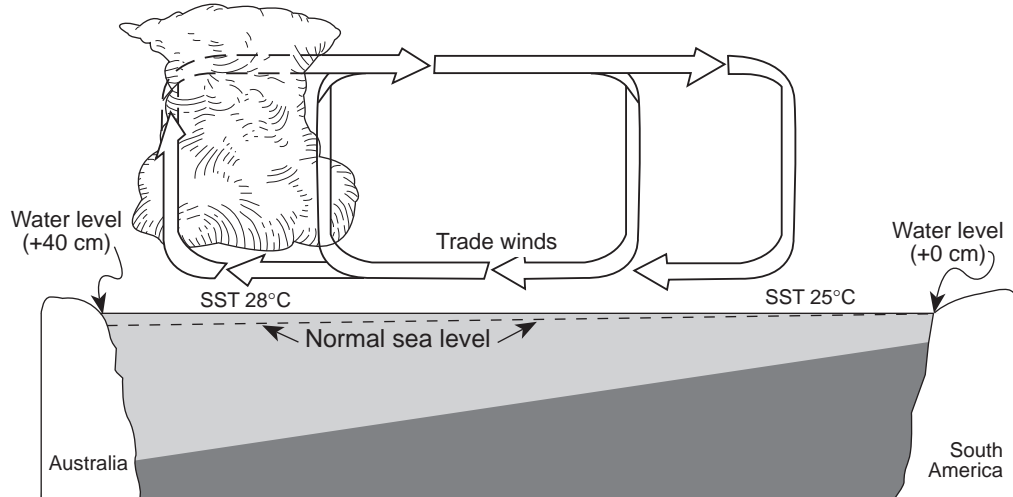
- (1) Hudson River
- (2) Genesee River
- (3) Delaware River
- (4) Susquehanna River

45 Which evidence best supports the inference that the meltwater river that once occupied the Cayuta Creek valley was larger than the modern Cayuta Creek?

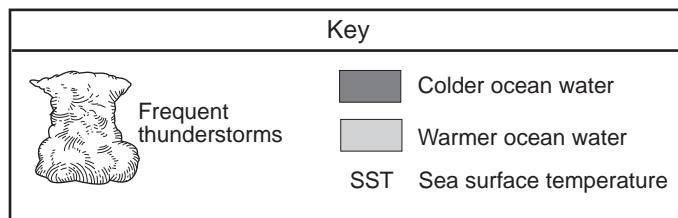
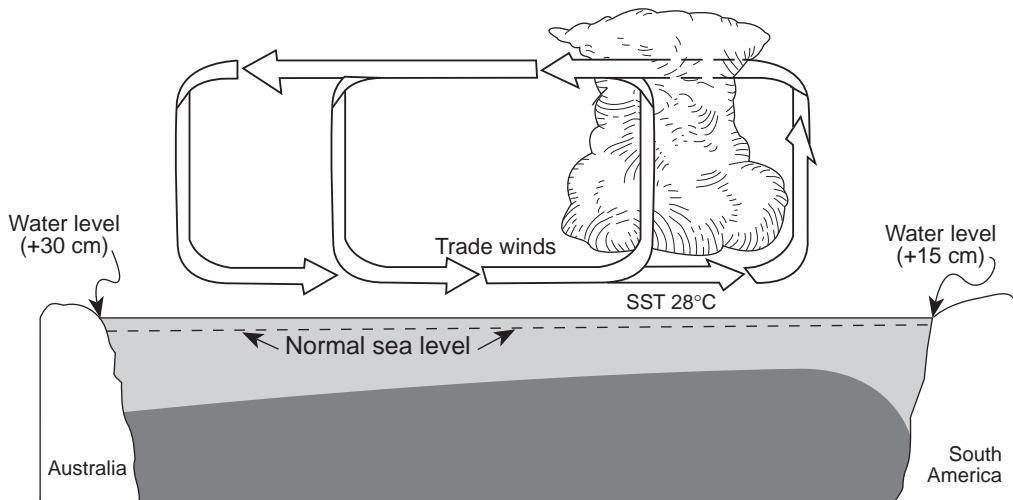
- (1) The modern Cayuta Creek occupies a V-shaped valley.
- (2) The valley floor is wider than the modern Cayuta Creek.
- (3) The modern Cayuta Creek lacks meanders and a flood plain.
- (4) The tributary streams meet the modern Cayuta Creek at nearly right angles.

Base your answers to questions 46 through 50 on the two cross sections below, which represent the Pacific Ocean and the atmosphere near the Equator during normal weather (cross section A) and during El Niño conditions (cross section B). Sea surface temperatures (SST) are labeled and trade-wind directions are shown with arrows. Cloud buildup indicates regions of frequent thunderstorm activity. The change from normal sea level is shown at the side of each diagram.

**Cross Section A: Normal Weather**



**Cross Section B: El Niño Conditions**





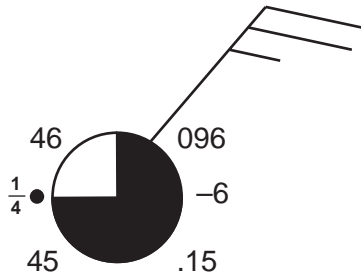
- 46 Which statement correctly describes sea surface temperatures along the South American coast and Pacific trade winds during El Niño conditions?
- (1) The sea surface temperatures are warmer than normal, and Pacific trade winds are from the west.
  - (2) The sea surface temperatures are warmer than normal, and Pacific trade winds are from the east.
  - (3) The sea surface temperatures are cooler than normal, and Pacific trade winds are from the west.
  - (4) The sea surface temperatures are cooler than normal, and Pacific trade winds are from the east.
- 47 Compared to normal weather conditions, the shift of the trade winds caused sea levels during El Niño conditions to
- (1) decrease at both Australia and South America
  - (2) decrease at Australia and increase at South America
  - (3) increase at Australia and decrease at South America
  - (4) increase at both Australia and South America
- 48 During El Niño conditions, thunderstorms increase in the eastern Pacific Ocean region because the warm, moist air is
- (1) less dense, sinking, compressing, and warming
  - (2) less dense, rising, expanding, and cooling
  - (3) more dense, sinking, compressing, and warming
  - (4) more dense, rising, expanding, and cooling
- 49 The development of El Niño conditions over this region of the Pacific Ocean has caused
- (1) changes in worldwide precipitation patterns
  - (2) the reversal of Earth's seasons
  - (3) increased worldwide volcanic activity
  - (4) decreased ozone levels in the atmosphere
- 50 Earth's entire equatorial climate zone is generally a belt around Earth that has
- (1) high air pressure and wet weather
  - (2) high air pressure and dry weather
  - (3) low air pressure and wet weather
  - (4) low air pressure and dry weather
-

**Part B-2**

**Answer all questions in this part.**

*Directions (51–64):* Record your answers in the spaces provided in your answer booklet. Some questions may require the use of the *Earth Science Reference Tables*.

- 51 The atmospheric conditions at a given location are represented by the weather station model below.



On the lines provided *in your answer booklet*, fill in the correct information for *each* variable listed, based on this weather station model. [2]

Base your answers to questions 52 through 54 on the diagram provided *in your answer booklet*, which represents the Sun's rays striking Earth at a position in its orbit around the Sun.

- 52 On the diagram provided *in your answer booklet*, neatly and accurately shade the area of Earth that is in darkness. [1]
- 53 On the diagram provided *in your answer booklet*, draw the line of latitude that is receiving the Sun's direct perpendicular rays on this date. [1]
- 54 What month of the year is represented by the diagram? [1]
- 

- 55 The diagram provided *in your answer booklet* shows the Sun, the Moon, and Earth in line with one another in space. On the diagram, draw *two* dots (•) on the surface of Earth to indicate the locations where the highest ocean tides are most likely occurring. [1]
- 56 Using the "Luminosity and Temperature of Stars" graph in the *Earth Science Reference Tables*, list the five stars below in order of *decreasing* relative luminosity, with letter *a* being the brightest. [1]

*Aldebaran, Betelgeuse, Polaris, Sirius, the Sun*

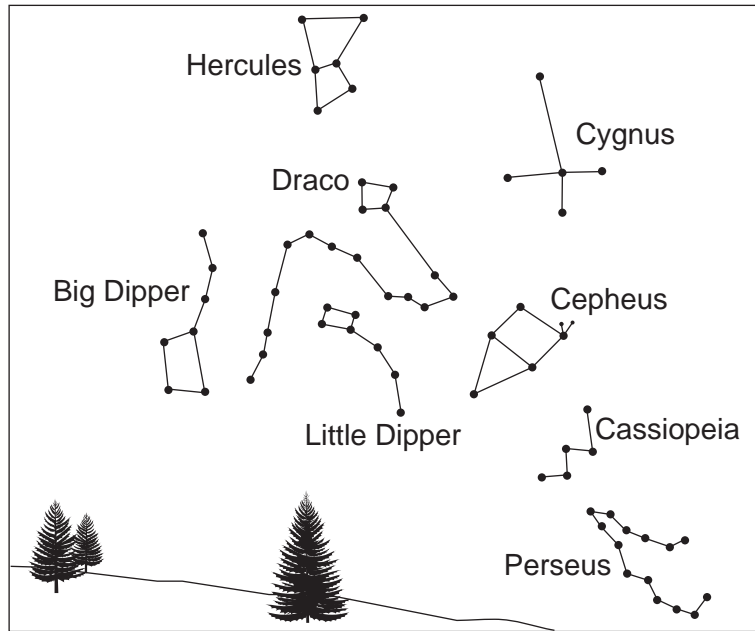
Base your answers to questions 57 through 61 on the geologic cross section provided *in your answer booklet*, which represents an outcrop of various types of bedrock and bedrock features in Colorado.

- 57 On the cross section provided *in your answer booklet*, indicate with arrows the direction of movement on *both* sides of the fault. [1]
- 58 According to this cross section, what is the amount of vertical movement of the shale along the fault? Express your answer to the *nearest tenth of a meter*. [1]
- 59 Place the geologic events listed *in your answer booklet* in order by numbering them from oldest (1) to youngest (4). [1]
- 60 The shale and sandstone layers both contain fossilized leaves from the *Fagopsis* tree, an index fossil for the Oligocene Epoch. State a possible age for these rock layers, in million years. [1]
- 61 The vesicular basalt includes zircon crystals containing the radioactive isotope U-235, which disintegrates to the stable isotope Pb-207. The zircon crystals have 98.44% of the original U-235 remaining, and 1.56% has decayed to Pb-207. Based on the table below, how many half-lives have elapsed since the formation of these crystals? [1]

Percent of U-235 Remaining	Percent Decayed to Pb-207	Half-Lives Elapsed
99.22	0.78	$\frac{1}{64}$
98.44	1.56	$\frac{1}{32}$
96.88	3.12	$\frac{1}{16}$
93.75	6.25	$\frac{1}{8}$
87.50	12.5	$\frac{1}{4}$
75.0	25.0	$\frac{1}{2}$
50.0	50.0	1
37.5	62.5	$1\frac{1}{2}$
25.0	75.0	2
12.5	87.5	3
6.25	93.75	4

Base your answers to questions 62 through 64 on diagram 1 below and on diagram 2 *in your answer booklet*, which show some constellations in the night sky viewed by a group of students. Diagram 1 below shows the positions of the constellations at 9:00 p.m. Diagram 2 *in your answer booklet* shows their positions two hours later.

**Diagram 1 — 9:00 p.m.**



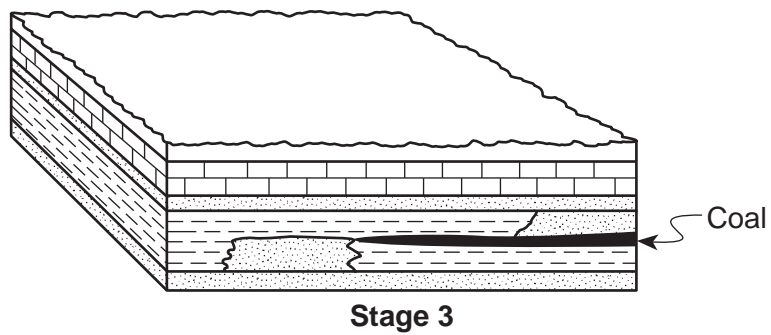
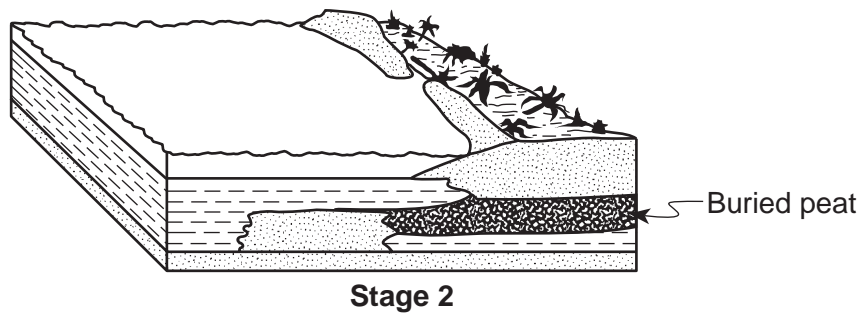
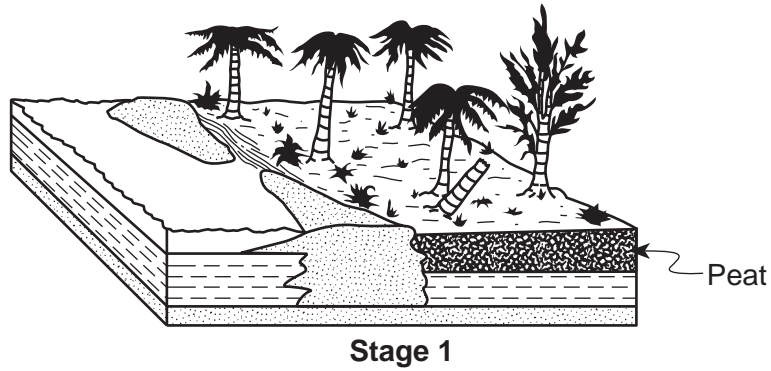
- 62 Circle *Polaris* on diagram 2 provided *in your answer booklet*. [1]
- 63 In which compass direction were the students facing? [1]
- 64 Describe the apparent direction of movement of the constellations Hercules and Perseus during the two hours between student observations. [1]
-

**Part C**

**Answer all questions in this part.**







*Directions (65–81):* Record your answers in the spaces provided in your answer booklet. Some questions may require the use of the *Earth Science Reference Tables*.

65 The sequence of diagrams below shows how coal is formed. Describe the material and *two* processes involved in the formation of coal. [2]

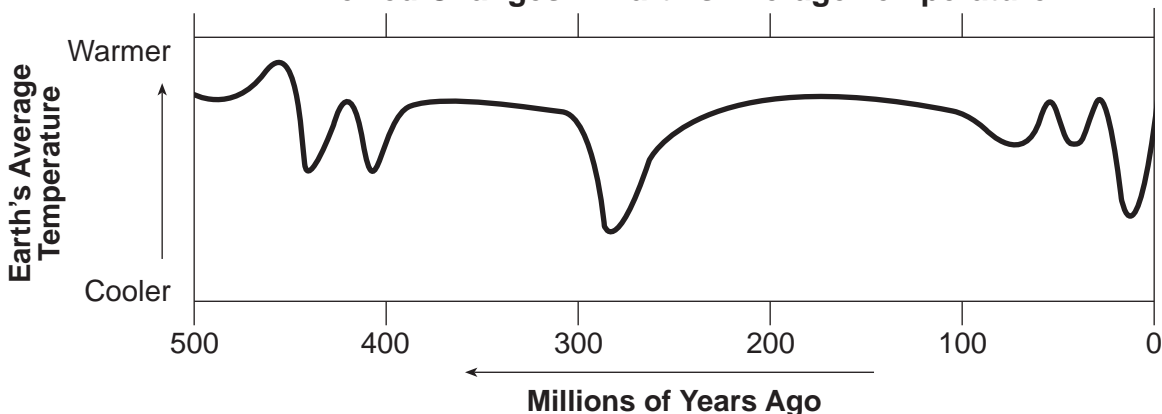


Base your answers to questions 66 and 67 on the table and graph below. The table labeled “Animal Key” shows symbols to represent various animal groups that exist on Earth. The graph shows inferred changes in Earth’s average temperatures over the last 500 million years.

**Animal Key**

Letter	Picture	Animal Group
A		Birds
B		Fish
C		Amphibians
D		Mammals
E		Humans
F		Reptiles

**Inferred Changes in Earth’s Average Temperature**



- 66 On the graph provided in *your answer booklet*, indicate when each of the life-forms in the table is believed to have first appeared on Earth by placing the letter for *each* animal group in the correct box. The correct location for earliest fish, letter *B*, has already been plotted above the graph. [2]
- 67 The two factors listed below could have caused the temperature variations shown on the graph. For *each* factor, state the effect that the increase described would have had on Earth’s temperature, and explain why that temperature change would have taken place. [2]

**Factors**

A Increase in carbon dioxide (CO<sub>2</sub>) and water vapor (H<sub>2</sub>O gas) content of Earth’s atmosphere

B Increase in volcanic ash in Earth’s atmosphere



Base your answers to questions 68 through 71 on the data table below, which shows recorded information for a major Atlantic hurricane. Use the map provided *in your answer booklet* to answer questions 68 and 69.

**Hurricane Data**

Date	Time	Latitude	Longitude	Maximum Winds (knots)	Air Pressure (mb)
Sept. 10	11:00 a.m.	19° N	59° W	70	989
Sept. 11	11:00 a.m.	22° N	62° W	95	962
Sept. 12	11:00 a.m.	23° N	67° W	105	955
Sept. 13	11:00 a.m.	24° N	72° W	135	921
Sept. 14	11:00 a.m.	26° N	77° W	125	932
Sept. 15	11:00 a.m.	30° N	79° W	110	943

- 68 Using the latitude and longitude data in the table, place an **X** on the map provided *in your answer booklet* for *each* location of the hurricane during these 6 days. Connect all the **X**s with a solid line. [1]
  - 69 Label the September 15 (9/15) position of the hurricane on the map. Starting from this plotted position on September 15, draw a dashed line on the map provided *in your answer booklet* to indicate the storm’s most likely path for the next 5 days. [1]
  - 70 Identify the weather instrument used to measure the air pressure associated with this hurricane. [1]
  - 71 Describe the relationship between air pressure and wind speed associated with this hurricane. [1]
- 

Base your answers to questions 72 and 73 on the weather map provided *in your answer booklet*, which shows a large white band of clouds moving toward the southeast. The line shown in the middle of the white cloud band is the frontal boundary between a cP air mass and an mT air mass. Two large arrows show the direction the front is moving.

- 72 On the frontal boundary line on the weather map provided *in your answer booklet*, draw the weather front symbol to represent the front moving toward the southeast. [1]
  - 73 On the same weather map, place an **X** centered on the geographic region that was most likely the source of the warm, moist (mT) air mass. [1]
-

Base your answers to questions 74 through 79 on the reading passage and maps below and on your knowledge of Earth science. The enlarged map shows the location of volcanoes in Colombia, South America.

### Fire and Ice — and Sluggish Magma

On the night of November 13, 1985, Nevado del Ruiz, a 16,200-foot (4,938 meter) snow-capped volcano in northwestern Colombia, erupted. Snow melted, sending a wall of mud and water raging through towns as far as 50 kilometers away, and killing 25,000 people.

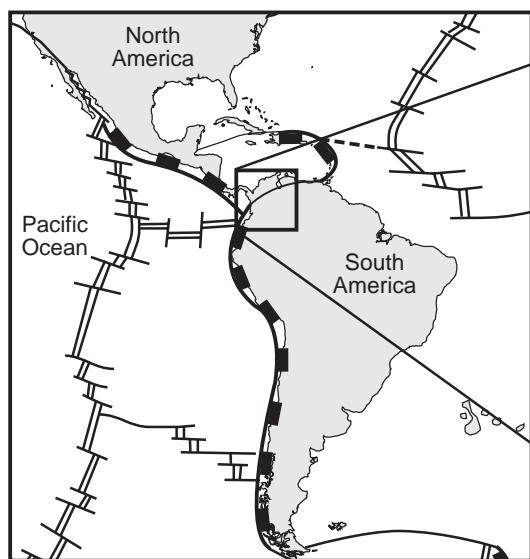
Long before disaster struck, Nevado del Ruiz was marked as a trouble spot. Like Mexico City, where an earthquake killed at least 7,000 people in October 1985, Nevado del Ruiz is located along the Ring of Fire. This ring of islands and the coastal lands along the edge of the Pacific Ocean are prone to volcanic eruptions and crustal movements.

The ring gets its turbulent characteristics from the motion of the tectonic plates under it. The perimeter of the Pacific, unlike that of the Atlantic, is located above active tectonic plates. Nevado del Ruiz happens to be located near the junction of four plate boundaries. In this area an enormous amount of heat is created, which melts the rock 100 to 200 kilometers below Earth's surface and creates magma.

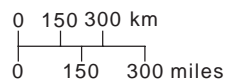
Nevado del Ruiz hadn't had a major eruption for 400 years before this tragedy. The reason: sluggish magma. Unlike the runny, mafic magma that makes up the lava flows of oceanic volcanoes such as those in Hawaii, the magma at this type of subduction plate boundary tends to be sticky and slow moving, forming the rock andesite when it cools. This andesitic magma tends to plug up the opening of the volcano. It sits in a magma chamber underground with pressure continually building up. Suddenly, tiny cracks develop in Earth's crust, causing the pressure to drop. This causes the steam and other gases dissolved in the magma to violently expand, blowing the magma plug free. Huge amounts of ash and debris are sent flying, creating what is called an explosive eruption.

Oddly enough, the actual eruption of Nevado del Ruiz didn't cause most of the destruction. It was caused not by lava but by the towering walls of sliding mud created when large chunks of hot ash and pumice mixed with melted snow.

Locator Plate Map



Enlarged Map Showing Volcanoes of Colombia

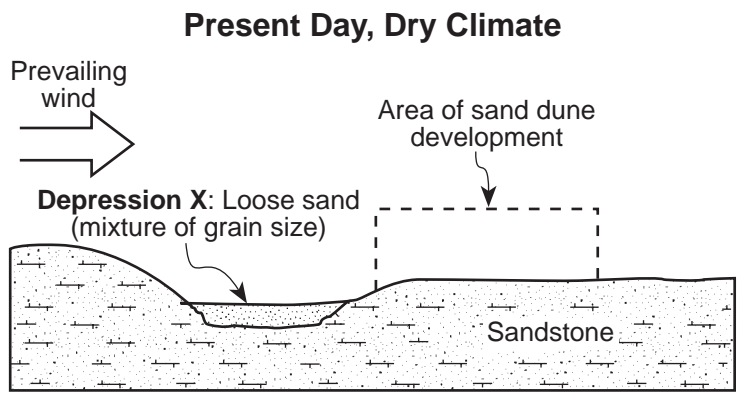


Key
▲ Volcanoes

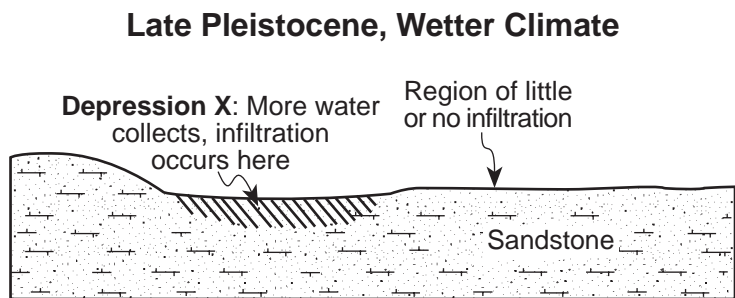
- 74 What are the names of the *four* tectonic plates located near the Nevado del Ruiz volcano? [1]
- 75 What caused most of the destruction associated with the eruption of Nevado del Ruiz? [1]
- 76 What caused the magma to expand, blowing the magma plug free? [1]
- 77 Vesicular texture is very common in igneous rocks formed during andesitic eruptions. Explain how this texture is formed. [1]
- 78 Why are eruptions of Nevado del Ruiz generally more explosive than most Hawaiian volcanic eruptions? [1]
- 79 Describe one emergency preparation that may reduce the loss of life from a future eruption of the Nevado del Ruiz volcano. [1]
- 

**GO RIGHT ON TO THE NEXT PAGE** ⇨

Base your answers to questions 80 and 81 on the cross section below. The cross section represents a part of Texas where weakly cemented sandstone is exposed at the surface. The mineral cement holding the sandstone grains together is calcite. Area X is a circular depression of loose sand that has been partially removed by prevailing winds. Sand dunes have developed downwind from depression X.



- 80 On the diagram of the area of sand dune development provided *in your answer booklet*, draw a sketch showing the general sideview of a sand dune formed by a wind blowing in the direction indicated. Your sketch should clearly show any variations in the slope of the sides of the dune. [1]
- 81 The cross section below shows this same area of Texas near the end of the last ice age when this area had a much wetter climate. More infiltration of rainwater was occurring at area X. Scientists infer that depression X was an area where slightly acidic rainwater collected and infiltrated into the sandstone.



Describe the effect that the slightly acidic infiltrating water had on the calcite cement holding the sandstone together. [1]

---

Tear Here

The University of the State of New York

REGENTS HIGH SCHOOL EXAMINATION

PHYSICAL SETTING  
EARTH SCIENCE

Friday, June 18, 2004 — 1:15 to 4:15 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.

Signature

Tear Here

# PHYSICAL SETTING EARTH SCIENCE

Friday, June 18, 2004 — 1:15 to 4:15 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 type="text"/>	<b>Performance Test Score</b> (Maximum Score: 23)	
.....		
<b>Part</b>	<b>Maximum Score</b>	<b>Student's Score</b>
<b>A</b>	<b>35</b>	
<b>B-1</b>	<b>15</b>	
<b>B-2</b>	<b>15</b>	
<b>C</b>	<b>20</b>	
<b>Total Written Test Score</b> (Maximum Raw Score: 85)		<input type="text"/>
<b>Final Score</b> (from conversion chart)		<input type="text"/>
<b>Raters' Initials:</b> Rater 1 ..... Rater 2 .....		

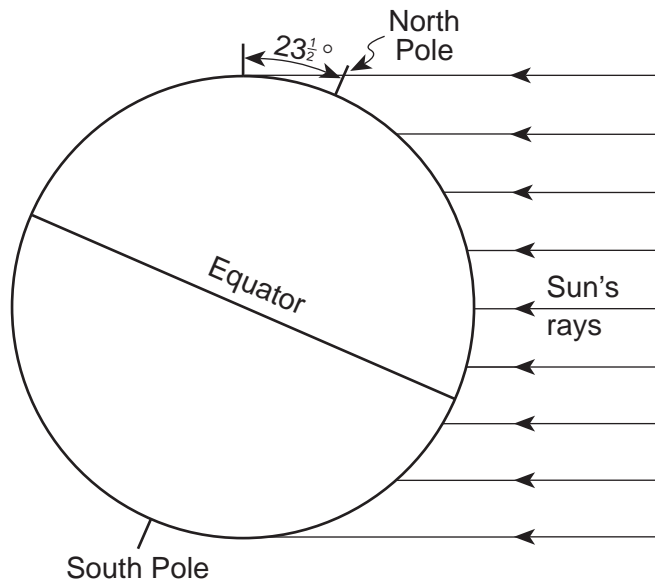
<b>Part B-2</b>	
<b>51</b> Air pressure: _____ <b>mb</b>	
Air temperature: _____ <b>°F</b>	
Amount of precipitation during last six hours: _____ <b>inch(es)</b>	
Cloud cover: _____ <b>%</b>	
Present weather: _____	

**For Raters Only**

**51**



52 and 53



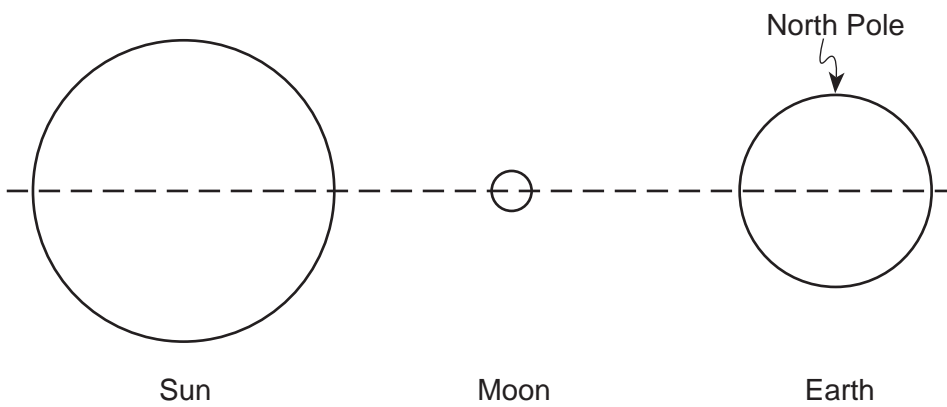
52

53

54 \_\_\_\_\_

54

55



55

(Not drawn to scale)

56 Brightest: (a) \_\_\_\_\_

(b) \_\_\_\_\_

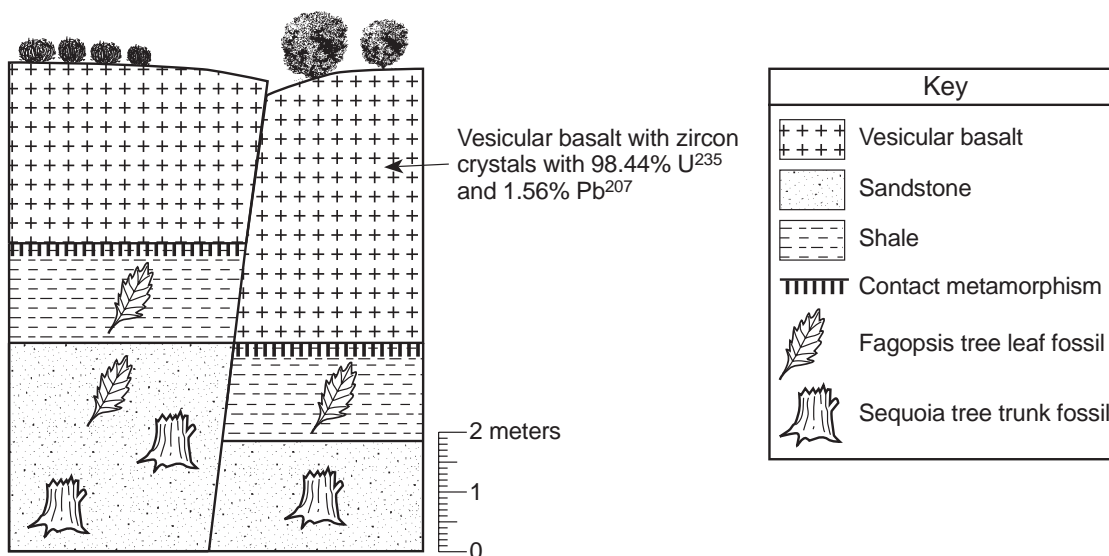
(c) \_\_\_\_\_

(d) \_\_\_\_\_

Least bright: (e) \_\_\_\_\_

56

57



57

58 \_\_\_\_\_ meter(s)

58

59 \_\_\_\_\_ The fault was formed.

\_\_\_\_\_ The shale was deposited.

\_\_\_\_\_ The vesicular basalt was formed.

\_\_\_\_\_ The sandstone was deposited.

59

60 \_\_\_\_\_ million years

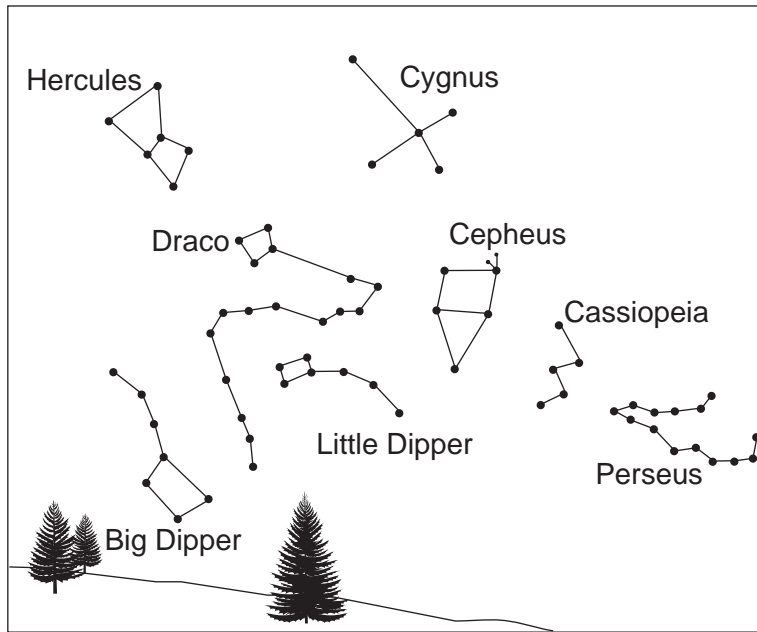
60

61 \_\_\_\_\_ half-lives

61

62

Diagram 2 — 11:00 p.m.



62

63 \_\_\_\_\_

63

64 Hercules appears to have moved: \_\_\_\_\_

64

Perseus appears to have moved: \_\_\_\_\_

Total Score for Part B-2

Part C

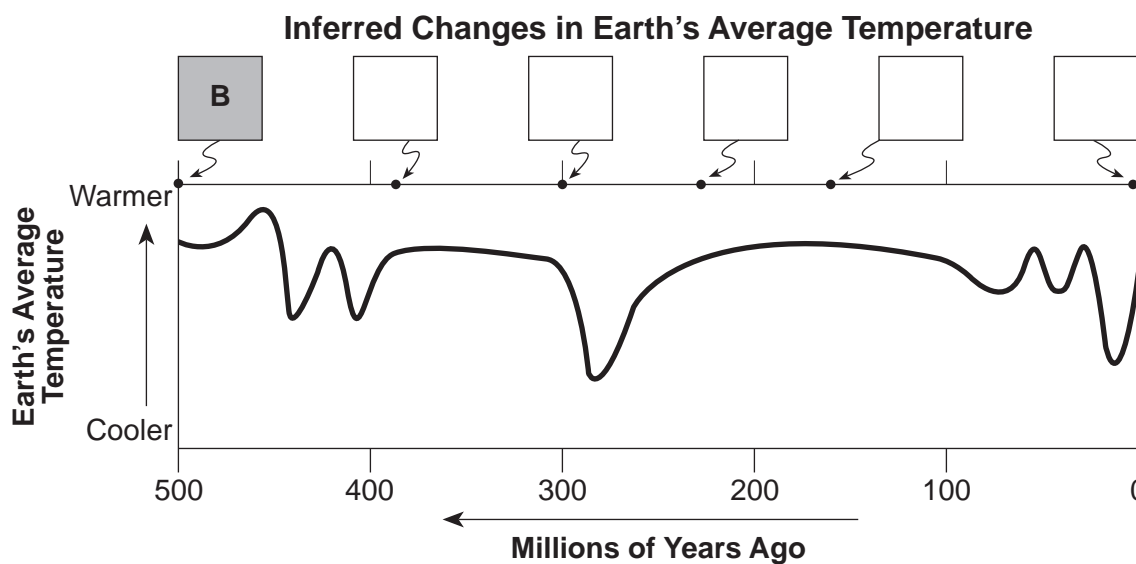
For Raters Only

65 Material: \_\_\_\_\_

65

Processes: \_\_\_\_\_ and \_\_\_\_\_

66



66

67 Factor A:

Effect on Earth's temperature: \_\_\_\_\_

Why temperature changes: \_\_\_\_\_

\_\_\_\_\_

67

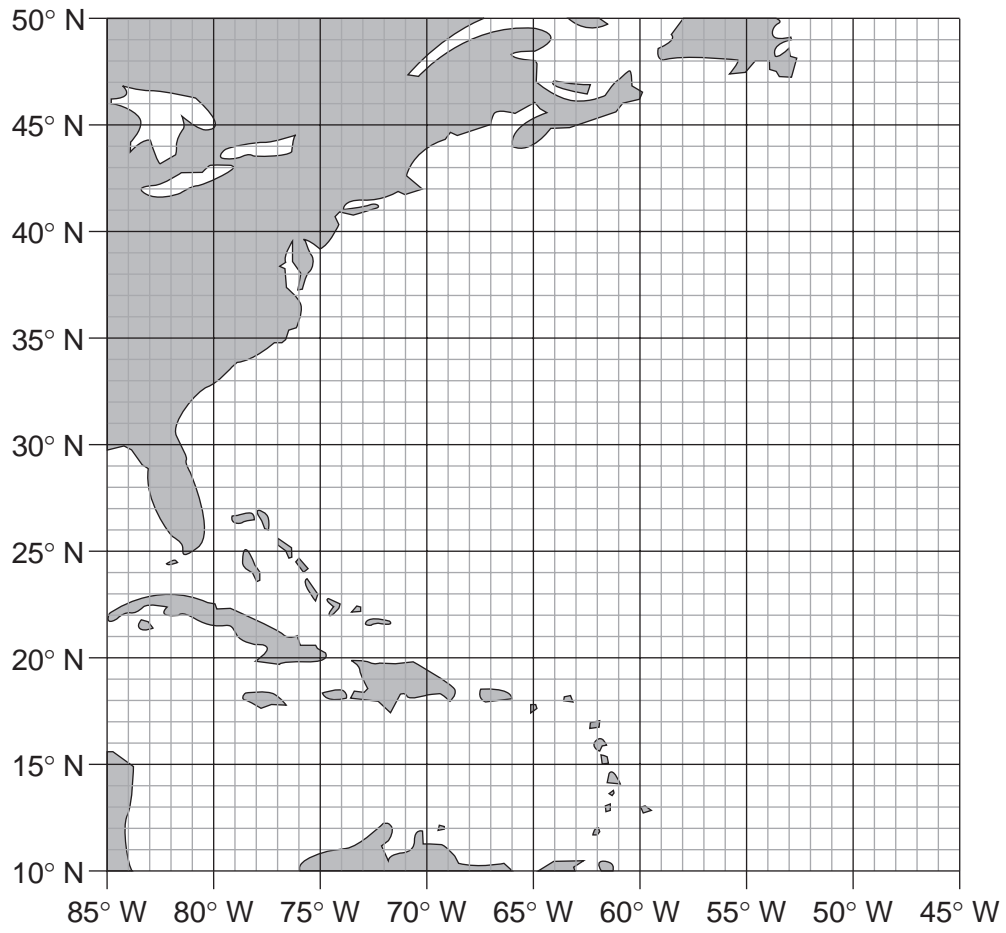
Factor B:

Effect on Earth's temperature: \_\_\_\_\_

Why temperature changes: \_\_\_\_\_

\_\_\_\_\_

68 and 69



For Raters Only

68

69

70 \_\_\_\_\_

70

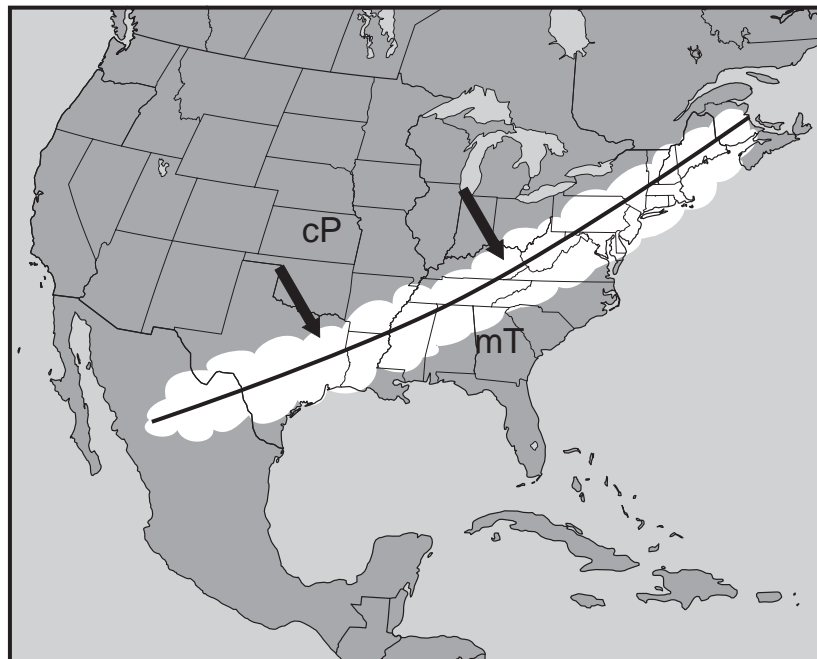
71 \_\_\_\_\_

71

\_\_\_\_\_

For Raters Only

72 and 73



72

73

74 (1) \_\_\_\_\_

(2) \_\_\_\_\_

(3) \_\_\_\_\_

(4) \_\_\_\_\_

74

75 \_\_\_\_\_

\_\_\_\_\_

75

76 \_\_\_\_\_

\_\_\_\_\_

76

77 \_\_\_\_\_

\_\_\_\_\_

77



**For Raters  
Only**

78

---

---

78

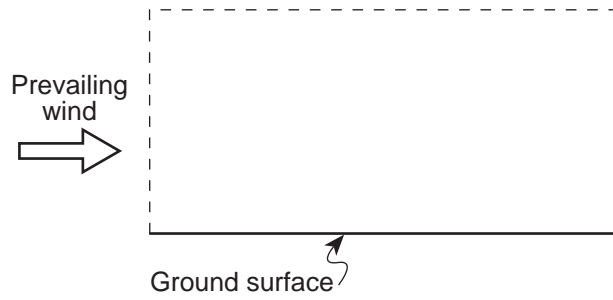
79

---

---

79

80



80

81

---

---

81

**Total Score for Part C**

# FOR TEACHERS ONLY

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

## PS-ES PHYSICAL SETTING/EARTH SCIENCE

Friday, June 18, 2004 — 1:15 to 4:15 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 . . . . . <b>3</b> . . . . .	13 . . . . . <b>1</b> . . . . .	25 . . . . . <b>3</b> . . . . .	36 . . . . . <b>1</b> . . . . .	44 . . . . . <b>4</b> . . . . .
2 . . . . . <b>2</b> . . . . .	14 . . . . . <b>2</b> . . . . .	26 . . . . . <b>4</b> . . . . .	37 . . . . . <b>1</b> . . . . .	45 . . . . . <b>2</b> . . . . .
3 . . . . . <b>3</b> . . . . .	15 . . . . . <b>1</b> . . . . .	27 . . . . . <b>3</b> . . . . .	38 . . . . . <b>3</b> . . . . .	46 . . . . . <b>1</b> . . . . .
4 . . . . . <b>2</b> . . . . .	16 . . . . . <b>3</b> . . . . .	28 . . . . . <b>3</b> . . . . .	39 . . . . . <b>1</b> . . . . .	47 . . . . . <b>2</b> . . . . .
5 . . . . . <b>3</b> . . . . .	17 . . . . . <b>3</b> . . . . .	29 . . . . . <b>2</b> . . . . .	40 . . . . . <b>4</b> . . . . .	48 . . . . . <b>2</b> . . . . .
6 . . . . . <b>3</b> . . . . .	18 . . . . . <b>2</b> . . . . .	30 . . . . . <b>3</b> . . . . .	41 . . . . . <b>4</b> . . . . .	49 . . . . . <b>1</b> . . . . .
7 . . . . . <b>1</b> . . . . .	19 . . . . . <b>2</b> . . . . .	31 . . . . . <b>4</b> . . . . .	42 . . . . . <b>1</b> . . . . .	50 . . . . . <b>3</b> . . . . .
8 . . . . . <b>1</b> . . . . .	20 . . . . . <b>1</b> . . . . .	32 . . . . . <b>2</b> . . . . .	43 . . . . . <b>4</b> . . . . .	
9 . . . . . <b>1</b> . . . . .	21 . . . . . <b>1</b> . . . . .	33 . . . . . <b>1</b> . . . . .		
10 . . . . . <b>4</b> . . . . .	22 . . . . . <b>2</b> . . . . .	34 . . . . . <b>3</b> . . . . .		
11 . . . . . <b>2</b> . . . . .	23 . . . . . <b>4</b> . . . . .	35 . . . . . <b>3</b> . . . . .		
12 . . . . . <b>3</b> . . . . .	24 . . . . . <b>1</b> . . . . .			

**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 Friday, June 18, 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** [2] Allow 2 credits for four or five correct responses.

Allow only 1 credit for only two or three correct responses.

The correct responses are shown below.

Air pressure: **1009.6** mb

Air temperature: **46°F**

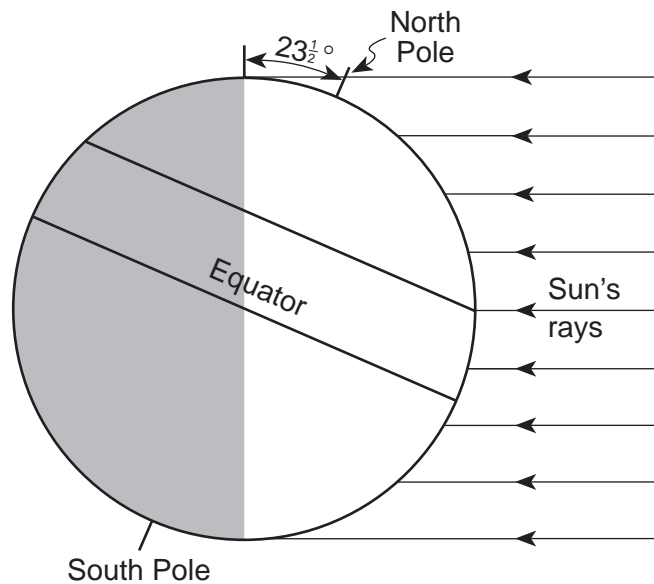
Amount of precipitation during last six hours: **0.15** or **.15** inch

Cloud cover: **75%**

Present weather: **rain**

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

**52** and **53** The correct responses are shown below.

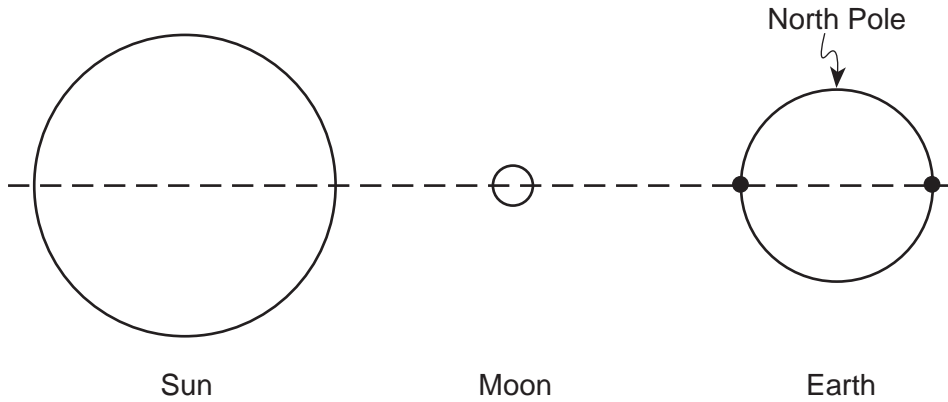


**52** [1] Allow 1 credit for correctly shading the half of Earth that faces away from the Sun.

**53** [1] Allow 1 credit for drawing a line approximately parallel to the Equator starting from a point within 2 millimeters of the intersection of the labeled Sun's ray and Earth's surface.

54 [1] Allow 1 credit for **June**.

55 [1] Allow 1 credit for the correct response shown below that shows two dots within 2 millimeters of the intersection of the dashed line and Earth’s surface.

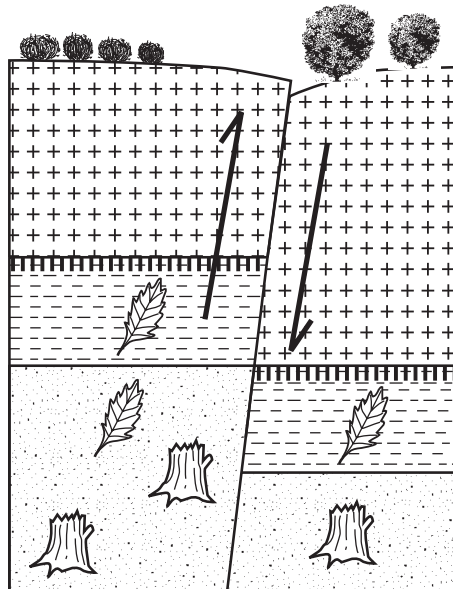


(Not drawn to scale)

56 [1] Allow 1 credit for the correct response shown below.

- Brightest: (a) ***Betelgeuse***  
 (b) ***Polaris***  
 (c) ***Aldebaran***  
 (d) ***Sirius***  
 Least Bright: (e) **the Sun**

57 [1] Allow 1 credit if both arrows are correct, as shown in the diagram below, or if the student draws only one arrow and it points in the correct direction for that side of the fault.



58 [1] Allow 1 credit for **1.7** ( $\pm 0.2$ ) meters.

59 [1] Allow 1 credit for the correct response shown below.

4 The fault was formed.

2 The shale was deposited.

3 The vesicular basalt was formed.

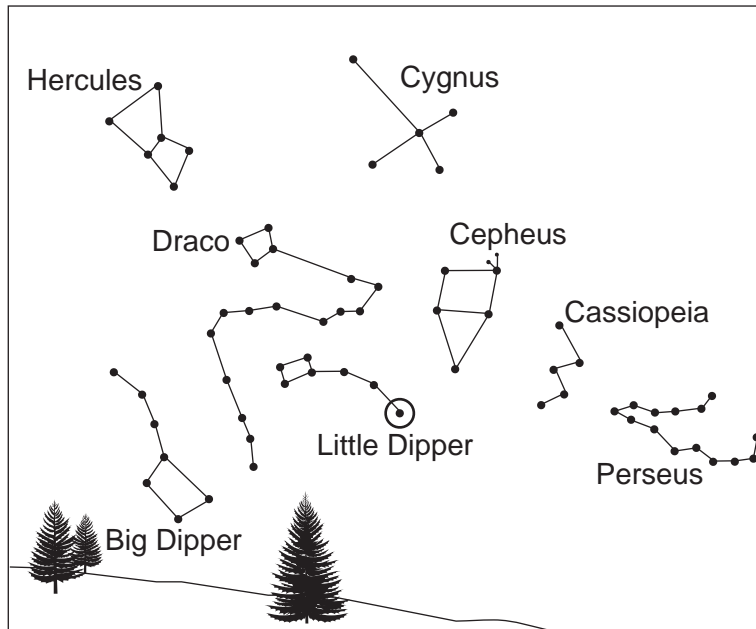
1 The sandstone was deposited.

60 [1] Allow 1 credit for any response from 33.7 to 24 million years.

61 [1] Allow 1 credit for  $\frac{1}{32}$  or **0.03125** half-lives.

62 [1] Allow 1 credit for correctly circling *Polaris*, as shown in the diagram below.

**Diagram 2 — 11:00 p.m.**



63 [1] Allow 1 credit for **north**.

- 64** [1] Allow 1 credit for a correct response. Acceptable responses include, but are not limited to, these examples:

Hercules: down and to the left (west)

to the left

counterclockwise

*and*

Perseus: up and to the right (east)

upward

counterclockwise

**Part C**

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

- 65** [2] Allow 1 credit for correctly identifying the material. Acceptable responses include, but are not limited to, these examples:

plant remains  
 peat  
 wood  
 trees

*and*

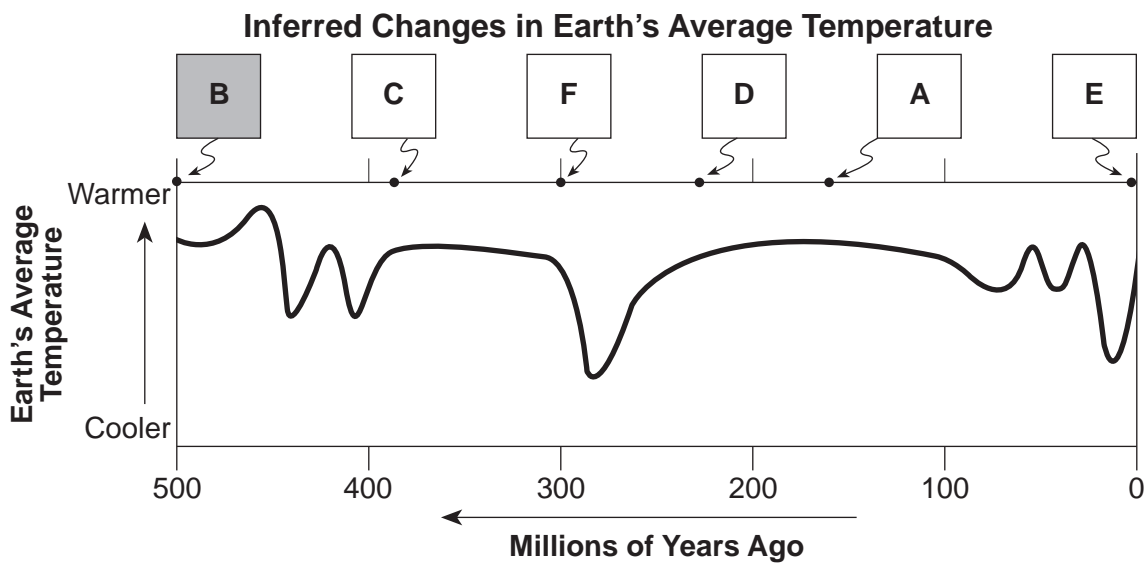
Allow 1 credit for correctly naming/describing *two* processes. Acceptable responses include, but are not limited to, these examples:

burial  
 compaction  
 deposition  
 decomposition  
 heat  
 pressure

- 66** [2] Allow 2 credits for four or five correct student responses.

Allow only 1 credit for only two or three correct student responses.

The correct responses are shown below.





- 67** [2] Allow 1 credit for a correct response for factor A. Acceptable responses include, but are not limited to, this example:

Effect on Earth’s temperature: increase

Why temperature changes: More outgoing infrared radiation is trapped by Earth’s atmosphere.

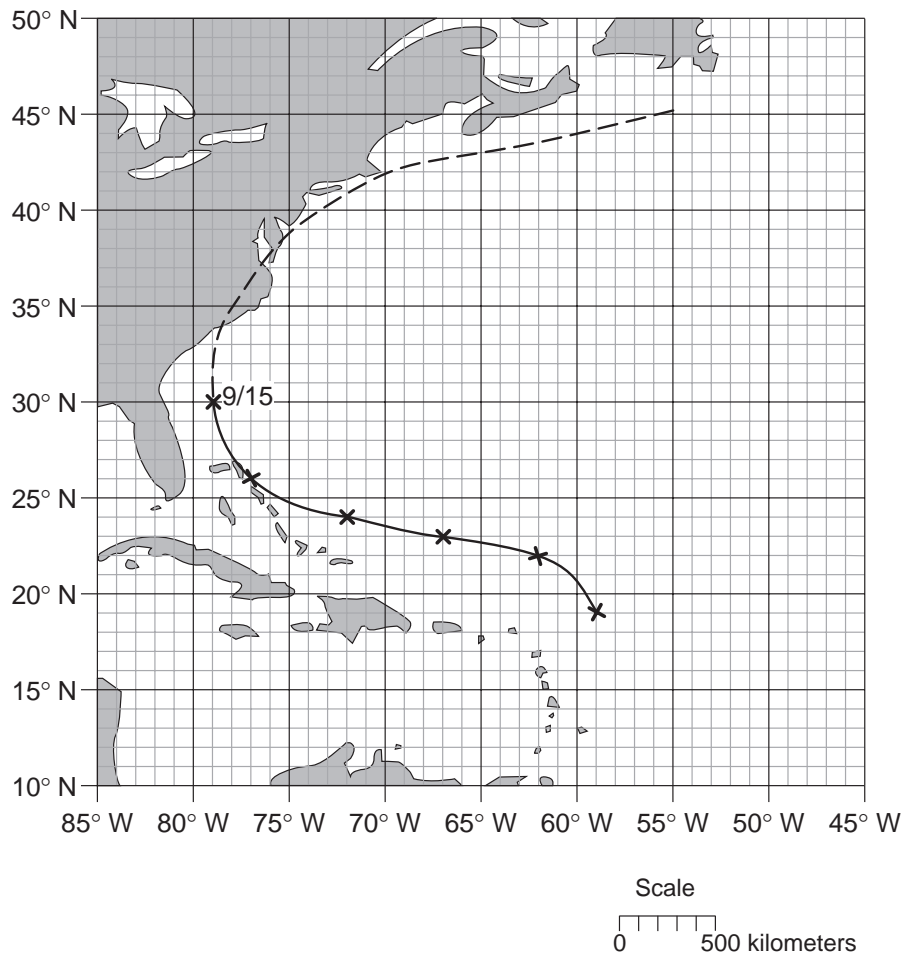
*and*

Allow 1 credit for a correct response for factor B. Acceptable responses include, but are not limited to, this example:

Effect on Earth’s temperature: decrease

Why temperature changes: More sunlight is reflected away from Earth.

- 68** and **69** The correct responses are shown below.

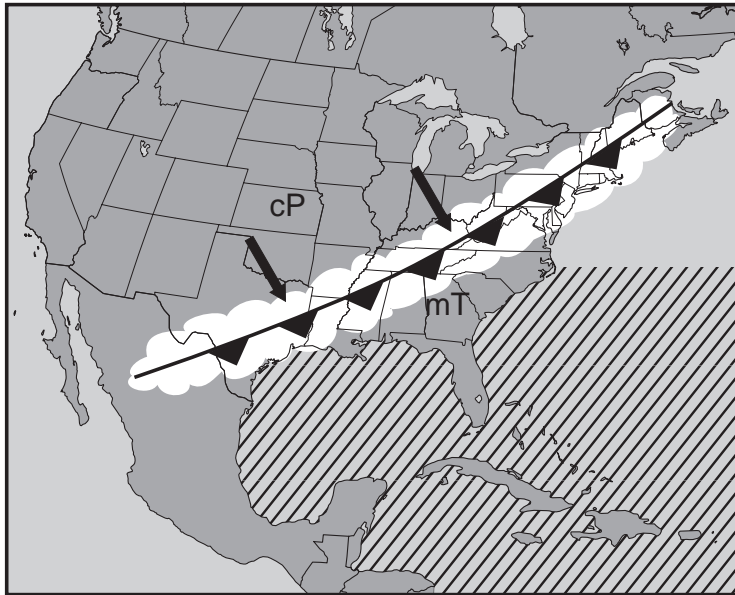


- 68** [1] Allow 1 credit if five or six of the student’s **X**s are plotted within  $\pm 1^\circ$  of the stated positions and are correctly connected with a line.

- 69** [1] Allow 1 credit for a correctly drawn line, even if it is not dashed. The line should end heading between north and east. Allow credit even if the starting point for the student answer is incorrect or unlabeled, but the drawn line ends heading between north and east above  $30^\circ$  N latitude.

- 70 [1] Allow 1 credit for **barometer** or **barograph**.
- 71 [1] Allow 1 credit for a correct response. Acceptable responses include, but are not limited to, this example:  
As the air pressure in the hurricane gets lower, the wind speed increases.

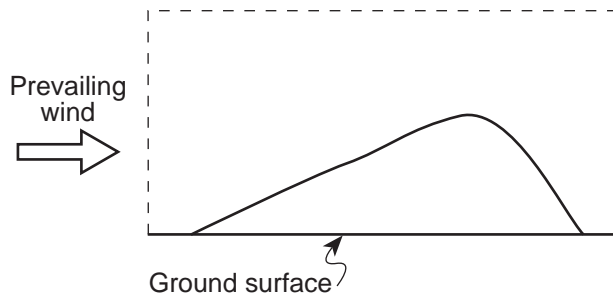
72 and 73 The correct responses are shown below.



- 72 [1] Allow 1 credit for drawing the cold front symbol in the correct location. Allow credit even if the symbol is not shaded.
- 73 [1] Allow 1 credit for an **X** located over the water in the diagonally lined area.
- 74 [1] Allow 1 credit if *all* four plates are correctly named. The correct responses are shown below.
- (1) **South American Plate**
  - (2) **Cocos Plate**
  - (3) **Caribbean Plate**
  - (4) **Nazca Plate**
- 75 [1] Allow 1 credit for a correct response. Acceptable responses include, but are not limited to, these examples:
- mass movement of mud down the mountain
  - a mud avalanche
  - It melted snow, causing mudslides.
  - Hot ash and pumice melted snow, creating landslides.

- 76** [1] Allow 1 credit for a correct response. Acceptable responses include, but are not limited to, these examples:
- a drop in pressure on the magma
  - Steam and gases that were dissolved in the magma violently expanded.
  - Cracks in Earth's crust lowered pressure on the magma.
  - Magma pressure cracked the overlying rocks, releasing the gases.
- 77** [1] Allow 1 credit for a correct response. Acceptable responses include, but are not limited to, these examples:
- Escaping gas bubbles are trapped in the rapidly cooling magma.
  - Gas/air pockets form in the rock as it cools.
- 78** [1] Allow 1 credit for a correct response. Acceptable responses include, but are not limited to, these examples:
- Hawaiian magma is mafic and the magma of the Nevado del Ruiz volcano is andesitic.
  - Hawaiian magma is runny and the magma of Nevado del Ruiz is thick and slow moving.
  - Hawaii is located at a hot spot in the center of the Pacific Plate. Nevado del Ruiz is near a subduction plate boundary.
- 79** [1] Allow 1 credit for a correct response. Acceptable responses include, but are not limited to, these examples:
- Geologists should monitor conditions and provide early warning.
  - People should leave their houses when early warning of an eruption is given.
  - Avoid building homes in valleys.
  - People should be discouraged from building near the volcano.
  - Evacuation routes should be publicized.
  - Predicted mudslide routes should be identified.

- 80** [1] Allow 1 credit for a correct profile, showing both the windward and leeward sides of the same dune, *and* showing the steepest gradient on the leeward side. Acceptable responses include, but are not limited to, this example:



- 81** [1] Allow 1 credit for a correct response. Acceptable responses include, but are not limited to, these examples:

The calcite cement would be chemically weathered and removed by infiltrating water.  
It would be dissolved.  
It will bubble.

## Map to Core Curriculum

<b>June 2004 Physical Setting/Earth Science</b>			
<b>Question Numbers</b>			
Key Ideas/Performance Indicators	Part A	Part B	Part C
<b>Standard 1</b>			
Math Key Idea 1	26,32	43	68
Math Key Idea 2	4,11,18,27,33	61	
Math Key Idea 3			
Sci. Inq. Key Idea 1	19,20,22,24	45,63,64	67
Sci. Inq. Key Idea 2		51	
Sci. Inq. Key Idea 3	2,4,8,9,10,11, 12,14,16,21,22, 23,25,26,27,29, 30,32,33,34,35	39,40,43,44,50, 56,60	66,69,72,73,74, 75,76,77,78
Eng. Des. Key Idea 1			70
<b>Standard 2</b>			
Key Idea 1	31		
Key Idea 2			
Key Idea 3			
<b>Standard 6</b>			
Key Idea 1	24		80
Key Idea 2	10,17,19	36,37,38,41,42, 45,46,47,48,51, 52,53,54,55,59, 62,63	65,66,68,72,73, 80,81
Key Idea 3	10,32	41,42,57,58,60	
Key Idea 4		38	
Key Idea 5	34	38,47,49,55,64	69,71,78
Key Idea 6			
<b>Standard 7</b>			
Key Idea 1			
Key Idea 2		49	79
<b>Standard 4</b>			
Performance Indicator 1	1,3,4,5,7,8,9, 10,14,15,18,21, 22,23,32	36,37,38,40,52, 53,54,55,56,57, 58,59,60,61,62, 63,64	66,68,81
Performance Indicator 2	2,6,11,12,13, 14,16,17,19,20, 24,25,26,27,28, 30,31,34,35	39,41,42,43,44, 45,46,47,48,49, 50,51	65,67,68,69,70, 71,72,73,74,75, 76,77,78,79,80,81
Performance Indicator 3	29,30,33		65,77,81
<b>Reference Tables</b>			
ESRT 2001 Edition	2,3,4,8,9,10,12, 14,16,21,23,25, 26,27,29,30,32, 33,34,35	39,40,43,50,51, 56,60	65,66,72,74

# Regents Examination in Earth Science – June 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	98	97	96	96	96	95	95	94	94	94	93	93	92	91	91	90	89	89	88	87	86	85	84	83
	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	97	96	94	94	94	93	93	93	92	92	91	91	90	90	89	88	88	87	86	85	84	83	83	82
	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	95	94	93	92	92	92	91	91	91	90	90	89	89	88	87	87	86	85	84	84	83	82	81	80
	74	94	93	92	92	91	91	91	90	90	89	89	88	88	87	86	86	85	84	84	83	82	81	80	79
	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	91	90	90	90	89	89	88	88	88	87	87	86	85	85	84	83	83	82	81	80	79	78	77
	70	92	90	89	89	89	88	88	88	87	87	86	86	85	85	84	83	83	82	81	80	79	78	77	77
	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	90	89	88	87	87	87	86	86	86	85	85	84	83	83	82	82	81	80	79	78	78	77	76	75
	66	89	88	87	86	86	86	85	85	85	84	84	83	83	82	81	81	80	79	78	78	77	76	75	74
	65	88	87	86	86	85	85	85	84	84	83	83	82	82	81	80	80	79	78	78	77	76	75	74	73
	64	87	86	85	85	84	84	84	83	83	82	82	81	81	80	80	79	78	78	77	76	75	74	73	72
	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	84	83	82	81	81	81	80	80	80	79	79	78	77	77	76	76	75	74	73	72	72	71	70	69	
58	83	82	81	80	80	80	80	79	79	78	78	77	77	76	75	75	74	73	72	72	71	70	69	68	
57	82	81	80	80	79	79	79	78	78	77	77	76	76	75	75	74	73	72	72	71	70	69	68	67	
56	81	80	79	79	79	78	78	77	77	77	76	76	75	74	74	73	72	72	71	70	69	68	67	66	
55	80	79	78	78	78	77	77	77	76	76	75	75	74	73	73	72	71	71	70	69	68	67	66	65	
54	80	79	77	77	77	76	76	76	75	75	74	74	73	73	72	71	71	70	69	68	67	66	66	65	
53	79	78	77	76	76	76	75	75	74	74	74	73	72	72	71	70	70	69	68	67	67	66	65	64	
52	78	77	76	75	75	75	74	74	74	73	73	72	72	71	70	70	69	68	67	67	66	65	64	63	
51	77	76	75	75	74	74	74	73	73	72	72	71	71	70	69	69	68	67	67	66	65	64	63	62	
50	76	75	74	74	73	73	73	72	72	71	71	70	70	69	69	68	67	66	66	65	64	63	62	61	
49	75	74	73	73	73	72	72	71	71	70	70	69	69	68	68	67	66	66	65	64	63	62	61	60	
48	74	73	71	71	71	71	70	70	69	69	68	68	67	67	66	66	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	71	70	69	69	68	68	68	67	67	66	66	65	65	64	63	63	62	61	61	60	59	58	57	56	
44	70	69	68	68	67	67	67	66	66	65	65	64	64	63	63	62	61	61	60	59	58	57	56	55	

**June 2004 Regents Examination in Earth Science – continued**

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