

PHYSICAL SETTING EARTH SCIENCE

Thursday, August 17, 2017 — 8:30 to 11:30 a.m., only

The possession or use of any communications device is strictly prohibited when taking this examination. If you have or use any communications device, no matter how briefly, your examination will be invalidated and no score will be calculated for you.

Use your knowledge of Earth science to answer all questions in this examination. Before you begin this examination, you must be provided with the *2011 Edition Reference Tables for Physical Setting/Earth Science*. You will need these reference tables to answer some of the questions.

You are to answer all questions in all parts of this examination. You may use scrap paper to work out the answers to the questions, but be sure to record your answers on your answer sheet and in your answer booklet. A separate answer sheet for Part A and Part B–1 has been provided to you. Follow the instructions from the proctor for completing the student information on your answer sheet. Record your answers to the Part A and Part B–1 multiple-choice questions on this separate answer sheet. Record your answers for the questions in Part B–2 and Part C in your separate answer booklet. Be sure to fill in the heading on the front of your answer booklet.

All answers in your answer booklet should be written in pen, except for graphs and drawings, which should be done in pencil.

When you have completed the examination, you must sign the declaration printed on 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 *2011 Edition Reference Tables for Physical Setting/Earth Science* must be available for you to 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, choose the word or expression that, of those given, best completes the statement or answers the question. Some questions may require the use of the *2011 Edition Reference Tables for Physical Setting/Earth Science*. Record your answers on your separate answer sheet.

1 In which sequence are the celestial objects correctly listed in order from the smallest mass to the largest mass?

- (1) Saturn, solar system, Milky Way, universe
- (2) Saturn, universe, Milky Way, solar system
- (3) Milky Way, Saturn, solar system, universe
- (4) Milky Way, universe, solar system, Saturn

2 The red shift of light from distant galaxies provides evidence that these galaxies are

- (1) decreasing in size
- (2) increasing in size
- (3) decreasing in distance from Earth
- (4) increasing in distance from Earth

3 The best evidence of Earth's rotation is provided by the

- (1) Foucault pendulum and global warming
- (2) Foucault pendulum and Coriolis effect
- (3) Moon phases and global warming
- (4) Moon phases and Coriolis effect

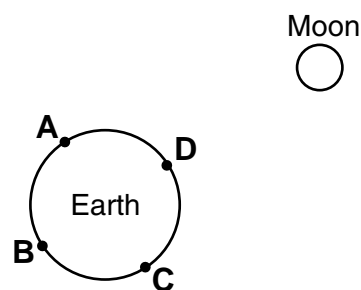
4 Which sphere of Earth covers approximately 70% of Earth's surface?

- (1) atmosphere
- (2) lithosphere
- (3) hydrosphere
- (4) asthenosphere

5 Some of the constellations that are visible to New York State observers at midnight in December are different from the constellations that are visible at midnight in June because

- (1) constellations rotate on an axis
- (2) constellations revolve around Earth
- (3) Earth rotates on its axis
- (4) Earth revolves around the Sun

6 The diagram below represents Earth and the Moon as viewed from above the North Pole. Points A, B, C, and D are locations on Earth's surface.



(Not drawn to scale)

According to the diagram, where will high ocean tides and low ocean tides most likely be located?

- (1) high tides at A and B; low tides at C and D
- (2) high tides at B and D; low tides at A and C
- (3) high tides at A and C; low tides at B and D
- (4) high tides at C and D; low tides at A and B

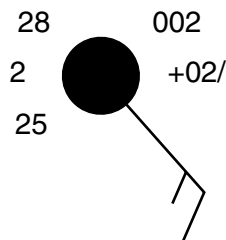
7 Urbanization affects the amount of vegetation and runoff in an area by

- (1) decreasing vegetation and decreasing runoff
- (2) decreasing vegetation and increasing runoff
- (3) increasing vegetation and decreasing runoff
- (4) increasing vegetation and increasing runoff

8 A severe thunderstorm warning was issued on a warm summer afternoon. Which present weather symbol represents the dangerous solid form of precipitation that is commonly associated with some of these severe thunderstorms?

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

9 The station model below represents the weather conditions for a location in New York State.



The barometric trend for the past three hours at this location indicates a steady increase of

- (1) 0.2 mb
- (2) 2.0 mb
- (3) 0.002 mb
- (4) 0.02 mb

10 Which New York State location is most often affected by lake-effect snow storms caused by winds blowing over Lake Ontario?

- (1) Jamestown
- (2) Plattsburgh
- (3) Oswego
- (4) Riverhead

11 Which type of air mass would most likely form over the Pacific Ocean north of the Aleutian Trench?

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

12 Mount Kilimanjaro is located in eastern Africa at 3° S. Which climate factor best explains the presence of permanent snow on its peak?

- (1) latitude
- (2) elevation
- (3) prevailing winds
- (4) ocean currents

13 In which portion of the electromagnetic spectrum is the maximum intensity of Earth's outgoing radiation?

- (1) visible light
- (2) gamma rays
- (3) infrared
- (4) ultraviolet

14 A solar water heater contains fluid-filled tubing that absorbs sunlight energy on its outside surface. Which tubing exterior will best absorb insolation?

- (1) dark-colored and rough
- (2) dark-colored and smooth
- (3) light-colored and rough
- (4) light-colored and smooth

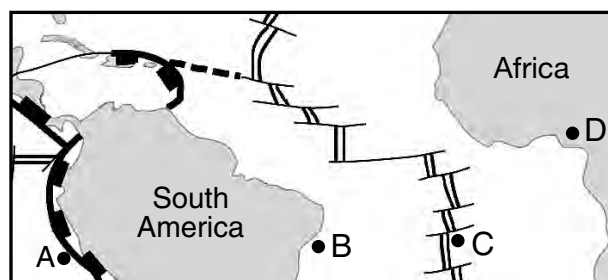
15 Equal masses of granite, iron, copper, and lead are placed in sunlight. Based on specific heat, which material will warm up the fastest?

- (1) granite
- (2) iron
- (3) copper
- (4) lead

16 During explosive volcanic eruptions, large amounts of ash entering Earth's atmosphere often rise to an altitude of 20 kilometers. What is the most likely effect of this ash cloud?

- (1) a decrease in the insolation reaching Earth's surface
- (2) a decrease in the thickness of Earth's stratosphere layer
- (3) an increase in the insolation reaching Earth's surface
- (4) an increase in the thickness of Earth's stratosphere layer

17 The map below shows some tectonic plate boundaries near South America and Africa. Letters A, B, C, and D represent locations on Earth's surface.

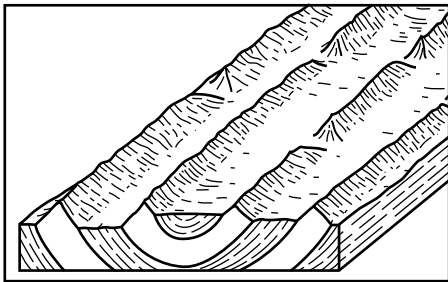


Which location most likely has the youngest bedrock?

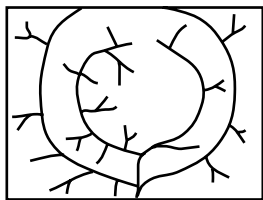
- (1) A
- (2) B
- (3) C
- (4) D

- 18 Compared to the average density and composition of oceanic crust, continental crust is
- (1) less dense and more felsic
 - (2) less dense and more mafic
 - (3) more dense and more felsic
 - (4) more dense and more mafic
- 19 The Hawaiian Islands were formed as a result of
- (1) lava flowing over Earth's surface where two tectonic plates move apart
 - (2) an oceanic plate moving over a mantle hot spot
 - (3) two oceanic plates colliding to form an island arc
 - (4) tectonic plates sliding past each other

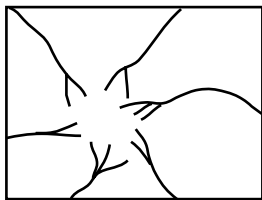
20 The block diagram below represents the underlying bedrock structure of a landscape region.



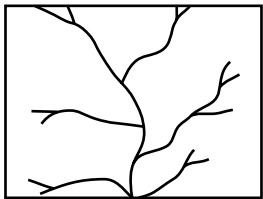
Which diagram represents the most likely stream drainage pattern on the surface of this landscape?



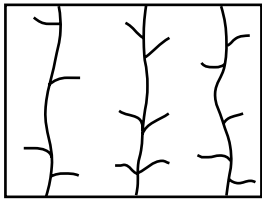
(1)



(3)



(2)



(4)

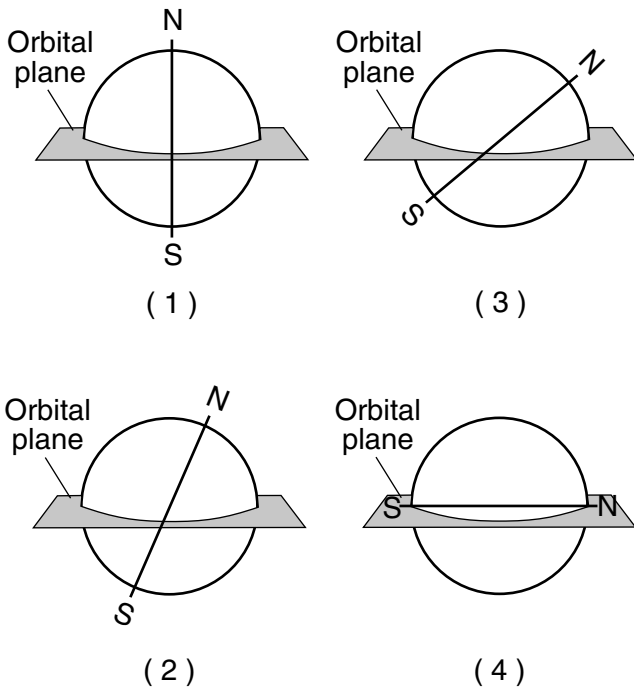
- 21 Which characteristics identify mountain landscape regions?
- (1) steep slopes with deformed bedrock
 - (2) steep slopes with horizontal bedrock
 - (3) gentle slopes with deformed bedrock
 - (4) gentle slopes with horizontal bedrock
- 22 Which agent of erosion causes the sandblasting of bedrock?
- (1) glaciers
 - (2) wind
 - (3) running water
 - (4) wave action
- 23 The photograph below shows wire netting installed over a steep rock outcrop.



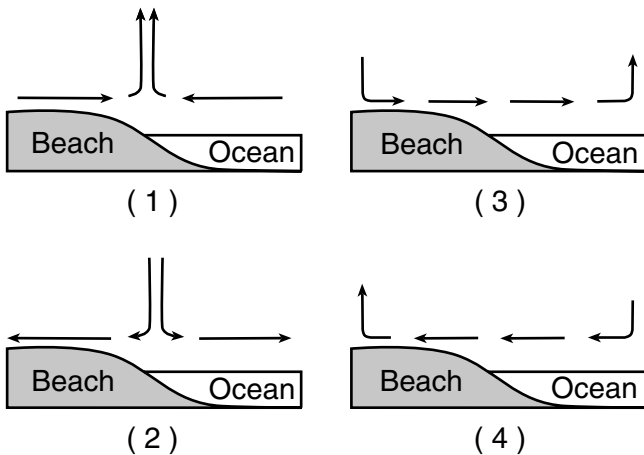
This wire netting has been installed to prevent loss of property or life resulting from

- (1) crosscutting and downwarping
 - (2) folding and faulting
 - (3) weathering and erosion
 - (4) high winds and flooding
- 24 Which two minerals are commercial sources of iron?
- (1) galena and graphite
 - (2) muscovite mica and biotite mica
 - (3) garnet and fluorite
 - (4) hematite and magnetite
- 25 Which mineral can be found in the rocks phyllite, sandstone, and granite?
- (1) quartz
 - (2) pyroxene
 - (3) gypsum
 - (4) calcite

26 Which diagram best represents Earth's axis position relative to Earth's orbital plane?



27 In which cross section do the arrows represent the most probable direction of air movement over land and water surfaces at an ocean coast on a hot, sunny, summer afternoon?



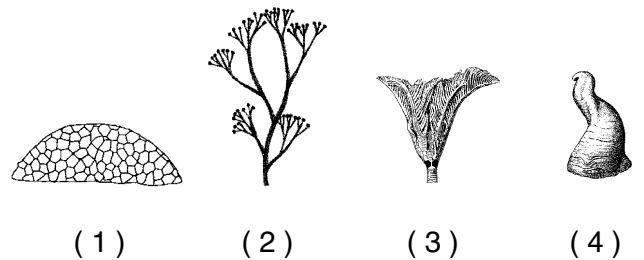
28 The table below shows the average diameter and falling velocity of five types of precipitation. The data for moderate rain have been left blank.

Type of Precipitation	Average Diameter (millimeters)	Falling Velocity (meters/second)
drizzle	0.96	4.1
light rain	1.24	4.8
moderate rain		
heavy rain	2.05	6.7
excessive rain	2.40	7.3

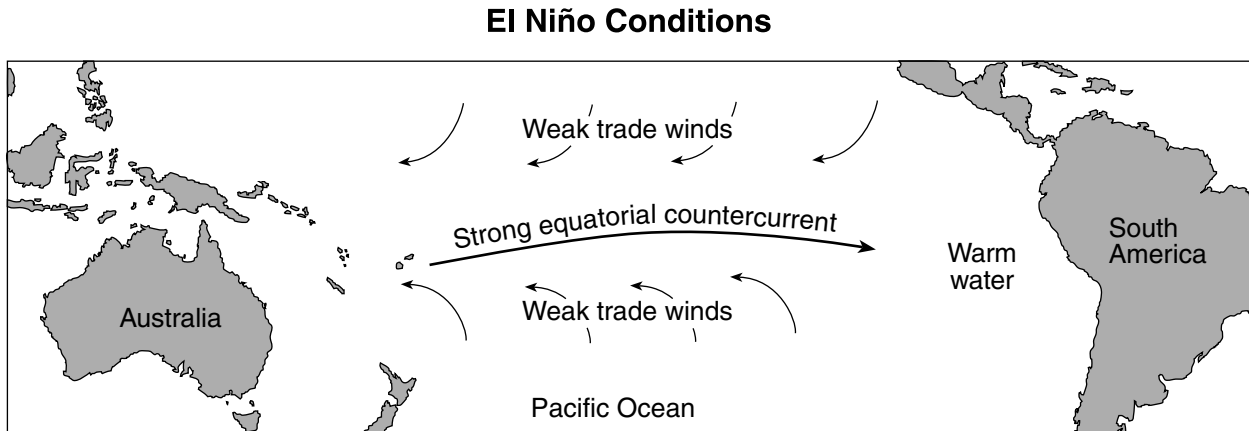
What are the probable values for the average diameter and falling velocity of the raindrops found in moderate rain?

- (1) average diameter = 1.20 mm
falling velocity = 4.6 m/sec
- (2) average diameter = 1.20 mm
falling velocity = 5.7 m/sec
- (3) average diameter = 1.60 mm
falling velocity = 4.6 m/sec
- (4) average diameter = 1.60 mm
falling velocity = 5.7 m/sec

29 Which New York State index fossil is classified as a coral?



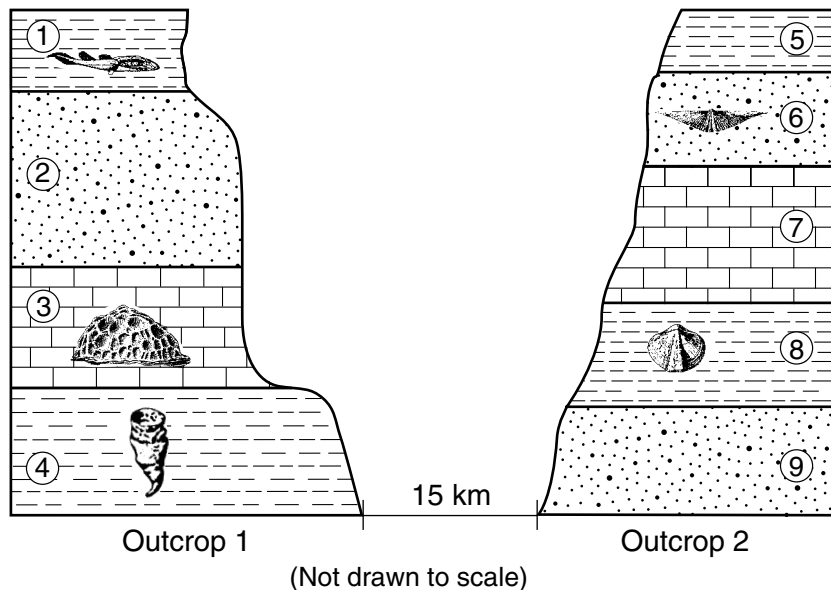
30 The map below shows the weak trade winds and strong equatorial countercurrent in the Pacific Ocean during El Niño conditions. This causes warm surface ocean water to migrate eastward, lowering the atmospheric pressure above this warm water.



What are the most likely changes to atmospheric temperature and precipitation along the west coast of South America during El Niño conditions?

- (1) lower temperatures and lower amounts of precipitation
- (2) lower temperatures and higher amounts of precipitation
- (3) higher temperatures and lower amounts of precipitation
- (4) higher temperatures and higher amounts of precipitation

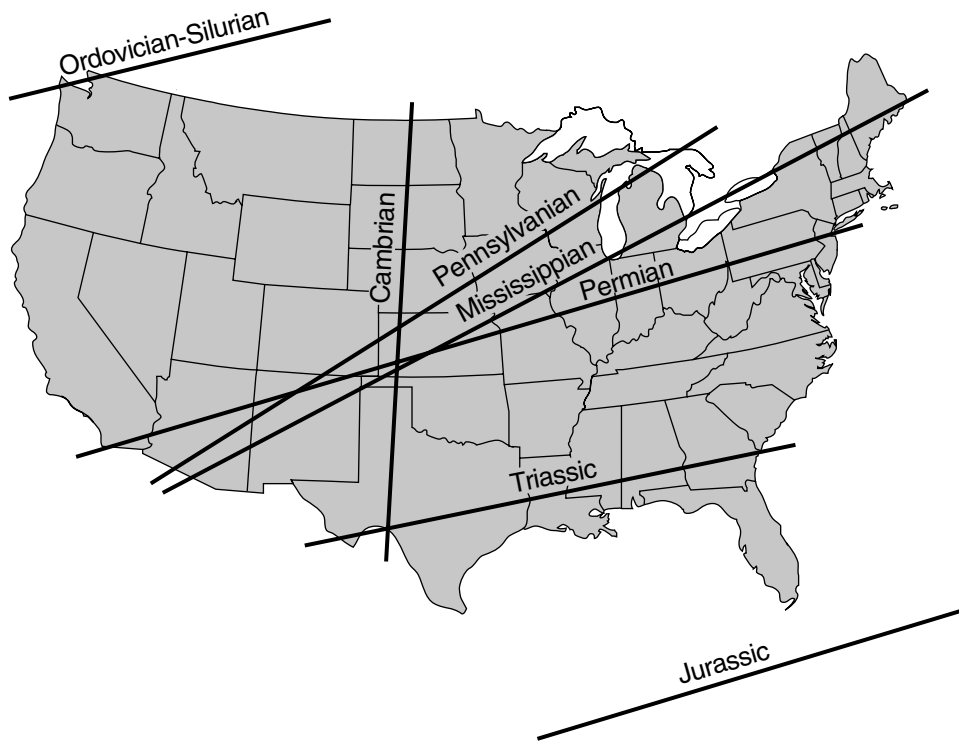
31 The cross sections below represent two bedrock outcrops 15 kilometers apart. Numbers 1 through 9 indicate rock layers. Some layers contain index fossils. No overturning of rock layers has occurred.



Which layers most likely formed during the same geologic time period?

- (1) 1 and 8
- (2) 2 and 9
- (3) 3 and 7
- (4) 4 and 5

32 Labeled lines on the map below show the inferred location of Earth's equator during the middle of several geologic periods.



Approximately how many million years ago (mya) was the region around current-day Watertown, New York, located the nearest to the equator?

- (1) 270 mya
- (2) 300 mya
- (3) 340 mya
- (4) 450 mya

33 Which table correctly matches rock textures with a sedimentary rock that exhibits each texture?

Rock Texture	Sedimentary Rock
clastic	sandstone
crystalline	breccia
bioclastic	rock gypsum

(1)

Rock Texture	Sedimentary Rock
clastic	shale
crystalline	dolostone
bioclastic	sandstone

(3)

Rock Texture	Sedimentary Rock
clastic	dolostone
crystalline	limestone
bioclastic	siltstone

(2)

Rock Texture	Sedimentary Rock
clastic	conglomerate
crystalline	rock salt
bioclastic	limestone

(4)

34 The data table below shows the dry-bulb and wet-bulb temperatures measured with a psychrometer on four different days at the same location.

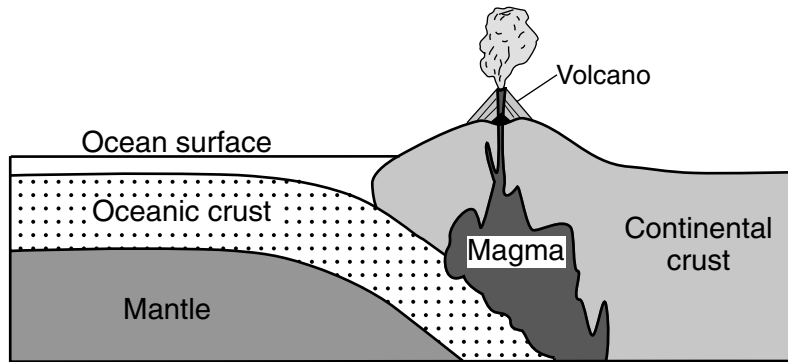
Temperatures Measured with a Psychrometer

Day	1	2	3	4
Dry-bulb temperature (°C)	0	5	10	15
Wet-bulb temperature (°C)	-5	0	5	10

According to the data shown in the table, which day had the highest relative humidity?

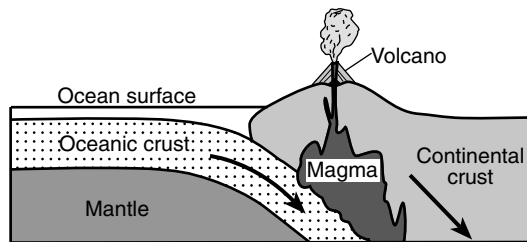
- (1) 1
- (2) 2
- (3) 3
- (4) 4

35 The cross section below represents a lithospheric plate boundary.

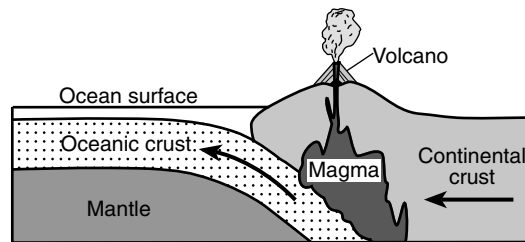


(Not drawn to scale)

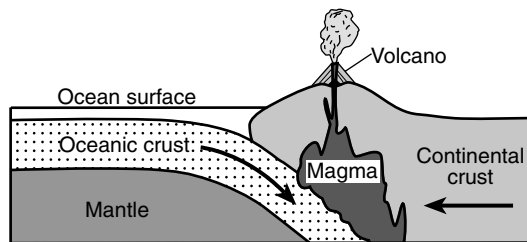
In which diagram do the arrows show the relative directions of plate movement at this type of plate boundary?



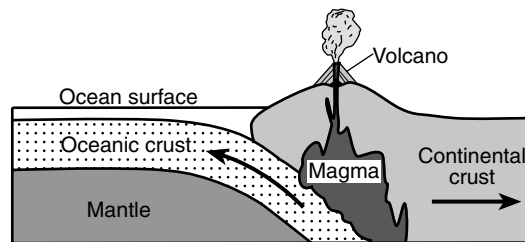
(1)



(3)



(2)



(4)

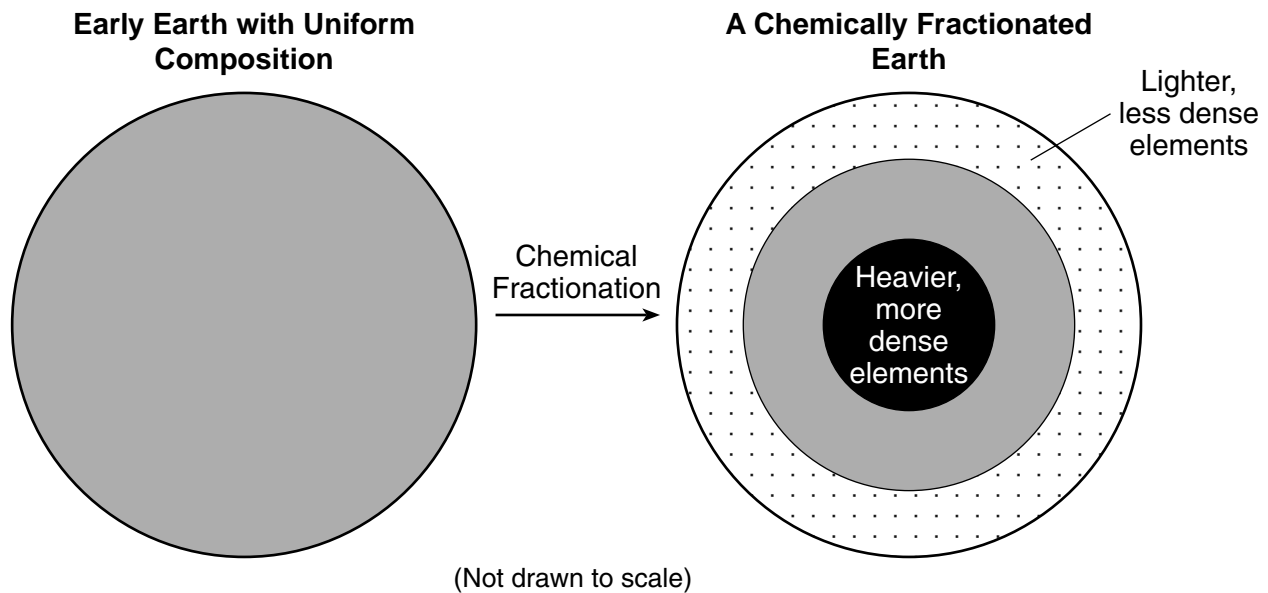
Part B-1

Answer all questions in this part.

Directions (36–50): For each statement or question, choose the word or expression that, of those given, best completes the statement or answers the question. Some questions may require the use of the 2011 Edition Reference Tables for Physical Setting/Earth Science. Record your answers on your separate answer sheet.

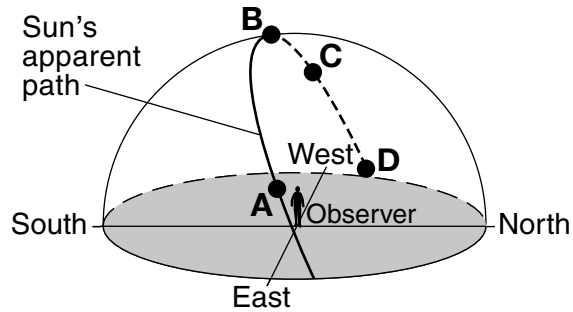
Base your answers to questions 36 through 38 on the information and diagram below and on your knowledge of Earth science. The diagram represents a simplified model of the early formation of Earth's interior.

Early in its formation, Earth was a molten mass of evenly mixed composition. During the next few million years, the heavier and more dense elements sank to the center, while lighter and less dense elements rose toward the surface. This is called chemical fractionation.



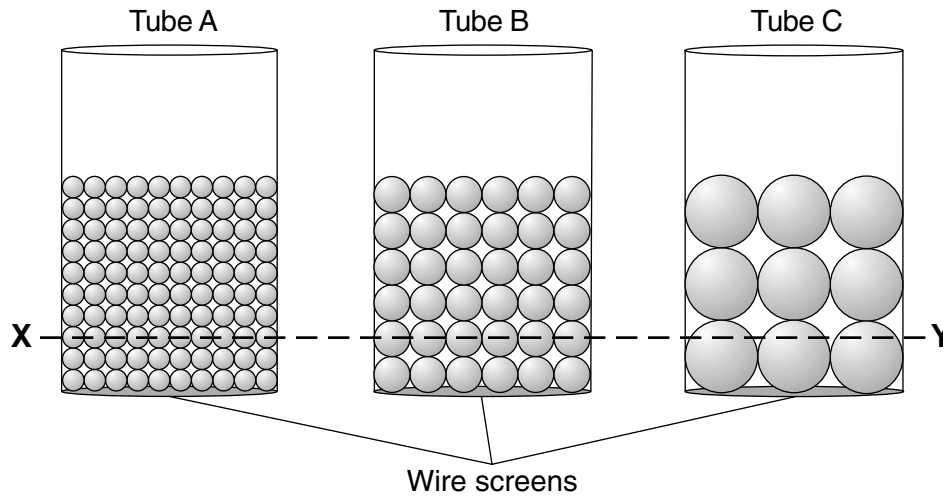
- 36 Chemical fractionation is most likely caused by
- (1) solidification
 - (2) gravity
 - (3) magnetic force
 - (4) chemical weathering
- 37 Approximately how many years ago did Earth and other planets in our solar system begin the process of chemical fractionation?
- (1) 8.2 billion years ago
 - (2) 13.8 billion years ago
 - (3) 542 million years ago
 - (4) 4600 million years ago
- 38 Which pair of elements sank to Earth's center during chemical fractionation?
- (1) aluminum and silicon
 - (2) carbon and sulfur
 - (3) iron and nickel
 - (4) oxygen and potassium

Base your answers to questions 39 through 41 on the diagram below and on your knowledge of Earth science. The diagram represents the apparent path of the Sun through the sky as viewed by an observer in the Northern Hemisphere. Points *A*, *B*, *C*, and *D* represent four positions of the Sun.

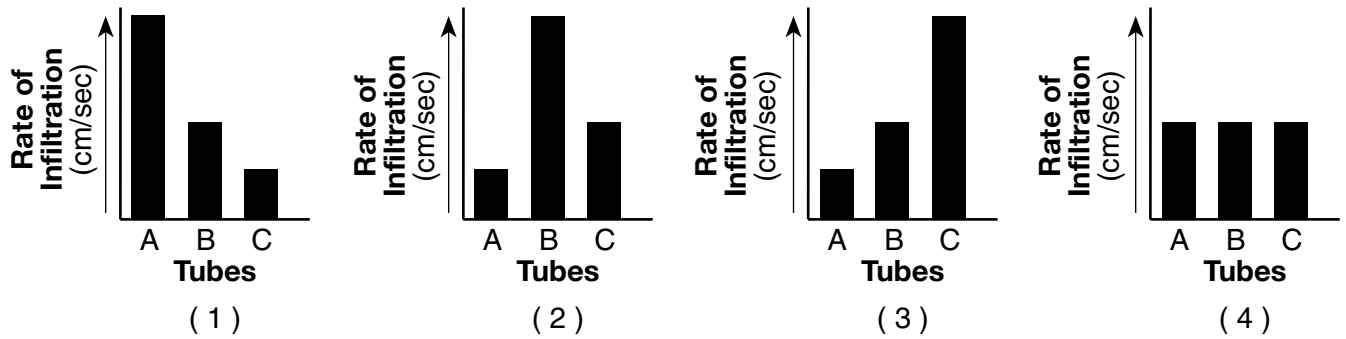


- 39 This apparent path of the Sun through the sky is caused by
- | | |
|---------------------------------------|---------------------------------------|
| (1) Earth's revolution around the Sun | (3) the Sun's revolution around Earth |
| (2) Earth's rotation on its axis | (4) the Sun's rotation on its axis |
- 40 The observer has the longest shadow when the Sun is at position
- | | |
|--------------|--------------|
| (1) <i>A</i> | (3) <i>C</i> |
| (2) <i>B</i> | (4) <i>D</i> |
- 41 What is the approximate time of day when the Sun is at position *C*?
- | | |
|------------|------------|
| (1) 6 a.m. | (3) 3 p.m. |
| (2) 9 a.m. | (4) 6 p.m. |
-

Base your answers to questions 42 and 43 on the diagram below and on your knowledge of Earth science. The diagram represents three tubes, A, B, and C, each containing an equal volume of uniform-sized spherical beads. The bottom of each tube is covered with a wire screen. XY is a reference line.



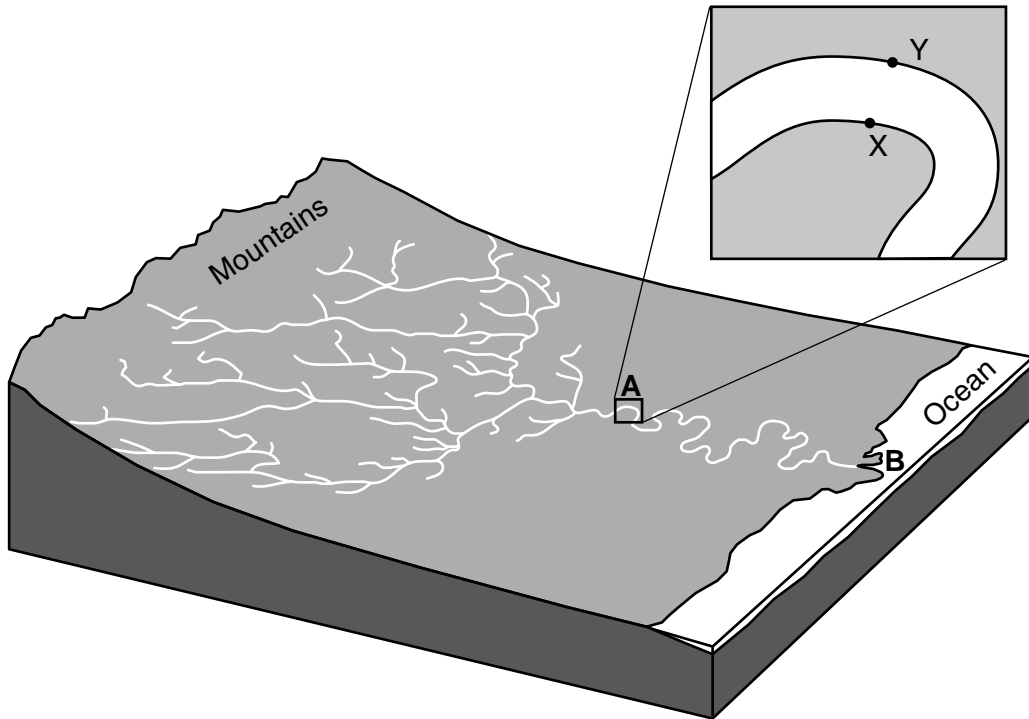
42 Which bar graph would best represent the rate of water infiltration through tubes A, B, and C?



43 These tubes are placed in water up to the level of line XY to demonstrate capillarity. After one hour, the height of the water above line XY will be

- (1) highest in tube A
- (2) highest in tube B
- (3) highest in tube C
- (4) the same height in all three tubes

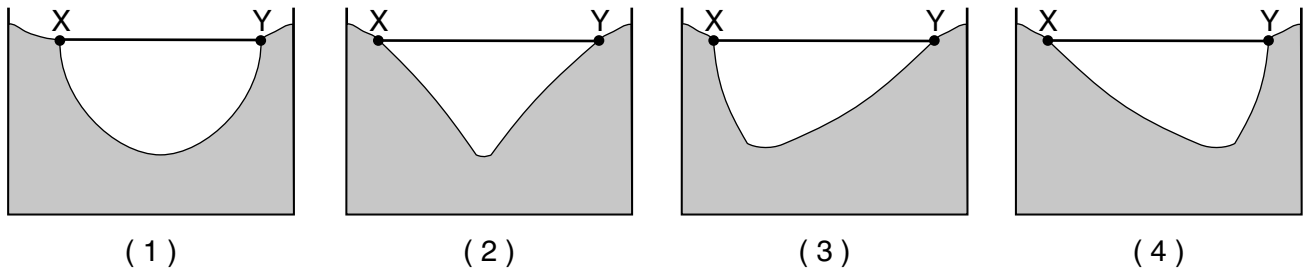
Base your answers to questions 44 through 46 on the block diagram below and on your knowledge of Earth science. The block diagram represents a river drainage system. A portion of the river, seen in box A, has been enlarged. Points X and Y are on opposite sides of the river. Letter B indicates the location where the river enters the ocean.



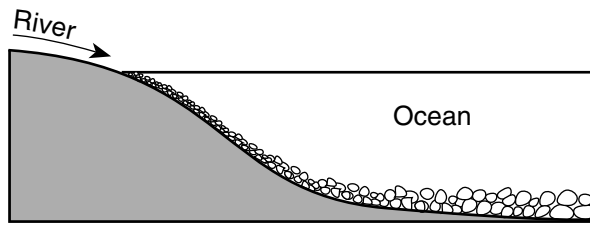
44 The area of land drained by this river and its tributaries is best described as the river's

- (1) topography
- (2) watershed
- (3) water table
- (4) floodplain

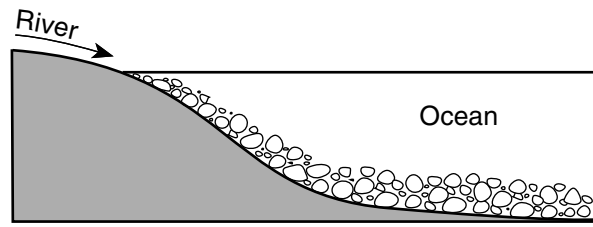
45 Which cross section best represents the profile of the bottom of the river between points X and Y at location A?



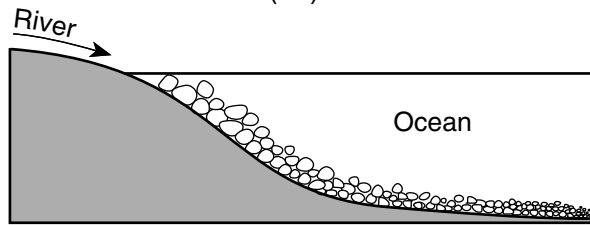
46 Which cross section represents the most likely pattern of sediments deposited where the river enters the ocean at location *B*?



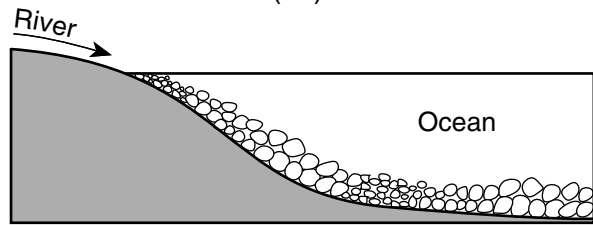
(1)



(3)

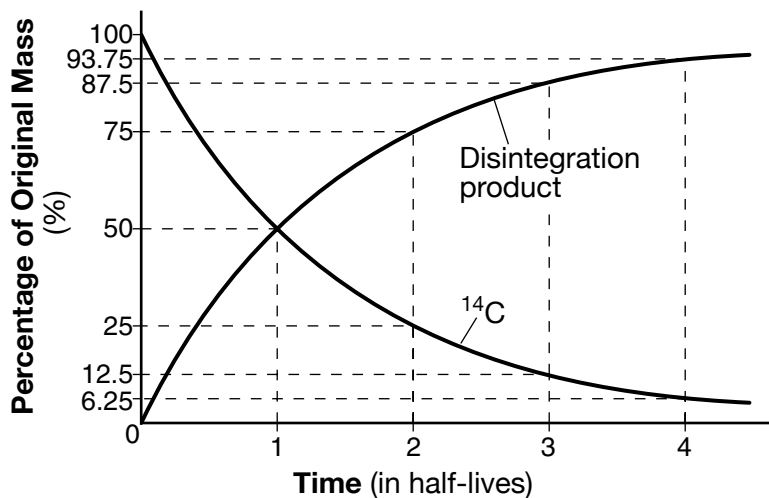


(2)



(4)

Base your answers to questions 47 through 50 on the graph below and on your knowledge of Earth science. The graph shows the percentages of the radioactive isotope carbon-14 (^{14}C) and its disintegration product produced during four half-lives of radioactive decay.



47 Radioactive carbon-14 is often useful in determining the absolute age of geologic samples because radioactive isotopes

- (1) decay at a regular rate
 (2) become less stable during decay
 (3) remain unchanged over time
 (4) stabilize after four half-lives

48 Which disintegration product is represented on the graph?

- (1) ^{206}Pb
 (2) ^{87}Sr
 (3) ^{40}Ar
 (4) ^{14}N

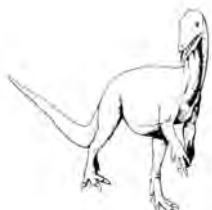
49 How many half-lives have passed if a sample contains 25% of its original carbon-14?

- (1) 1 half-life
 (2) 2 half-lives
 (3) 3 half-lives
 (4) 4 half-lives

50 The age of which index fossil could be determined by using carbon-14?



(1)



(2)



(3)



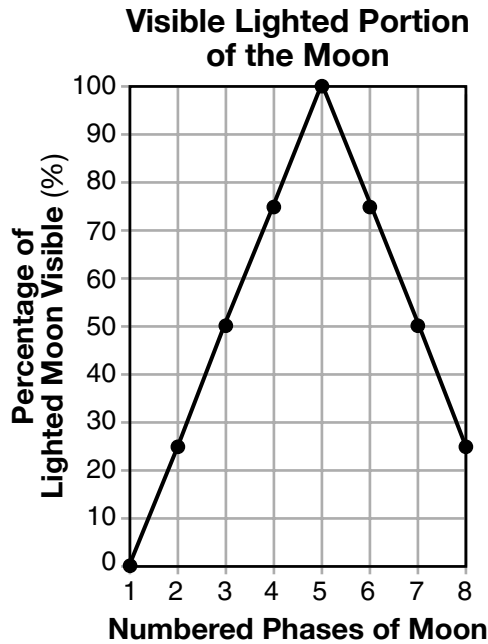
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Part B–2

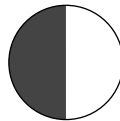
Answer all questions in this part.

Directions (51–65): Record your answers in the spaces provided in your answer booklet. Some questions may require the use of the *2011 Edition Reference Tables for Physical Setting/Earth Science*.

Base your answers to questions 51 through 53 on the graph below and on your knowledge of Earth science. The graph shows the percentage of the lighted portion of the Moon that is visible to an observer in New York State through eight consecutive Moon phases.

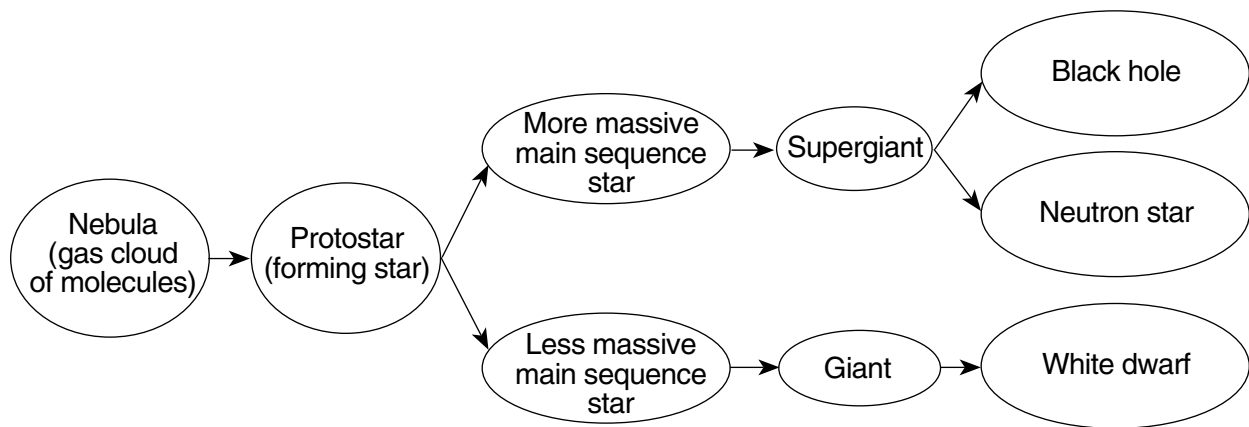


- 51 The phases of the Moon are said to be waxing when the lighted portion of the Moon gradually increases over time. Identify the numbered phase of the Moon when waxing begins and the numbered phase when waxing ends. [1]
- 52 On the diagram *in your answer booklet*, place an **X** on the Moon's orbit to represent the Moon's position at phase 5. [1]
- 53 The diagram below represents the appearance of the Moon at phase 3 as seen by an observer in New York State.



In the circle *in your answer booklet*, shade the part of the Moon that appears dark to an observer in New York State when the Moon is at phase 7. [1]

Base your answers to questions 54 through 57 on the flowchart below and on your knowledge of Earth science. The flowchart represents possible pathways in the evolution of stars.



- 54 Based on this flowchart, identify the characteristic of a main sequence star that determines whether the star becomes a giant or a supergiant. [1]
- 55 State the name of *one* star labeled on the *Characteristics of Stars* graph in the *Earth Science Reference Tables* that may become either a black hole or neutron star. [1]
- 56 Identify the nuclear process that occurs when lighter elements in a star combine to form heavier elements, producing the star's radiant energy. [1]
- 57 *In your answer booklet*, circle the relative surface temperature and relative luminosity of the main sequence star *Sirius* compared with the surface temperature and luminosity of the Sun. [1]
-

Base your answers to questions 58 through 61 on the topographic map in your answer booklet and on your knowledge of Earth science. Points *A*, *B*, *C*, and *D* represent locations on Earth's surface. Elevations are measured in meters.

- 58 On the map *in your answer booklet*, draw the 200-meter contour line in the southern portion of the map. Extend the contour line to the edges of the map. [1]
- 59 On the grid *in your answer booklet*, construct a topographic profile along line *AB* by plotting the elevation of *each* contour line that crosses line *AB*. The elevations of points *A* and *B* have been plotted on the grid. Connect *all ten* plots with a line from *A* to *B* to complete the profile. [1]
- 60 Calculate the gradient between points *C* and *D*. Label your answer with the correct units. [1]
- 61 Identify the compass direction toward which Kim Brook flows. Describe the evidence shown on the map that indicates the water flows downhill in that compass direction. [1]
-

Base your answers to questions 62 through 65 on the information below and on your knowledge of Earth science.

Adirondack Earthquake

On October 7, 1983, a magnitude 5.3 earthquake occurred in New York State's Adirondack region. The earthquake's epicenter was at Blue Mountain Lake, which is located approximately 32 miles (50 kilometers) southwest of Mt. Marcy.

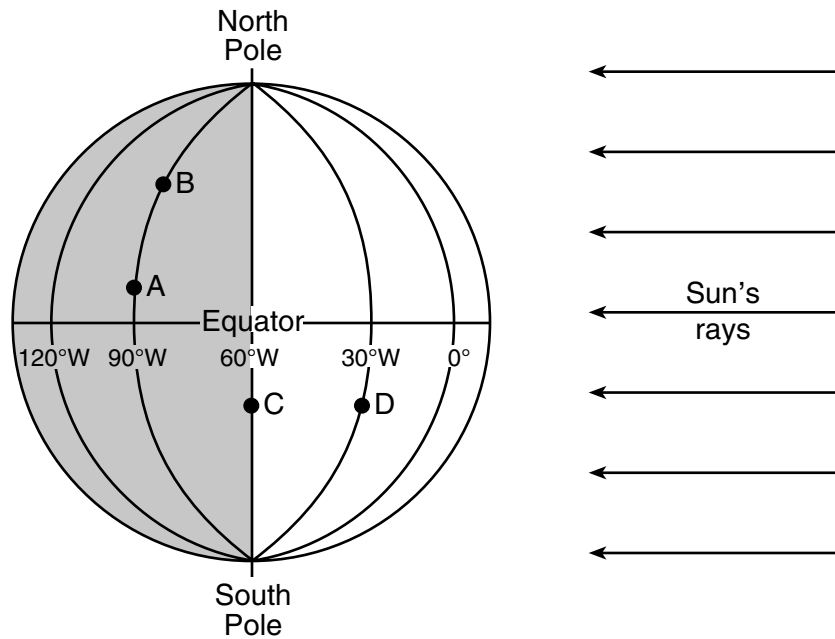
- 62 *In your answer booklet*, circle the New York State location (Old Forge *or* New York City) that recorded the greater amount of time between the arrival of the first *P*-wave and the arrival of the first *S*-wave from the Blue Mountain Lake earthquake. Explain why this location had the greater difference between the *P*-wave and *S*-wave arrival times. [1]
- 63 Determine how long it took the first *P*-wave to travel from Blue Mountain Lake to a seismic station 1200 kilometers away. [1]
- 64 Identify *one* type of metamorphic surface bedrock where this earthquake epicenter was located. [1]
- 65 Perth, Australia, is located almost directly on the opposite side of Earth from the epicenter of this earthquake. A seismograph in Perth received *P*-waves but *not* *S*-waves from this earthquake. Identify the interior layer of Earth and the characteristic of this layer that prevented the *S*-waves from arriving at Perth. [1]
-

Part C

Answer all questions in this part.

Directions (66–85): Record your answers in the spaces provided in your answer booklet. Some questions may require the use of the *2011 Edition Reference Tables for Physical Setting/Earth Science*.

Base your answers to questions 66 through 68 on the diagram below and on your knowledge of Earth science. The diagram represents Earth on the first day of a season. The equator, several lines of longitude, and the North and South Poles have been labeled. Letters A through D represent locations on Earth's surface.



- 66 Identify *one* possible date that is represented by the position of Earth in this diagram. [1]
- 67 State whether the relative altitude of *Polaris* at location A is lower or higher than at location B. Explain why this difference is observed. [1]
- 68 State the solar time at location D if the solar time at location C is 6:00 a.m. Indicate a.m. or p.m. in your answer. [1]
-

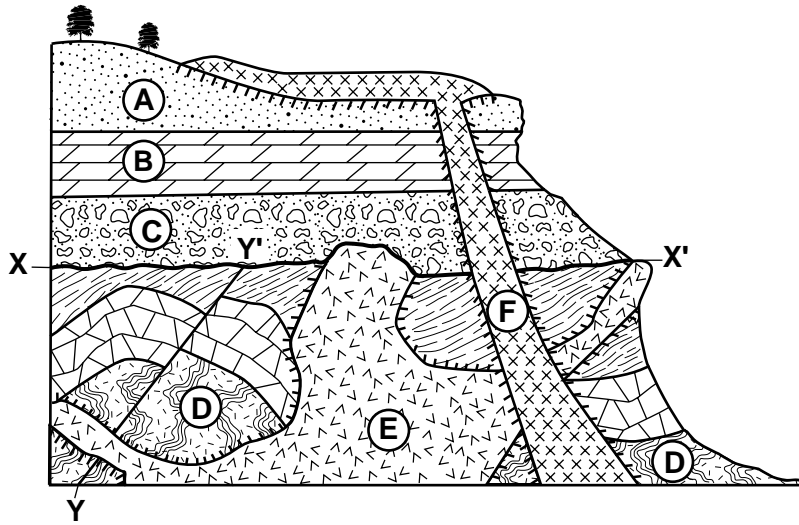
Base your answers to questions 69 through 72 on the data table below, on the map in your answer booklet, and on your knowledge of Earth science. The data table shows latitude and longitude locations of the center of Hurricane Odile recorded at the same time each day from September 12 to September 18, 2014. The data table also shows the hurricane’s barometric pressure in millibars (mb) and wind speed in knots (kt). The location of La Paz, Mexico, is indicated on the map.

Hurricane Odile

Date	Location		Barometric Pressure (mb)	Wind Speed (kt)
	Latitude (° N)	Longitude (° W)		
September 12	15	105	993	50
September 13	16	106	983	65
September 14	19	107	918	120
September 15	23	110	941	110
September 16	27	113	987	55
September 17	30	114	995	40
September 18	31	112	1003	25

- 69 On the map *in your answer booklet*, plot the seven locations of Hurricane Odile indicated by the latitudes and longitudes shown in the data table. Connect *all seven* plots with a line. [1]
- 70 Using the set of axes *in your answer booklet*, draw a line to represent the general relationship between barometric pressure and wind speed associated with Hurricane Odile. [1]
- 71 Identify *one* weather instrument that was used to measure the wind speed of Hurricane Odile. [1]
- 72 Describe *two* actions that a person living in La Paz, Mexico, could take to prepare for an approaching hurricane. [1]
-

Base your answers to questions 73 through 75 on the cross section below and on your knowledge of Earth science. On the cross section, letters A through F represent rock units. Line XX' indicates an unconformity and line YY' indicates a fault. No overturning of rock layers has occurred.



Key		
Igneous Rocks		
	Diorite	
		Contact metamorphism

73 Identify the name of the rock formed in the zone of contact metamorphism between rock units A and F. [1]

74 List *two* processes that produced unconformity XX'. [1]

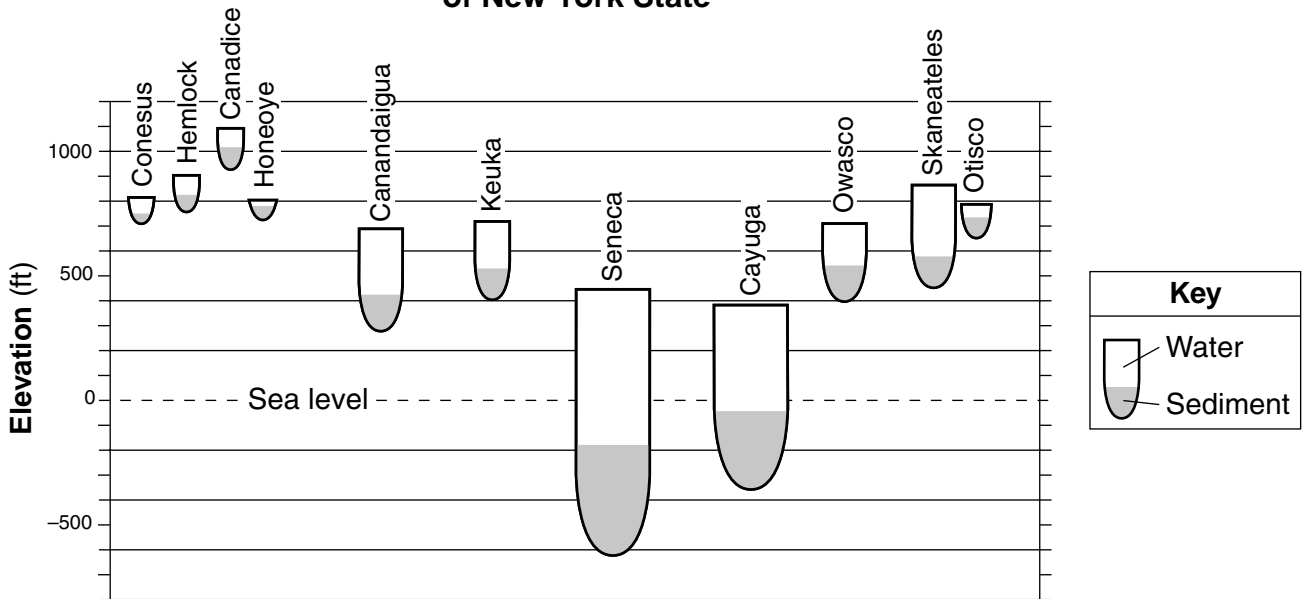
75 In your answer booklet, list the letters of rock units D, E, F, and fault YY' in the correct sequence from oldest to youngest. [1]

Base your answers to questions 76 through 79 on the passage and cross section below, and on your knowledge of Earth science. The cross section represents the elevation and depth of each Finger Lake in New York State. The gray shading in each lake represents the sediment fill at the bottom of each lake.

Formation of the Finger Lakes

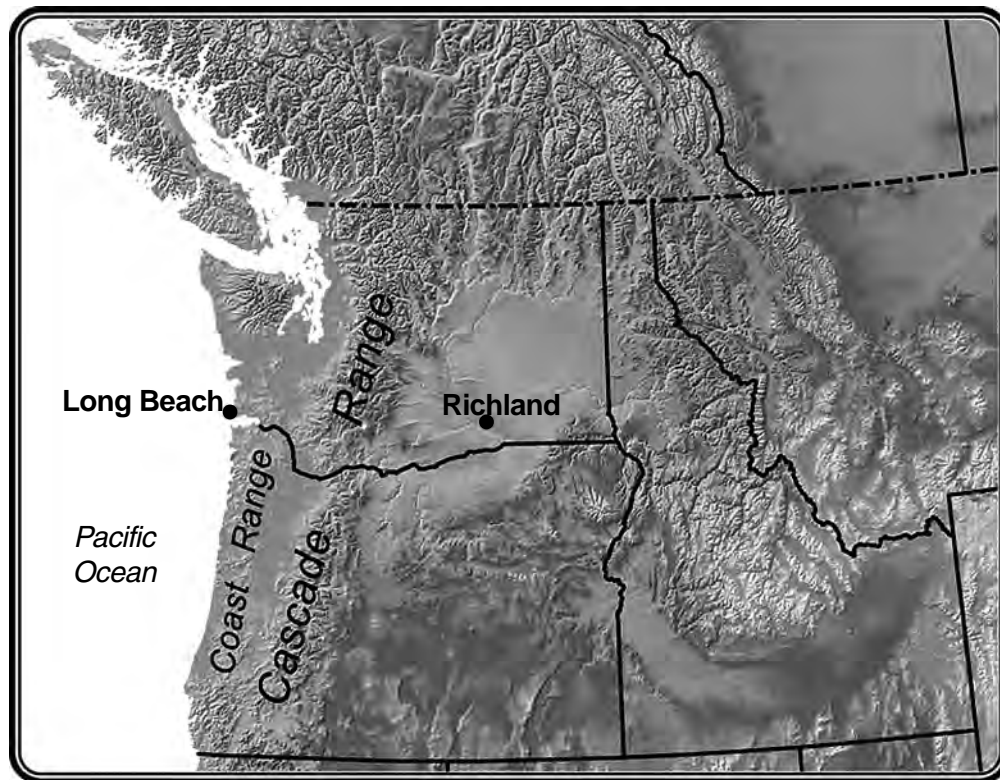
The Finger Lakes originated as a series of south-flowing rivers that existed in what is now central New York State. Around 1.7 to 1.8 million years ago, a continental glacier advanced southward, beginning an ice age that consisted of many advances and retreats of glaciers. The Finger Lakes were carved by several of these advances, which gouged the valleys of the rivers into deep troughs, some of which extend below present-day sea level. As the glaciers advanced, they pushed a great amount of soil and rock ahead of them. During the time when the ice sheets were melting and retreating, glacial moraines were left behind. These deposits dammed the glacial valleys at their southern ends, and the valleys then flooded to form the Finger Lakes.

Elevation and Maximum Depth of the Finger Lakes of New York State



- 76 Identify *one* Finger Lake that has a maximum water depth of approximately 175 feet. [1]
- 77 Identify the geologic time period and epoch when these continental glaciers formed the Finger Lakes of New York State. [1]
- 78 Describe *one* way that the arrangement of sediments in the glacial moraines is different from the arrangement of sediments deposited in the earlier river channels. [1]
- 79 Describe the cross-sectional shape of the original river valleys before they were gouged by the advancing glaciers. [1]

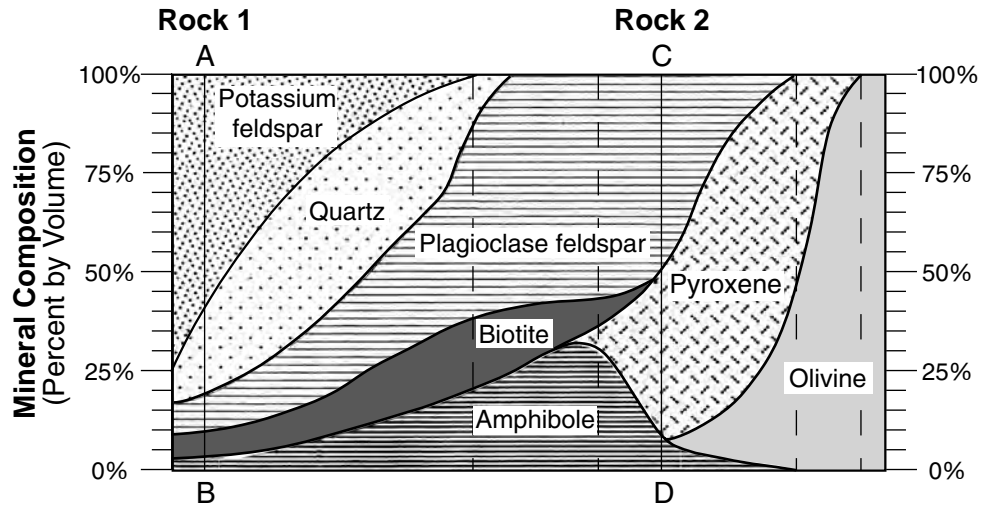
Base your answers to questions 80 and 81 on the map below and on your knowledge of Earth science. The map shows the locations of the Coast Range and Cascade Range in the Pacific Northwest of the United States and two cities in this region.



80 Identify the name of the cool surface ocean current that influences the climate of this region. [1]

81 Explain why the difference between average winter and summer temperatures is smaller in Long Beach than in Richland. [1]

Base your answers to questions 82 through 85 on the diagram below and on your knowledge of Earth science. The diagram represents a portion of the scheme for igneous rock identification. Line *AB* represents the percentages of the minerals in igneous rock 1 and line *CD* represents the percentages of the minerals in igneous rock 2.



82 Rock 1 is a glassy, vesicular igneous rock. Identify the name of rock 1. [1]

83 Compared to the color and density of igneous rock 1, describe how the relative color and density of igneous rock 2 are different. [1]

84 Explain why andesite and diorite can both have the same percentage of mineral composition by volume, and yet be two different igneous rocks. [1]

85 The table in *your answer booklet* shows the composition of three minerals commonly found in igneous rocks. Complete the table by placing *one X* in each row to indicate if that mineral is found in both rock 1 and rock 2, neither rock 1 nor rock 2, rock 1 only, or rock 2 only. [1]

