

PHYSICAL SETTING EARTH SCIENCE

Friday, January 23, 2026 — 9:15 a.m. to 12:15 p.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 The concept that the planets travel around the Sun in eccentric orbits is best explained by the

(1) Big Bang theory
(2) Plate Tectonic theory
(3) geocentric model
(4) heliocentric model

- 2 The table below shows the times of ocean high tides and low tides on a certain date at a location in Massachusetts.

Ocean Tides

Type of Tide	Time
low	12:18 a.m.
high	7:08 a.m.
low	1:08 p.m.
high	7:49 p.m.

At what time would the next low tide occur at this location?

(1) 1:49 a.m. (3) 8:29 a.m.
(2) 1:49 p.m. (4) 8:29 p.m.

- 3 Which energy-producing process that combines lighter elements into heavier elements (such as hydrogen into helium) occurs inside the Sun?

(1) radioactive decay (3) condensation
(2) nuclear fusion (4) outgassing

- 4 Which factor causes the swing of a Foucault pendulum to appear to change direction over a period of time?

(1) Earth's rotation on its axis
(2) Earth's revolution around the Sun
(3) 23.5° tilt of Earth's axis
(4) gravitational pull of the Moon

- 5 The time exposure photograph shows star trails in a portion of the night sky, as viewed from a location in the United States.



Source: astro.unl.edu/naap/motion2/starpath.html

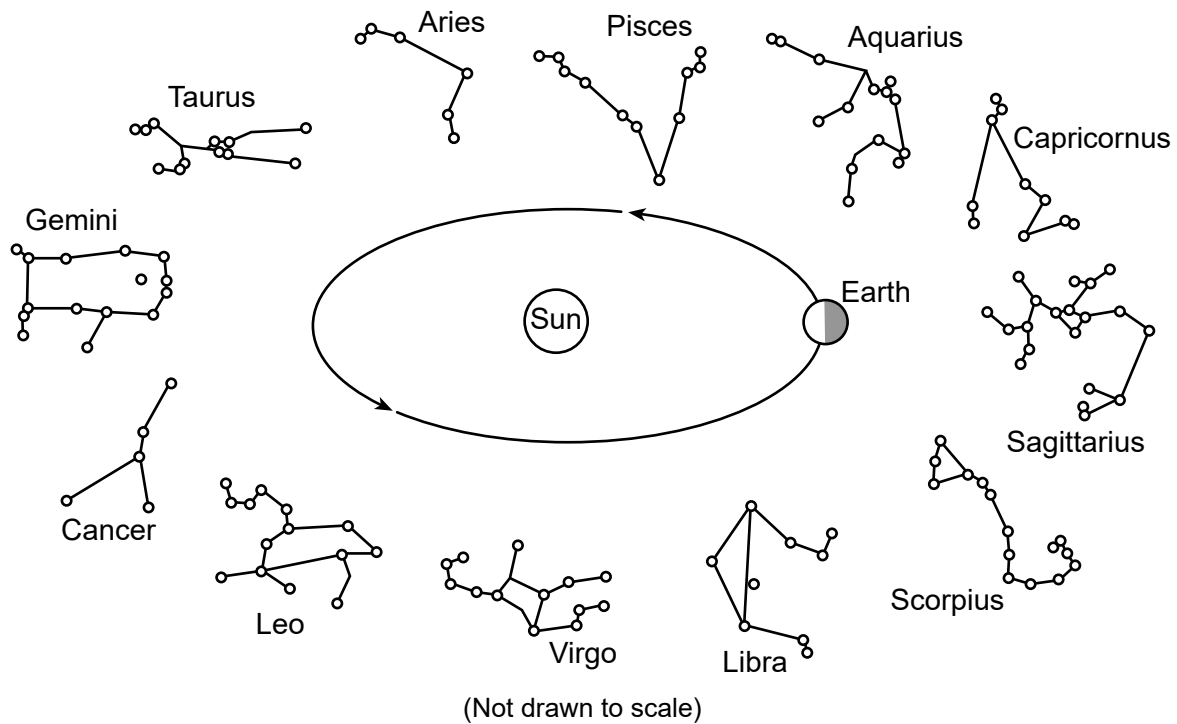
Which direction was the camera pointing when this photograph was taken?

(1) east (3) north
(2) west (4) south

- 6 Earth's early atmosphere is inferred to be the result of

(1) outgassing from Earth's interior
(2) crustal plate movement
(3) convection in Earth's outer core
(4) decay of radioactive isotopes

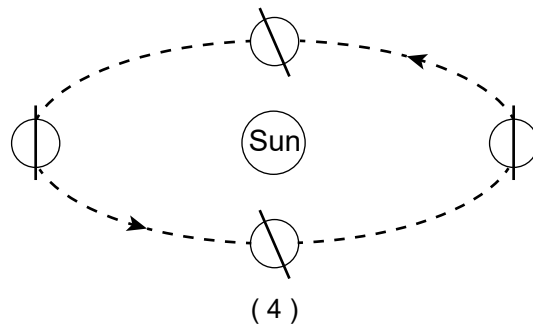
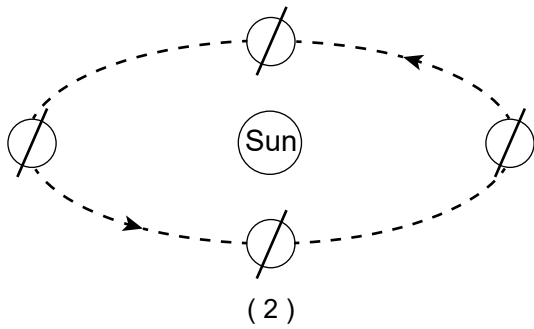
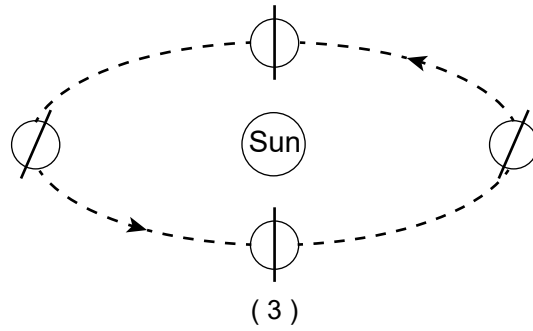
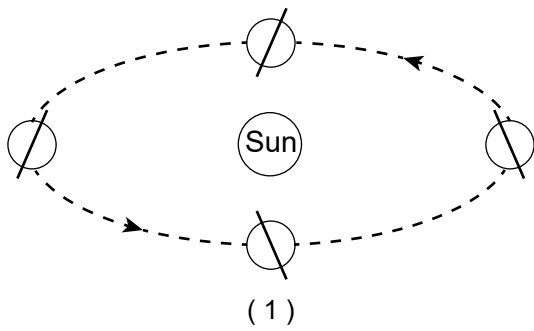
- 7 The diagram below represents one position of Earth in its orbit around the Sun and 12 constellations that can be seen in the night sky by an observer in New York State.



Which statement best explains why some constellations are *not* visible in the night sky in New York State at certain times of the year?

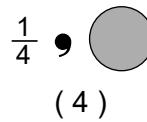
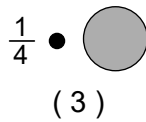
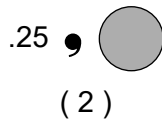
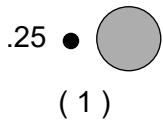
- | | |
|--|-------------------------------------|
| (1) Earth spins on its axis. | (3) Earth orbits the Sun. |
| (2) The constellations spin on their axes. | (4) The constellations orbit Earth. |

8 Which diagram correctly shows the orientation of Earth's tilted axis in relation to the Sun as Earth revolves around the Sun?

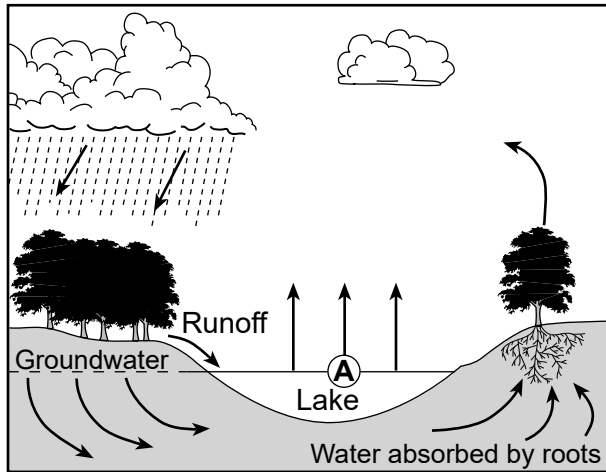


(Not drawn to scale)

9 Which station model correctly represents a location with overcast skies that is experiencing drizzle with a visibility of one-quarter mile?



- 10 The diagram below represents the water cycle. Letter A identifies one of the processes occurring in the cycle.



The process represented by letter A involves

- (1) 334 J/g of heat energy gained to change into water vapor
 - (2) 334 J/g of heat energy released into the lake water
 - (3) 2260 J/g of heat energy gained to change into water vapor
 - (4) 2260 J/g of heat energy released into the lake water
- 11 Approximately 90% of atmospheric ozone is located in the stratosphere. Between which altitudes is most of this ozone layer located?
- (1) 0 km and 10 km
 - (2) 12 km and 50 km
 - (3) 50 km and 75 km
 - (4) 80 km and 120 km
- 12 On March 21, the duration of insolation at Albany, New York, is approximately 12 hours. Each day for the next six months, the duration of insolation at Albany will
- (1) decrease
 - (2) increase
 - (3) decrease, then increase
 - (4) increase, then decrease

- 13 The photograph below shows Chimborazo, a volcano in South America, located near the equator.

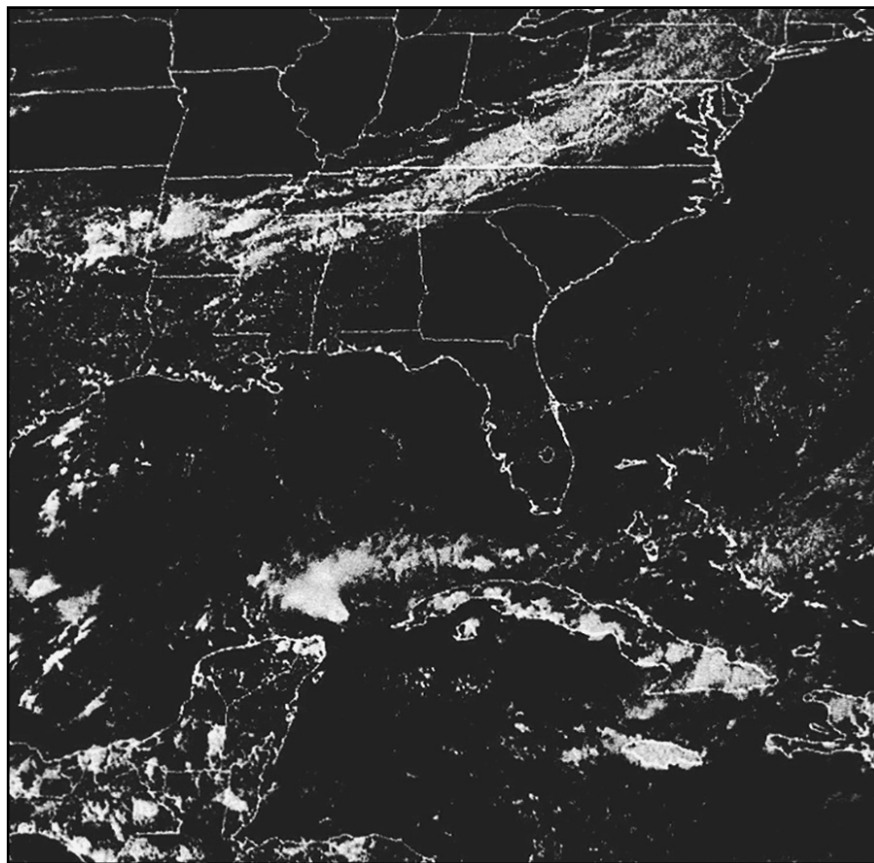


Source: <http://www.alpineinstitute.com/catalog/ecuador-chimborazo-climb/>

Which climate factor is responsible for the snow on this volcano?

- (1) low latitude
 - (2) low elevation
 - (3) high latitude
 - (4) high elevation
- 14 The *least* absorption of insolation occurs with surfaces that are
- (1) dark and smooth
 - (2) dark and rough
 - (3) light and smooth
 - (4) light and rough
- 15 Why is the range between the summer and winter temperatures greater in central New York State than on Long Island?
- (1) Long Island has a higher percentage of urbanization.
 - (2) Long Island is surrounded by a large body of water.
 - (3) Central New York State has higher elevations.
 - (4) Central New York State receives more insolation.
- 16 Equal amounts of which material at room temperature would have the greatest increase in temperature with the addition of 100 joules of heat?
- (1) basalt
 - (2) copper
 - (3) granite
 - (4) water

17 The photograph below is a satellite image of a portion of the Northern Hemisphere.

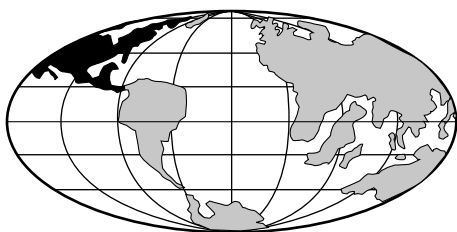


Source: https://www.star.nesdis.noaa.gov/goes/conus_band.php?sat=G16&band=02&length=12

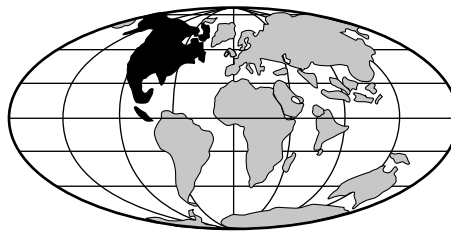
The white regions on this image indicate areas of

- | | |
|-----------------|----------------------|
| (1) cloud cover | (3) high pressure |
| (2) snow cover | (4) flooded surfaces |

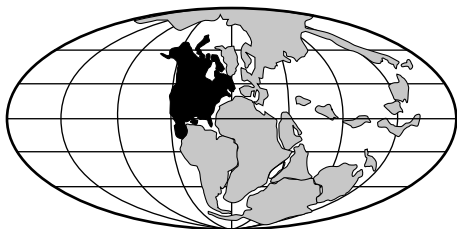
18 Which map best indicates the inferred position of Earth's landmasses when the first coral reefs were formed?



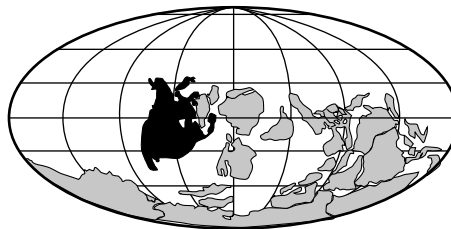
(1)



(3)



(2)



(4)

19 The photograph below shows an outcrop.

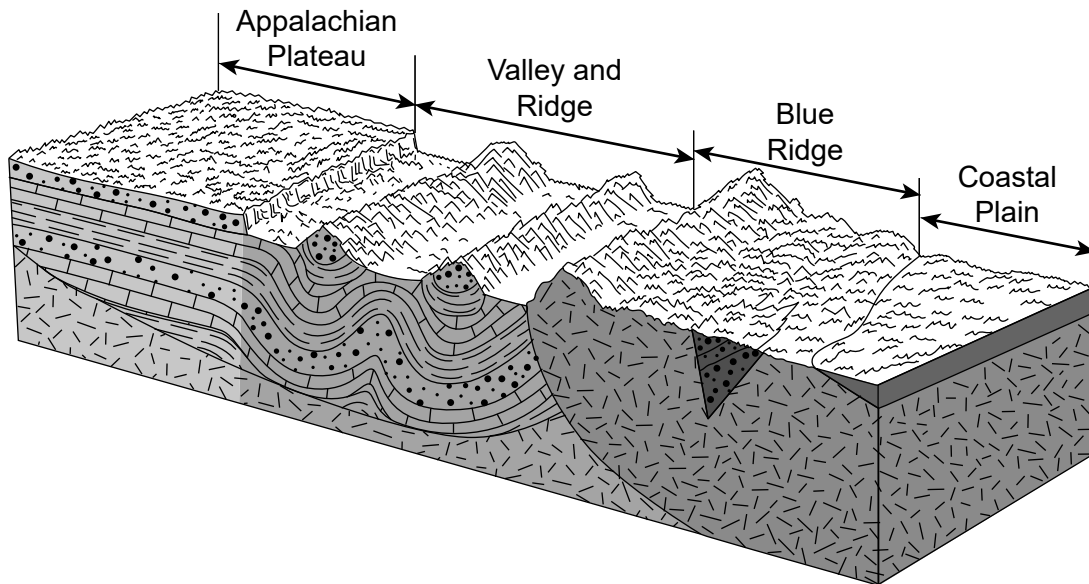


Source: <https://dec.vermont.gov/geological-survey/about/current-projects>

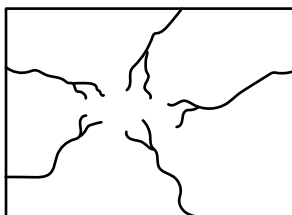
What evidence shown in the photograph indicates that crustal movement has occurred?

- (1) A variety of sediment sizes are shown.
- (2) The rock layers have different thicknesses.
- (3) A forest of trees are found above the outcrop.
- (4) The rock layers are no longer horizontal.

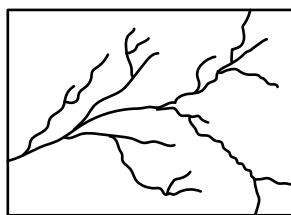
20 The block diagram below shows some of the bedrock geology and landscape regions in the states of Virginia and West Virginia.



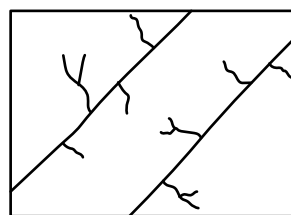
Which stream drainage pattern has most likely developed in the Valley and Ridge landscape region of Virginia?



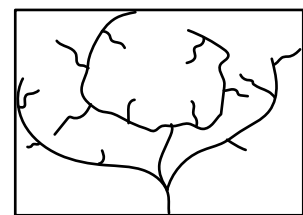
(1)



(2)



(3)



(4)

21 In the expanse of geologic time, which group of organisms listed below has existed for the shortest period of time?

- (1) birds (3) humans
- (2) dinosaurs (4) placoderm fish

22 Which index fossil found in surface bedrock of New York State may be classified as a Cambrian-age trilobite?

- (1) *Elliptocephala* (3) *Centroceras*
- (2) *Cryptolithus* (4) *Phacops*

23 Preserved life-forms, found in the fossil record, show the progression to more complex organisms over geologic time. This pattern of fossils provides evidence for

- (1) plate tectonics
- (2) animal migration
- (3) the evolution of life
- (4) the widespread distribution of life

24 Earth's last magnetic pole reversal occurred about 780,000 years ago. Evidence on Earth's surface for this phenomenon would be found in the

- (1) basaltic bedrock found along the Mid-Atlantic Ridge
- (2) metamorphic bedrock in Australia
- (3) salt and gypsum deposits found in the Erie-Ontario Lowlands
- (4) sand and clay deposits along the west coast of the United States

25 Convection currents that cause Earth's lithospheric plates to move occur in the

- (1) plastic mantle (3) outer core
- (2) stiffer mantle (4) inner core

26 Compared to the density and thickness of continental crust, the oceanic crust is

- (1) more dense and thicker
- (2) more dense and thinner
- (3) less dense and thicker
- (4) less dense and thinner

27 Landslides are most commonly found in regions having a

- (1) low rainfall event and gentle slopes
- (2) low rainfall event and steep slopes
- (3) high rainfall event and gentle slopes
- (4) high rainfall event and steep slopes

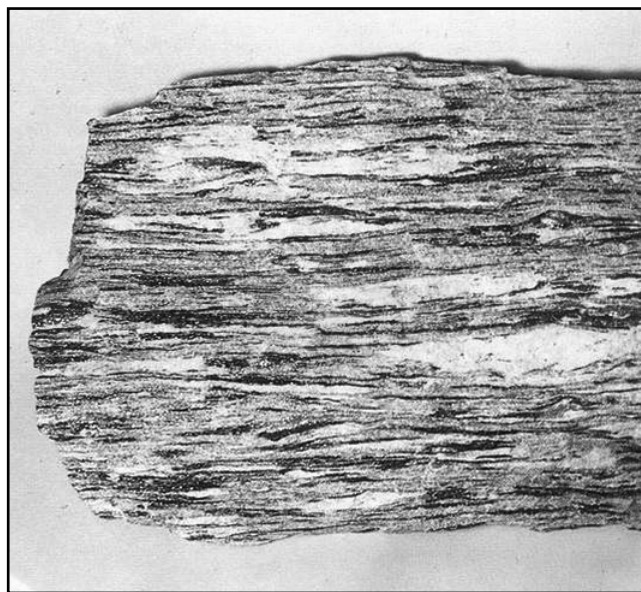
28 Vesicular texture is used to describe

- (1) metamorphic rocks with distorted pebbles
- (2) igneous rocks with gas pockets
- (3) metamorphic rocks with platy mica crystals
- (4) igneous rocks that are smooth and glassy

29 Which characteristic would be most useful in distinguishing graphite from magnetite?

- (1) luster (3) streak
- (2) color (4) hardness

30 The photograph below shows a sample of gneiss.



What is the texture and grain size of this gneiss?

- (1) foliated and fine grained
- (2) foliated and coarse grained
- (3) nonfoliated and fine grained
- (4) nonfoliated and coarse grained

31 Which table best describes the landscape category and the general bedrock structure, type, and composition of bedrock in Old Forge, New York?

Landscape Category	plateau region
Bedrock Structure	horizontal
Bedrock Type	sedimentary
Bedrock Composition	limestone, shale, sandstone

(1)

Landscape Category	mountain region
Bedrock Structure	folded
Bedrock Type	metamorphic
Bedrock Composition	gneiss, quartzite, marble

(3)

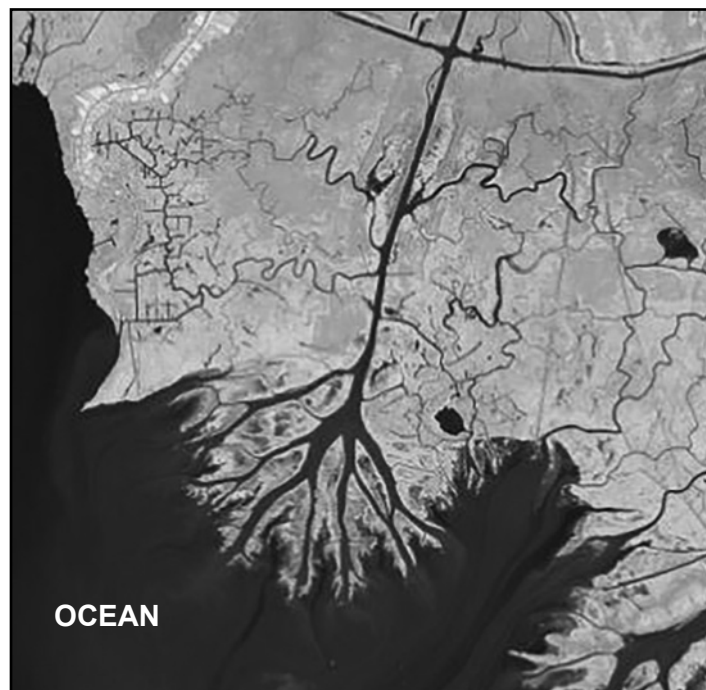
Landscape Category	mountain region
Bedrock Structure	horizontal
Bedrock Type	metamorphic
Bedrock Composition	gneiss, quartzite, marble

(2)

Landscape Category	plateau region
Bedrock Structure	folded
Bedrock Type	sedimentary
Bedrock Composition	limestone, shale, sandstone

(4)

32 The satellite image below shows a portion of a river as it enters the ocean.

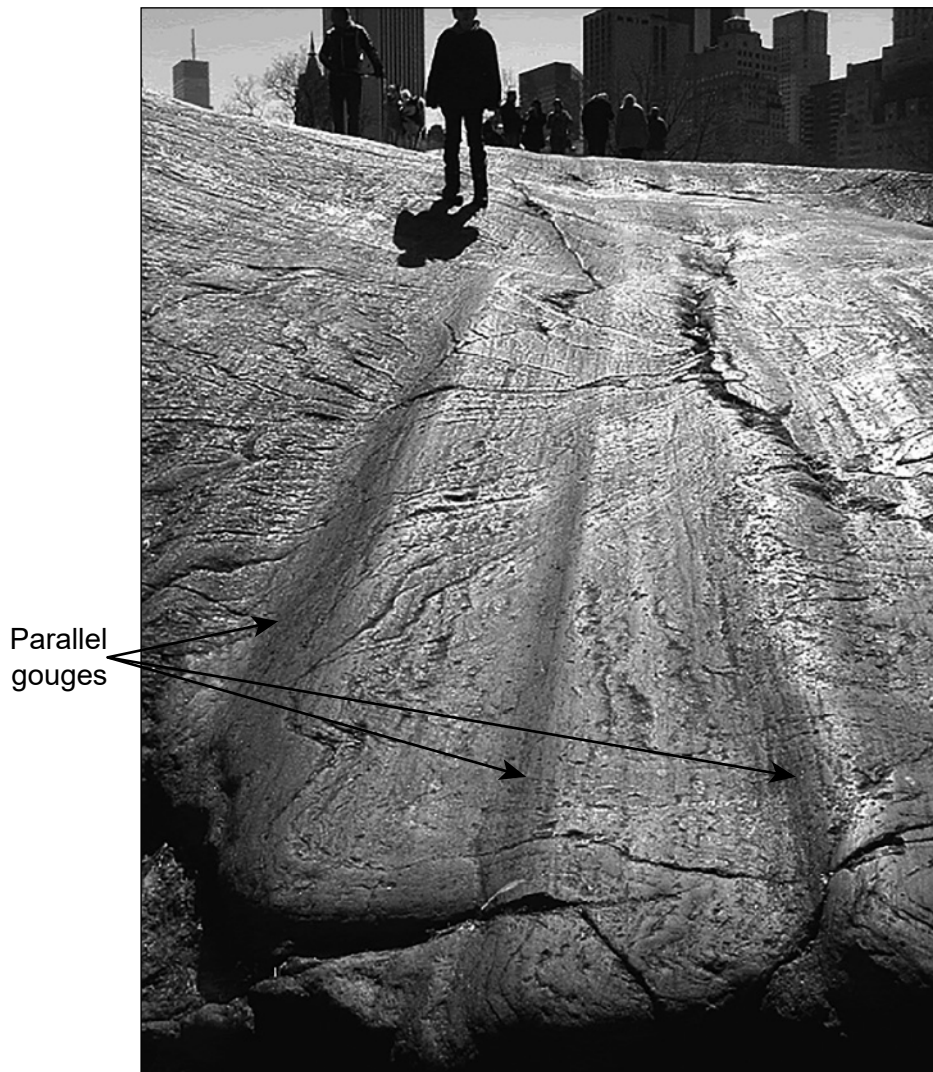


Source: <https://www.tinyurl.com/yas5hpw5>

Which landform is produced where this river enters the ocean?

- (1) delta
- (2) landslide
- (3) string of kettle lakes
- (4) string of finger lakes

33 The photograph below shows a series of long, parallel gouges on the surface of exposed bedrock in New York City.

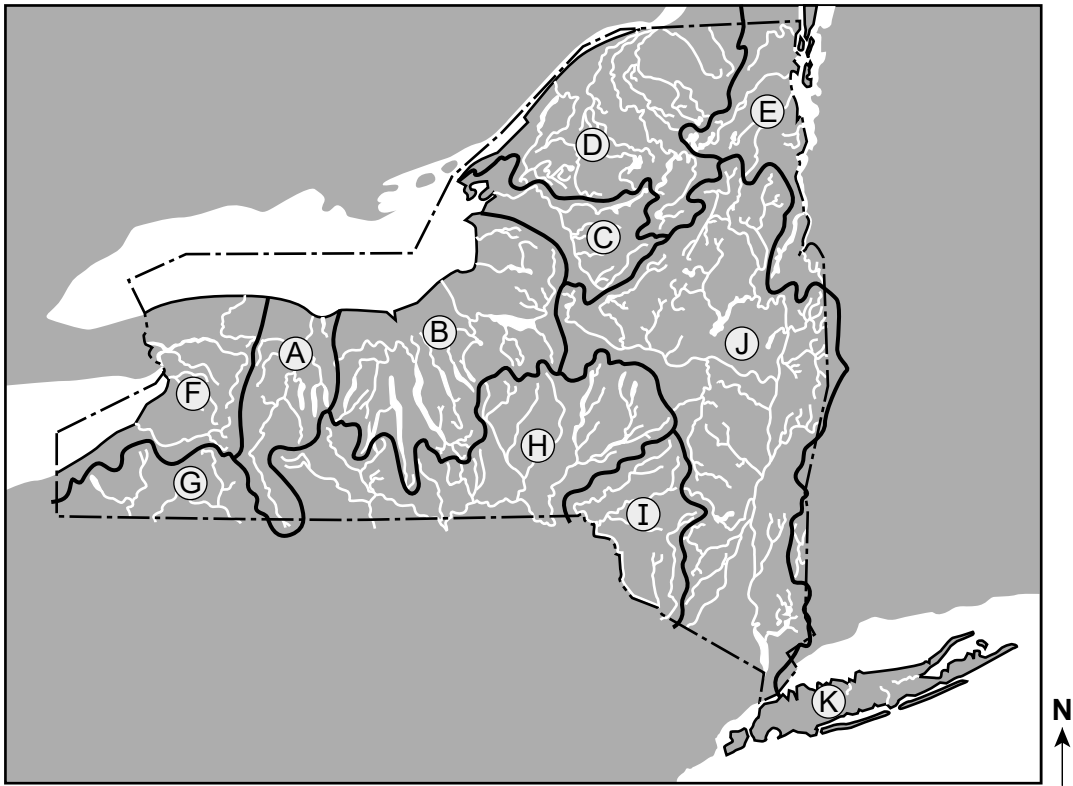


Source: <https://hudsonvalleygeologist.blogspot.com/2011/03/umpire-rat-rock-in-central-park.html>

The gouges on the rock were formed by boulders that were

- (1) deposited on bedrock at the bottom of a river
- (2) tumbled over the bedrock on a hillside during a landslide
- (3) moved along the bedrock at the bottom of a stream
- (4) dragged across the bedrock at the bottom of a glacier

34 The map below shows major watershed areas in New York State. Letters A through K represent individual watersheds.



Which table indicates the watersheds of the Mohawk River and the Susquehanna River?

River	Watershed
Mohawk	I
Susquehanna	B

(1)

River	Watershed
Mohawk	J
Susquehanna	H

(3)

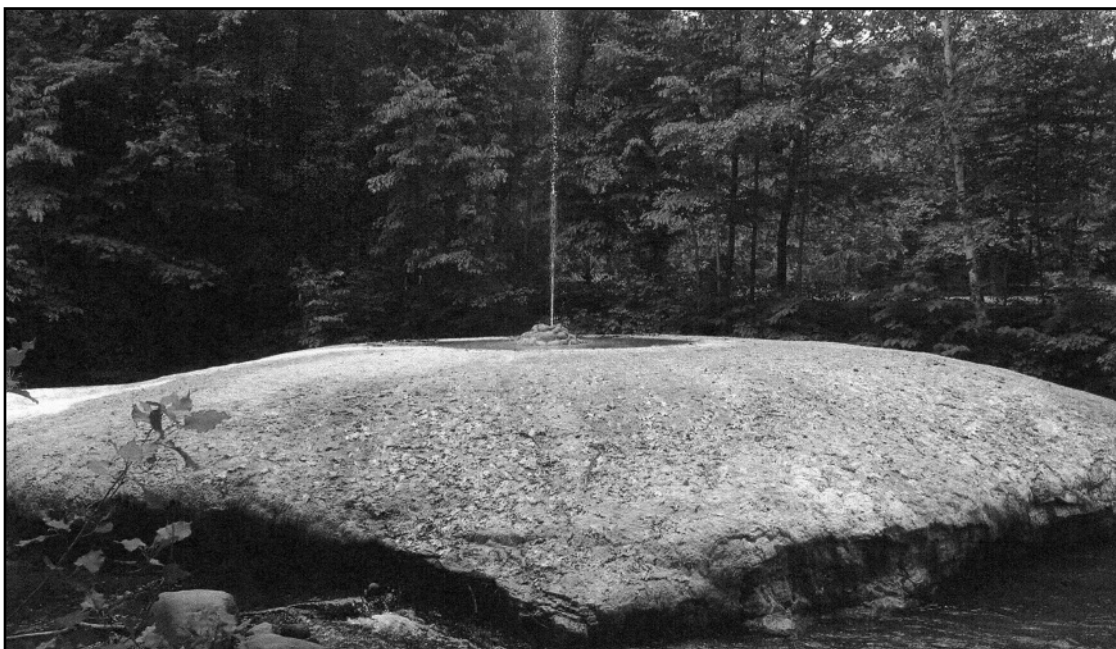
River	Watershed
Mohawk	B
Susquehanna	I

(2)

River	Watershed
Mohawk	H
Susquehanna	J

(4)

- 35 The photograph below shows a dome of rock found in Saratoga Springs, New York. The dome of rock is travertine, a variety of limestone.



Which mineral makes up most of the travertine?

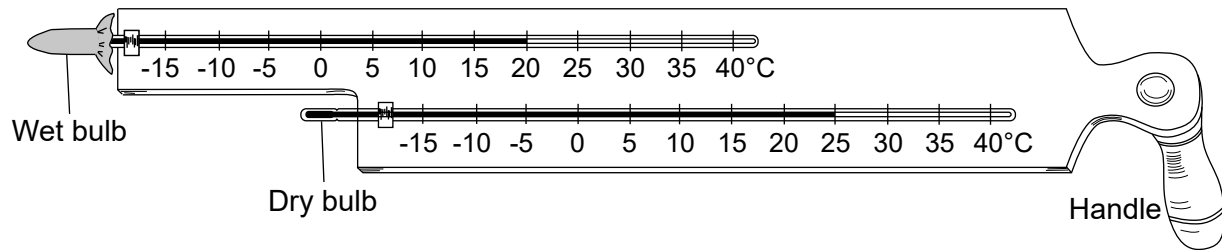
- | | |
|-------------|------------|
| (1) quartz | (3) halite |
| (2) calcite | (4) talc |
-

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 diagram below and on your knowledge of Earth science.



The diagram represents a weather instrument used to determine relative humidity and dew point.

36 Which weather instrument is shown?

- (1) anemometer
- (2) psychrometer
- (3) barometer
- (4) rain gauge

37 According to the temperature readings shown, what is the dew point?

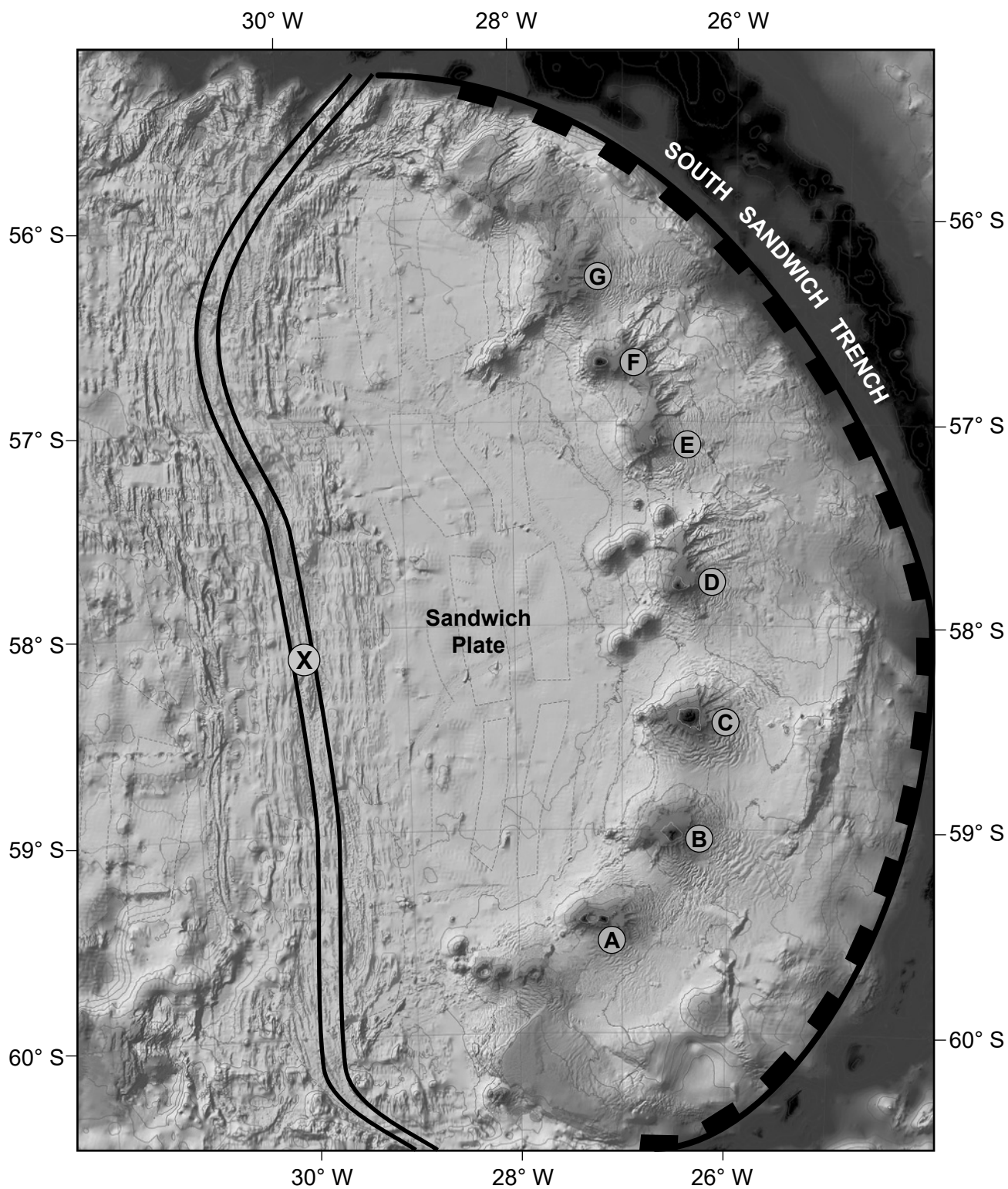
- (1) 5°C
- (2) 12°C
- (3) 17°C
- (4) 63°C

38 Which conditions would exist if the relative humidity were 100%?

- (1) The dry-bulb temperature would be below the wet-bulb temperature.
 - (2) The dry-bulb temperature would be the same as the wet-bulb temperature.
 - (3) The wet-bulb temperature would be lower than 0°C and the dry-bulb temperature would be higher than 0°C.
 - (4) The wet-bulb temperature would be lower than 20°C and the dry-bulb temperature would be higher than 20°C.
-

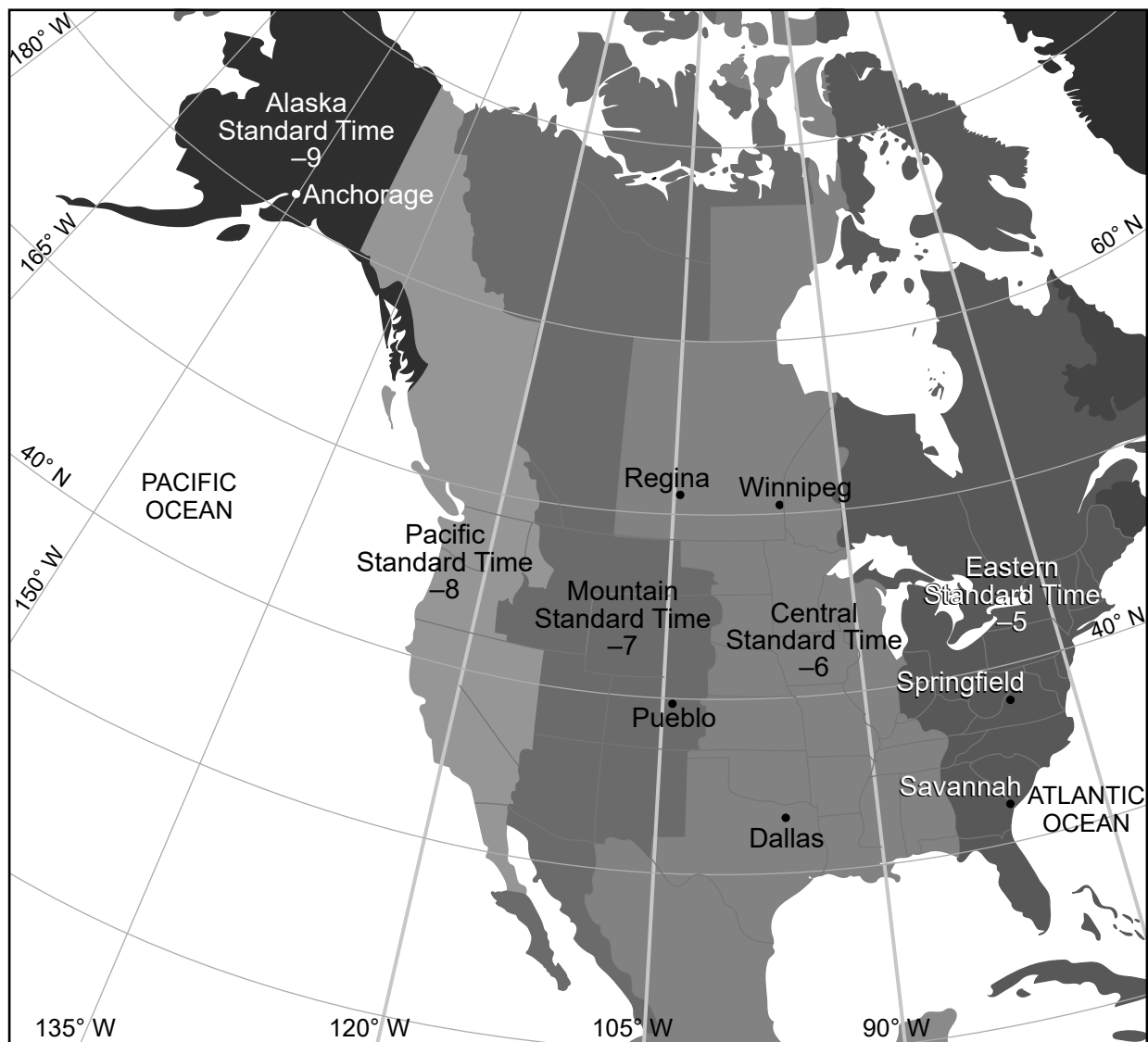
Base your answers to questions 39 through 42 on the passage and map below and on your knowledge of Earth science. The map shows the ocean floor and the location of seven volcanic islands, labeled A through G, found on the Sandwich Plate. Tectonic plate boundaries are indicated. One plate boundary is labeled X.

The Sandwich Plate is one of the smallest tectonic plates on Earth. Several volcanic islands are located west of the South Sandwich Trench. Due to their location, most of the islands are covered by glaciers. This chain of volcanic islands is a result of subduction. Due to their volcanic origin, over 70% of the islands are made of basalt from lava flows. A spreading center is located west of these islands.



- 39 Which tectonic plate is subducting under the Sandwich Plate?
- (1) South American Plate
 - (2) African Plate
 - (3) Antarctic Plate
 - (4) Scotia Plate
- 40 Which type of plate boundary is represented by letter X?
- (1) convergent
 - (2) complex or uncertain
 - (3) divergent
 - (4) transform
- 41 Peridotite has also been found exposed along the sides of some of the volcanic islands. How is this rock different than the basalt that makes up 70% of the islands?
- (1) Basalt contains more olivine than peridotite.
 - (2) Basalt contains more quartz than peridotite.
 - (3) Peridotite formed extrusively, while basalt formed intrusively.
 - (4) Peridotite formed intrusively, while basalt formed extrusively.
- 42 What is the name and relative temperature of the ocean current that flows south of the Sandwich Plate?
- (1) warm Brazil Current
 - (2) cool Brazil Current
 - (3) warm Antarctic Circumpolar Current
 - (4) cool Antarctic Circumpolar Current
-

Base your answers to questions 43 and 44 on the map below and on your knowledge of Earth science. The map shows a portion of North America, including parts of Canada and the United States. The shaded areas on the map show continental North American time zones. The number in each time zone indicates the difference in hours compared to the time at the Prime Meridian. Some cities are labeled on the map.



43 When it is 3:00 p.m. in Anchorage, Alaska, what time is it in Dallas, Texas?

- | | |
|---------------|----------------|
| (1) 6:00 a.m. | (3) 12:00 noon |
| (2) 9:00 a.m. | (4) 6:00 p.m. |

44 From which two cities can Polaris be observed at nearly the same angle above the northern horizon?

- | | |
|----------------------------|-------------------------|
| (1) Dallas and Savannah | (3) Pueblo and Savannah |
| (2) Regina and Springfield | (4) Winnipeg and Dallas |

Base your answers to questions 45 through 47 on the data table below, which describes the ten stars that appear brightest in the nighttime sky over New York State. Stars are ranked by how bright they appear to the unaided eye from 1 (brightest) to 10 (dimpest). Distances are measured in light-years from Earth. A light-year is the distance light travels in one year.

The Ten Brightest Stars in New York State Nighttime Skies

Rank	Star Name	Luminosity (relative to Sun)	Distance (light-years)	Surface Temperature (K)
(brightest) 1	Sirius	27	8.6	9500
2	Arcturus	298	36.7	4106
3	Vega	61	25.3	8912
4	Capella	162	42.2	5419
5	Rigel	51,194	777	9076
6	Procyon	7.5	11.6	6500
7	Betelgeuse	58,980	429	3488
8	Altair	12	16.8	7757
9	Aldebaran	1080	65	3406
(dimpest) 10	Antares	387,000	604	2776

45 Which star would appear red to the unaided eye?

- | | |
|-------------|-------------|
| (1) Vega | (3) Altair |
| (2) Procyon | (4) Antares |

46 Based on its luminosity and temperature, the star Capella would be classified as a

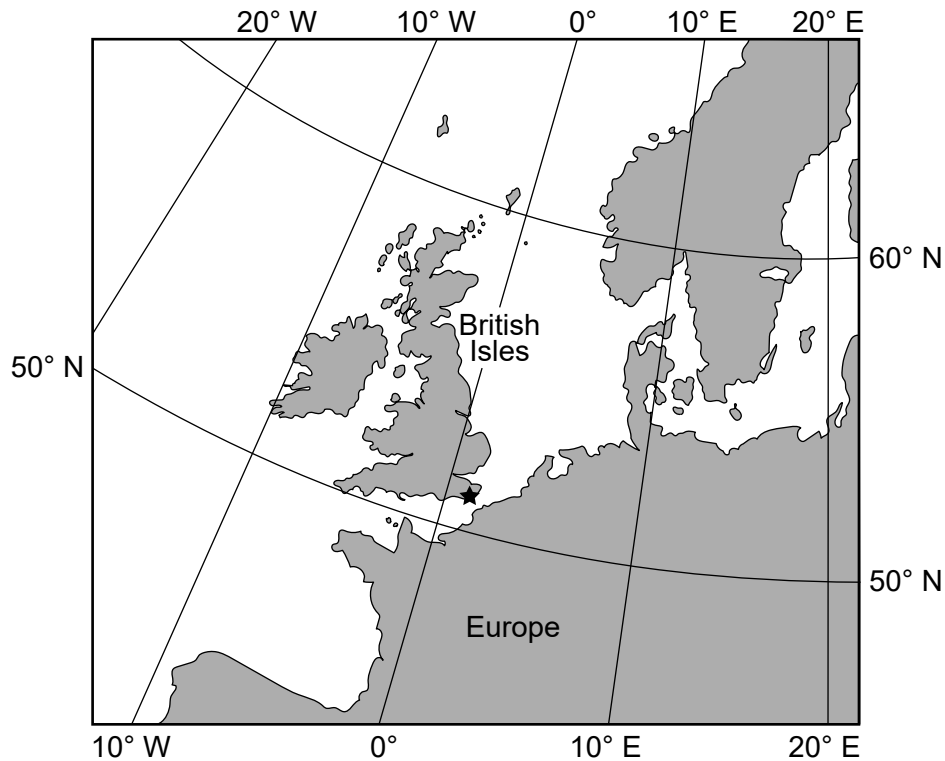
- | | |
|-------------------|----------------|
| (1) main sequence | (3) giant |
| (2) white dwarf | (4) supergiant |

47 When viewed from Earth, why does Arcturus appear brighter than Betelgeuse?

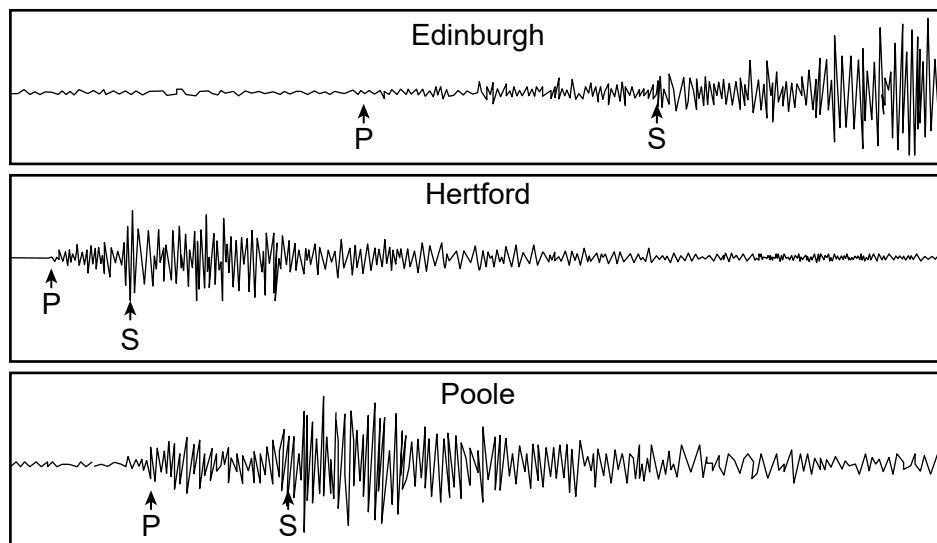
- (1) Arcturus is hotter and farther from Earth than Betelgeuse.
 - (2) Arcturus is hotter and closer to Earth than Betelgeuse.
 - (3) Arcturus is cooler and farther from Earth than Betelgeuse.
 - (4) Arcturus is cooler and closer to Earth than Betelgeuse.
-

Base your answers to questions 48 through 50 on the map and diagram below and on your knowledge of Earth science. The star (★) on the map shows the location of the epicenter of an earthquake that occurred in the British Isles on April 28, 2007. The diagram represents seismograms showing the arrival of *P*- and *S*-waves recorded from this earthquake at three locations.

Site of April 28, 2007 Earthquake



Seismograms of April 28, 2007 Earthquake from Three Stations



48 What is the latitude and longitude of the epicenter of this earthquake?

(1) 51° N, 1° E

(3) 1° N, 51° E

(2) 51° N, 1° W

(4) 1° N, 51° W

49 Based on the seismograms, which list shows the three locations from the closest to the epicenter to farthest from the epicenter?

(1) Edinburgh $\rightarrow$ Poole $\rightarrow$ Hertford

(3) Hertford $\rightarrow$ Poole $\rightarrow$ Edinburgh

(2) Edinburgh $\rightarrow$ Hertford $\rightarrow$ Poole

(4) Hertford $\rightarrow$ Edinburgh $\rightarrow$ Poole

50 More earthquakes occur in Iceland and along the west coast of the United States than in the British Isles because Iceland and the west coast of the United States

(1) are located on plate boundaries while the British Isles are not

(2) are closer to the asthenosphere than the British Isles

(3) have fewer fault zones than the British Isles

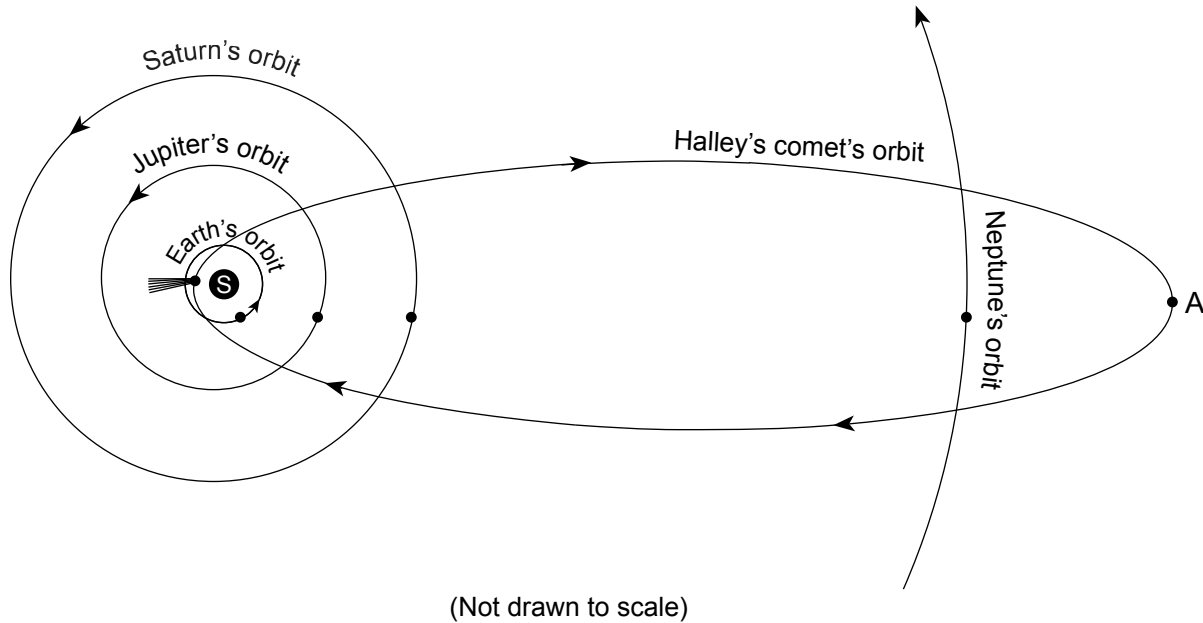
(4) have less volcanic bedrock than the British Isles

Part B–2

Answer all questions in this part.

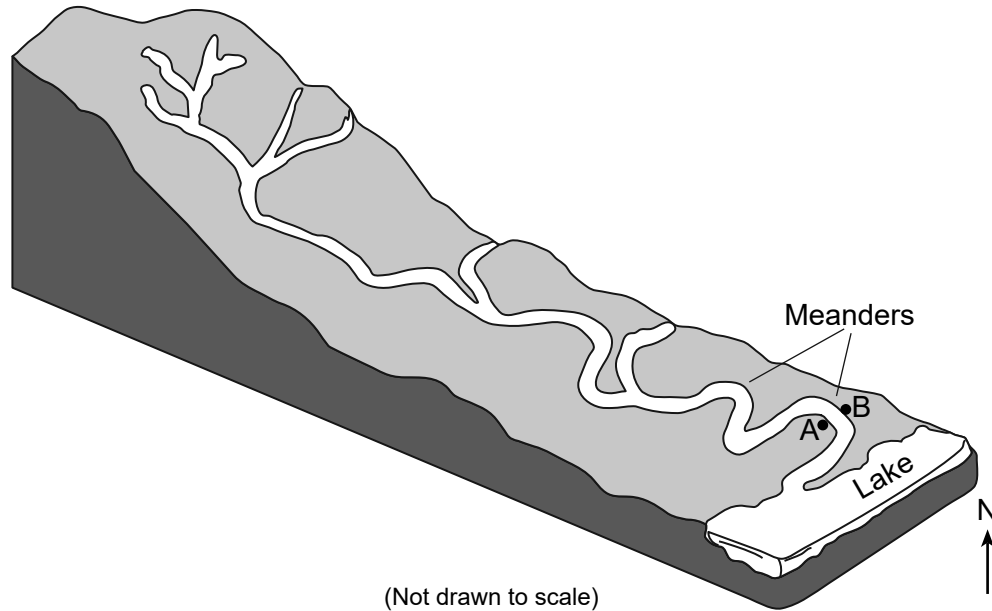
Directions (51–65): Record your answers in the spaces provided in your answer booklet. Some questions may require the use of the *2011 Edition Reference Tables for Physical Setting/Earth Science*.

Base your answers to questions 51 through 53 on the diagram below and on your knowledge of Earth science. The diagram represents a portion of our solar system. The Sun (**S**) and the orbits of four planets are labeled. Halley's comet (☄) is shown at perihelion, its closest distance to the Sun. The path of Halley's Comet is also labeled. Letter A represents another location in the orbit of Halley's Comet.



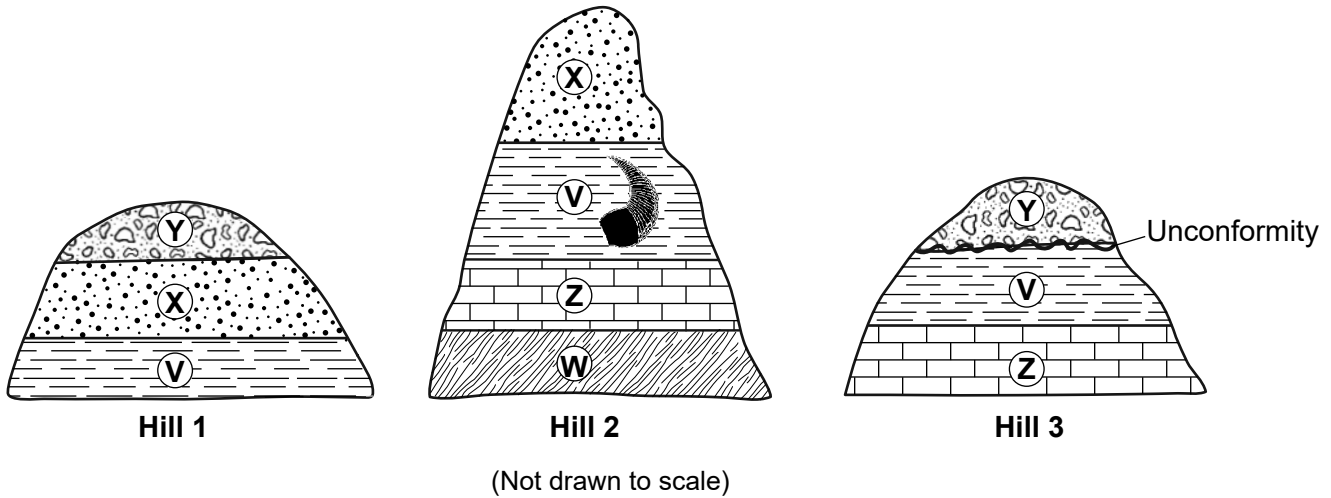
- 51 Describe how the gravitational force between Halley's Comet and the Sun changes as it travels from location A to perihelion and then back to position A again. [1]
- 52 Compared to the terrestrial planets, describe how the mass and density of the Jovian planets are different. [1]
- 53 On the diagram in *your answer booklet*, the shaded distance between 0 mm and 1 mm represents the equatorial diameter of Earth drawn to scale. On this same diagram, starting at 0 mm, shade in the bar labeled "diameter of Sun" to represent the equatorial diameter of the Sun to the same scale. [1]

Base your answers to questions 54 through 56 on the block diagram below and on your knowledge of Earth science. The diagram represents a meandering river flowing into a lake. Letters *A* and *B* indicate locations along the riverbank.



- 54 Explain why location *B*, which is located on the outside of a meander curve, has a greater amount of erosion than location *A*. [1]
- 55 In terms of sediment size, describe the pattern of deposition that occurs when the transported sediments enter the lake. [1]
- 56 Describe how the sediment transported in the river weathers and becomes rounded. [1]
-

Base your answers to questions 57 through 59 on the cross sections below and on your knowledge of Earth science. The cross sections represent rock units labeled V, W, X, Y, and Z in three hills in a region. A New York State index fossil is found in one rock layer. No overturning of rock layers has occurred.

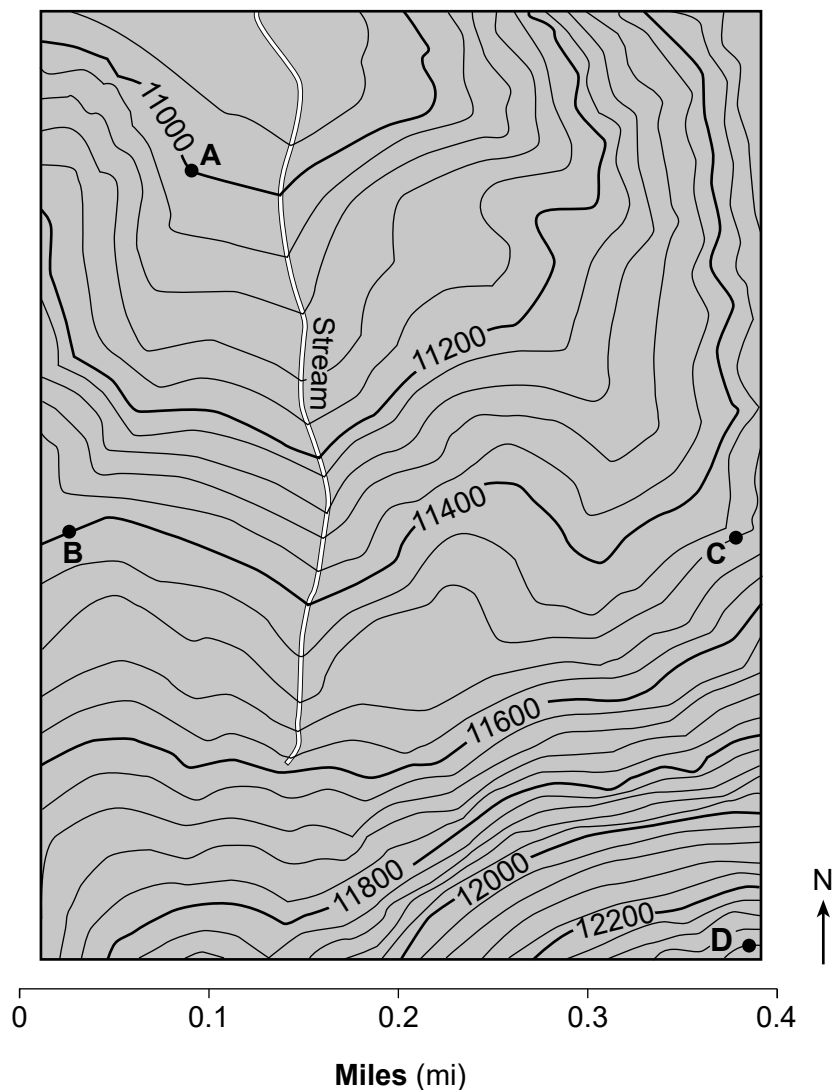


57 Determine the correct relative age sequence of rock layers V, W, X, Y, and Z from oldest to youngest. [1]

58 Explain how rock unit W formed. [1]

59 Describe *one* characteristic of index fossils that allows them to be useful in correlating rock layers. [1]

Base your answers to questions 60 through 62 on the topographic map below and on your knowledge of Earth science. The map shows a portion of the Colorado Rockies in the western United States. Elevations are measured in feet.

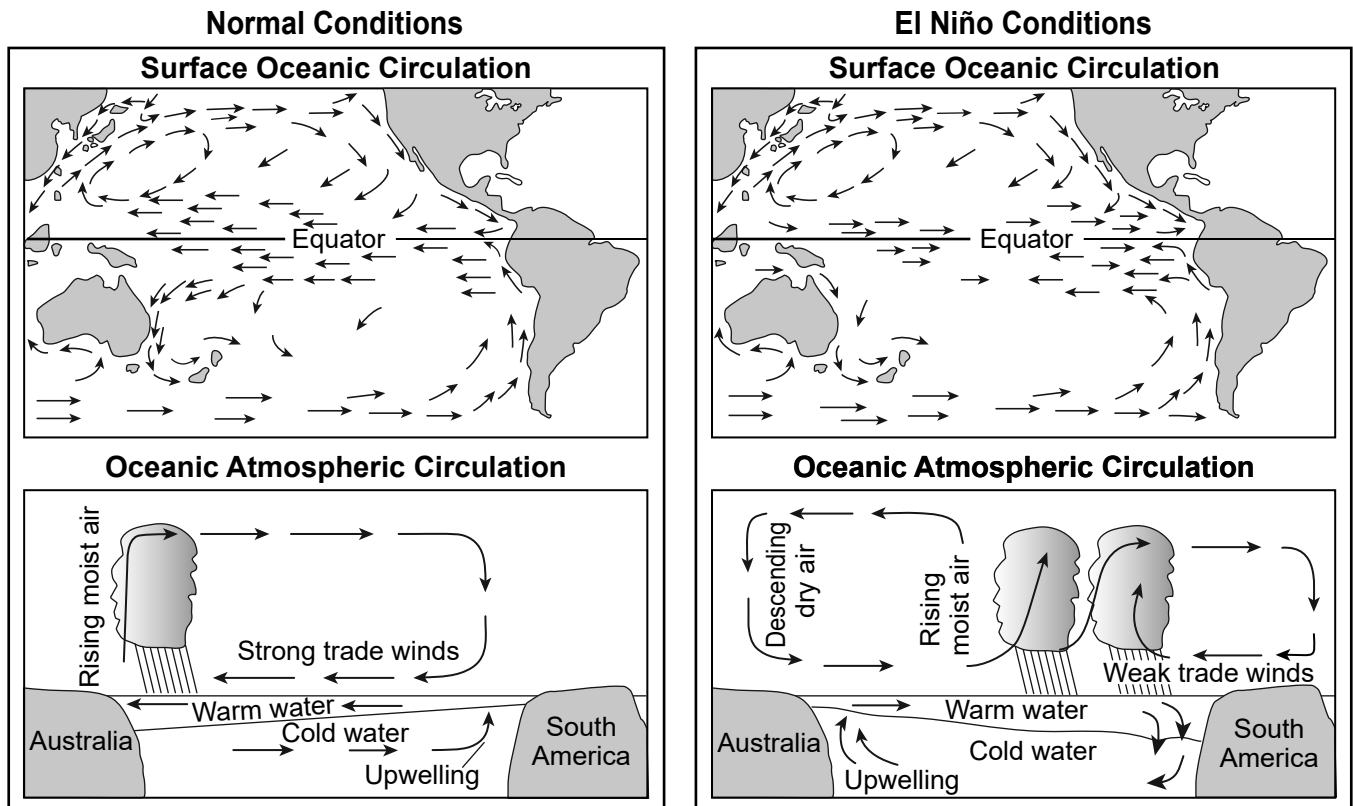


60 Determine the contour interval for this map. [1]

61 Identify the general direction the stream flows on this map. [1]

62 Explain how the contour lines on the map indicate that the slope between points C and D is steeper than the slope between points A and B. [1]

Base your answers to questions 63 through 65 on the two maps and cross sections below and on your knowledge of Earth science. The maps and cross sections represent oceanic and atmospheric circulation during normal conditions and El Niño conditions. Ocean currents and trade-wind directions are indicated with arrows. Clouds indicate regions of frequent thunderstorm activity.



(Not drawn to scale)

- 63 Describe the change in the strength of the trade winds during an El Niño event. [1]
- 64 Compared to the general air pressure over Australia under normal conditions, identify how the overall general air pressure over Australia under El Niño conditions is different. [1]
- 65 Describe what happens in rising moist air that causes clouds to form. [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 weather map in *your answer booklet* and on your knowledge of Earth science. The weather map shows some station model data in and around New York State. The center of a low-pressure system (**L**) is indicated, and two associated fronts are represented by front A and front B.

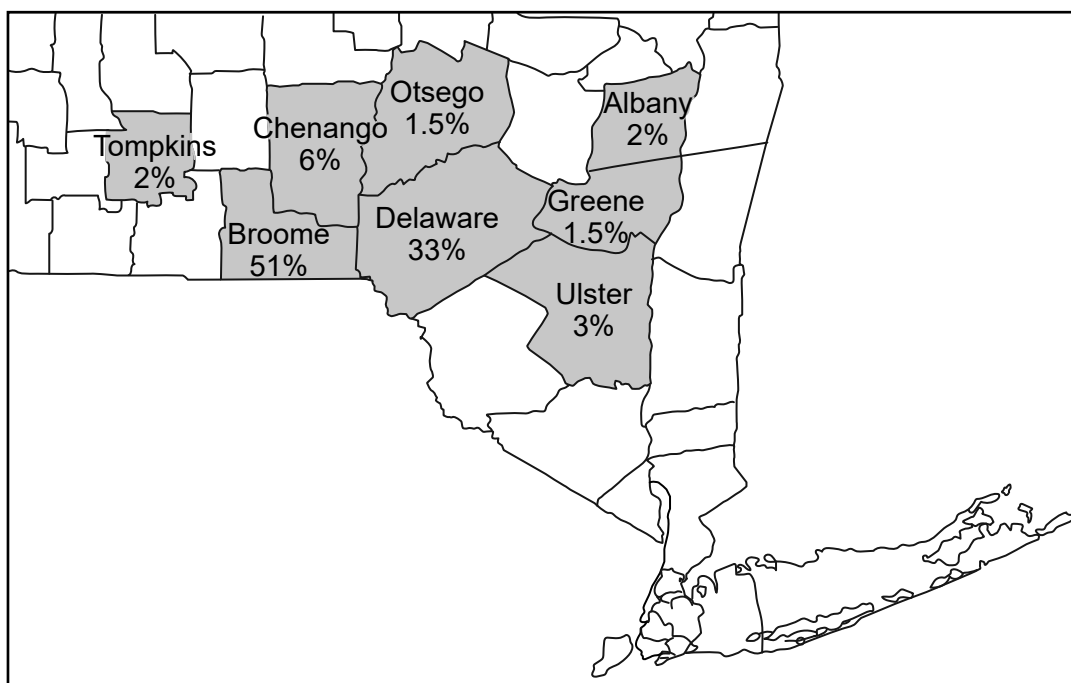
- 66 On the map in *your answer booklet*, draw the 20°F and 40°F isotherms. Extend the isotherms to the edges of the map. [1]
- 67 The air mass located between these two fronts originated along the Tropic of Cancer in the southern Florida region. Write the two-letter air-mass symbol to represent this air-mass. [1]
- 68 Heavy snow with blizzard conditions is forecast for Elmira, New York, during this weather event. Describe *two* emergency preparedness actions that people should take three to six hours before this storm is predicted to arrive. [1]
-

Base your answers to questions 69 through 72 on the passage and map below and on your knowledge of Earth science. The map shows the names of some counties in southeastern New York State and the percentages of bluestone currently being mined in those counties.

New York State Bluestone

Bluestone is the name given to a specific Devonian age sandstone quarried in southeastern New York. Although called “bluestone,” the color varies from greenish gray to grayish-red purple. However, while color is important, it is the mineral composition that makes the rock valuable. Instead of being a quartz sandstone, bluestones are quartz-feldspar sandstones. This mix results in a dense, tough, durable rock ideal for many uses such as street curbing, patio surfaces, and fireplaces. Bluestone was first mined in Ulster County over 200 years ago, but other New York counties now produce a greater percentage of these valuable and versatile rocks.

Percentage of Total Bluestone Mined in Eight New York State Counties



- 69 Identify *two* rock cycle processes that formed the bluestone after the deposition of sand grains. [1]
- 70 State a reason why the color blue is *not* a useful property for the identification of bluestone. [1]
- 71 The quartz and feldspar particles in bluestone average 0.05 cm in diameter. State the minimum stream velocity needed to maintain the movement of these particles to their point of deposition in New York State. [1]
- 72 State the name of the New York State landscape region where the highest percentage of bluestone is currently mined. [1]
-

Base your answers to questions 73 through 75 on the data table below, the grid in your answer booklet, and on your knowledge of Earth science. The data table shows the amount of radioactive uranium-238 and the disintegration product of uranium-238 over five half-lives.

Half-Life	Radioactive Uranium-238 (%)	Disintegration Product of Uranium-238 (%)
0	100	0
1	50	50
2	25	75
3	12.5	87.5
4	6.25	93.75
5	3.125	96.875

73 On the grid in *your answer booklet*, construct a line graph by plotting the disintegration product of uranium-238 for each half-life indicated. Connect *all six* plots with a line. [1]

74 Describe the relationship between the amount of original radioactive isotope and the amount of disintegration product over time. [1]

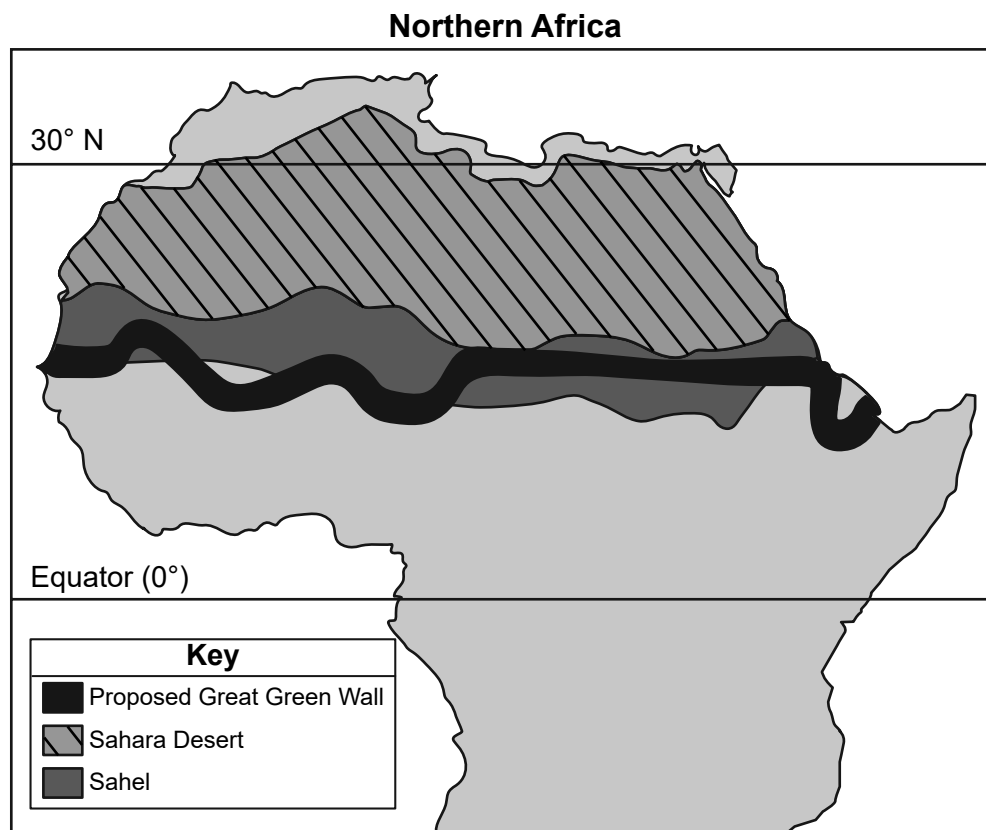
75 Identify the disintegration product for this radioactive isotope. [1]

Base your answers to questions 76 through 78 on the passage and map below, and on your knowledge of Earth science. The map shows the location of the Sahara Desert, the Sahel, and the proposed Great Green Wall.

Great Green Wall

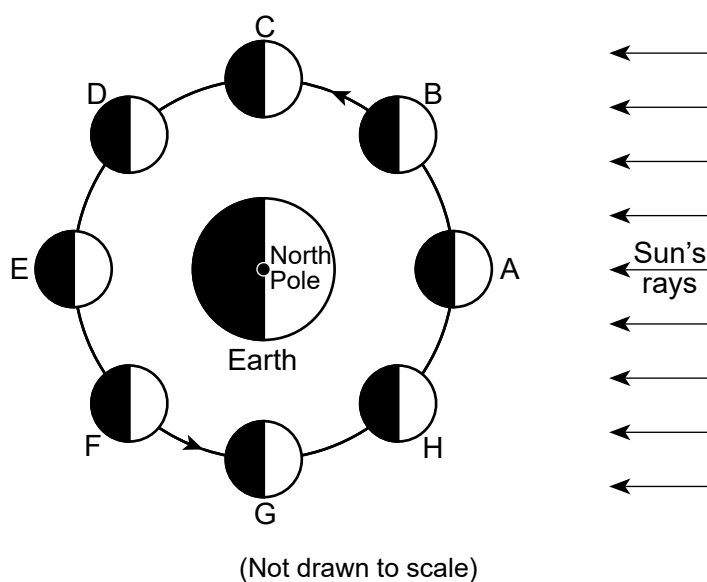
The Great Green Wall is a project to combat the effects of climate change and desertification (becoming a desert) in Northern Africa. The initial idea of this project was to plant a 10-mile wide line of trees resistant to arid conditions along the 4815-mile-long southern border of the Sahara Desert, a region known as the Sahel, to keep the desert from “expanding” southward. This \$8-billion project intends to restore 247 million acres of land in danger of becoming a desert. A secondary effect of this project will be to restore grasslands ruined by decades of overuse. Many years of poor farming techniques and droughts caused by climate change have removed much of the surface vegetation. Fertile topsoil has been lost by winds, making the land less able to support crops and other vegetation.

By 2030, it is expected that these planted trees could absorb approximately 250 metric tons of carbon dioxide as part of the trees’ life process of photosynthesis, thus greatly reducing the effect carbon dioxide has on global warming. This amount is the equivalent of keeping all of California’s cars parked for 3.5 years. Trees will also hold soils in place and prevent topsoil erosion. Deep planting pits and placing stone barriers around farming fields will help raise the level of the water table when rain occurs.



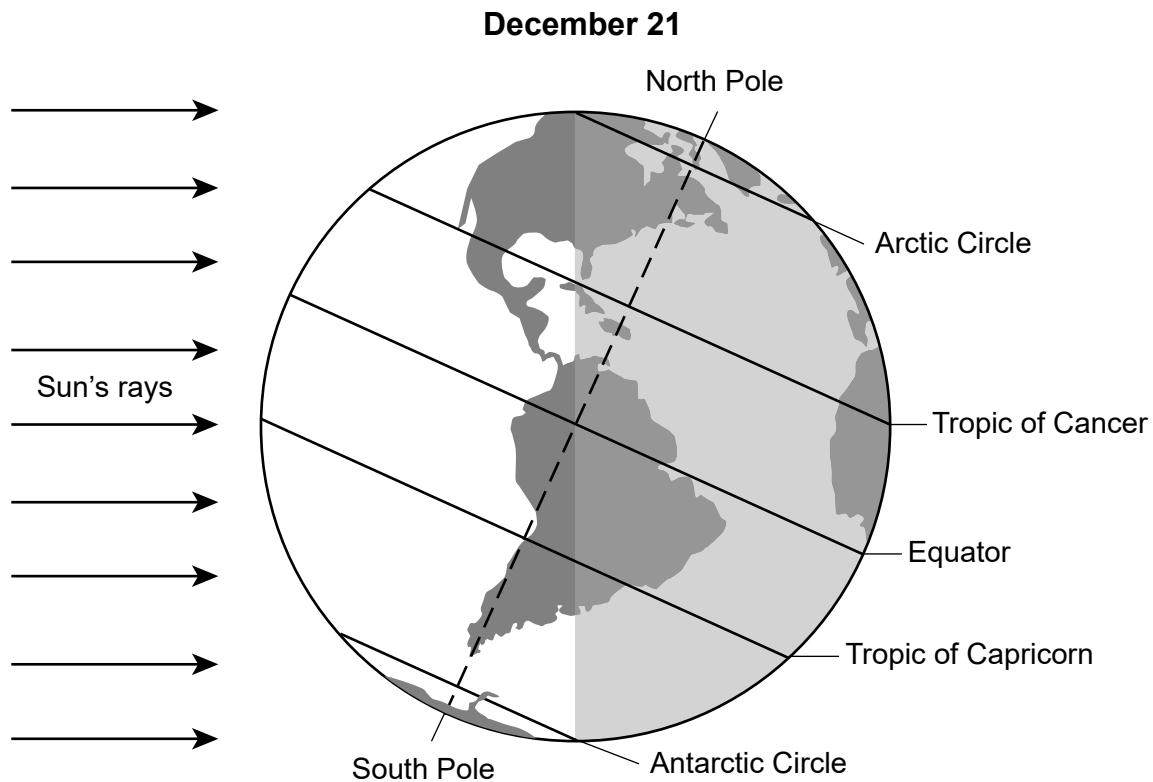
- 76 On the set of axes in *your answer booklet*, draw a line to represent the relationship between the amount of trees in the Great Green Wall and the amount of carbon dioxide absorbed. [1]
- 77 June, July, and sometimes August are the drought season in the Sahel. Describe the relative air temperature and the relative humidity that most likely causes drought conditions in the Sahel. [1]
- 78 Other than evaporation, identify the process that occurs in trees by which water vapor exits the leaves of the trees. [1]
-

Base your answers to questions 79 through 82 on the diagram below and on your knowledge of Earth science. The diagram represents the Moon at eight positions, A through H, in its orbit around Earth.



- 79 On the diagram in *your answer booklet*, shade the portion of the Moon that is in darkness, as viewed from New York State, when the Moon is at position B. [1]
- 80 Identify the letter of the Moon's position in its orbit where a lunar eclipse might be observed from Earth. [1]
- 81 State the number of days needed for the Moon to complete one cycle of phases. [1]
- 82 Explain how the Moon's motions cause the same side of the Moon to always face Earth. [1]
-

Base your answers to questions 83 through 85 on the diagram below and on your knowledge of Earth science. The diagram represents Earth as viewed from space on December 21.



- 83 Describe the relationship between latitude in the northern hemisphere and the number of daylight hours on this day. [1]
- 84 Describe the change in the length of an observer's shadow when measured at solar noon on the Tropic of Cancer for the next 3 months. [1]
- 85 Identify the season that is beginning on the Antarctic Circle on this day. [1]
-

