The University of the State of New York

REGENTS HIGH SCHOOL EXAMINATION

PHYSICAL SETTING
EARTH SCIENCE

Thursday, January 26, 2012 — 1:15 to 4:15 p.m., only

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.

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

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 Which planet's day (period of rotation) is longer than its year (period of revolution)?

(1) Mercury
(2) Venus
(3) Jupiter
(4) Saturn

2 Which event is cyclic and predictable?

(1) a volcano erupting above a subducting tectonic plate
(2) an earthquake occurring at the San Andreas Fault
(3) Jupiter's apparent movement across the night sky
(4) an asteroid striking Earth's surface

3 A high tide occurred at 6:00 a.m. at a beach on Long Island. The next high tide at this same beach would occur at approximately

(1) 12:15 p.m. on the same day
(2) 6:30 p.m. on the same day
(3) 12:45 p.m. on the following day
(4) 7:00 a.m. on the following day

4 The best evidence that Earth rotates on its axis is the changing

(1) phases of the Moon
(2) altitude of the noontime Sun from day to day
(3) apparent path of a Foucault pendulum
(4) velocity of Earth in its orbit

5 The curving of the planetary winds to the right in the Northern Hemisphere is evidence of

(1) the Coriolis effect
(2) high- and low-pressure belts
(3) Earth's revolution
(4) the tilt of Earth's axis

6 Which star is cooler and less luminous than the Sun?

(1) *Proxima Centauri*
(2) *Pollux*
(3) *Rigel*
(4) *40 Eridani B*

7 Seasonal changes on Earth are primarily caused by the

(1) parallelism of the Sun's axis as the Sun revolves around Earth
(2) changes in distance between Earth and the Sun
(3) elliptical shape of Earth's orbit around the Sun
(4) tilt of Earth's axis as Earth revolves around the Sun

8 A ship is at a location of 40° S 77° W. Which type of surface ocean current and tectonic plate boundary are located beneath this ship?

(1) warm ocean current and a transform boundary
(2) warm ocean current and a convergent boundary
(3) cool ocean current and a transform boundary
(4) cool ocean current and a convergent boundary

9 What best explains why, in early spring, ice remains longer on Lake Erie than on the surrounding land areas when the air temperature is above freezing?

(1) Water has a higher specific heat than land.
(2) Energy is needed for water to evaporate.
(3) Cool winds from the surrounding land cool the ice on the lake.
(4) Air temperature does not affect water temperature.

10 What controls the direction of movement of most surface ocean currents?

(1) density differences at various ocean depths
(2) varying salt content in the ocean
(3) prevailing winds
(4) seismic activity

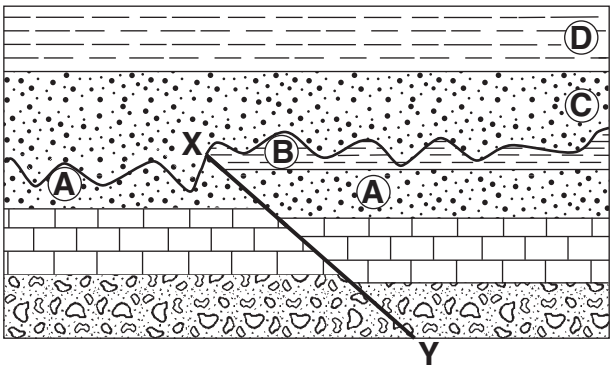
11 Due to radioactive decay, an igneous rock sample now contains one-fourth of the amount of potassium-40 that it originally contained. The age, in years, of this rock sample is approximately

(1) 0.7×10^9 y
(2) 1.3×10^9 y
(3) 2.6×10^9 y
(4) 5.2×10^9 y

12 Which geologic event occured in New York State at about the same time as the extinction of dinosaurs and ammonoids?

(1) formation of the Queenston Delta
(2) deposition of the sands and clays underlying Long Island
(3) initial opening of the Atlantic Ocean
(4) advance and retreat of the last continental ice sheet

13 The geologic cross section below shows bedrock layers *A* through *D*. Line *XY* is a fault.



The fault most likely occurred after

(1) all bedrock layers were formed
(2) layer *C* formed, but before layer *D* formed
(3) layer *A* formed, but before layer *B* formed
(4) layer *B* formed, but before layer *C* formed

14 The Gulf Stream and North Atlantic Current modify the climate of northwestern Europe by making the climate

(1) warmer and drier
(2) warmer and more humid
(3) cooler and drier
(4) cooler and more humid

15 What is the approximate density of a mineral with a mass of 262.2 grams that displaces 46 cubic centimeters of water?

(1) 1.8 g/cm^3
(2) 5.7 g/cm^3
(3) 6.1 g/cm^3
(4) 12.2 g/cm^3

16 Obsidian's glassy texture indicates that it formed

(1) slowly, deep below Earth's surface
(2) slowly, on Earth's surface
(3) quickly, deep below Earth's surface
(4) quickly, on Earth's surface

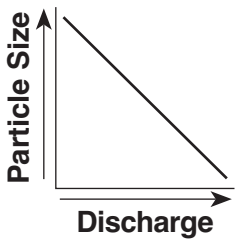
17 What is the color and type of rock that forms oceanic crust at mid-ocean ridges?

(1) light colored and igneous
(2) light colored and sedimentary
(3) dark colored and igneous
(4) dark colored and sedimentary

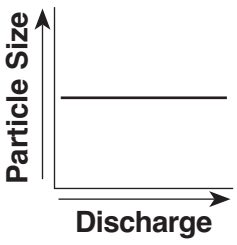
18 A plane traveling in a straight line from Watertown to Utica would fly over which landscape region?

(1) Tug Hill Plateau
(2) Adirondack Mountains
(3) St. Lawrence Lowlands
(4) Champlain Lowlands

19 Which graph best represents the correct relationship between the discharge of a river and the particle size that can be transported by that river?



(1)



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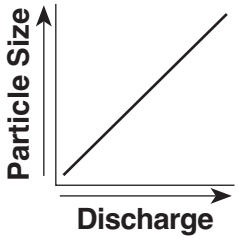
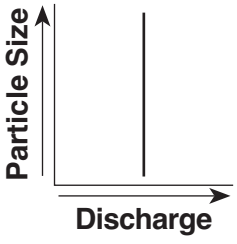
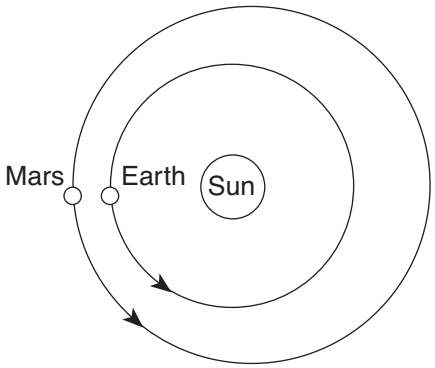


(2)



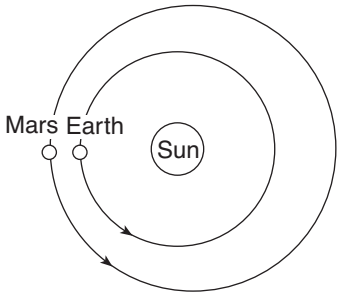
(4)

20 The diagram below shows the relative positions of Earth and Mars in their orbits on a particular date during the winter of 2007.

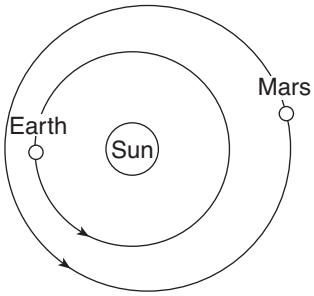


(Not drawn to scale)

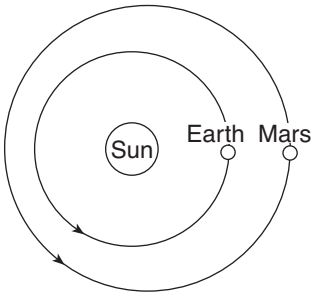
Which diagram correctly shows the locations of Earth and Mars on the same date during the winter of 2008?



(1)



(2)



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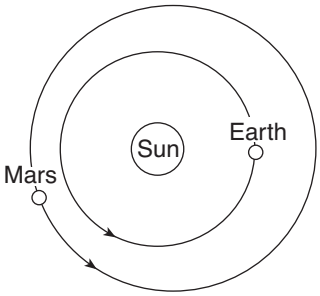
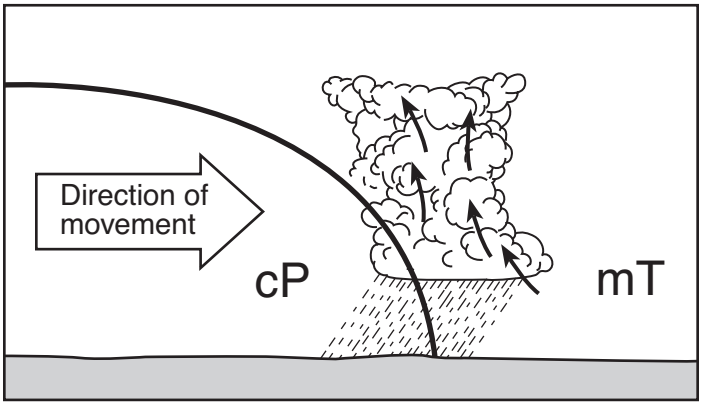


(4)

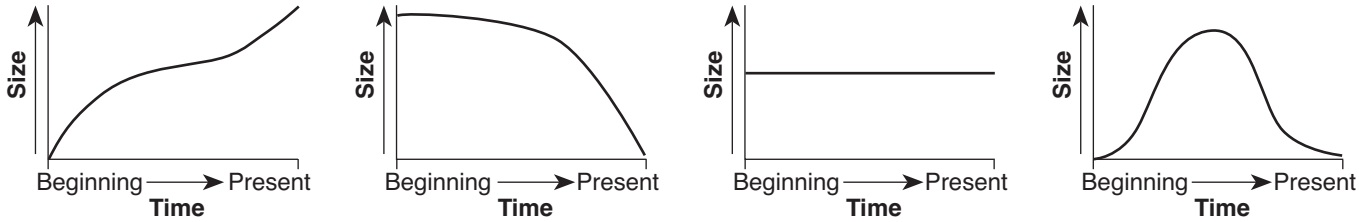
21 A cross section of a weather front is shown below.



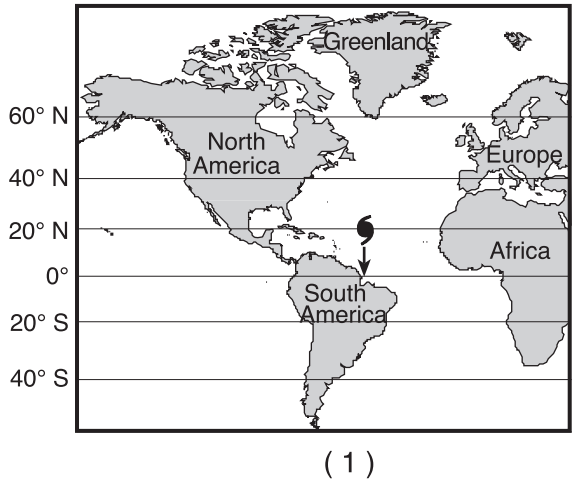
Which symbol would be used to represent this front on a weather map?

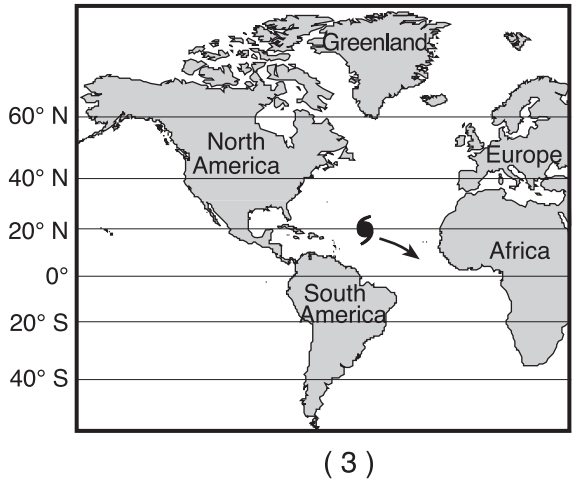
(1) (2) (3) (4)

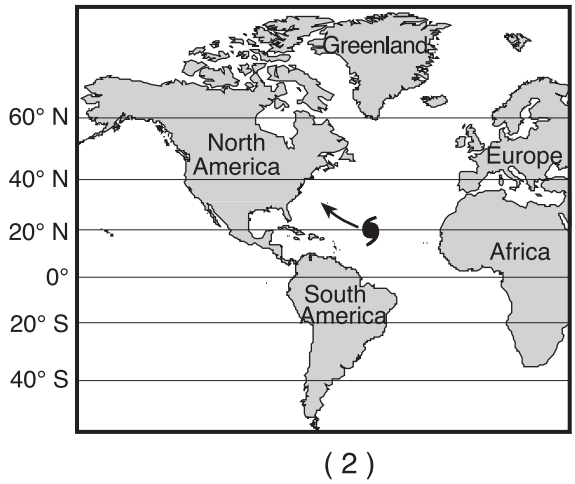
22 According to the Big Bang theory, which graph best represents the relationship between time and the size of the universe from the beginning of the universe to the present?

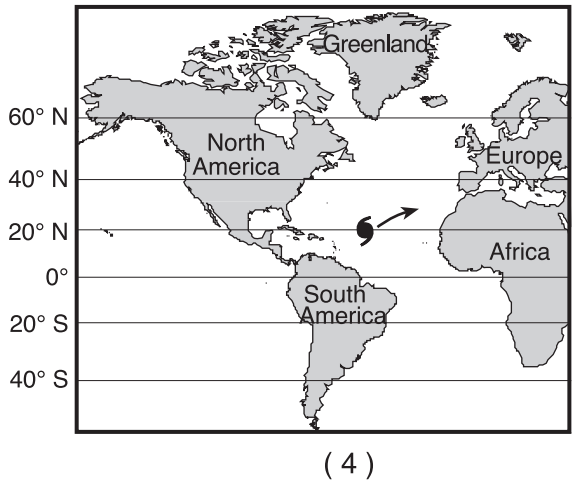


23 Which map below shows the most likely storm track for a hurricane ( ) in the Atlantic Ocean?

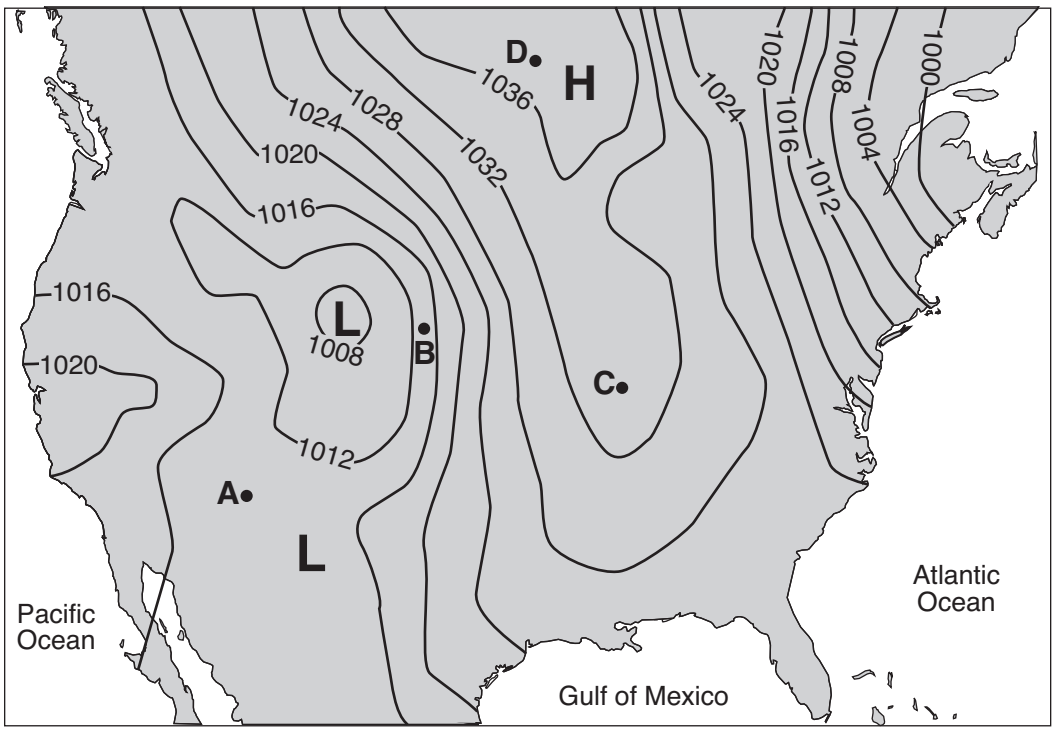








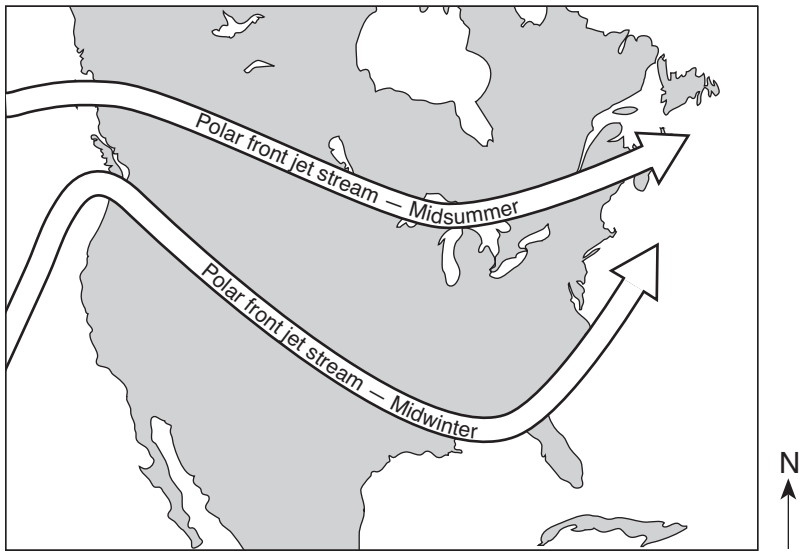
24 The weather map below shows isobars labeled in millibars. Points *A*, *B*, *C*, and *D* are locations on Earth's surface.



Which location was probably experiencing the highest wind speed?

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

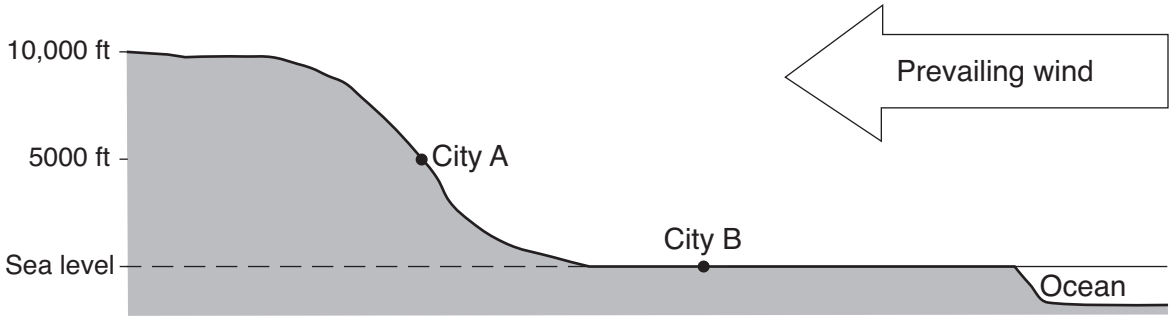
25 The map below shows two seasonal positions of the polar front jet stream over North America.



Which statement best explains why the position of the polar front jet stream varies with the seasons?

(1) Rising air compresses and cools in winter.
(2) Water heats and cools more rapidly than land in winter.
(3) Prevailing winds reverse direction in summer.
(4) The vertical rays of the Sun shift north of the equator in summer.

26 The cross section below shows two cities, *A* and *B*, at different elevations.

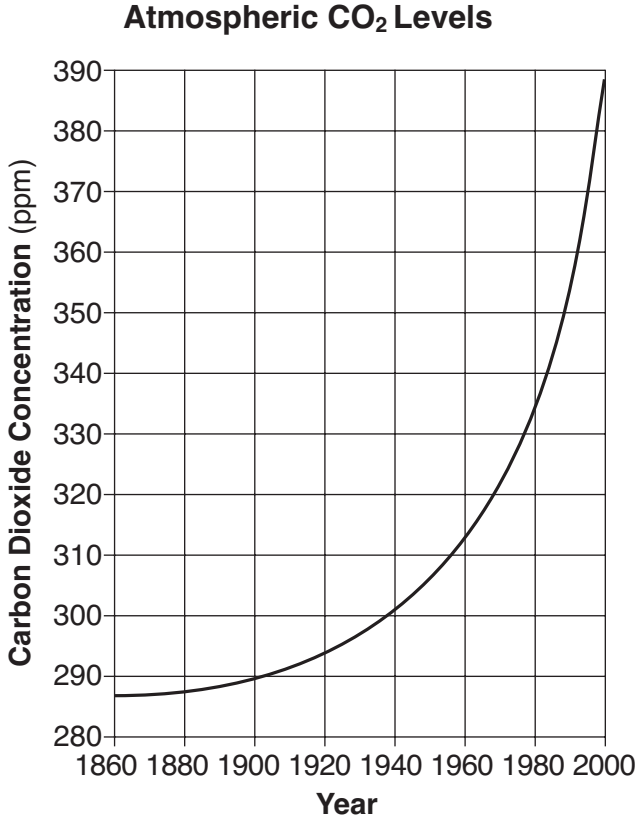


(Not drawn to scale)

Compared to the yearly temperature and precipitation at city *B*, city *A* most likely has

(1) lower temperatures and less precipitation
(2) lower temperatures and more precipitation
(3) higher temperatures and less precipitation
(4) higher temperatures and more precipitation

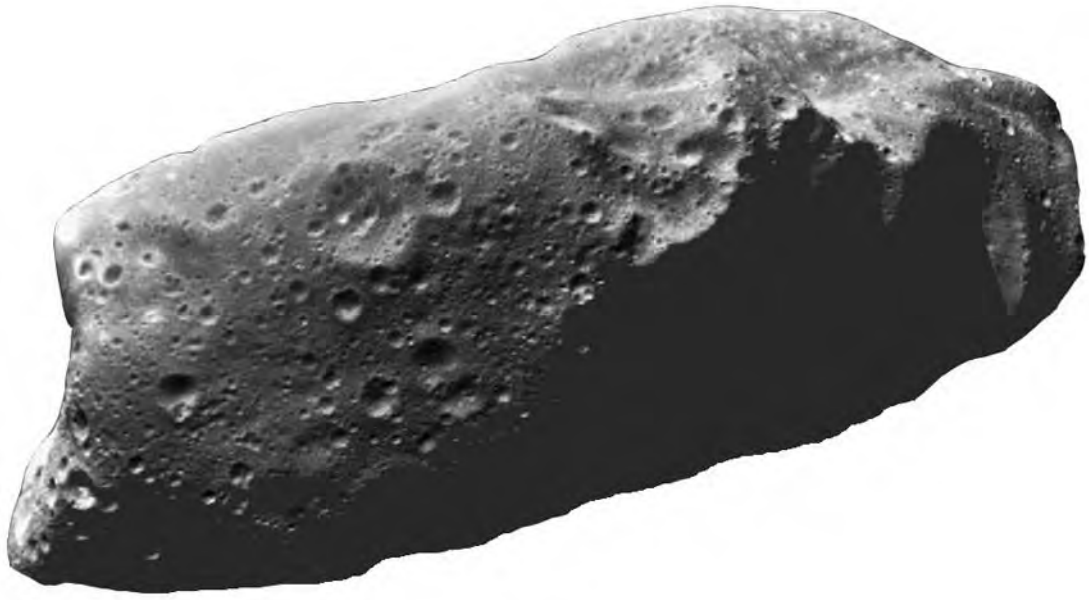
27 The graph below shows changes in carbon dioxide concentrations in Earth's atmosphere over a 140-year period. Carbon dioxide concentrations are shown in parts per million (ppm).



This significant change in CO_2 concentration is most likely caused by

(1) decreased cloud cover, and is predicted to decrease average global temperatures
(2) decreased volcanic activity, and is predicted to increase average global temperatures
(3) increased use of fossil fuels, and is predicted to increase average global temperatures
(4) increased El Niño activity, and is predicted to decrease average global temperatures

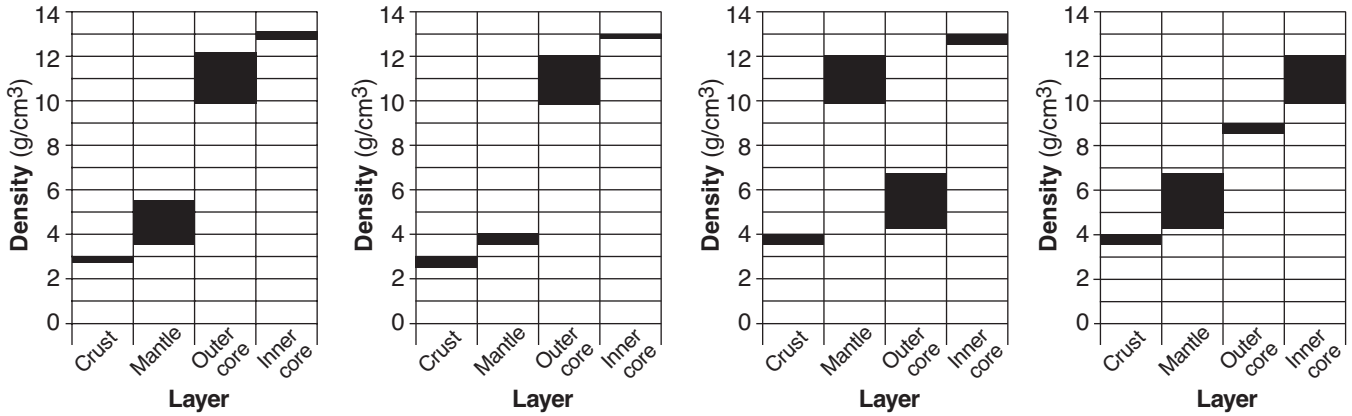
28 The solar system object in the photograph below is 56 kilometers long.



The object in the photograph is most likely

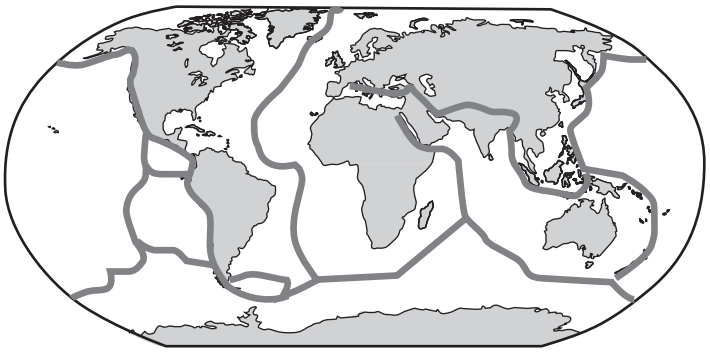
(1) an asteroid
(2) Neptune
(3) Earth's Moon
(4) Mercury

29 Which graph best shows the range of density in each of Earth's layers?

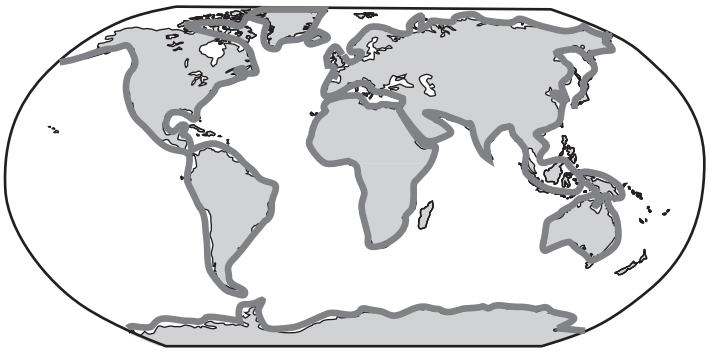


30 Which world map shows the locations where most earthquakes and volcanoes occur on Earth?

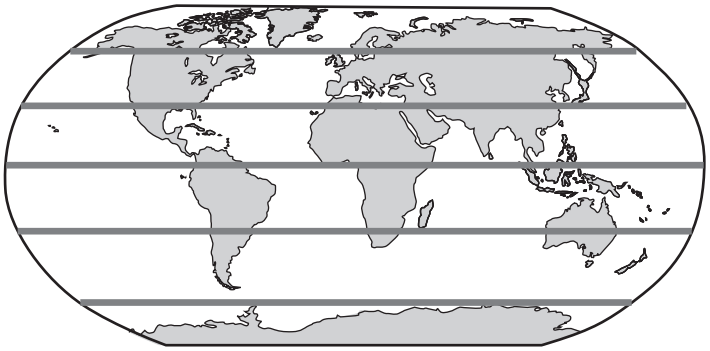
(1)



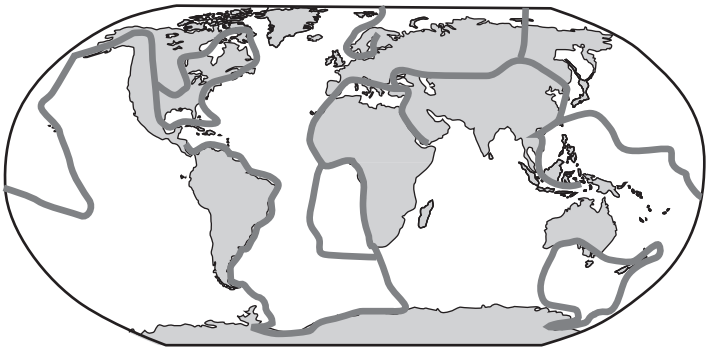
(2)

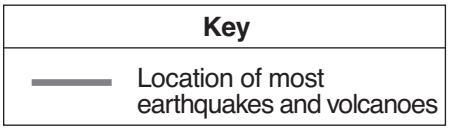


(3)

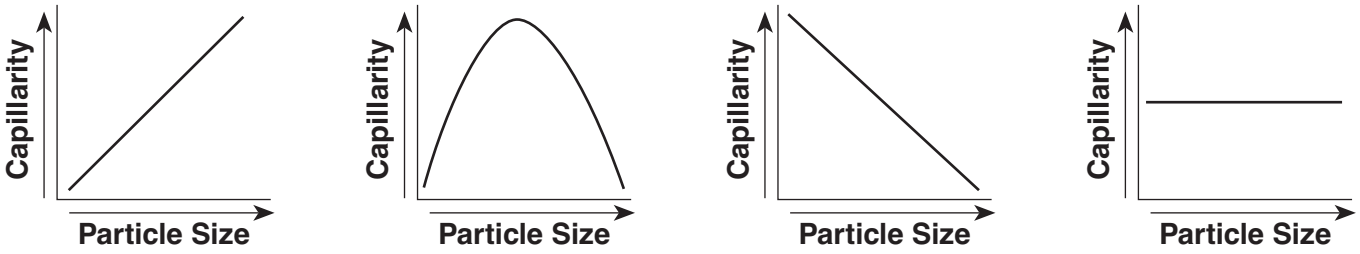


(4)

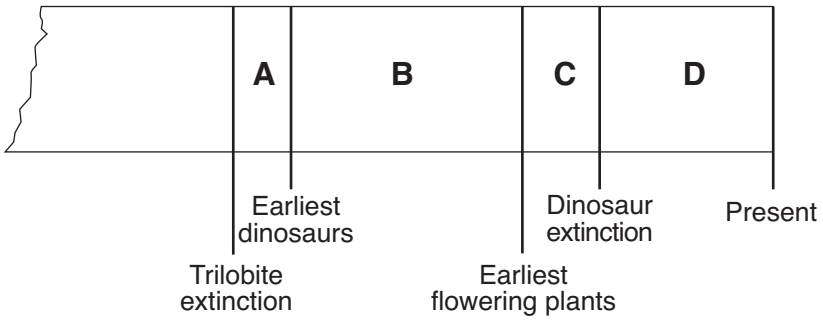




31 Which graph shows the general relationship between soil particle size and the capillarity of the soil?



32 The diagram below is a portion of a geologic timeline. Letters *A* through *D* represent the time intervals between the labeled events, as estimated by scientists.

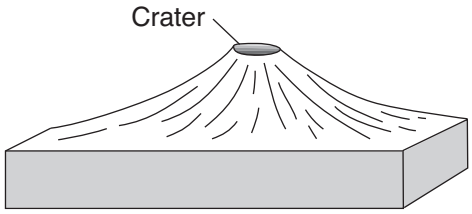


(Not drawn to scale)

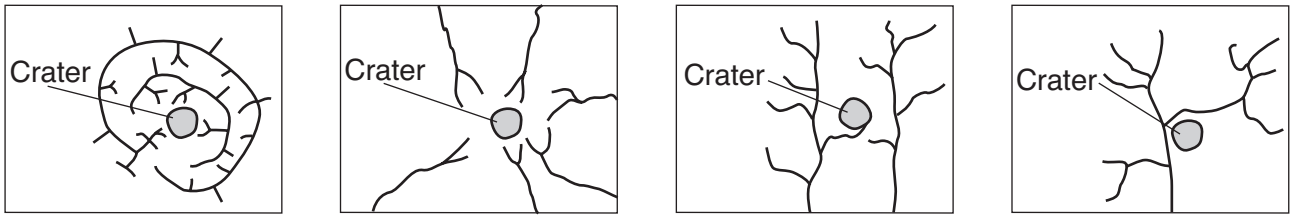
Fossil evidence indicates that the earliest birds developed during which time interval?

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

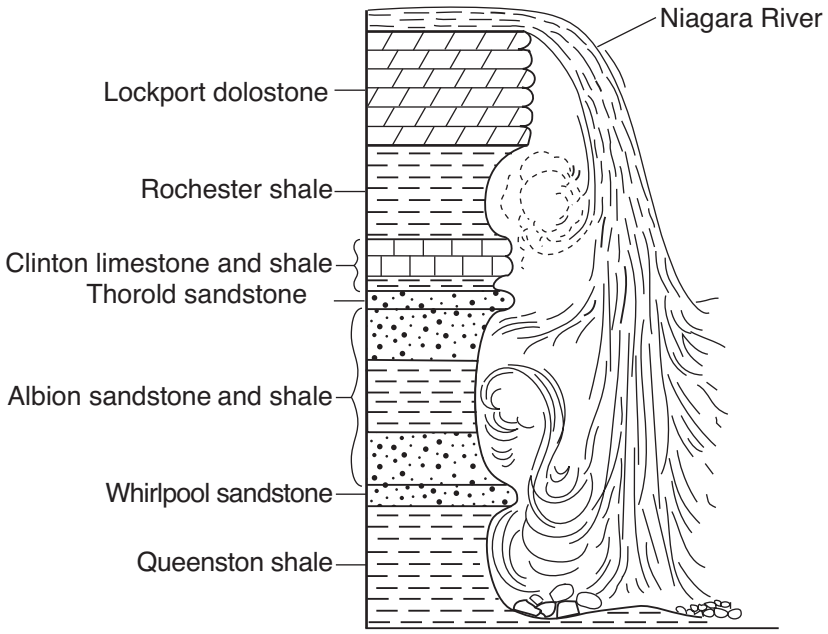
33 The block diagram below shows a volcano.



Which map shows the stream drainage pattern that most likely formed on the surface of this volcano?



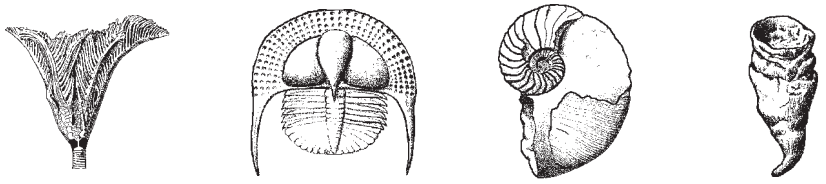
34 A cross section of Niagara Falls is shown below.



Which two rock units appear to be most resistant to weathering and erosion?

(1) Lockport dolostone and Whirlpool sandstone
(2) Rochester shale and Albion sandstone and shale
(3) Clinton limestone and shale and Queenston shale
(4) Thorold sandstone and Queenston shale

35 Which index fossil has been found in Ordovician-age bedrock?



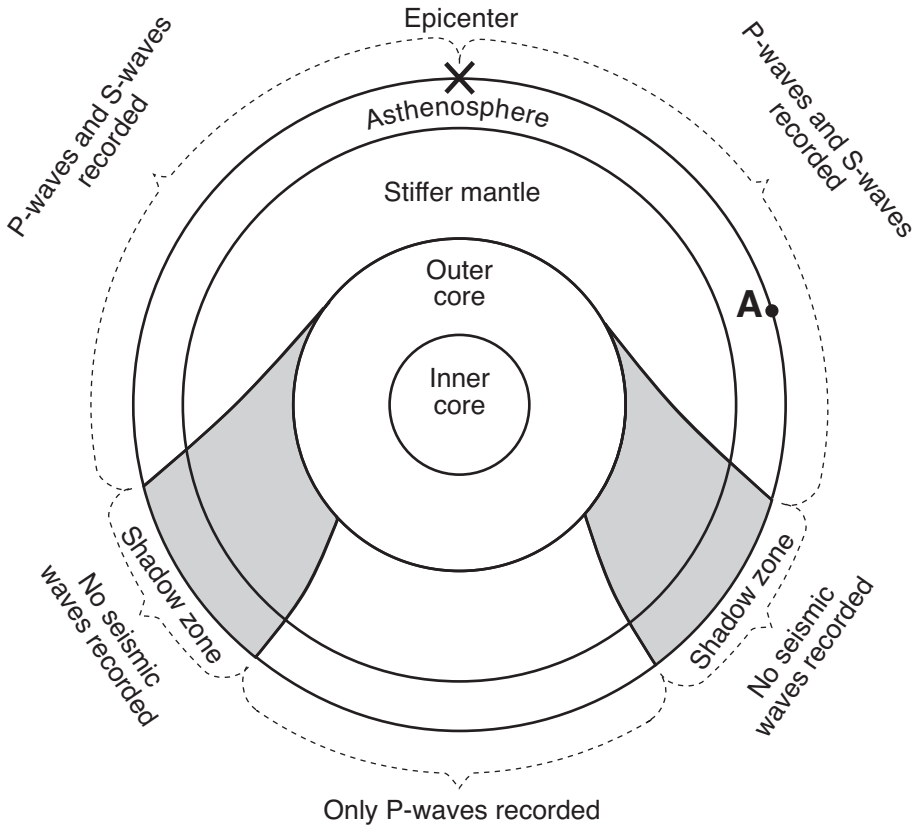
(1) (2) (3) (4)

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 and 37 on the cross section below, which shows the type of seismic waves recorded at various locations after an earthquake has occurred. Point *A* is a location on Earth's surface and *X* is the epicenter of the earthquake.



(Not drawn to scale)

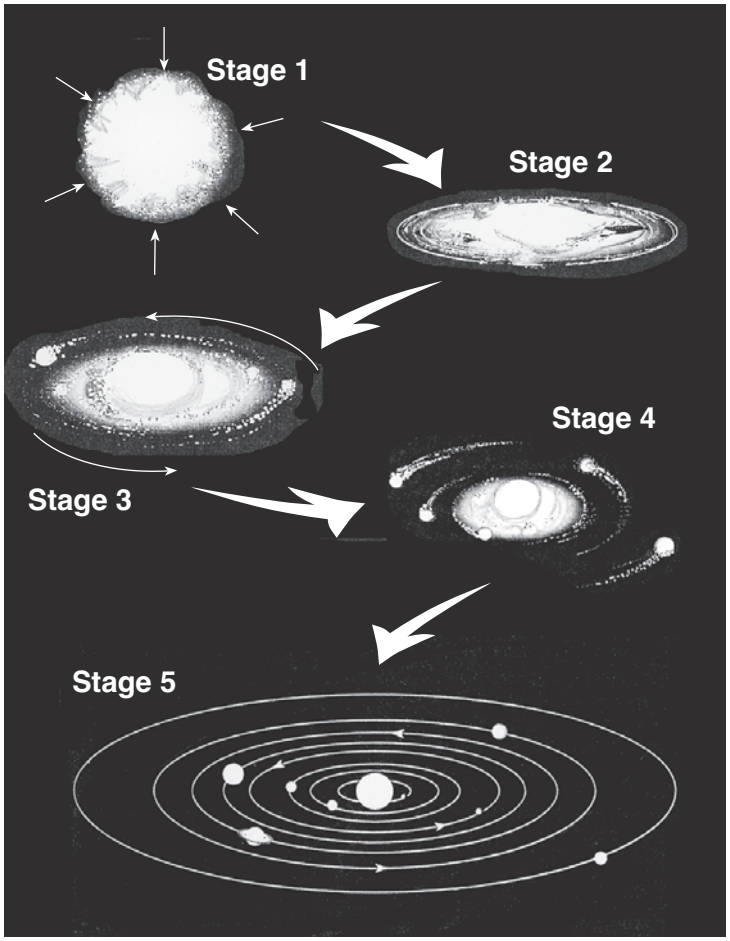
36 Point *A* is located 7600 kilometers from the epicenter of this earthquake. How many minutes did it take the first *S*-wave to reach point *A*?

(1) 9 min
(2) 11 min
(3) 16 min
(4) 20 min

37 How many kilometers did the seismic waves travel from the earthquake directly to the outside of the outer core?

(1) 800 km
(2) 1400 km
(3) 2900 km
(4) 6400 km

Base your answers to questions 38 through 41 on the diagram below. The diagram represents the inferred stages in the formation of our solar system. Stage 1 shows a contracting gas cloud. The remaining stages show the gas cloud flattening into a spinning disk as planets formed around our Sun.



(Not drawn to scale)

38 Which force was mostly responsible for the contraction of the gas cloud?

(1) friction
(2) gravity
(3) magnetism
(4) inertia

39 Which process was occurring during some of these stages that resulted in the formation of heavier elements from lighter elements?

(1) conduction
(2) radiation
(3) radioactive decay
(4) nuclear fusion

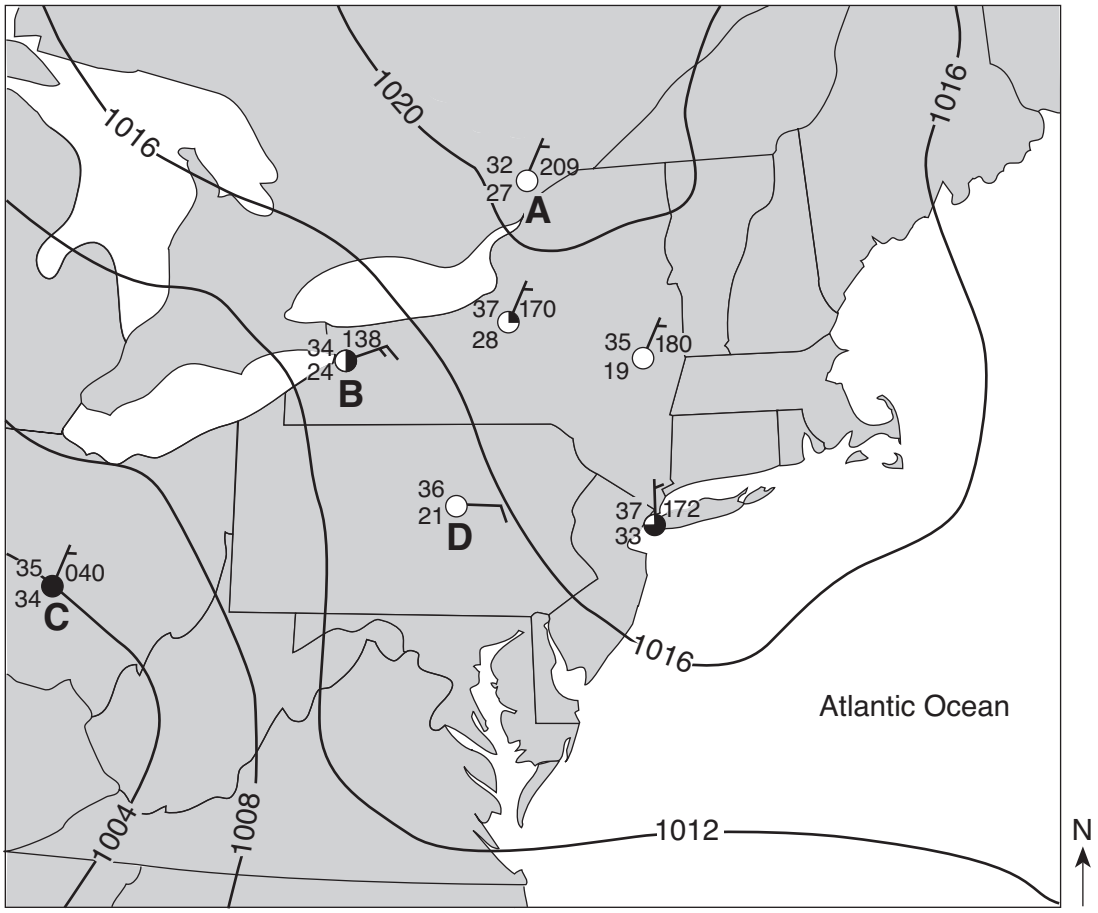
40 Approximately how long ago did stage 4 end and stage 5 begin?

(1) 1 billion years
(2) 5 billion years
(3) 20 billion years
(4) 100 billion years

41 Compared to the terrestrial planets, the Jovian planets in stage 5 have

(1) larger diameters
(2) higher densities
(3) shorter periods of revolution
(4) longer periods of rotation

Base your answers to questions 42 through 45 on the weather map below. The map shows isobars and seven weather station models. Four of the weather stations are identified by letters *A*, *B*, *C*, and *D*.



42 Which New York State weather station had clear skies?

(1) Albany
(2) Buffalo
(3) New York City
(4) Syracuse

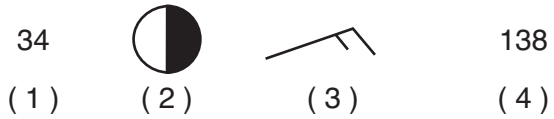
43 Which weather station had the highest relative humidity?

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

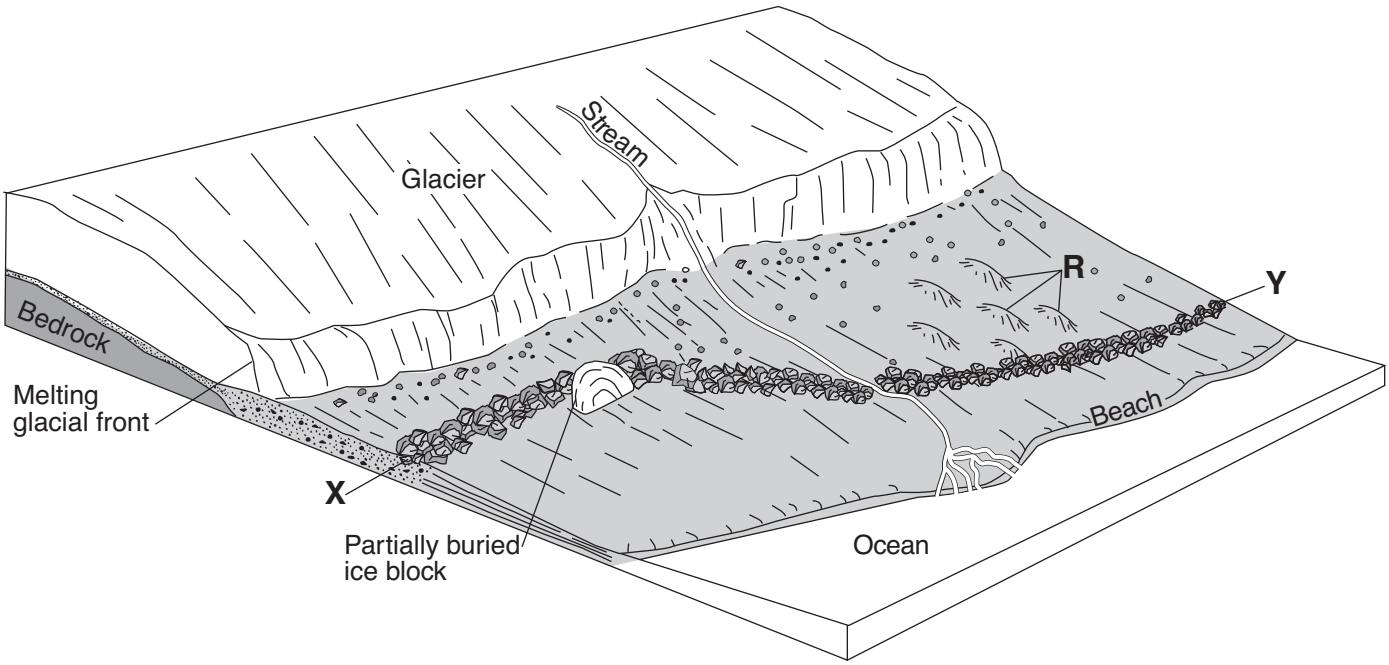
44 What was the probable air pressure, in millibars, at station *D*?

(1) 1015.0 mb
(2) 1017.0 mb
(3) 1021.0 mb
(4) 1036.0 mb

45 Which weather information shown at station *B* was measured with an anemometer and weather vane?



Base your answers to questions 46 through 48 on the diagram below, which shows the edge of a continental glacier that is receding. *R* indicates elongated hills. The ridge of sediments from *X* to *Y* represents a landscape feature.



46 The elongated hills labeled *R* are most useful in determining the

(1) age of the glacier
(2) direction the glacier has moved
(3) thickness of the glacier
(4) rate at which the glacier is melting

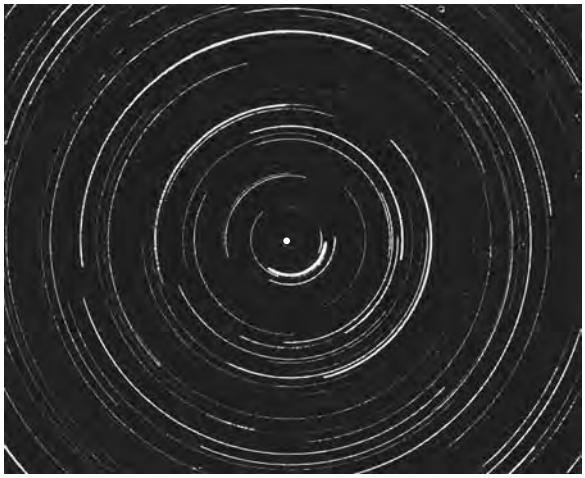
47 Which feature will most likely form when the partially buried ice block melts?

(1) drumlin
(2) moraine
(3) kettle lake
(4) finger lake

48 The ridge of sediments from *X* to *Y* can best be described as

(1) sorted and deposited by ice
(2) sorted and deposited by meltwater
(3) unsorted and deposited by ice
(4) unsorted and deposited by meltwater

Base your answers to questions 49 and 50 on the time-exposure photograph shown below. The photograph was taken by aiming a camera at a portion of the night sky above a New York State location and leaving the camera's shutter open for a period of time to record star trails.



49 Which celestial object is shown in the photograph near the center of the star trails?

(1) the Sun
(2) the Moon
(3) *Sirius*
(4) *Polaris*

50 During the time exposure of the photograph, the stars appear to have moved through an arc of 120°. How many hours did this time exposure take?

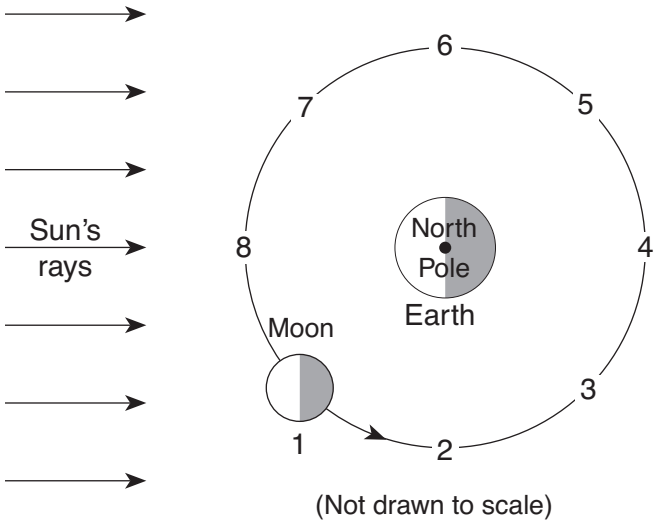
(1) 5 h
(2) 8 h
(3) 12 h
(4) 15 h

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 54 on the diagram below, which shows the Moon at position 1 in its orbit around Earth. Numbers 2 through 8 represent other positions in the Moon's orbit.



(Not drawn to scale)

51 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 1. [1]

52 A solar eclipse could occur when the Moon is located at which numbered position? [1]

53 How many days does it take the Moon to go from one full-Moon phase to the next full-Moon phase when viewed from Earth? [1]

54 Identify *one* numbered orbital position where the gravitational attraction of the Moon and the Sun cause Earth to experience the highest high tides. [1]

Base your answers to questions 55 and 56 on the data table below, which shows the air temperature, in degrees Fahrenheit, and air pressure, in inches of mercury (Hg), recorded at a weather station in New York State from 11 a.m. to 7 p.m. on a day in September.

Time	**Air Temperature** (°F)	**Air Pressure** (in of Hg)
11 a.m.	77	29.81
12 noon	81	29.79
1 p.m.	84	29.77
2 p.m.	88	29.75
3 p.m.	87	29.74
4 p.m.	86	29.73
5 p.m.	85	29.73
6 p.m.	82	29.74
7 p.m.	79	29.76

55 On the grid *in your answer booklet*, construct a line graph by plotting the data for the air temperature for *each* time from 11 a.m. to 7 p.m. Connect the plots with a line. The data for air pressure have been plotted. [1]

56 State the relationship between air temperature and air pressure from 11 a.m. to 2 p.m. [1]

_____

Base your responses to questions 57 through 59 on the passage below.

Frozen Mammoth

A wooly mammoth was found in 1999 buried in the frozen soil of the Siberian tundra. Carbon-14 dating indicated that it had died about 20,000 years ago. Many fossils represent only the partial remains of organisms. However, a complete mammoth with bones, skin, hair, and internal organs intact represented a unique opportunity for scientists to investigate the lifestyle of this animal and the environment in which it lived.

57 Identify *both* the period and epoch of geologic time during which the wooly mammoth lived. [1]

58 Identify *one* New York State index fossil of an organism that lived during the same time as the wooly mammoth. [1]

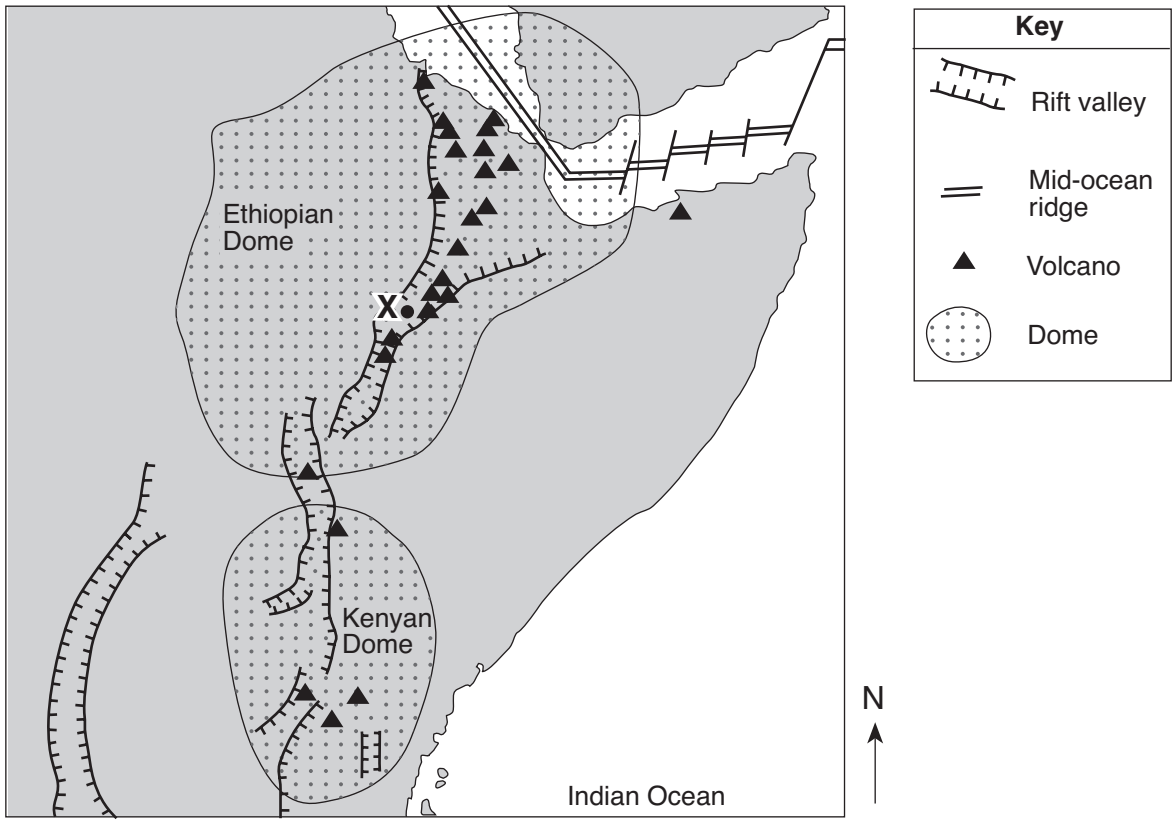
59 The low permeability of the tundra soil helped to preserve the mammoth. Explain why the tundra soil has a low permeability. [1]

Base your answers to questions 60 through 62 on the passage and map of a portion of the East African Rift system shown below. Point *X* represents a location on Earth's surface within a rift valley on the Ethiopian Dome.

The Great Rift Valley

Rifting of Earth's crust in eastern Africa began during the Neogene Period as the Ethiopian and Kenyan Domes formed. These two huge domes were created as Earth's mantle pushed up the overlying crust. As the crust was forced upward, the resulting tension cracked the crust, resulting in the eruption of volcanoes and the formation of large rifts. The crust continued to pull apart, forming rift valleys. These valleys have become deeper and are currently becoming filled with sediments, igneous rock, and water.

East African Rift System



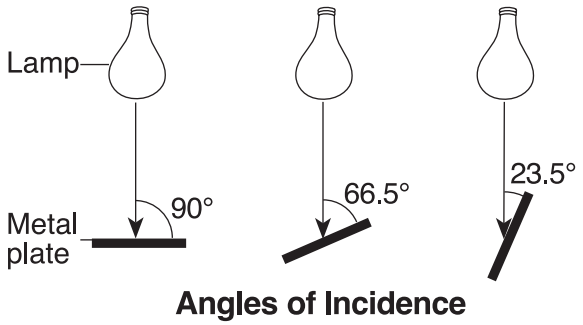
60 How many million years ago did the Ethiopian and Kenyan Domes form? [1]

61 On the cross section *in your answer booklet*, draw *two* curved arrows, one on each side of the dashed line, to show the direction of movement of the convection currents within the asthenosphere that caused the formation of the dome and the rift valley near location *X*. [1]

62 Which *two* lithospheric plates are separated by a mid-ocean ridge in the northeastern portion of the Ethiopian Dome? [1]

Base your answers to questions 63 through 65 on the experiment description and diagram below.

A student was interested in how the angle of insolation affects absorption of radiation. The student took three black metal plates, each containing a built-in thermometer, and placed them at the same distance from three identical lamps. The plates were tilted so that the light from the lamps created three different angles of incidence with the center of the plates, as shown in the diagram. The starting temperatures of the plates were recorded. The lamps were turned on for 10 minutes. Then the final temperatures were recorded.



Angles of Incidence

63 Explain why the metal plate at a 90° angle of incidence had a final temperature higher than the other two plates. [1]

64 How would the final temperatures of the three metal plates be different if the experiment was repeated using white metal plates? Explain why the white plates would have these final temperatures. [1]

65 The metal plate at a 90° angle of incidence represents a location on Earth at solar noon on March 21. What is the latitude of this location? [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 69 on the map in your answer booklet, which shows elevations in feet at various points. The southern part of the map has contour lines representing elevations at 20-foot intervals. Lines *AB* and *CD* are reference lines on the map.

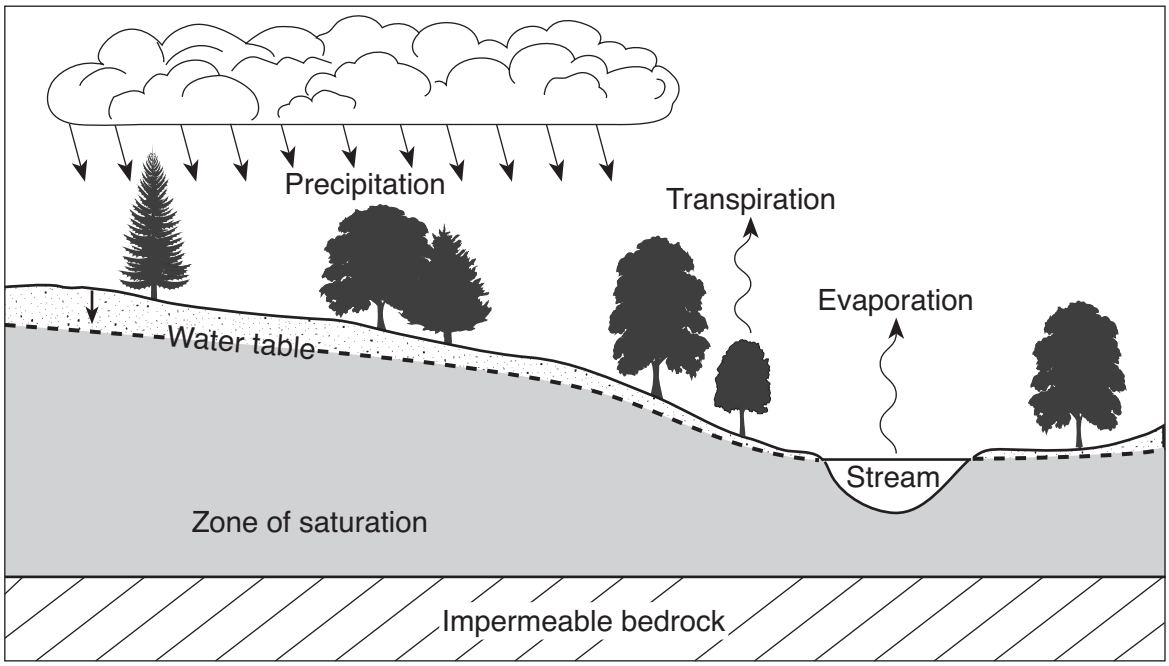
66 On the map *in your answer booklet*, draw contour lines for the 780-ft, 760-ft, and 740-ft elevations. Extend your contour lines to the edges of the map. [1]

67 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*. Connect the plots with a line to complete the profile. [1]

68 Calculate the gradient along line *CD* and label your answer with the correct units. [1]

69 Explain how the contour lines indicate the direction of flow of Otter Creek. [1]

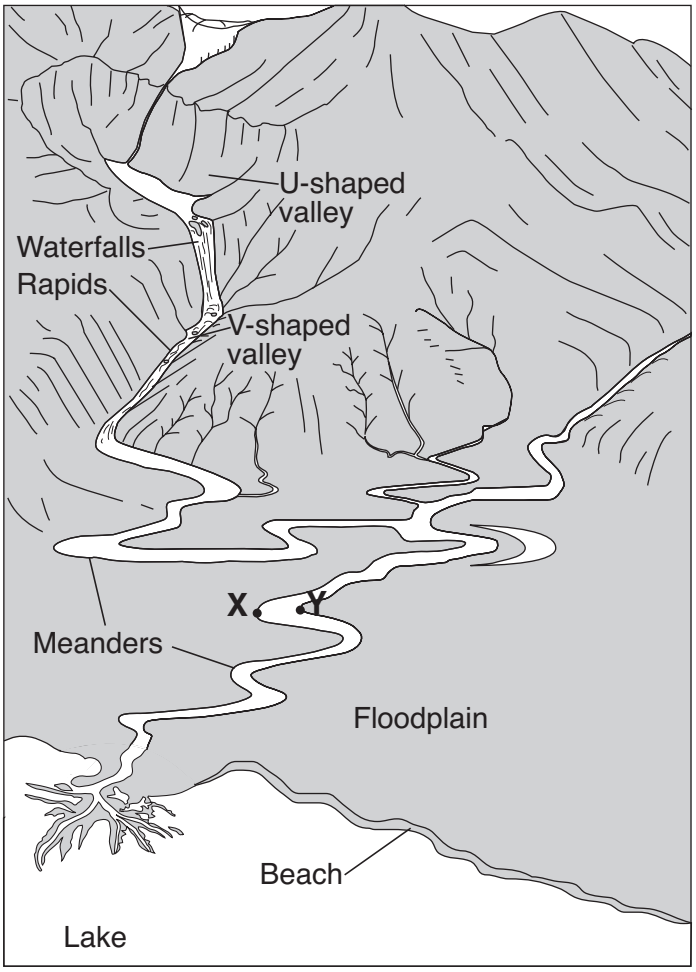
Base your answers to questions 70 and 71 on the diagram below, which shows some processes in the water cycle.



70 State the relationship between the amount of precipitation in this area and the height of the water table above the impermeable bedrock. [1]

71 Describe *one* change that would cause more water to evaporate from this stream. [1]

Base your answers to questions 72 through 75 on the diagram below, which shows several different landscape features. Points *X* and *Y* indicate locations on the streambank.



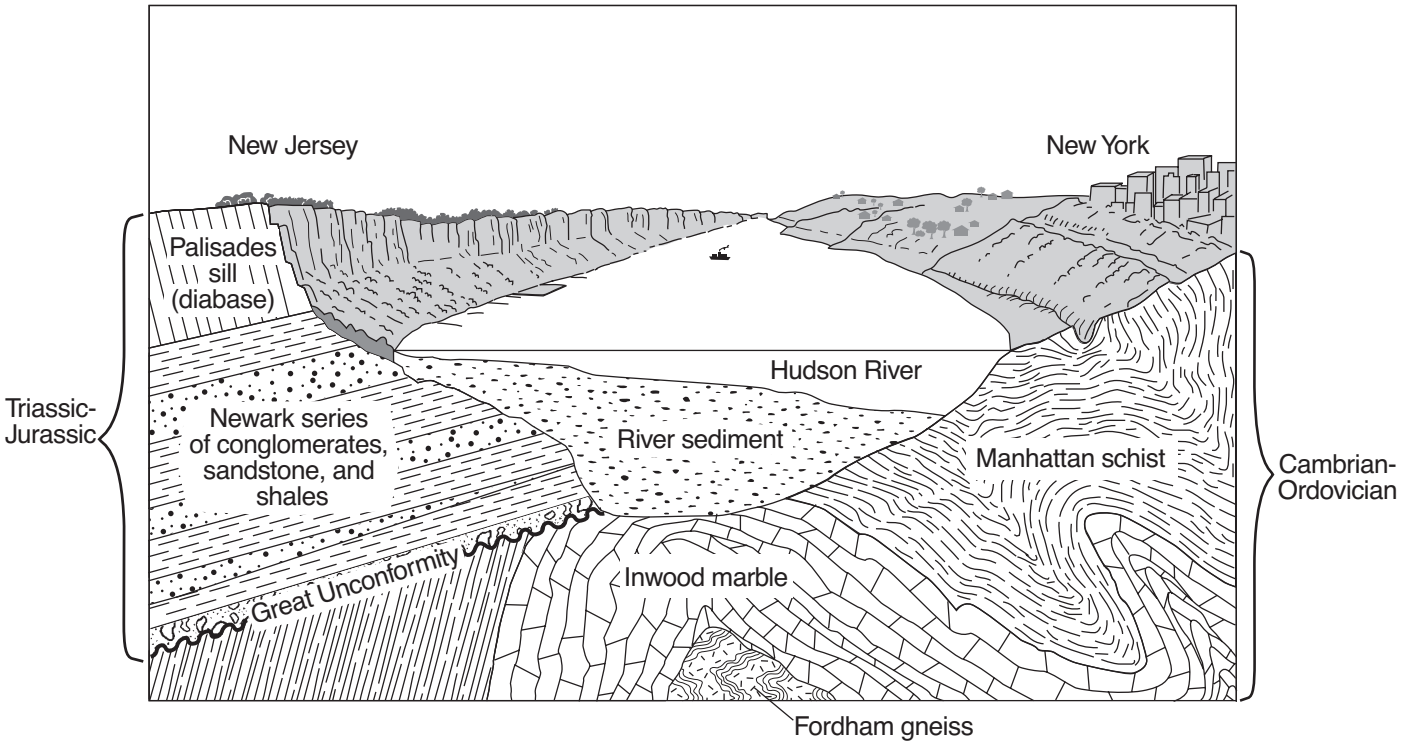
72 Explain why the upper valley in the mountains is U-shaped and the lower valley is V-shaped. [1]

73 Identify which point, *X* or *Y*, has more stream erosion and explain why the amounts of erosion are different. [1]

74 Explain why the stream meanders on the floodplain, but *not* in the mountains. [1]

75 The beach consists of particles with diameters from 0.01 cm to 0.1 cm. Identify the sedimentary rock that will form when burial and cementation of these sediments occur. [1]

Base your answers to questions 76 through 78 on the cross section below showing the underlying bedrock of New York and New Jersey along the Hudson River.



76 Identify the oldest bedrock shown in the diagram. [1]

77 Describe *one* piece of evidence shown in the cross section that indicates that the Inwood marble was formed by regional metamorphism. [1]

78 Identify *two* processes that led directly to the development of the Great Unconformity beneath the Newark series. [1]

Base your answers to questions 79 through 81 on the information below.

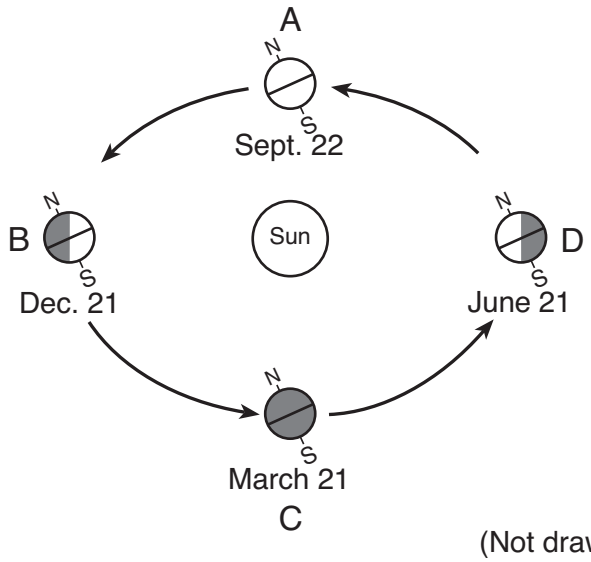
A student on a field trip in New York State collected a sample of metamorphic bedrock containing bands of coarse-grained crystals of plagioclase feldspar, pyroxene, quartz, and mica.

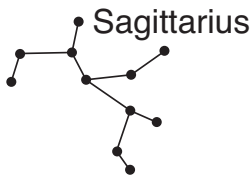
79 List *two* of the chemical elements found in plagioclase feldspar. [1]

80 Describe *two* physical properties of pyroxene. [1]

81 Identify the metamorphic rock found by the student. [1]

Base your answers to questions 82 through 84 on the diagram of the Sun, Earth, and the constellation Sagittarius shown below. Positions *A* through *D* show Earth in its orbit around the Sun on the first day of each season. Sagittarius is represented in its position in space relative to Earth's orbit.





(Not drawn to scale)

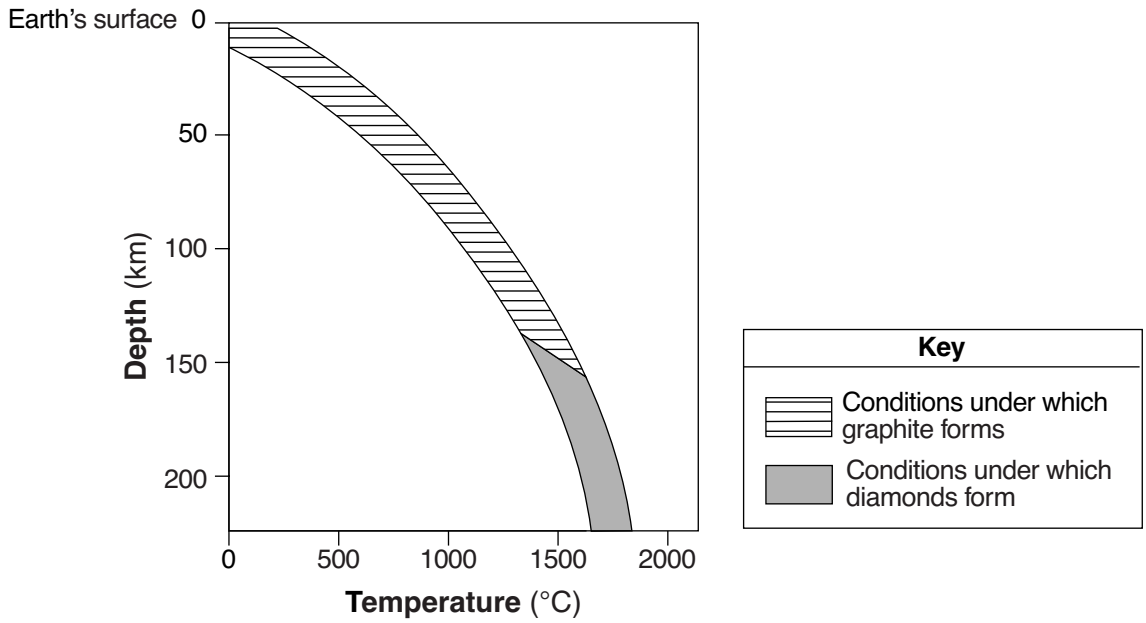
82 At which lettered position does Sagittarius appear highest in the sky at midnight to observers near Earth's equator? [1]

83 How many hours of daylight will an observer in New York State experience when Earth is at position *C*? [1]

84 The diagram *in your answer booklet* shows the yearly range of altitudes of the noontime Sun as seen by an observer in New York State. Write the letters for each of the *four* Earth positions, *A*, *B*, *C*, and *D*, in the Sun circles on this diagram to identify when the observer will see the Sun at these noontime altitudes in New York State. More than one letter may be written in a circle. [1]

---

85 The graph below shows the depth and temperature conditions in Earth's interior under which carbon becomes either the mineral graphite or the mineral diamond.



Compared to the depth and temperature conditions under which graphite forms, describe the difference in the relative depth and relative temperature conditions under which most diamonds form. [1]

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P.S./EARTH SCIENCE

The University of the State of New York

REGENTS HIGH SCHOOL EXAMINATION

PHYSICAL SETTING
EARTH SCIENCE

Thursday, January 26, 2012 — 1:15 to 4:15 p.m., only

ANSWER BOOKLET

☐ Male

Student . . . . . Sex: ☐ Female

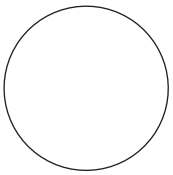
Teacher . . . . . .

School . . . . . Grade . . . . . .

Record your answers for Part B–2 and Part C in this booklet.

Part B–2

51

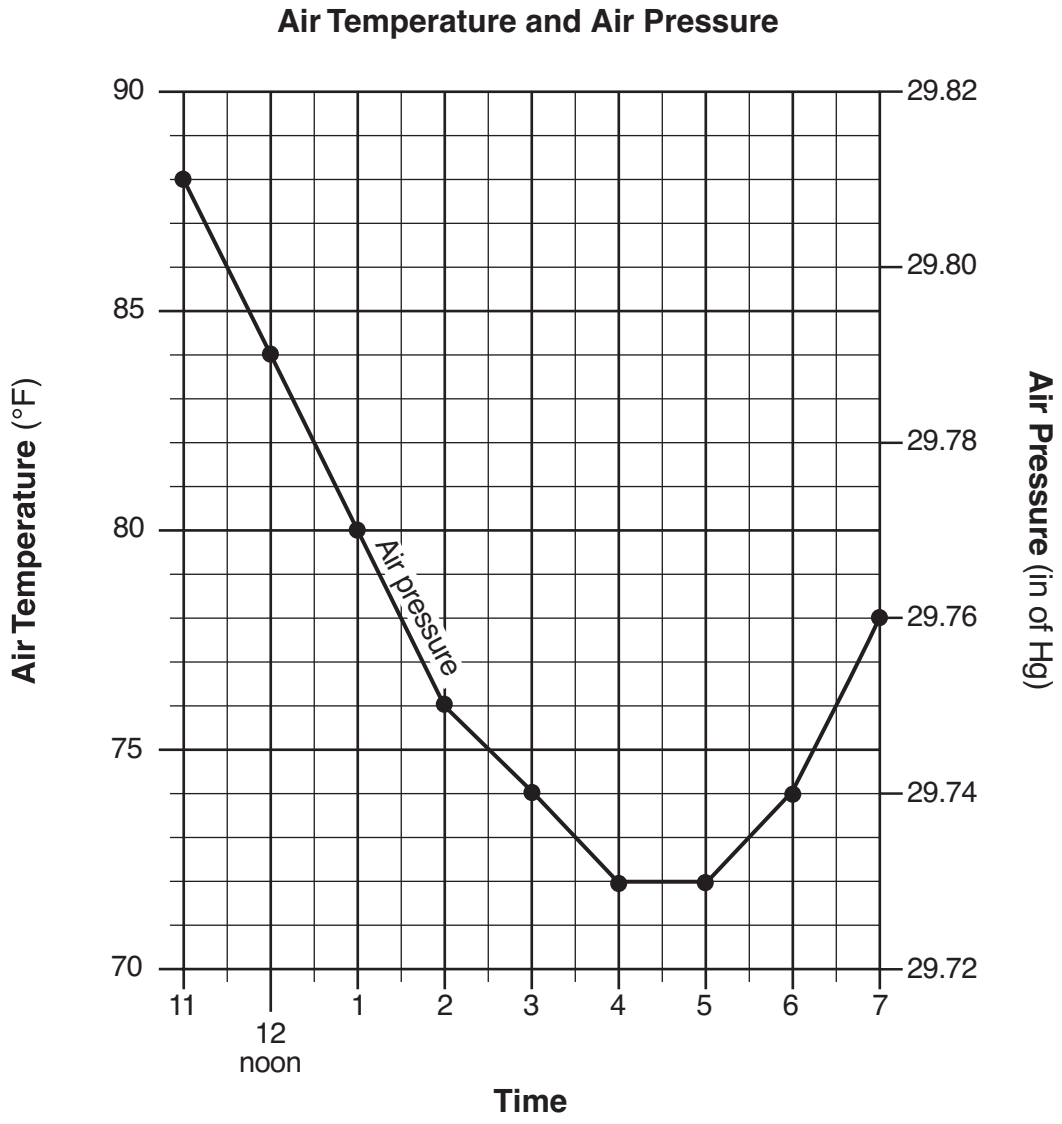


52 Position number: _____

53 _____ **d**

54 Position number: _____

55


Air Temperature and Air Pressure
90
85
80
75
70
29.82
29.80
29.78
29.76
29.74
29.72
Air Temperature (°F)
Air Pressure (in of Hg)
Air pressure
11
12
noon
1
2
3
4
5
6
7
Time

56 _____

_____

57 _____ **Period**

_____ **Epoch**

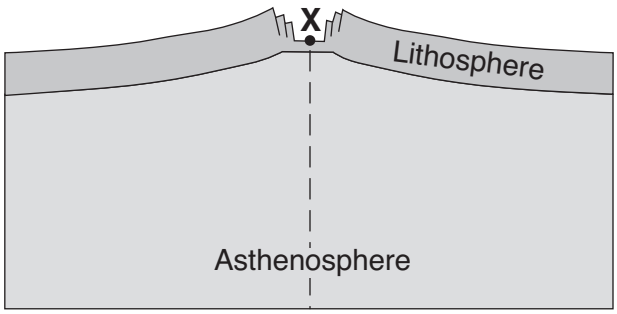
58 _____

59 _____

_____

60 _____ **million years ago**

61



62 _____ **Plate** and _____ **Plate**

63 _____

_____

64 Final temperatures: _____

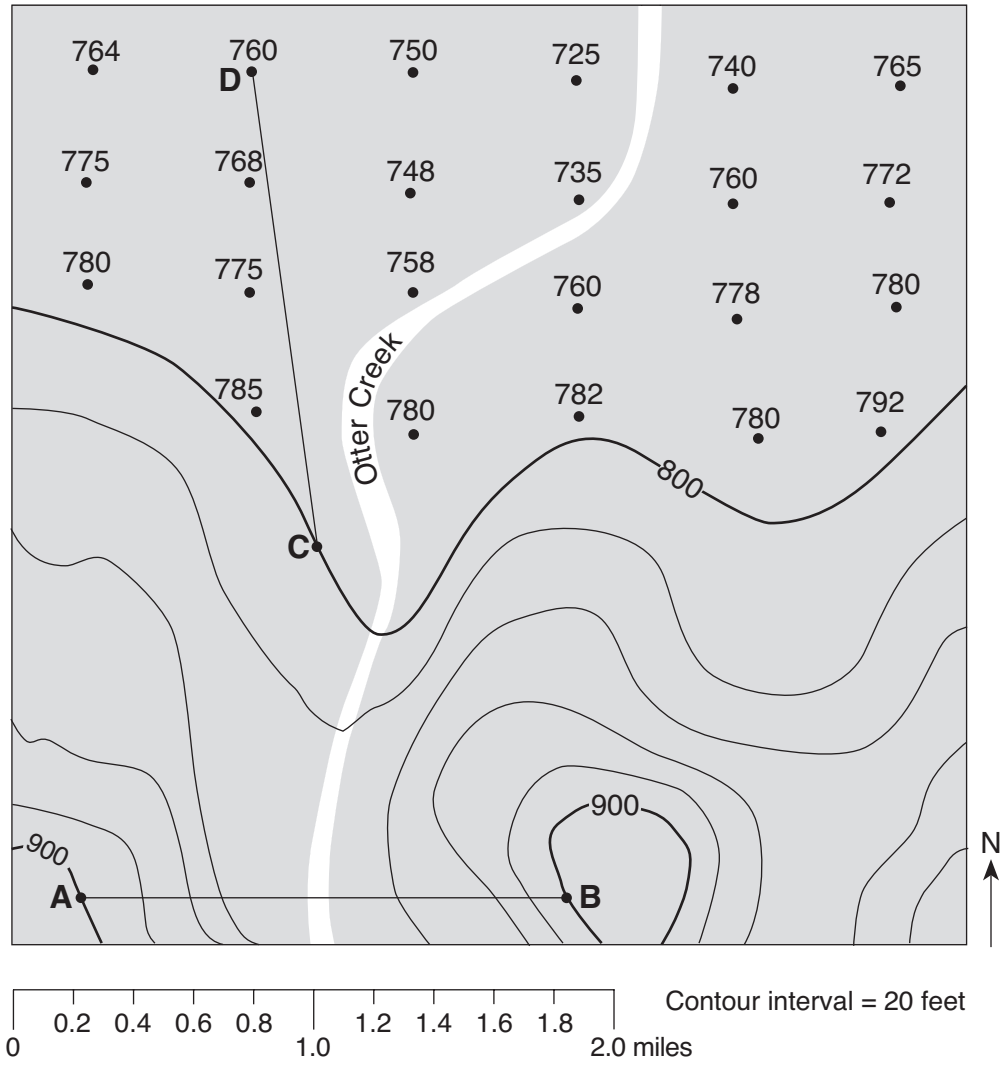
Explanation: _____

_____

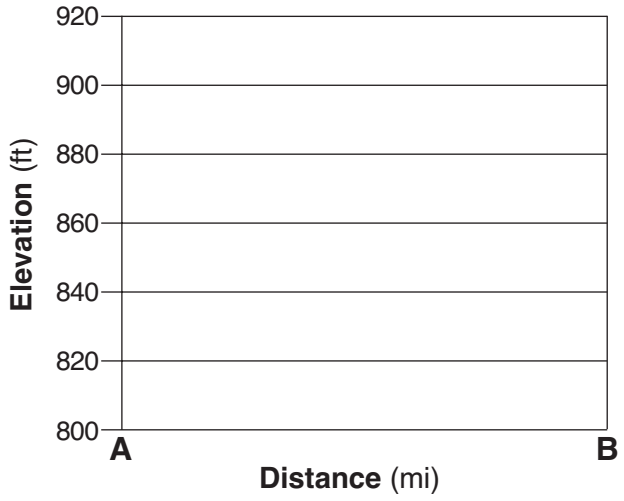
65 _____

Part C

66


764
760
D
750
725
740
765
775
768
748
735
760
772
780
775
758
760
778
780
785
780
782
780
792
Otter Creek
800
C
900
900
A
B
N
0
0.2
0.4
0.6
0.8
1.0
1.2
1.4
1.6
1.8
2.0 miles
Contour interval = 20 feet

67


920
900
880
860
840
820
800
Elevation (ft)
A
B
Distance (mi)

68 Gradient = _____

69 _____

_____

70 _____

_____

71 _____

72 U-shaped: _____

V-shaped: _____

73 Point: _____

Explanation: _____

_____

74 _____

_____

75 _____

76 _____

77 _____

_____

78 (1) _____

(2) _____

79 (1) _____

(2) _____

80 (1) _____

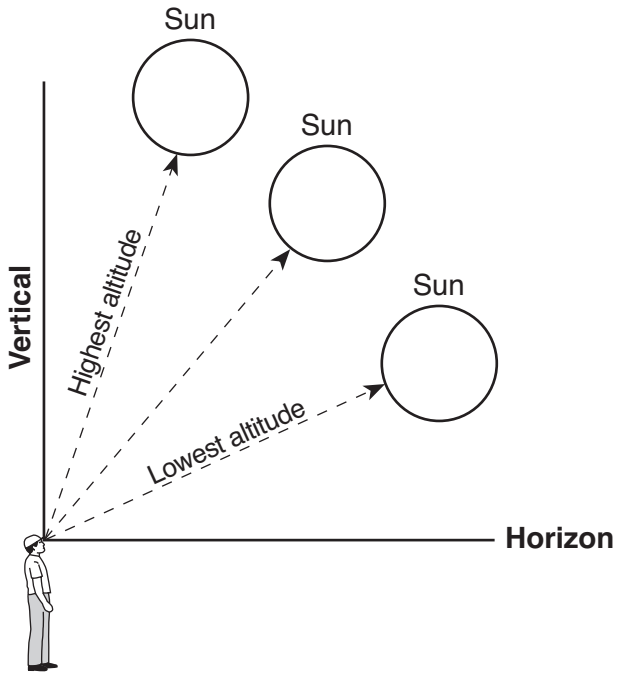
(2) _____

81 _____

82 Lettered position: _____

83 _____ **h**

84



85 Relative depth: _____

Relative temperature: _____

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P.S./EARTH SCIENCE

FOR TEACHERS ONLY

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

PS–ES PHYSICAL SETTING/EARTH SCIENCE

Thursday, January 26, 2012 — 1:15 to 4:15 p.m., only

SCORING KEY AND RATING GUIDE

Directions to the Teacher:

Refer to the directions on page 2 before rating student papers.

Updated information regarding the rating of this examination may be posted on the New York State Education Department's web site during the rating period. Check this web site at: http://www.p12.nysed.gov/apda/ and select the link "Scoring Information" for any recently posted information regarding this examination. This site should be checked before the rating process for this examination begins and several times throughout the Regents Examination period.

Part A and Part B–1
Allow 1 credit for each correct response.

Part A

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

Part B–1

36 . . . . . **4**	40 . . . . . **2**	44 . . . . . **1**	48 . . . . . **3** . . . . .
37 . . . . . **3**	41 . . . . . **1**	45 . . . . . **3**	49 . . . . . **4** . . . . .
38 . . . . . **2**	42 . . . . . **1**	46 . . . . . **2**	50 . . . . . **2** . . . . .
39 . . . . . **4**	43 . . . . . **3**	47 . . . . . **3**	

Directions to the Teacher

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

Do *not* attempt to correct the student's work by making insertions or changes of any kind.

Allow 1 credit for each correct response.

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

Students' responses must be scored strictly according to the Scoring Key and Rating Guide. For open-ended questions, credit may be allowed for responses other than those given in the rating guide if the response is a scientifically accurate answer to the question and demonstrates adequate knowledge as indicated by the examples in the rating guide. On the student's separate answer sheet, for each question, record the number of credits earned and the teacher's assigned rater/scorer letter.

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

For handscoring, raters should enter the scores earned in the appropriate boxes printed on the separate answer sheet. Next, the rater should add these scores and enter the total in the space provided. The student's score for the Earth Science Performance Test should be recorded in the space provided. Then the student's raw scores on the written test and the performance test should be converted to a scale score by using the conversion chart that will be posted on the Department's web site at: http://www.p12.nysed.gov/apda/ on Thursday, January 26, 2012. The student's scale score should be entered in the box labeled "Scale Score" on the student's answer sheet. The scale score is the student's final examination score.

Schools are not permitted to rescore any of the open-ended questions on this exam after each question has been rated once, regardless of the final exam score. Schools are required to ensure that the raw scores have been added correctly and that the resulting scale score has been determined accurately.

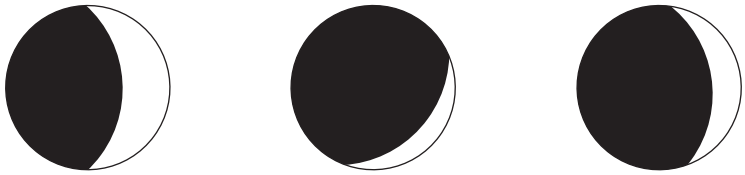
Because scale scores corresponding to raw scores in the conversion chart may change from one administration to another, it is crucial that for each administration, the conversion chart provided for that administration be used to determine the student's final score.

Part B–2

Allow a maximum of 15 credits for this part.

51 [1] Allow 1 credit if the student shades more than half of the Moon, leaving a lighted portion on the right edge as shown below.

Examples of 1-credit responses:



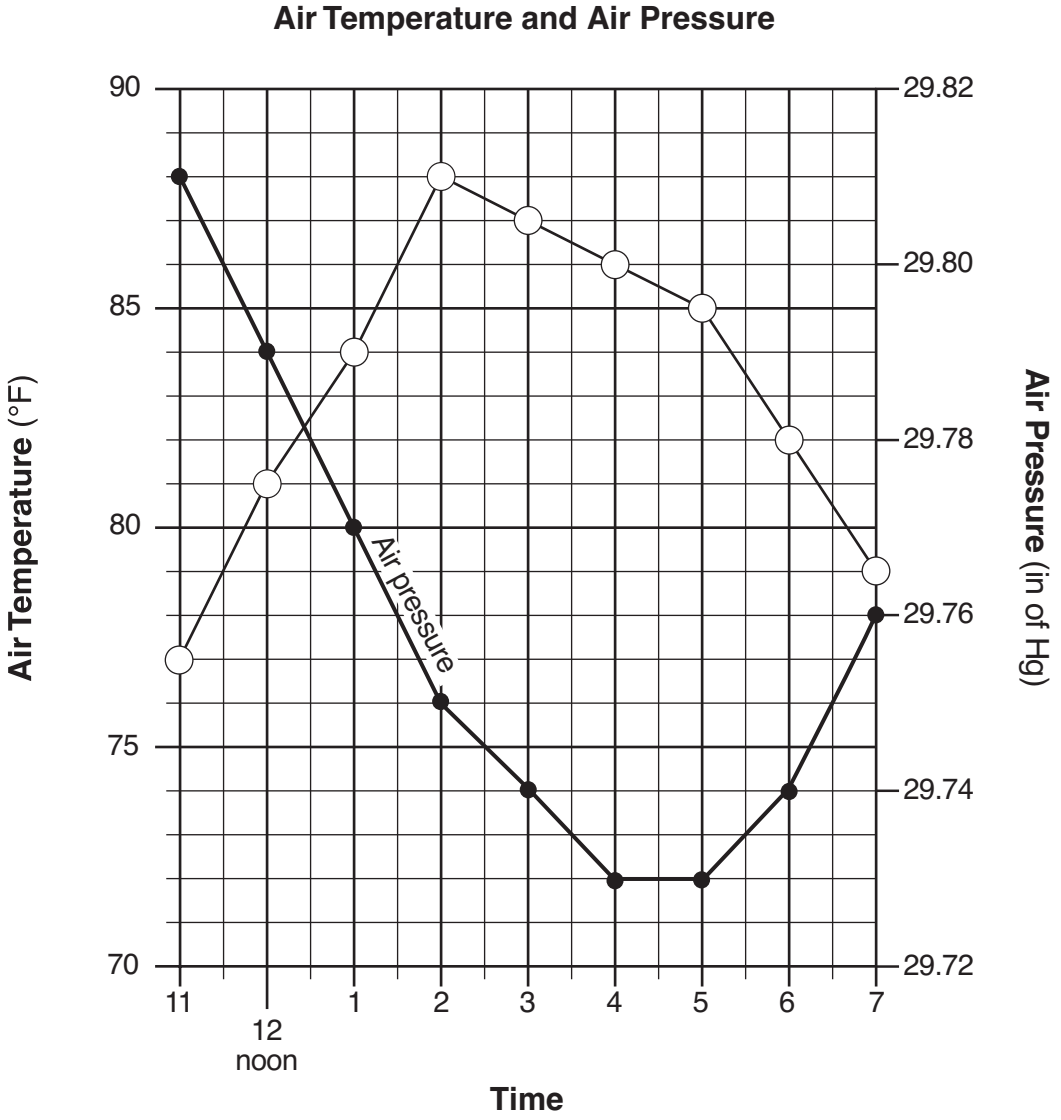
52 [1] Allow 1 credit for position number 8.

53 [1] Allow 1 credit for any value from 29 d to 30 d.

54 [1] Allow 1 credit for position number 4 *or* 8.

55 [1] Allow 1 credit if the centers of *all nine* plots are within the circles shown and are correctly connected with a line that passes within each circle.

Note: It is recommended that an overlay of the same scale as the student answer booklet be used to ensure reliability in rating.



56 [1] Allow 1 credit. Acceptable responses include, but are not limited to:

— As temperature increased, pressure decreased.

— There is an inverse relationship between air temperature and air pressure.

— As one variable increases, the other variable decreases.

57 [1] Allow 1 credit if *both* responses are correct: Quaternary Period and Pleistocene Epoch.

58 [1] Allow 1 credit. Acceptable responses include, but are not limited to:

— mastodont

— beluga whale

— condor

— humans

59 [1] Allow 1 credit. Acceptable responses include, but are not limited to:

— The rate at which water infiltrates the soil will decrease if the soil is frozen.

— Frozen ground is mostly impermeable.

— Ice fills the pore spaces.

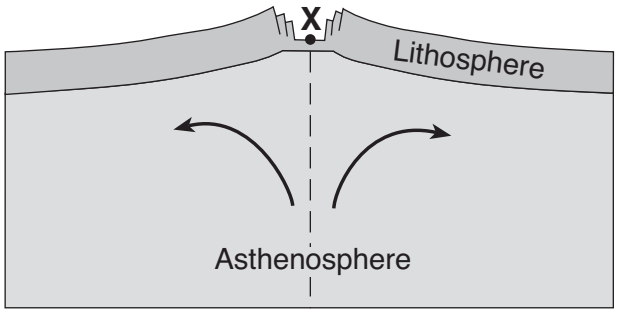
— The ground is frozen.

— The soil is composed of small particles.

60 [1] Allow 1 credit for any value from 23 million years ago to 1.8 million years ago.

61 [1] Allow 1 credit for correctly drawn arrows that rise and curve away from the dashed line.

Example of a 1-credit response:



62 [1] Allow 1 credit for Arabian Plate and African Plate.

63 [1] Allow 1 credit. Acceptable responses include, but are not limited to:

— The 90°-angle plate received more intense radiation.

— It received the most concentrated/more direct rays.

— It absorbed the most light.

— It reflected the least amount of light.

64 [1] Allow 1 credit. Acceptable explanations include, but are not limited to:

Final temperatures:

— lower

— cooler

Explanation:

— More light is reflected off the white surface.

— Less energy is absorbed by the white surface.

— Black absorbs energy better.

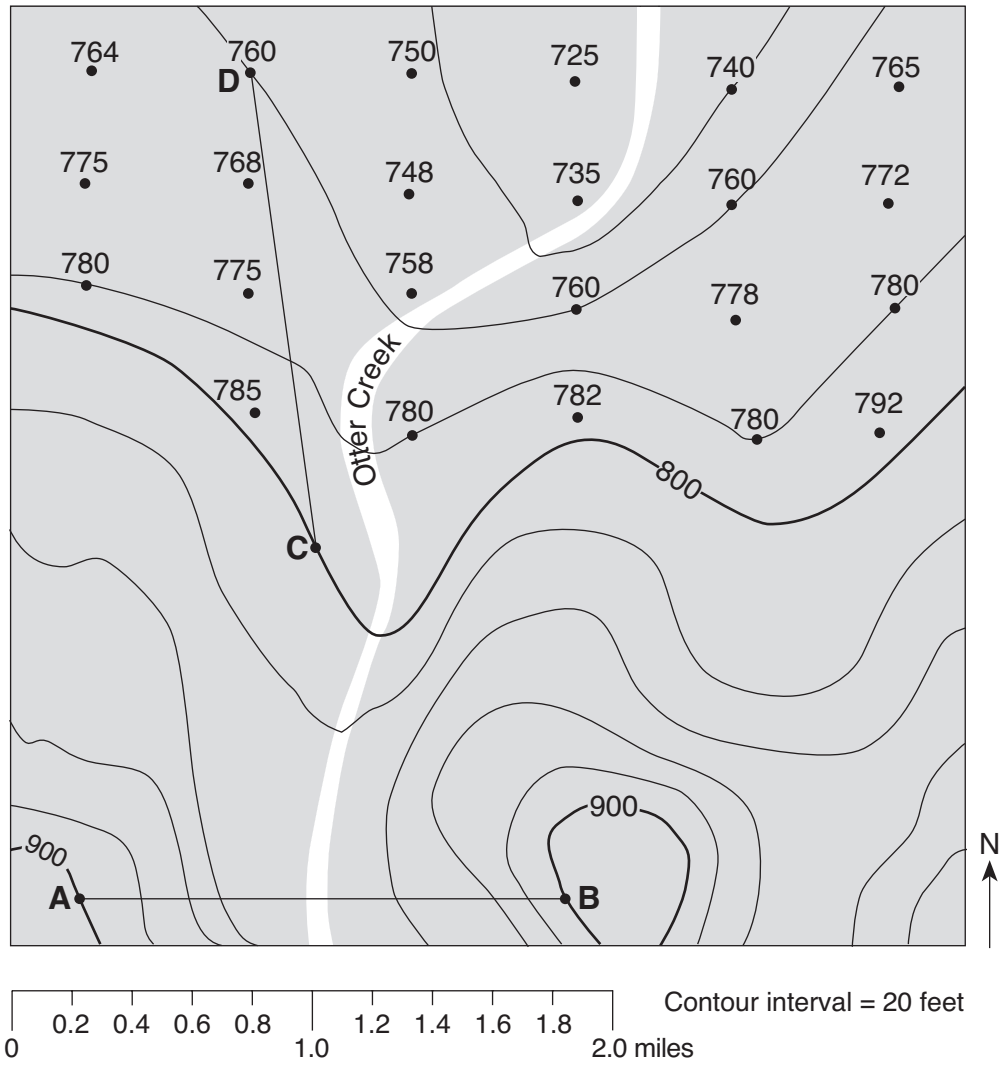
65 [1] Allow 1 credit for 0° latitude *or* the equator.

Part C

Allow a maximum of 20 credits for this part.

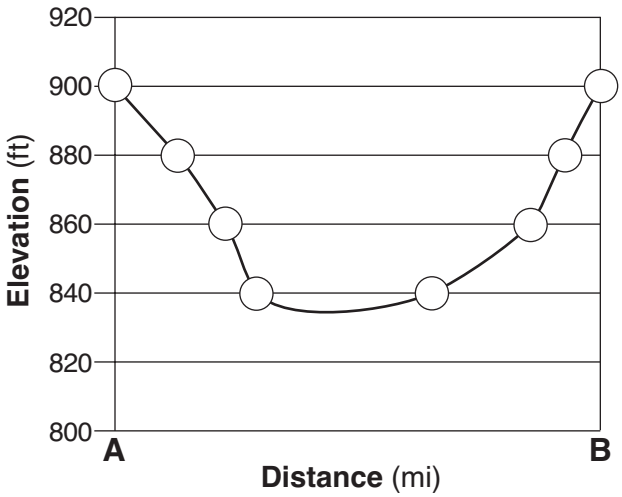
66 [1] Allow 1 credit if *all three* contour lines are correctly drawn. Contour lines must extend to the edges of the map to receive credit. If additional contour lines are drawn, *all* must be correct to receive credit.

Example of a 1-credit response:



67 [1] Allow 1 credit if the centers of *all eight* plots are within the circles shown and are correctly connected with a line that passes within the circles. The line must show a valley lower than 840 feet but higher than 820 feet.

Note: It is recommended that an overlay of the same scale as the student answer booklet be used to ensure reliability in rating.



68 [1] Allow 1 credit for any value from 23 to 27 with the correct units. Acceptable units include, but are not limited to:

— feet/mile

— ft per mi

69 [1] Allow 1 credit. Acceptable responses include, but are not limited to:

— Contour lines bend upstream forming a V-shape.

— Streams flow from higher-elevation isolines to lower-elevation isolines.

— Isolines bend uphill when they cross streams.

70 [1] Allow 1 credit. Acceptable responses include, but are not limited to:

— When precipitation increases, the water table will rise (or get closer to the surface).

— The level of the water table above the bedrock will increase with greater precipitation.

— Less precipitation will cause a lower water table.

— There is a direct relationship between the amount of precipitation and the height of the water table above the impermeable bedrock.

71 [1] Allow 1 credit. Acceptable responses include, but are not limited to:

— an increase in temperature

— The stream's surface area increased.

— increase in wind

72 [1] Allow 1 credit. Acceptable responses include, but are not limited to:

U-shaped:

— It was eroded by glaciers.

— A glacier formed the valley.

— formed by glacial ice

V-shaped:

— Running water cut the V-shaped valley.

— A stream formed the valley.

73 [1] Allow 1 credit for *X* and a correct explanation. Acceptable explanations include, but are not limited to:

— Point *X* is on the outside of a meander curve.

— Stream velocity is greater at point *X*.

— More deposition occurs at *Y*.

74 [1] Allow 1 credit. Acceptable responses include, but are not limited to:

— The stream began to flow over a nearly flat landscape.

— Stream velocity decreased.

— Gradient decreases from the mountains to the floodplain.

— The stream flows more slowly on the floodplain.

— The floodplain is composed of loose sediment.

75 [1] Allow 1 credit for sandstone.

76 [1] Allow 1 credit for Fordham gneiss *or* gneiss.

77 [1] Allow 1 credit. Acceptable responses include, but are not limited to:

— The marble shows deformation.

— The rock formation is folded.

— The marble is located between two other regional metamorphic rocks.

78 [1] Allow 1 credit for *two* correct responses. Acceptable responses include, but are not limited to:

— uplift *or* folding

— erosion

— weathering

— subsidence *or* submergence

— deposition

79 [1] Allow 1 credit for *two* different chemical elements. Acceptable responses include, but are not limited to:

— Ca *or* calcium

— Na *or* sodium

— Al *or* aluminum

— Si *or* silicon

— O *or* oxygen

80 [1] Allow 1 credit for *two* correct responses. Acceptable responses include, but are not limited to:

— hardness of 5–6

— black to green color

— shows cleavages *or* cleaves in two directions at a 90° angle

— nonmetallic luster

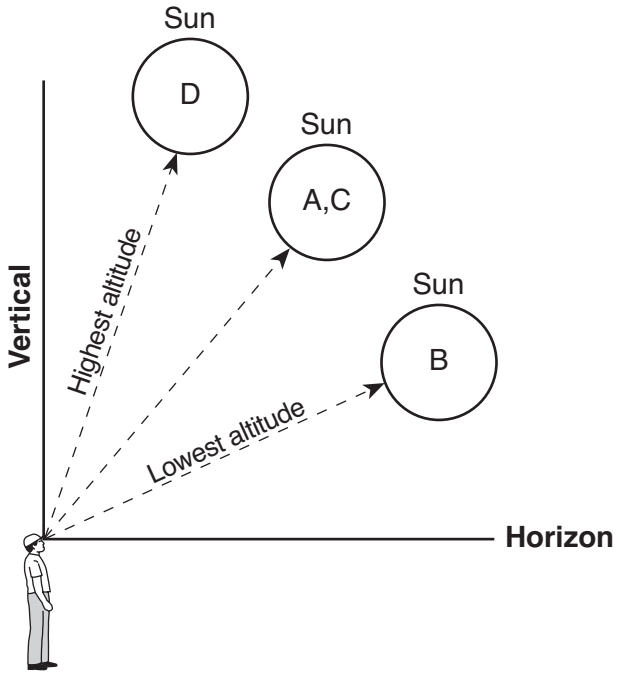
81 [1] Allow 1 credit for gneiss.

82 [1] Allow 1 credit for *D or* June 21.

83 [1] Allow 1 credit for 12 h.

84 [1] Allow 1 credit if *all four* letters are written within or adjacent to the correct circles.

Example of a 1-credit response:



85 [1] Allow 1 credit. Acceptable responses include, but are not limited to:

Relative depth:

— greater depth

— deeper

Relative temperature:

— higher temperature

— hotter

Regents Examination in Physical Setting/Earth Science

January 2012

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

The *Chart for Determining the Final Examination Score for the January 2012 Regents Examination in Physical Setting/Earth Science* will be posted on the Department's web site at: http://www.p12.nysed.gov/apda/ on Thursday, January 26, 2012. Conversion charts provided for previous administrations of the Regents Examination in Physical Setting/Earth Science must NOT be used to determine students' final scores for this administration.

Online Submission of Teacher Evaluations of the Test to the Department

Suggestions and feedback from teachers provide an important contribution to the test development process. The Department provides an online evaluation form for State assessments. It contains spaces for teachers to respond to several specific questions and to make suggestions. Instructions for completing the evaluation form are as follows:

1. Go to http://www.forms2.nysed.gov/emsc/osa/exameval/reexameval.cfm.
2. Select the test title.
3. Complete the required demographic fields.
4. Complete each evaluation question and provide comments in the space provided.
5. Click the **SUBMIT** button at the bottom of the page to submit the completed form.

Map to Core Curriculum

January 2012 Physical Setting/Earth Science			
Question Numbers			
Key Ideas/Performance Indicators	Part A	Part B	Part C
Standard 1			
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Math Key Idea 3		55	
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Science Inquiry Key Idea 2			
Science Inquiry Key Idea 3	12, 14, 19	40	
Engineering Design Key Idea 1			
Standard 2			
Key Idea 1	18		
Key Idea 2			
Key Idea 3			
Standard 6			
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Key Idea 1			
Key Idea 2			
Standard 4			
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Key Idea 2	9, 10, 14, 17, 18, 19, 21, 23, 24, 25, 26, 27, 29, 30, 33, 34	36, 37, 42, 43, 44, 45, 46, 47, 48, 55, 56, 61, 62, 63, 64	66, 67, 68, 69, 72, 73, 74, 77, 83
Key Idea 3	15, 16		75, 79, 80, 81, 85
Reference Tables			
ESRT 2011 Edition (Revised)	1, 6, 8, 9, 10, 11, 12, 14, 15, 16, 17, 18, 20, 21, 23, 25, 26, 29, 30, 32, 35	36, 37, 40, 41, 42, 43, 44, 45, 57, 58, 60, 61, 62, 65	68, 75, 76, 77, 79, 80, 81