

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 1.0×10^{-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

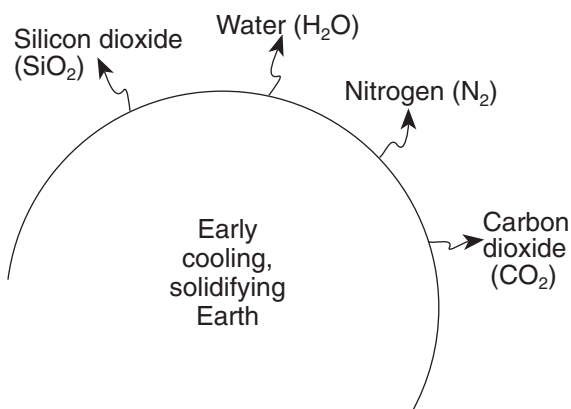
- 5 On June 21, where will the Sun appear to rise for an observer located in New York State?

(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.

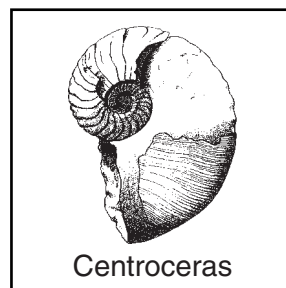
- 7 The diagram below shows four different chemical materials escaping from the interior of early Earth.



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

(1) SiO₂ (3) N₂
(2) H₂O (4) CO₂

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



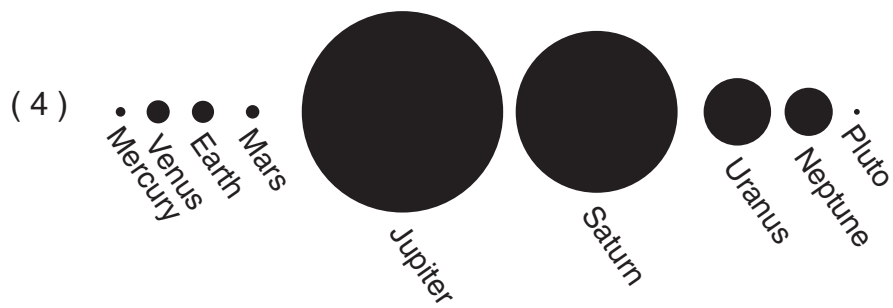
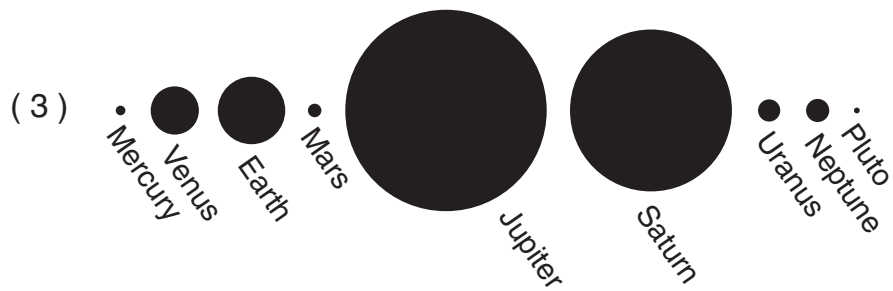
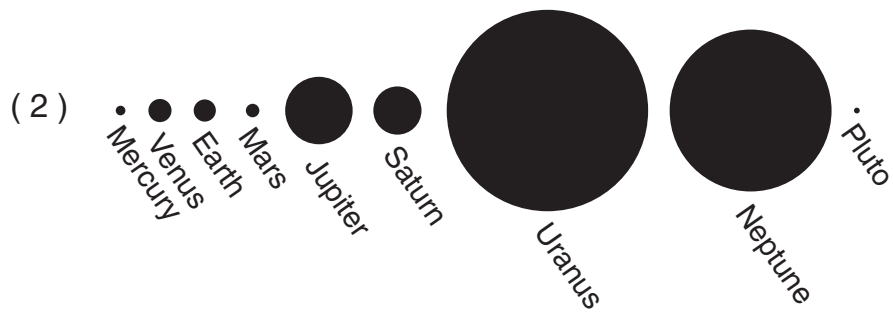
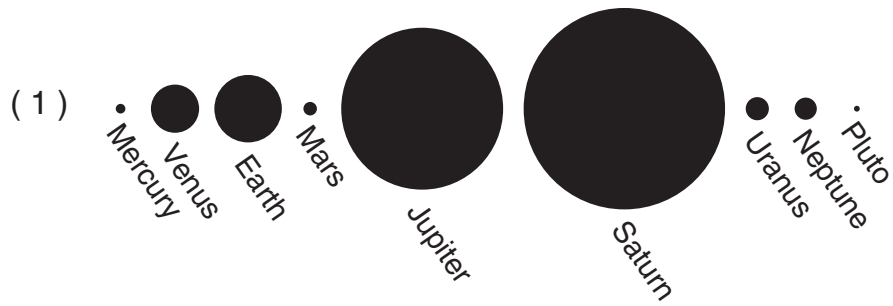
Which other fossil is most likely to be found in the same age bedrock?

(1) *Phacops* (3) *Coelophysis*
(2) condor (4) *Tetragraptus*

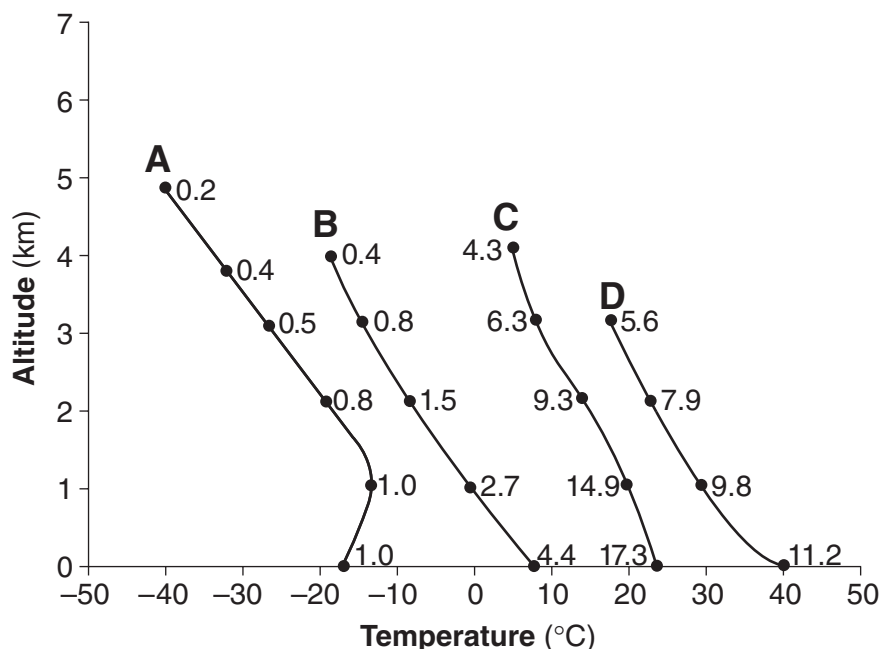
- 9 Soil composed of which particle size usually has the greatest capillarity?

(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

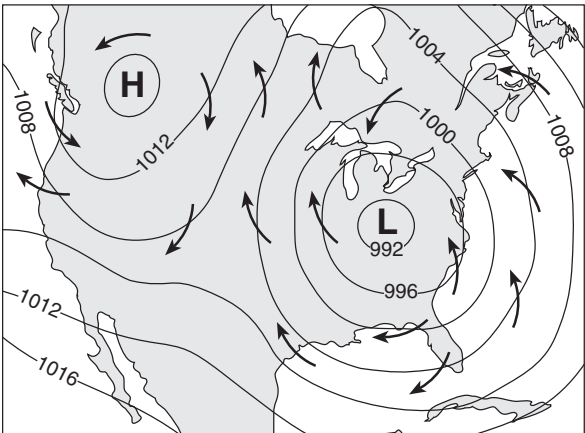
- 15 During a dry summer, the flow of most large New York State streams generally

- (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

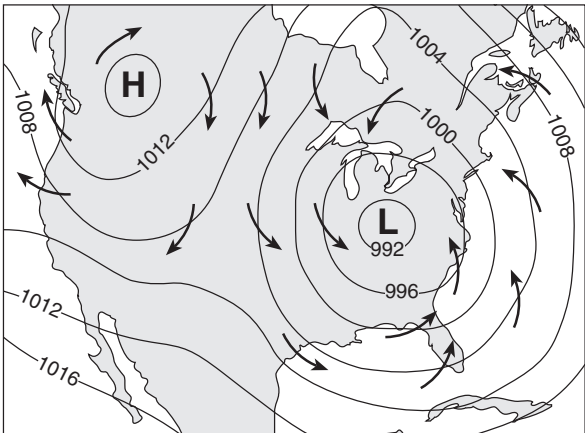
- 16 The density of Earth's crust is

- (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

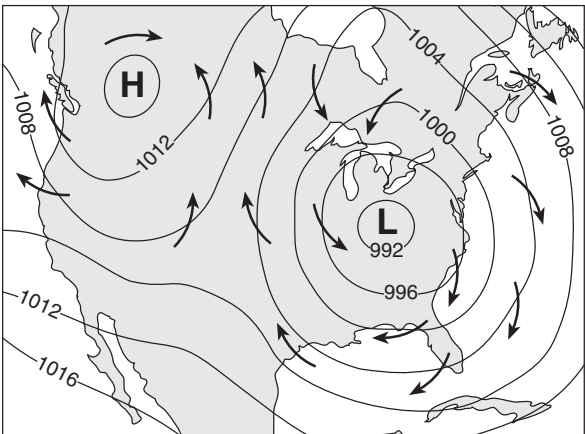
17 Which map best represents the direction of surface winds associated with the high- and low-pressure systems?



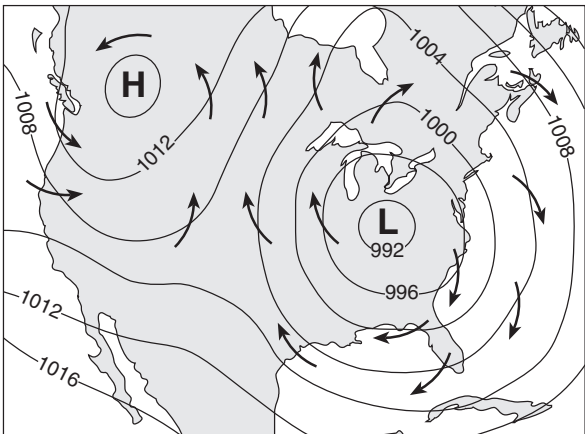
(1)



(3)

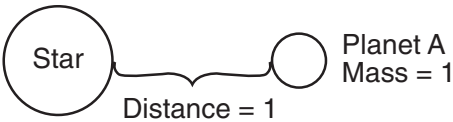


(2)

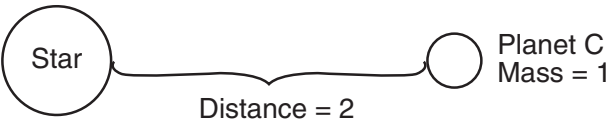


(4)

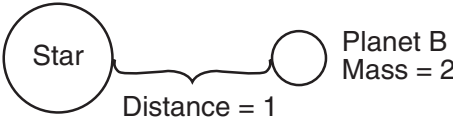
18 In each diagram below, the mass of the star is the same. In which diagram is the force of gravity greatest between the star and the planet shown?



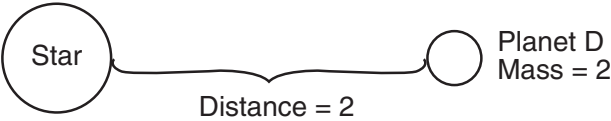
(1)



(3)

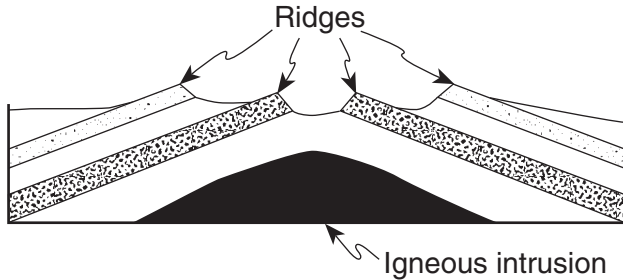


(2)



(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.

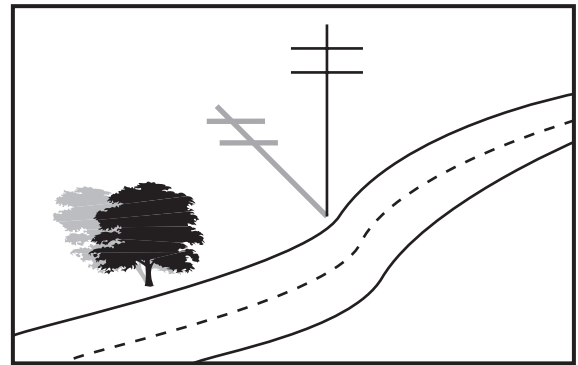


Which process most likely produced the present appearance of this feature?

- (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?

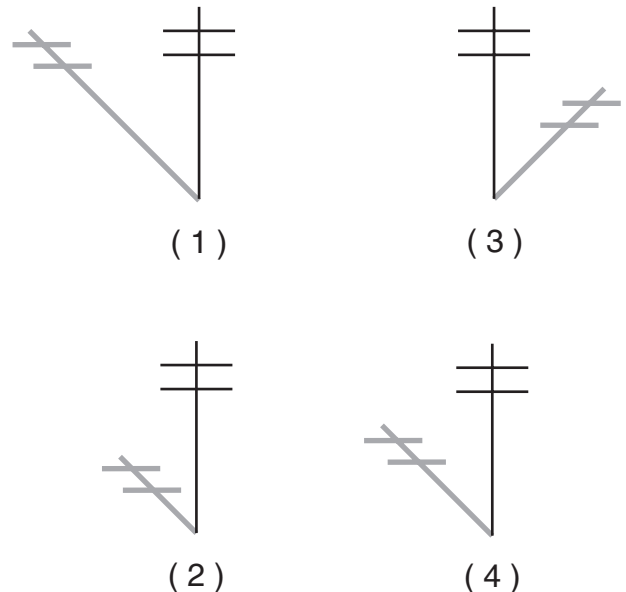
- | | |
|-----------------|-----------------|
| (1) brachiopods | (3) graptolites |
| (2) eurypterids | (4) trilobites |

- 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

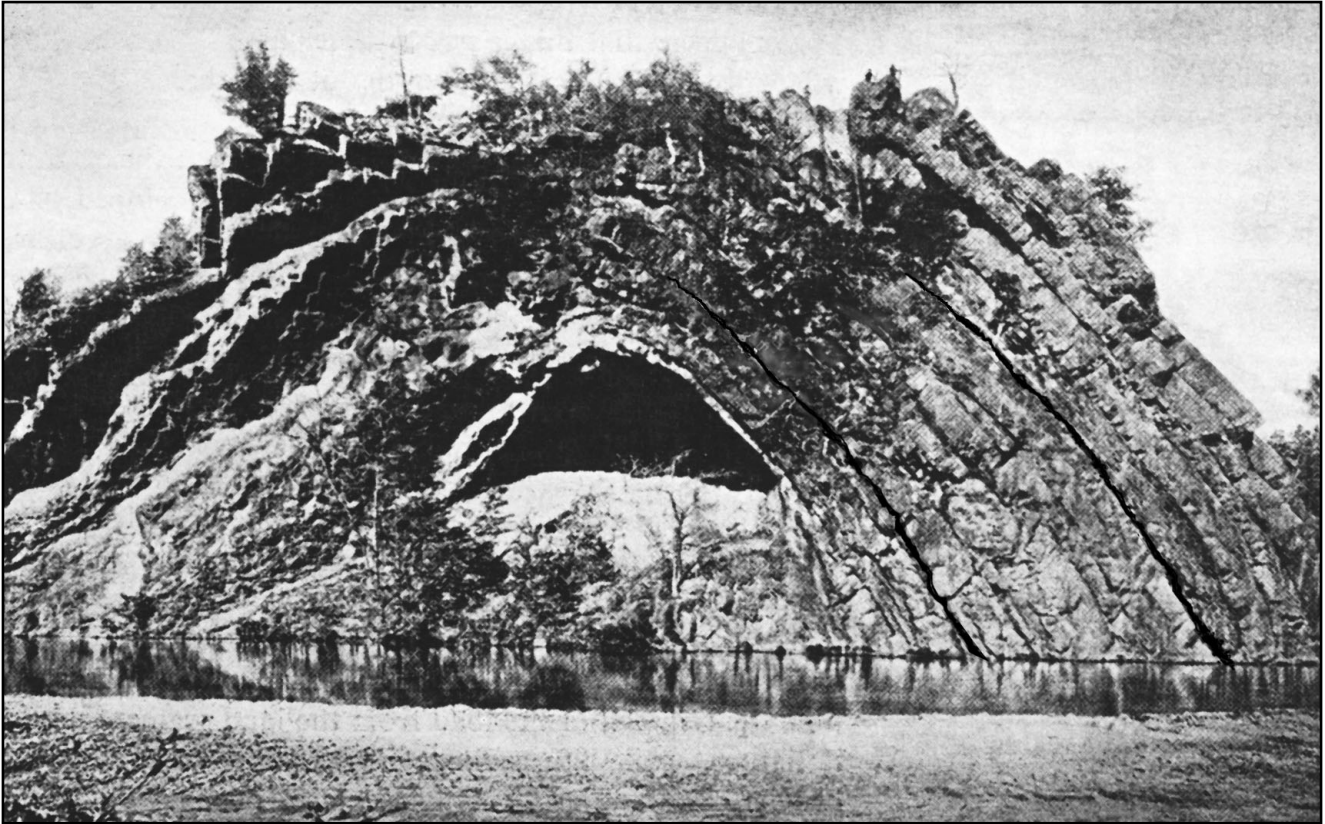
Which shadow was cast by the same telephone pole on June 21 at solar noon?



- 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

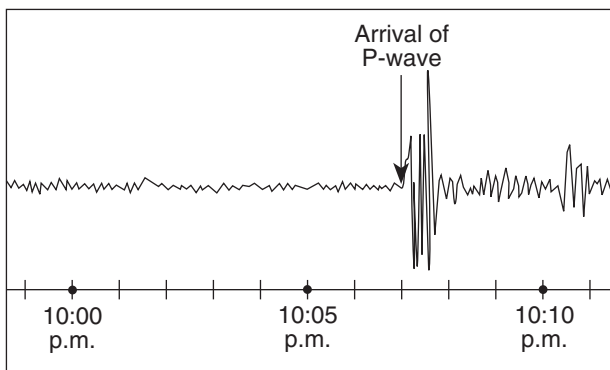
24 The photograph below shows deformed rock structure found on Earth's surface.



Deformed rock structure like this is most often caused by

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

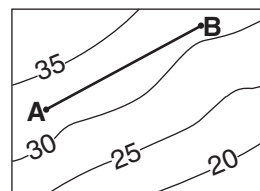
25 The seismogram below shows the time that an earthquake *P*-wave arrived at a seismic station in Albany, New York.



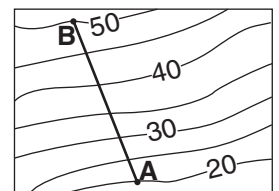
If the earthquake occurred at exactly 10:00 p.m., approximately how far from the earthquake epicenter was Albany, New York?

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

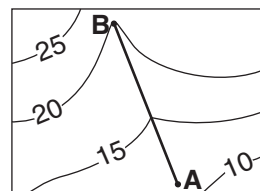
26 On each topographic map below, the straight-line distance from point A to point B is 5 kilometers. Which topographic map shows the steepest gradient between A and B?



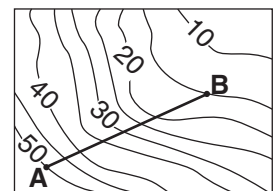
(1)



(3)

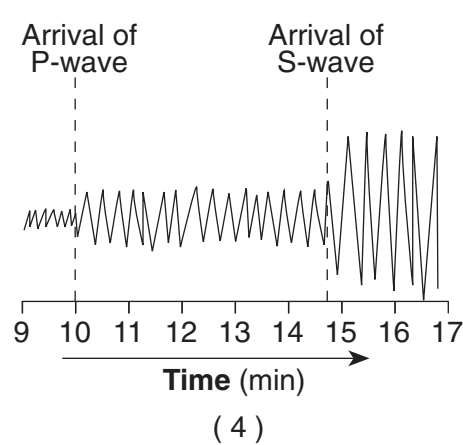
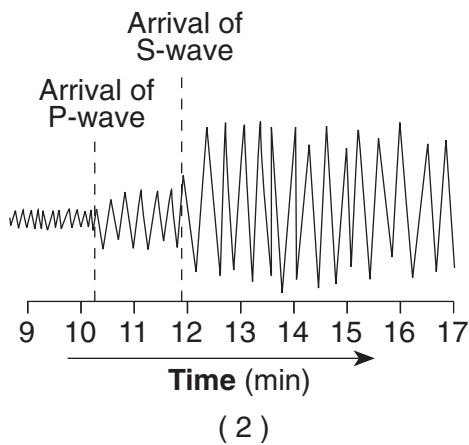
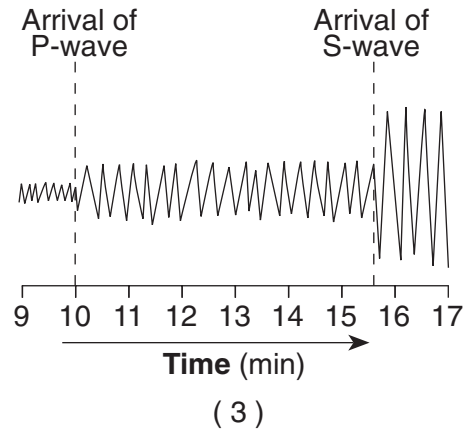
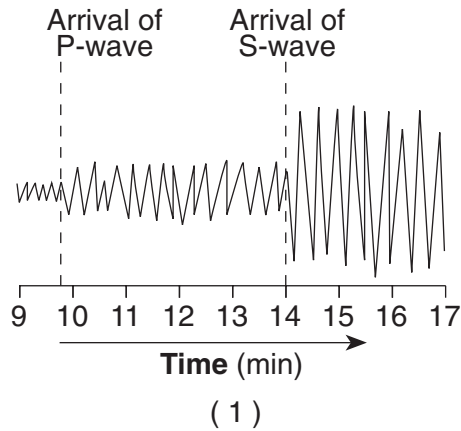


(2)



(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

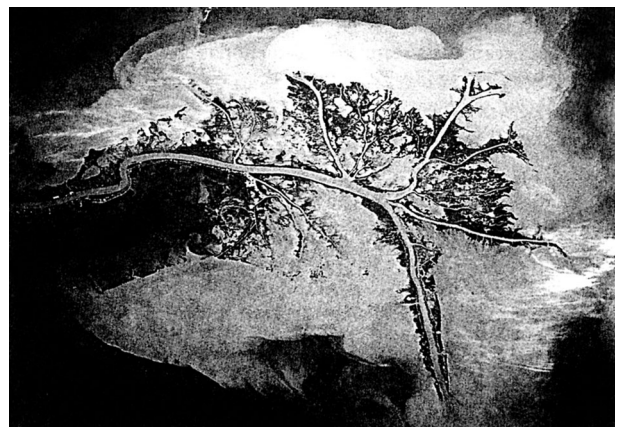
29 When granite melts and then solidifies, it becomes

- (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

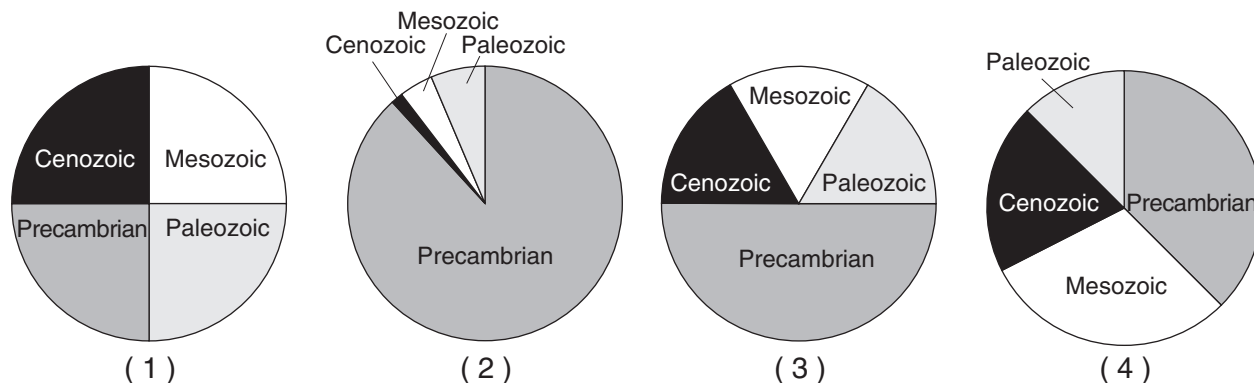
31 The satellite photograph below shows a geologic feature composed of silt, sand, and clay.



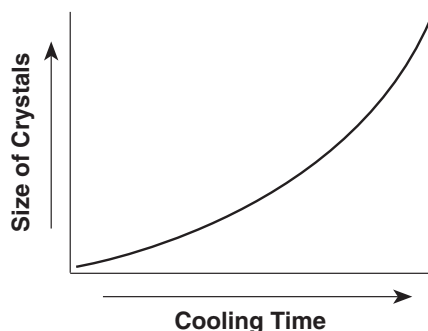
The geologic feature shown in the photograph was primarily deposited by which agent of erosion?

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

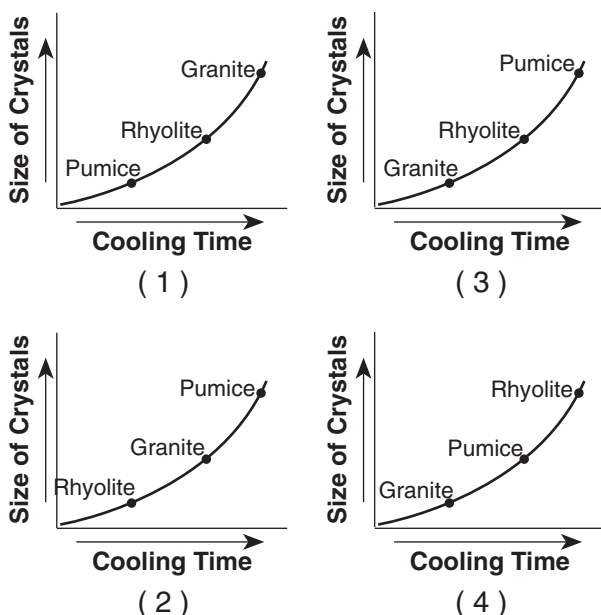
32 Which graph shows the relative duration of geologic time for the Precambrian, Paleozoic, Mesozoic, and Cenozoic time intervals?



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



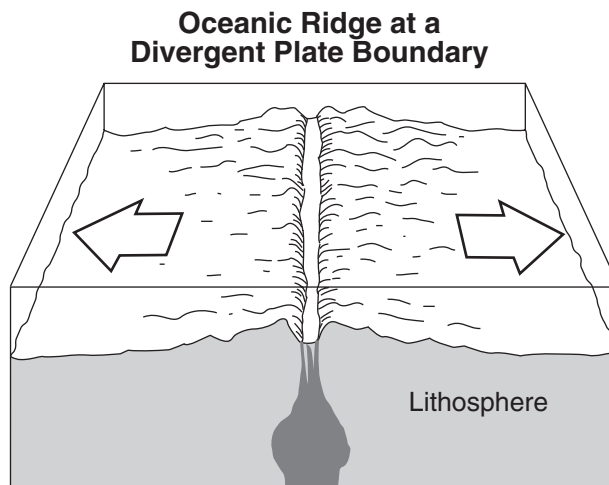
Which graph correctly shows the relative positions of the igneous rocks granite, rhyolite, and pumice?



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

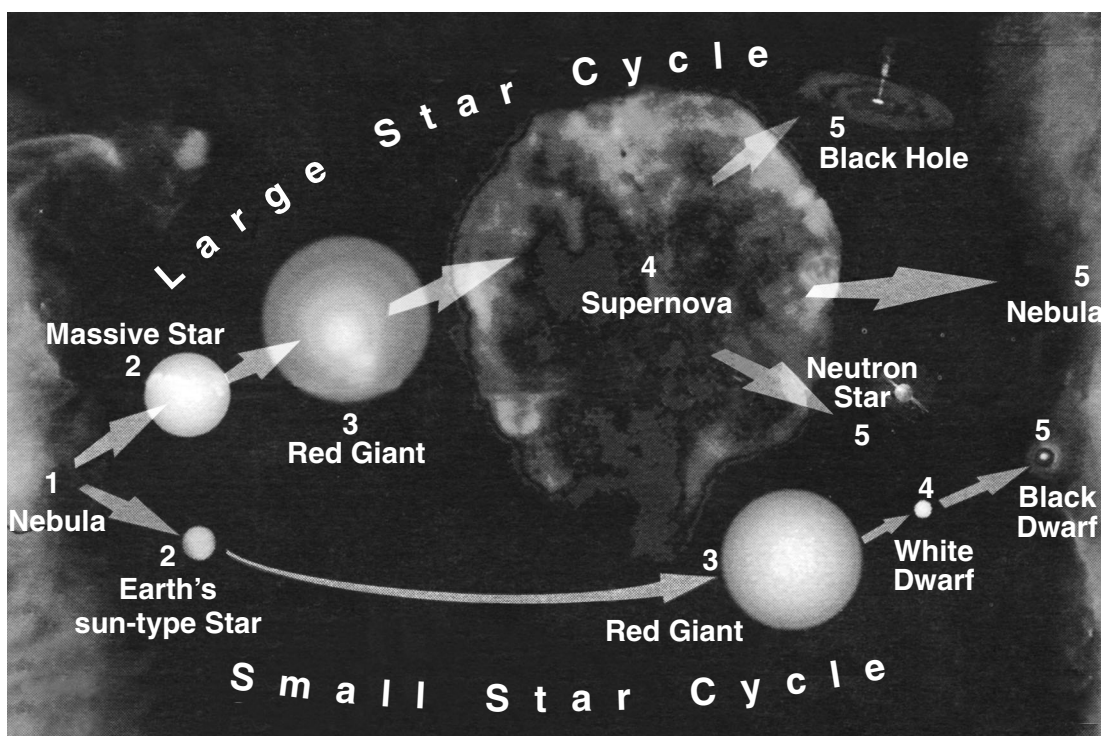
Part B-1

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.

The Life Cycles of Stars



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

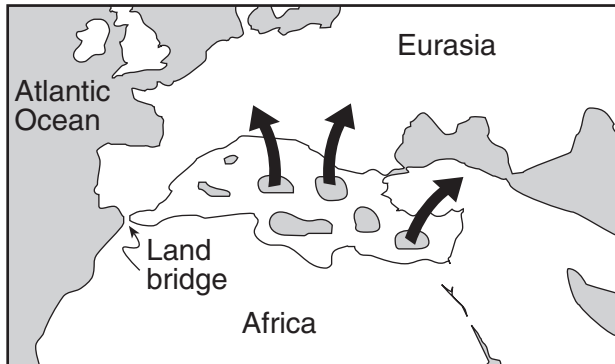
38 According to the diagram, a star like Earth's Sun will eventually

- (1) explode in a supernova
- (2) become a black hole
- (3) change into a white dwarf
- (4) become a neutron star

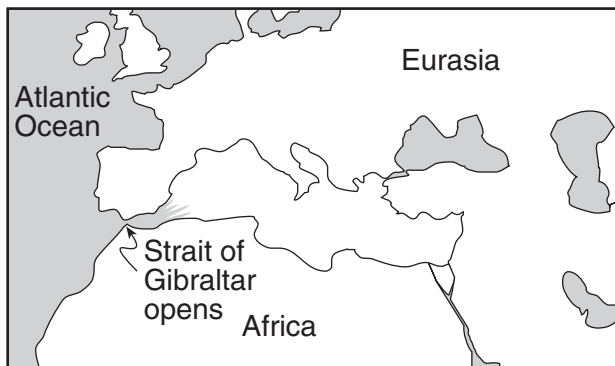
Base your answers to questions 39 and 40 on the maps below, which show changes in the distribution of land and water in the Mediterranean Sea region that scientists believe took place over a period of 6 million years.



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**

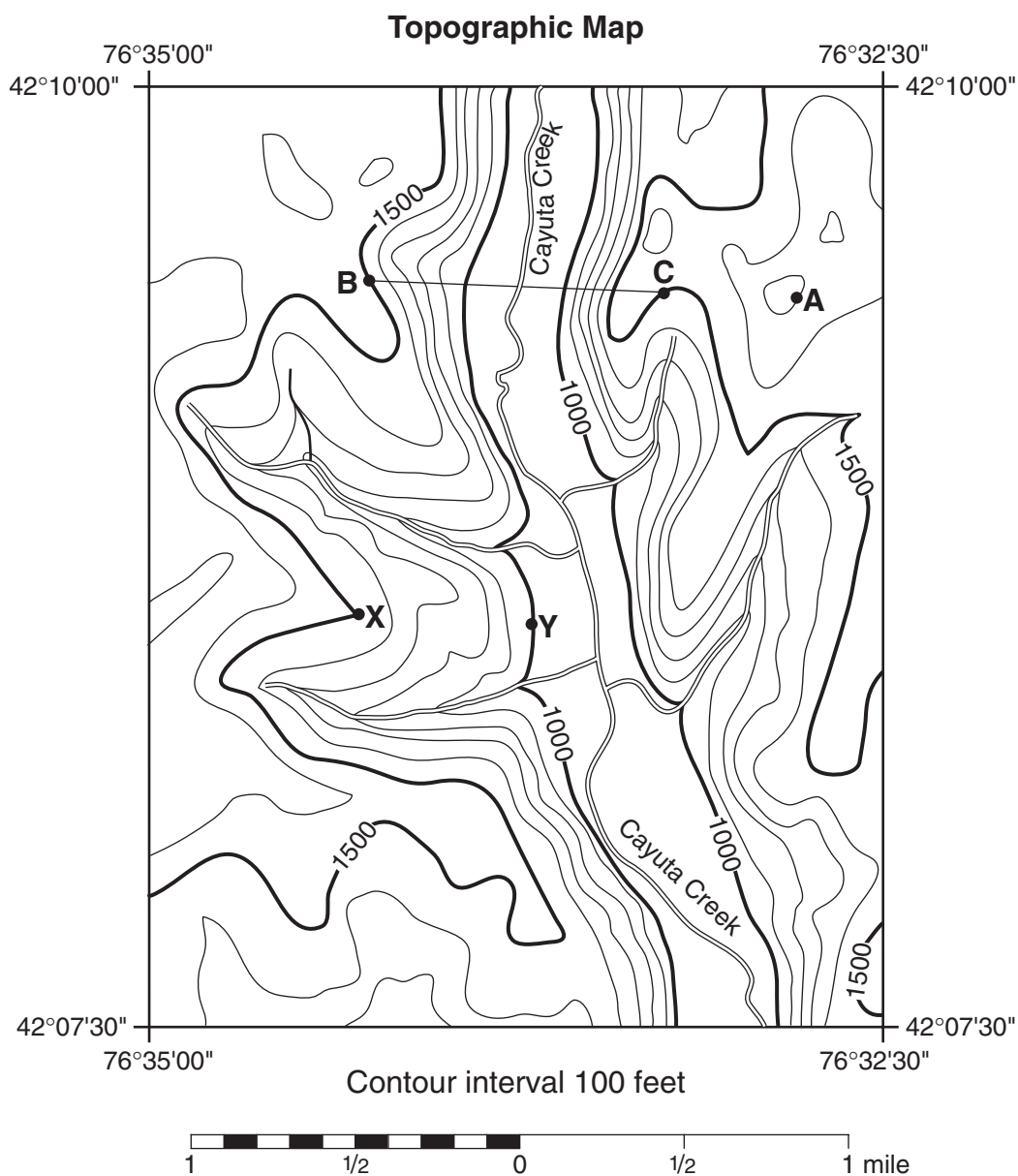
39 Which type of rock was precipitated from seawater as the Mediterranean Sea evaporated between 8 million years ago and 5.5 million years ago?

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

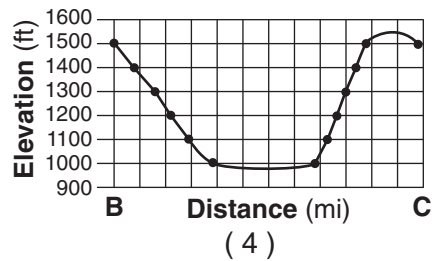
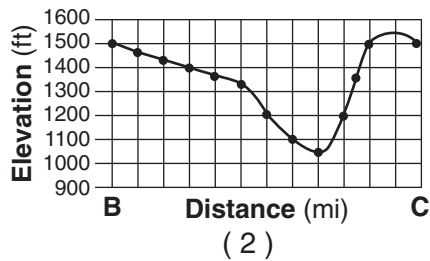
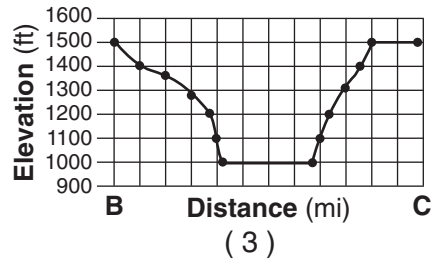
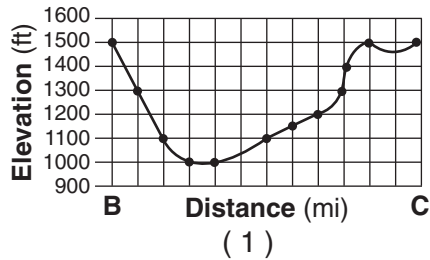
40 During which geologic time period did the changes shown in the maps take place?

- | | |
|----------------|-------------|
| (1) Cambrian | (3) Permian |
| (2) Cretaceous | (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 (3) 1,600 ft
- (2) 1,650 ft (4) 1,550 ft

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

- (1) 100 ft/mi (3) 500 ft/mi
- (2) 250 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?

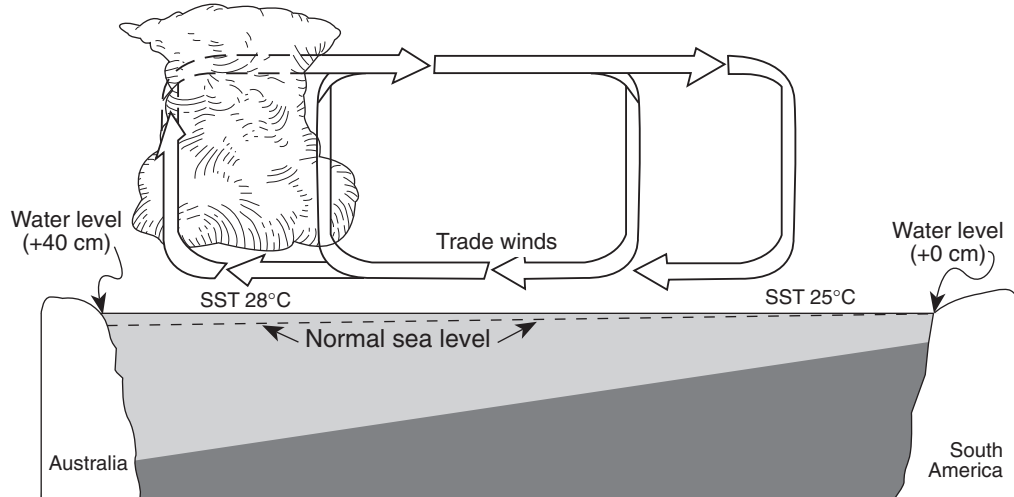
- (1) Hudson River
- (2) Genesee River
- (3) Delaware River
- (4) Susquehanna River

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?

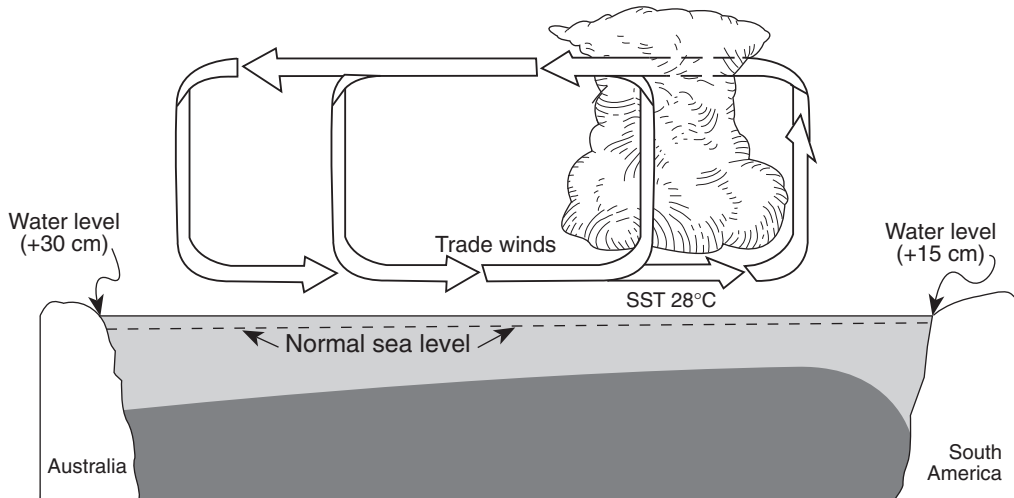
- (1) The modern Cayuta Creek occupies a V-shaped valley.
- (2) The valley floor is wider than the modern Cayuta Creek.
- (3) The modern Cayuta Creek lacks meanders and a flood plain.
- (4) The tributary streams meet the modern Cayuta Creek at nearly right angles.




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



Key	
	Frequent thunderstorms
	Colder ocean water
	Warmer ocean water
SST	Sea surface temperature

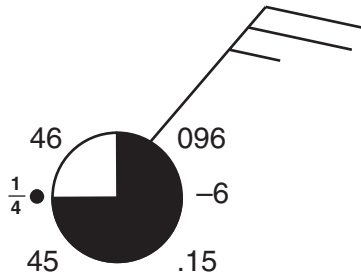
- 46 Which statement correctly describes sea surface temperatures along the South American coast and Pacific trade winds during El Niño conditions?
- (1) The sea surface temperatures are warmer than normal, and Pacific trade winds are from the west.
 - (2) The sea surface temperatures are warmer than 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

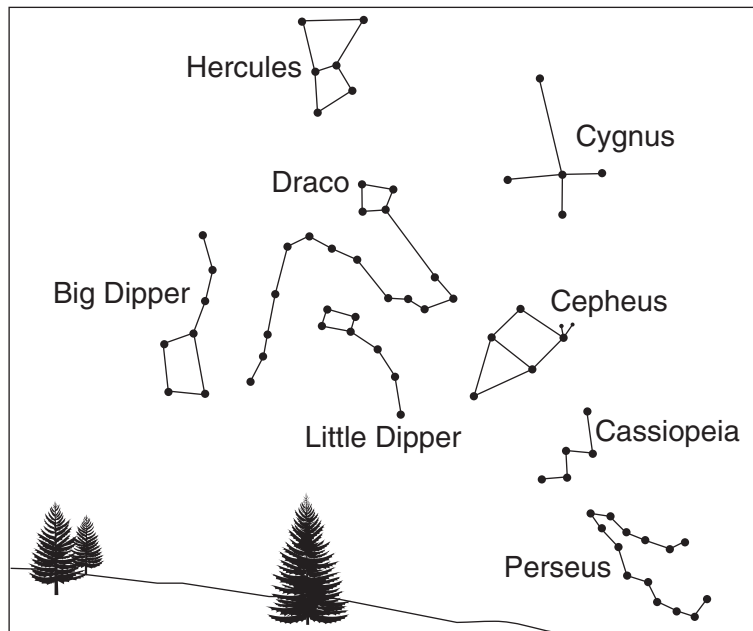
Base your answers to questions 57 through 61 on the geologic cross section provided *in your answer booklet*, which represents an outcrop of various types of bedrock and bedrock features in Colorado.

- 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.



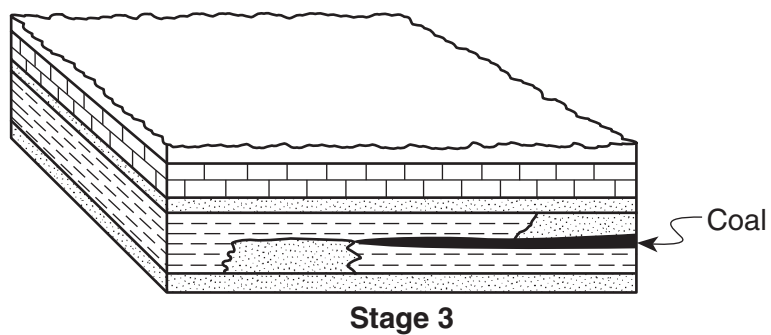
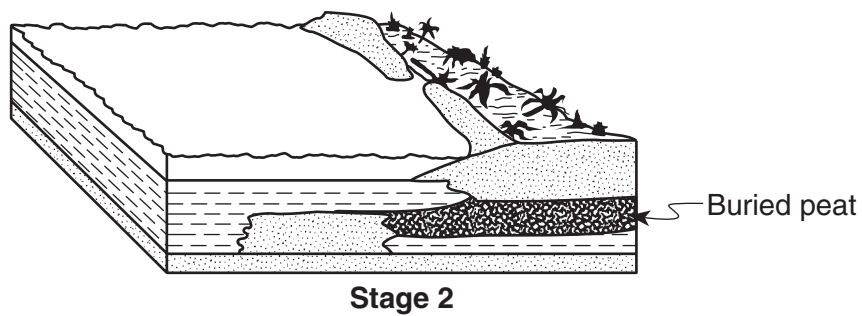
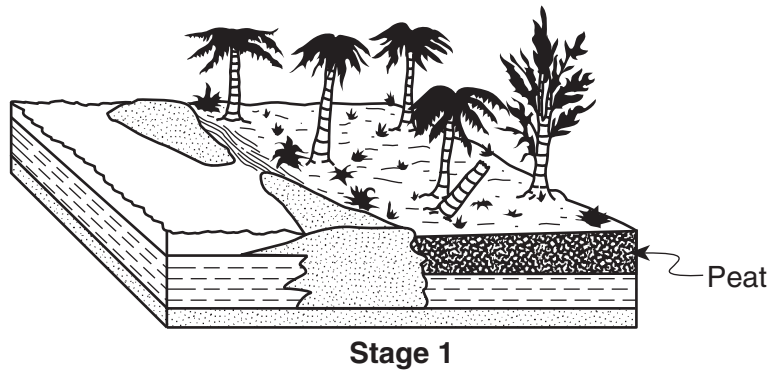
- 62 Circle *Polaris* on diagram 2 provided *in your answer booklet*. [1]
- 63 In which compass direction were the students facing? [1]
- 64 Describe the apparent direction of movement of the constellations Hercules and Perseus during the two hours between student observations. [1]
-

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*.

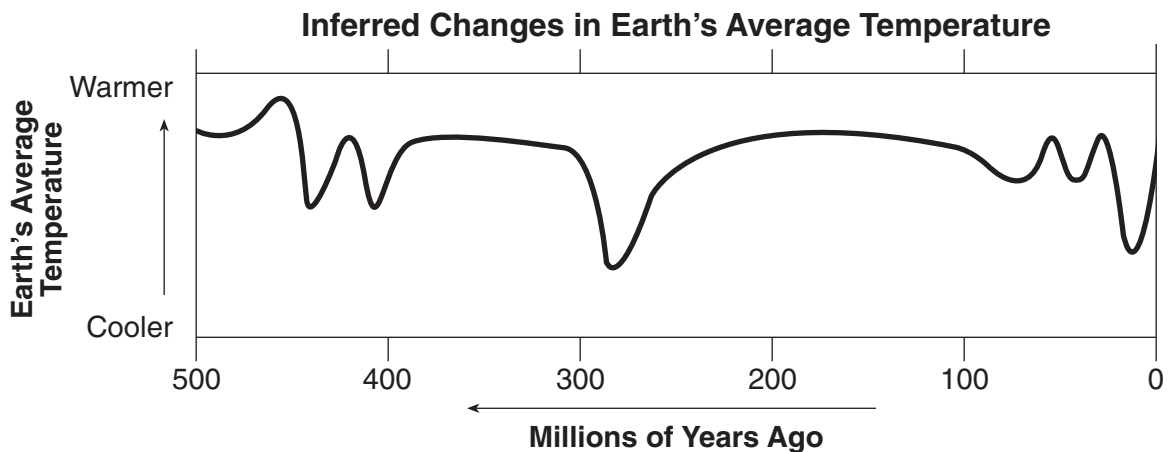
- 65 The sequence of diagrams below shows how coal is formed. Describe the material and *two* processes involved in the formation of coal. [2]



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



- 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 (CO₂) and water vapor (H₂O 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.

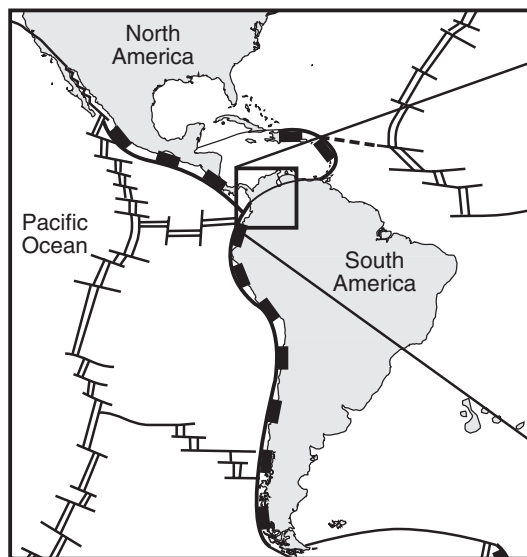
Long before disaster struck, Nevado del Ruiz was marked as a trouble spot. Like Mexico City, where an earthquake killed at least 7,000 people in October 1985, Nevado del Ruiz is located along the Ring of Fire. This ring of islands and the coastal lands along the edge of the Pacific Ocean are prone to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



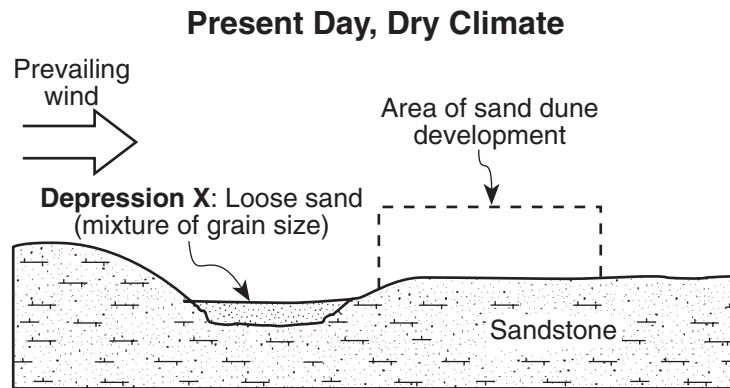
Enlarged Map Showing Volcanoes of Colombia



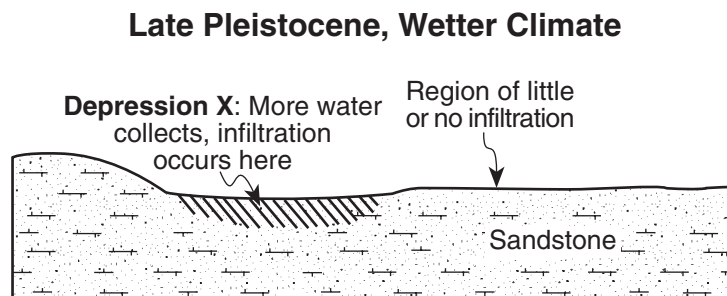
- 74 What are the names of the *four* tectonic plates located near the Nevado del Ruiz volcano? [1]
- 75 What caused most of the destruction associated with the eruption of Nevado del Ruiz? [1]
- 76 What caused the magma to expand, blowing the magma plug free? [1]
- 77 Vesicular texture is very common 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]
