

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

**PHYSICAL SETTING  
EARTH SCIENCE**

**Wednesday, August 14, 2013 — 12:30 to 3:30 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.**

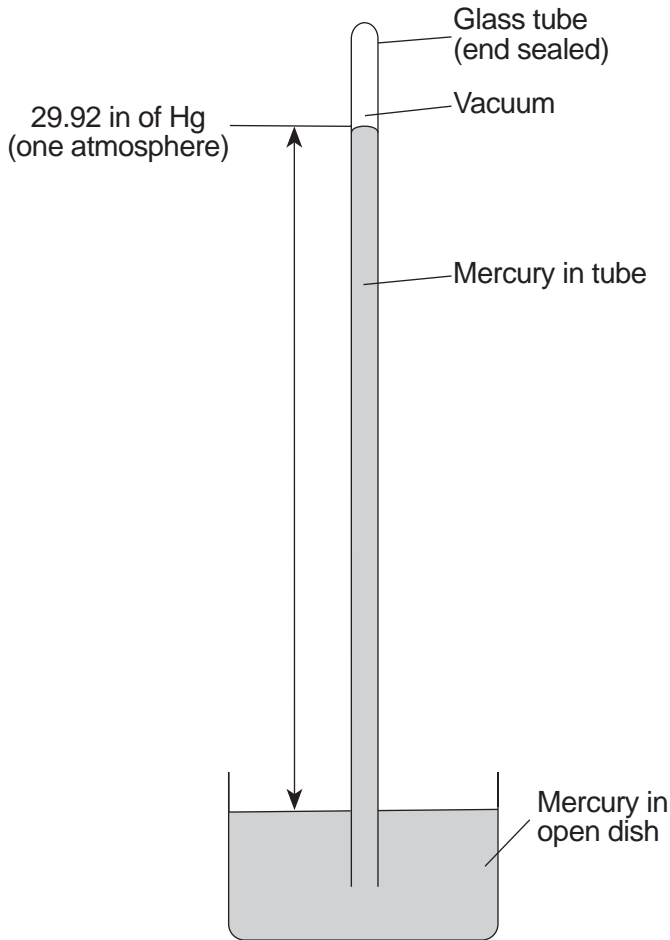
## Part A

### 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 Which two characteristics do all Jovian planets have in common?
- (1) small diameters and low densities
  - (2) small diameters and high densities
  - (3) large diameters and low densities
  - (4) large diameters and high densities
- 2 Which event occurred approximately 4.6 billion years ago?
- (1) evolution of the earliest fish
  - (2) evolution of stromatolites
  - (3) formation of the oldest known Earth rocks
  - (4) formation of Earth and our solar system
- 3 Which process combines lighter elements into heavier elements and produces energy within the Sun and other stars?
- (1) fusion
  - (2) insolation
  - (3) conduction
  - (4) radioactive decay
- 4 Which evidence best supports the Big Bang theory?
- (1) rate of rotation of the Sun
  - (2) existence of cosmic background radiation
  - (3) uniform radioactive decay of uranium-238
  - (4) separation of Earth's interior into different layers
- 5 Which star has a surface temperature most similar to the surface temperature of *Alpha Centauri*?
- (1) *Polaris*
  - (2) *Betelgeuse*
  - (3) *Procyon B*
  - (4) *Sirius*
- 6 The red shift of light from most galaxies is evidence that
- (1) most galaxies are moving away from Earth
  - (2) a majority of stars in most galaxies are red giants
  - (3) the light slows down as it nears Earth
  - (4) red light travels faster than other colors of light
- 7 Which motion causes some constellations to be visible in New York State only during winter nights and other constellations to be visible only during summer nights?
- (1) Stars in constellations revolve around Earth.
  - (2) Stars in constellations revolve around the Sun.
  - (3) Earth revolves around the Sun.
  - (4) Earth rotates on its axis.
- 8 Sediment samples *A* through *D* below have the same volume and packing, but contain different percentages of various particle sizes.
- Sample *A*: 75% clay and 25% silt  
Sample *B*: 25% clay and 75% sand  
Sample *C*: 50% pebbles and 50% sand  
Sample *D*: 50% pebbles and 50% cobbles
- Which sample most likely has the greatest permeability?
- (1) *A*
  - (2) *B*
  - (3) *C*
  - (4) *D*
- 9 Most of Earth's weather events take place in the
- (1) thermosphere
  - (2) mesosphere
  - (3) stratosphere
  - (4) troposphere

10 The diagram below represents a weather instrument.



(Not drawn to scale)

Which weather variable was this instrument designed to measure?

- (1) air pressure
- (2) dewpoint
- (3) relative humidity
- (4) amount of precipitation

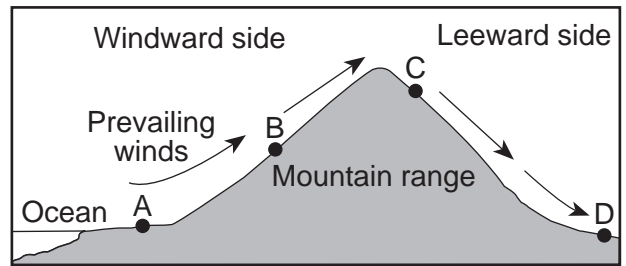
11 Jet stream winds over the United States generally move from

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

12 What is the dewpoint when the dry-bulb temperature is 8°C and the wet-bulb temperature is 2°C?

- (1) 28°C
- (2) 6°C
- (3) 3°C
- (4) -9°C

13 The cross section below represents prevailing winds moving over a coastal mountain range. Letters A through D represent locations on Earth's surface.



Which location will most likely have the *least* annual precipitation?

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

14 Which transfer of energy occurs mainly through the process of convection?

- (1) electromagnetic energy transferred from the Sun to the Moon
- (2) solar energy transferred through space to Earth's surface
- (3) heated air in the lower atmosphere transferred upward by density differences
- (4) heat from radioactive decay transferred by molecular collisions to surrounding mantle rock

15 In which planetary wind belt do most storms move toward the northeast?

- (1) 30° N to 60° N
- (2) 0° to 30° N
- (3) 0° to 30° S
- (4) 30° S to 60° S

16 What is the inferred pressure, in millions of atmospheres, in Earth's interior at a depth of 2900 kilometers?

- (1) 1.4
- (2) 9.9
- (3) 3.0
- (4) 4900

17 Compared to the oceanic crust, the continental crust is

- (1) less dense and more basaltic
- (2) less dense and more felsic
- (3) more dense and more granitic
- (4) more dense and more mafic

18 Which landmass is moving northward with Australia as part of the same tectonic plate?

- (1) India
- (2) Antarctica
- (3) North America
- (4) South America

19 The epicenter of an earthquake is located 6500 kilometers away from a seismic station. If the first S-wave arrived at this seismic station at 1:30 p.m., at what time did the first P-wave arrive?

- (1) 1:20 p.m.
- (2) 1:22 p.m.
- (3) 1:38 p.m.
- (4) 1:40 p.m.

20 Which two cities are located in the Interior Lowlands?

- (1) Elmira and Binghamton
- (2) Riverhead and New York City
- (3) Massena and Old Forge
- (4) Buffalo and Watertown

21 The large waterfall at Niagara Falls, New York, was originally located at the Niagara Escarpment. Which term best describes an escarpment?

- (1) U-shaped valley
- (2) V-shaped valley
- (3) cliff
- (4) drumlin

22 Trees growing on the edge of a river's meander are most likely to fall into the river due to

- (1) deposition on the inside of the meander
- (2) deposition on the outside of the meander
- (3) erosion on the inside of the meander
- (4) erosion on the outside of the meander

23 What is the approximate minimum stream velocity needed to keep a 6.4-cm-diameter particle in motion?

- (1) 10 cm/s
- (2) 50 cm/s
- (3) 100 cm/s
- (4) 200 cm/s

24 The photograph below shows a sandstone butte in an arid region.



Which agents of erosion are currently changing the appearance of this butte?

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

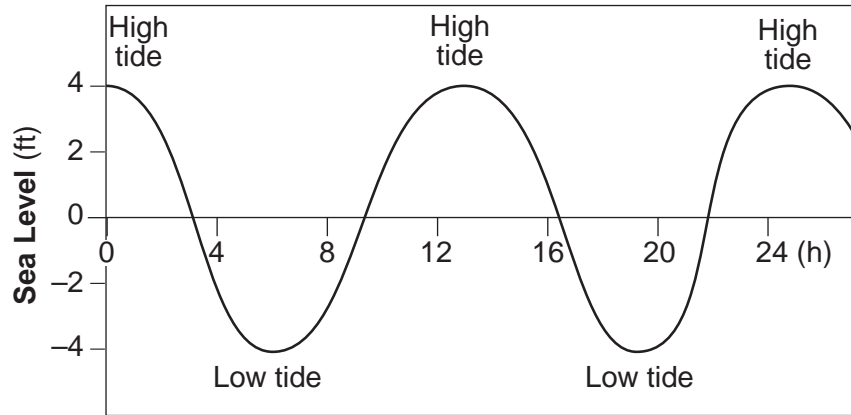
25 Sediment is deposited in a river delta because the

- (1) velocity of the river decreases
- (2) force of gravity decreases
- (3) volume of the river increases
- (4) gradient of the river increases

26 Which processes lead directly to the formation of igneous rock?

- (1) weathering and erosion
- (2) compaction and cementation
- (3) heat and pressure
- (4) melting and solidification

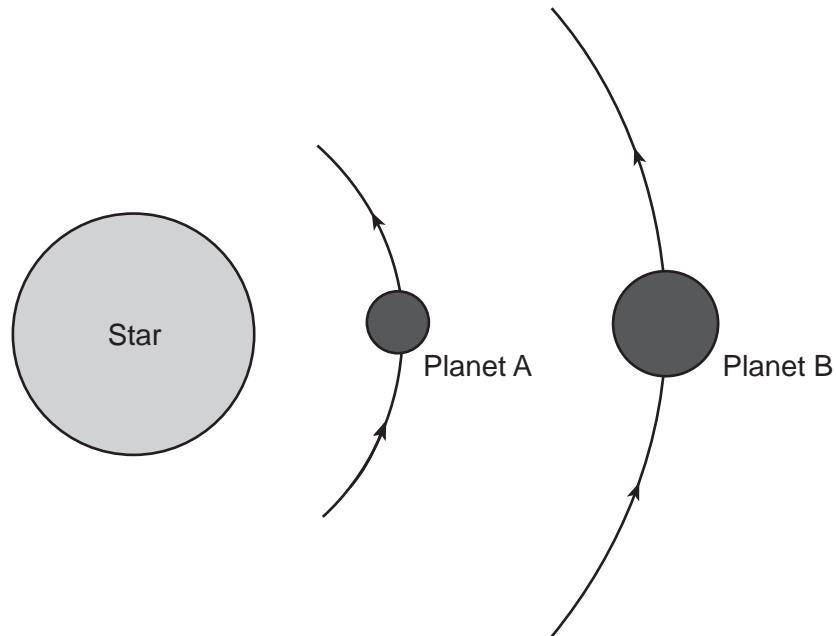
27 A graph of tidal sea-level changes at a coastal city is shown below.



The number of hours from one high tide to the next high tide is approximately

- (1) 4 h
- (2) 8 h
- (3) 12 h
- (4) 24 h

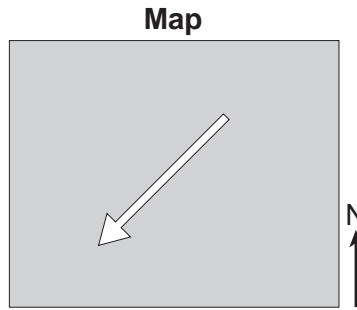
28 The diagram below represents planets *A* and *B*, of equal mass, revolving around a star.



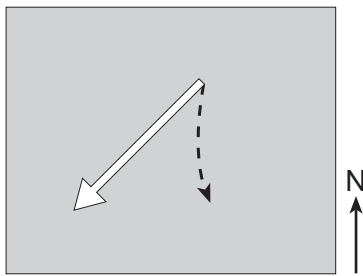
Compared to planet *A*, planet *B* has a

- (1) weaker gravitational attraction to the star and a shorter period of revolution
- (2) weaker gravitational attraction to the star and a longer period of revolution
- (3) stronger gravitational attraction to the star and a shorter period of revolution
- (4) stronger gravitational attraction to the star and a longer period of revolution

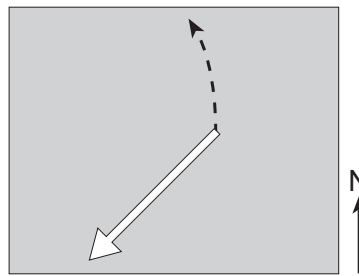
29 The arrow on the map below represents the direction a wind is blowing over a land surface in the Northern Hemisphere *without* showing the Coriolis effect.



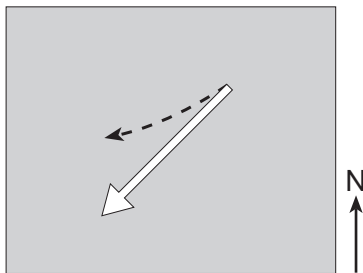
Which dashed arrow represents how the wind direction will change in the Northern Hemisphere due to the Coriolis effect?



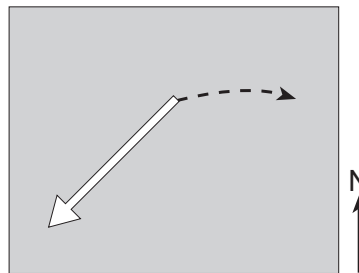
(1)



(3)

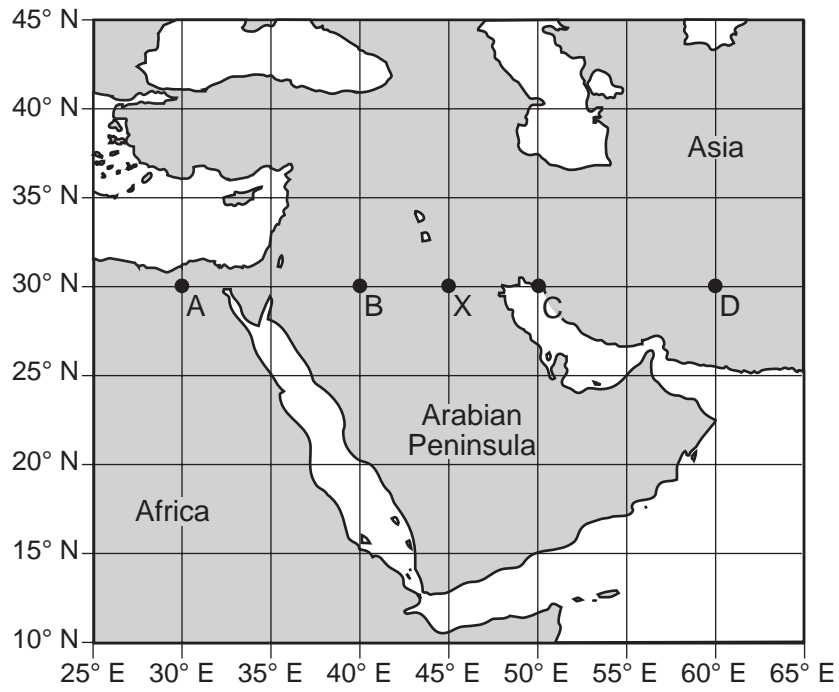


(2)



(4)

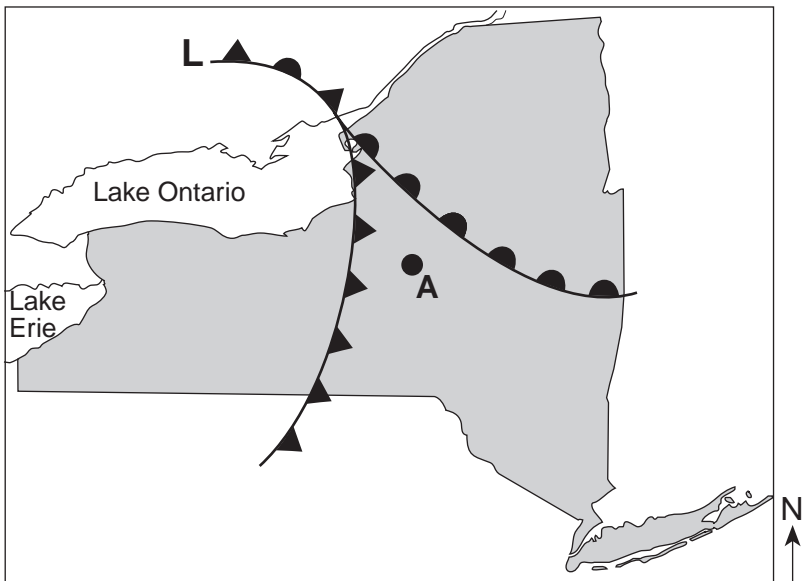
30 The map below shows a portion of the Middle East. Points A, B, C, D, and X are locations on Earth's surface.



When it is 10:00 a.m. solar time at location X, at which location is 11:00 a.m. solar time being observed?

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

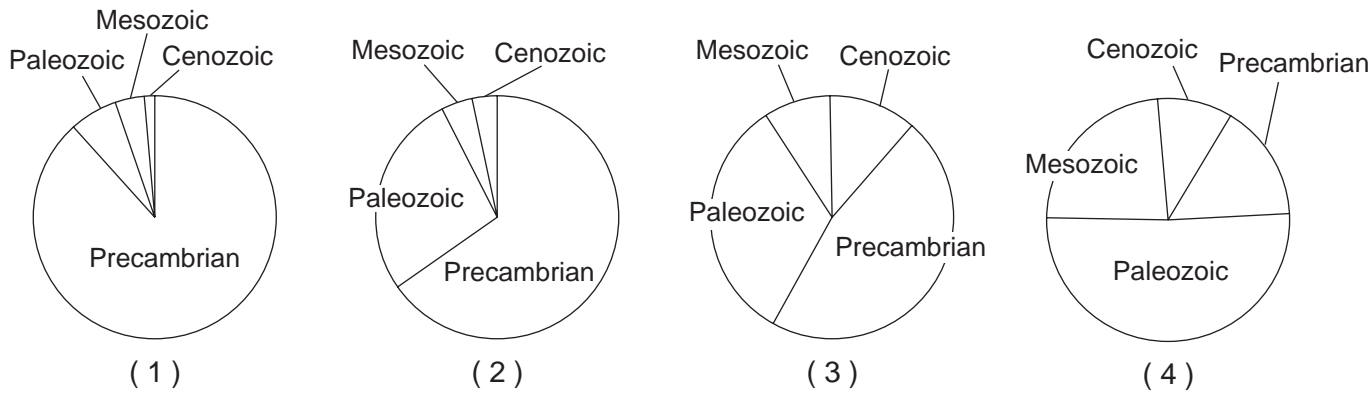
31 The weather map below shows a portion of a low-pressure system.



Which front will most likely pass over location A during the next two hours?

- (1) warm
- (2) stationary
- (3) occluded
- (4) cold

32 Which pie graph best shows the relative length of time of the major intervals of Earth's geologic history?





33 The table below lists some information about the minerals graphite and diamond.

**Data Table**

Mineral	Composition	Depth of Formation	Hardness	Electrical Conductor
graphite	carbon	shallow	1	good
diamond	carbon	very deep	10	poor

Some properties of diamond are different from those of graphite because diamond

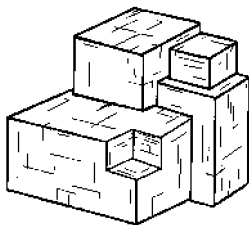
- (1) has a different arrangement of atoms
- (2) forms larger crystals
- (3) has a different composition
- (4) is older in geologic age

Base your answers to questions 34 and 35 on the data table below and on your knowledge of Earth science. The table provides information about four minerals, *A* through *D*.

**Data Table**

Mineral	Breakage	Hardness	Luster	Color
A	cleavage	2.5	metallic	silver
B	cleavage	2.5	nonmetallic	black
C	cleavage	3	nonmetallic	colorless
D	fracture	6.5	nonmetallic	green

34 The diagram below represents a sample of mineral *A*.



Mineral *A* is most likely

- (1) garnet
- (2) galena
- (3) olivine
- (4) halite

35 Which mineral can scratch *A*, *B*, and *C*, but can *not* scratch *D*?

- (1) talc
- (2) selenite gypsum
- (3) fluorite
- (4) quartz

## 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 passage below and on your knowledge of Earth science.

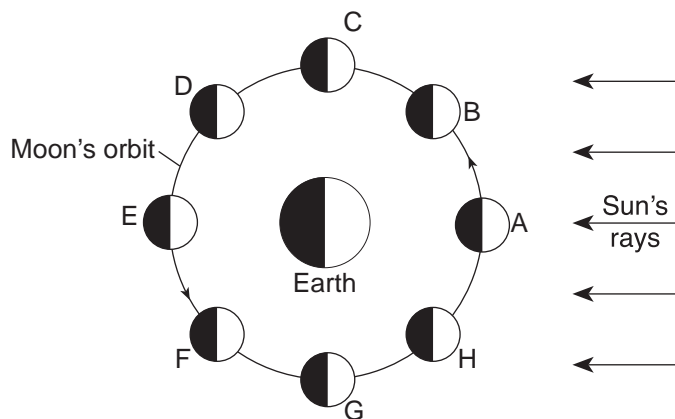
### Ice Ages

Earth has undergone many ice ages, each lasting millions of years. Some scientists infer that most ice ages were caused by landmasses blocking the ocean currents between equatorial regions and the poles. Ice ages usually ended when the positions of continents allowed ocean currents to resume transporting equatorial heat to the poles.

During each ice age there were advances and retreats of glaciers. These cool glacial and warm interglacial climate intervals were caused mostly by changes in Earth's orbit and tilt. Earth is presently in a warm interglacial interval.

- 36 Earth's warm interglacial intervals are due primarily to
- (1) changes in Earth's period of rotation
  - (2) changes in Earth's orbit and tilt
  - (3) increases in elevation of North America
  - (4) divergence at the Mid-Atlantic Ridge
- 37 Approximately 359 million years ago, the average intensity of insolation received in a year by the land area that is now eastern North America was likely
- (1) greater, because eastern North America was at a lower latitude
  - (2) greater, because eastern North America was at a higher latitude
  - (3) less, because eastern North America was at a lower latitude
  - (4) less, because eastern North America was at a higher latitude
- 38 Evidence that glaciers covered large areas of New York State is best provided by
- (1) long-term temperature measurements
  - (2) folded layers of bedrock
  - (3) kettle lakes and drumlins
  - (4) the presence of streams and rivers
-

Base your answers to questions 39 through 41 on the diagram below and on your knowledge of Earth science. The diagram represents the Moon in eight positions, *A* through *H*, in its orbit around Earth.



(Not drawn to scale)

39 When a solar eclipse is viewed from Earth, the Moon must be located at orbital position

- (1) *A*
- (2) *E*
- (3) *C*
- (4) *G*

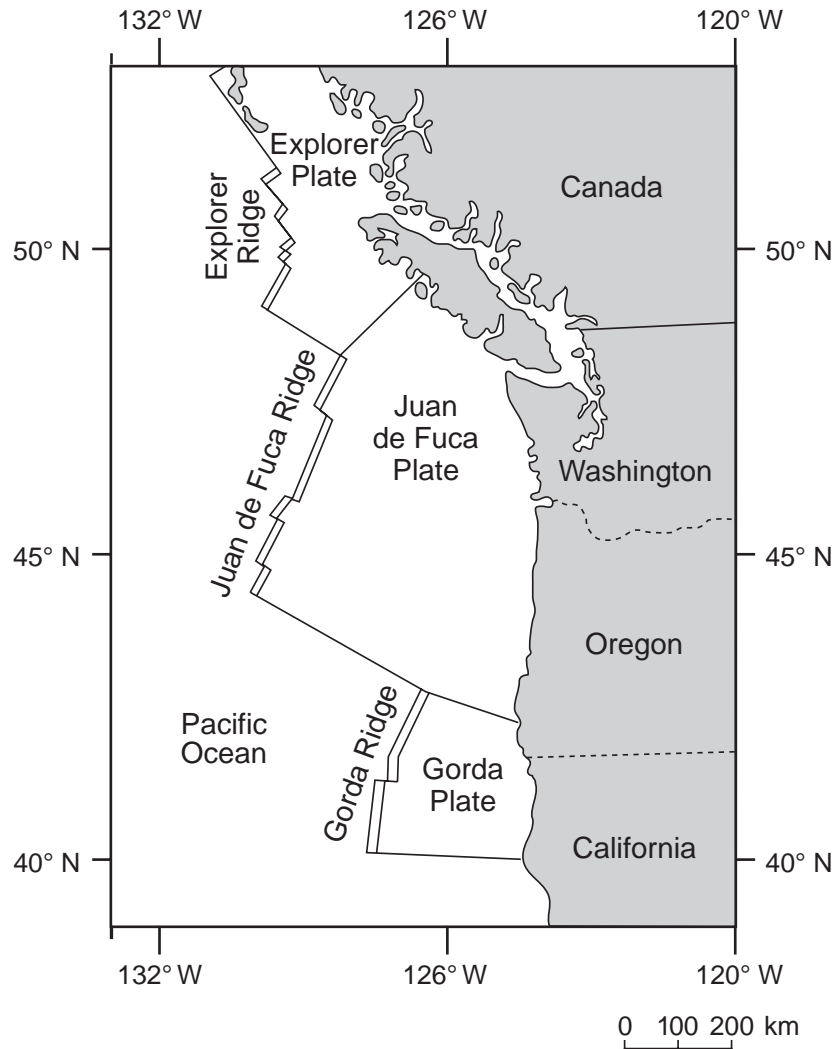
40 How many days are required for the Moon to complete a cycle of phases from the new Moon position represented in the diagram to the new Moon the following month?

- (1) 2.2 d
- (2) 27.3 d
- (3) 29.5 d
- (4) 365.26 d

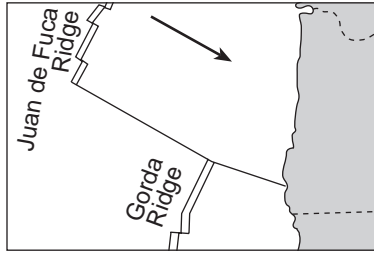
41 Which Moon phase is observed in New York State when the Moon is located at position *F*?

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

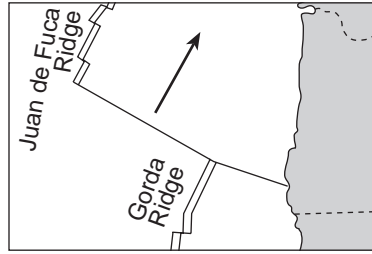
Base your answers to questions 42 and 43 on the map below and on your knowledge of Earth science. The map shows the coast of the northwestern United States. The Explorer and Gorda ridges and plates are parts of the Juan de Fuca tectonic system.



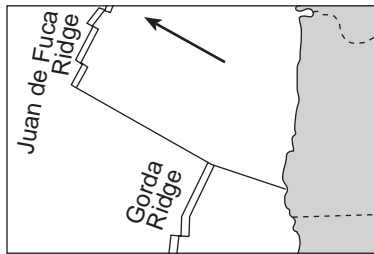
42 The arrow on which map best shows the direction of movement of the Juan de Fuca Plate in relation to the Juan de Fuca Ridge?



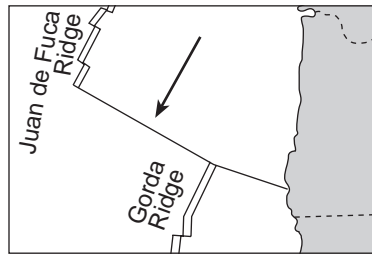
( 1 )



( 3 )



( 2 )



( 4 )

43 The Explorer Ridge is the boundary between the Explorer Plate and the

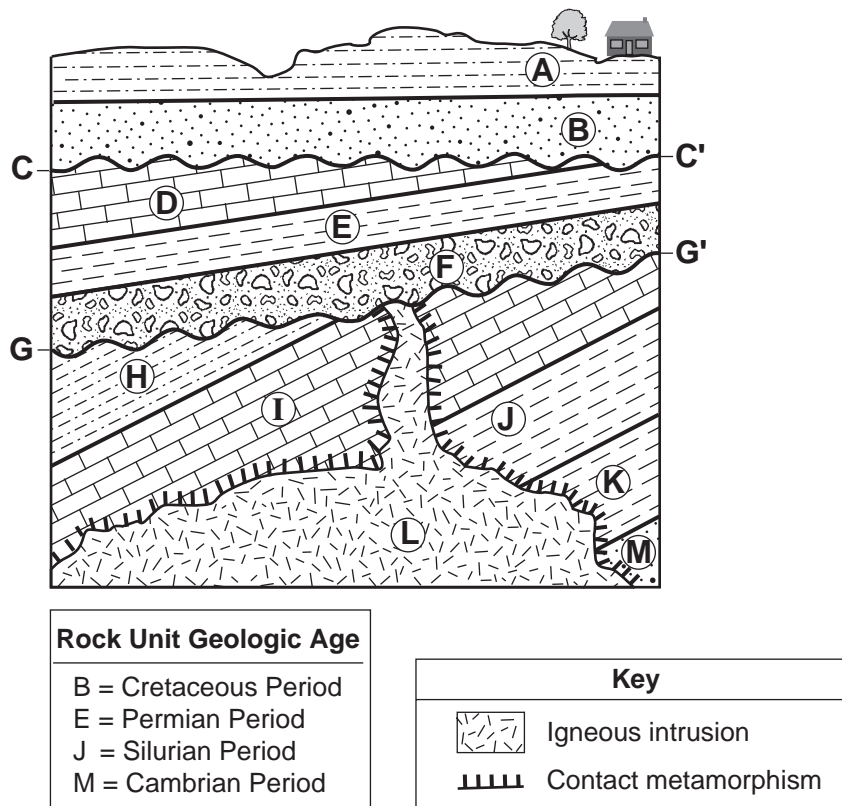
(1) North American Plate

(3) Juan de Fuca Plate

(2) Pacific Plate

(4) Gorda Plate

Base your answers to questions 44 through 47 on the cross section below and on your knowledge of Earth science. The cross section represents rock units that have *not* been overturned. Lines *CC'* and *GG'* represent unconformities. The geologic ages of some of the lettered rock units are shown below the cross section.



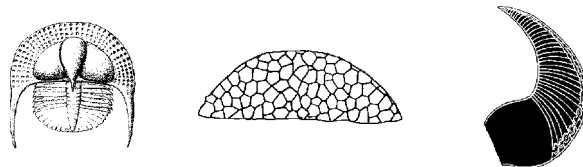
44 Which rock unit was formed most recently?

- (1) A
- (2) F
- (3) L
- (4) M

45 Why is there *no* contact metamorphism indicated between rock unit L and rock unit F?

- (1) Conglomerate does not metamorphose.
- (2) The intrusion was not hot enough to metamorphose rock unit F.
- (3) The contact metamorphism within rock unit F eroded away.
- (4) Rock unit F was deposited after the intrusion of rock unit L.

46 The diagrams below represent three index fossils found in one of the rock units.



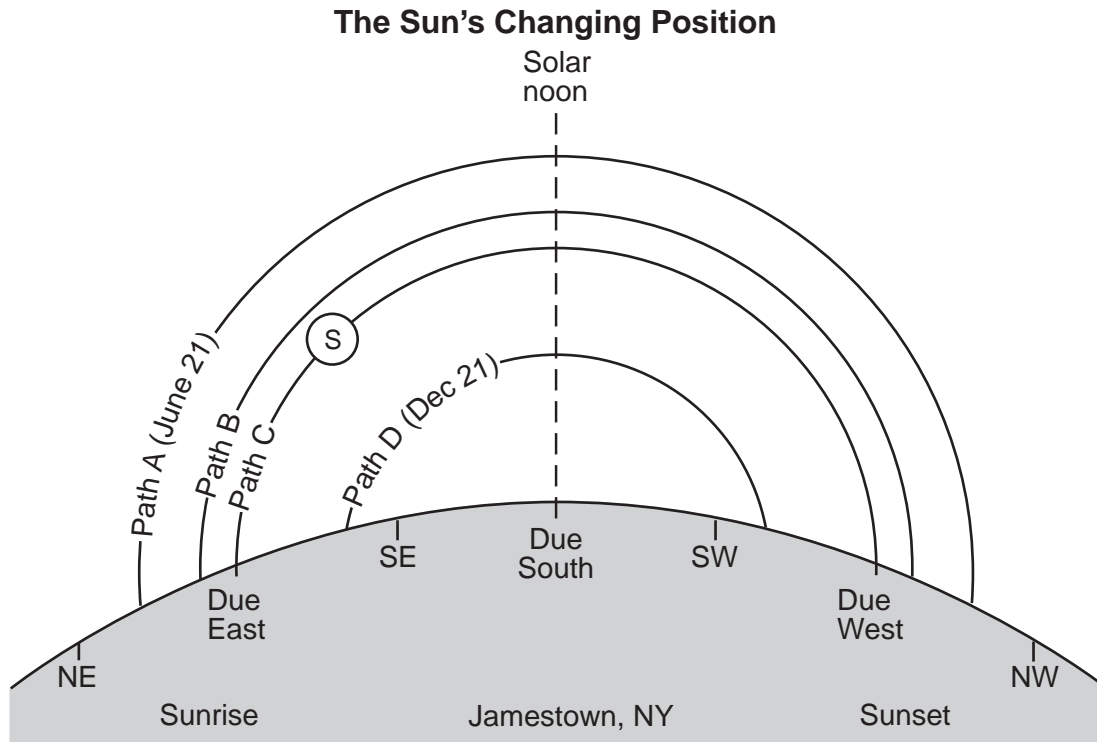
These fossils are most likely found in

- (1) rock unit I
- (2) rock unit J
- (3) rock unit K
- (4) rock unit M

47 Which inference about rock units *D*, *E*, and *H* can best be supported by evidence in the cross section?

- (1) They contain mostly sand-sized sediment.
  - (2) They contain both land and marine fossils.
  - (3) They were altered by contact metamorphism.
  - (4) They were deposited as horizontal layers and were later tilted.
- 

Base your answers to questions 48 through 50 on the diagram below and on your knowledge of Earth science. The diagram represents four apparent paths of the Sun, labeled *A*, *B*, *C*, and *D*, observed in Jamestown, New York. The June 21 and December 21 sunrise and sunset positions are indicated. Letter *S* identifies the Sun's position on path *C* at a specific time of day. Compass directions are indicated along the horizon.



48 The greatest duration of insolation in Jamestown occurs when the Sun appears to travel along path

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

49 At what time of day is the Sun at position *S*?

- (1) 6 a.m.
- (2) 9 a.m.
- (3) 3 p.m.
- (4) 6 p.m.

50 When the Sun appears to travel along path *D* at Jamestown, which latitude on Earth receives the most direct rays from the Sun?

- (1) 42° N
  - (2) 23.5° N
  - (3) 0°
  - (4) 23.5° S
-

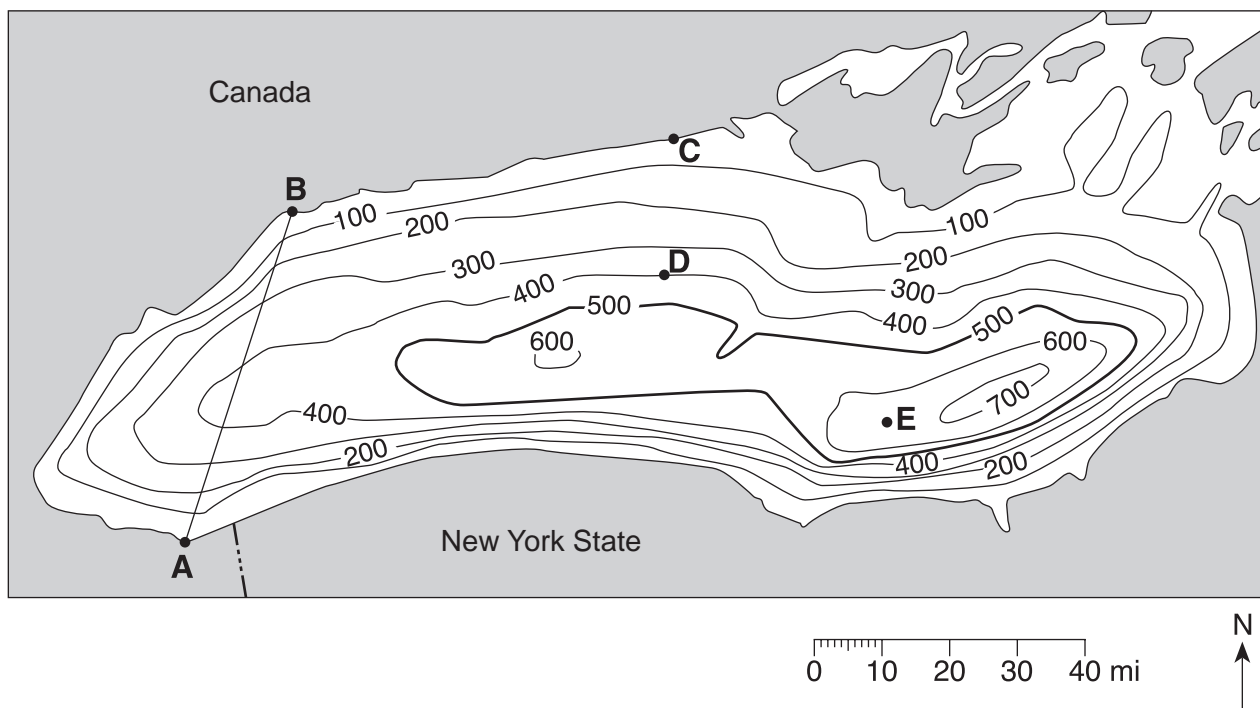
**Part B-2**

**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 field map below and on your knowledge of Earth science. The map shows the depth of Lake Ontario. Isoline values indicate water depth, in feet. Points *A*, *B*, and *C* represent locations on the shoreline of Lake Ontario. Points *D* and *E* represent locations on the bottom of the lake.

**Water Depth of Lake Ontario**



- 51 On the grid *in your answer booklet*, draw a profile of the bottom of western Lake Ontario by plotting the depth of the water along line *AB*. Plot *each* point where an isoline showing depth is crossed by line *AB*. Connect the plots with a line, starting at *A* and ending at *B*, to complete the profile. [1]
- 52 Calculate the gradient of the lake bottom between point *C* and point *D*. Label your answer with the correct units. [1]
- 53 What is a possible depth of the water at location *E*? [1]
- 54 What evidence shown on the map indicates that the southern section of the bottom of Lake Ontario has the steepest slope? [1]
-

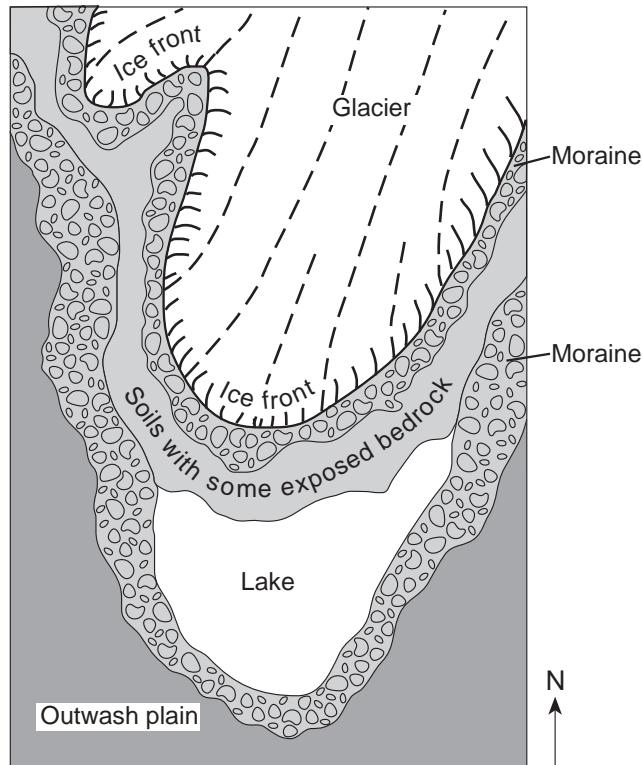


Base your answers to questions 55 through 58 on the cross sections below and on your knowledge of Earth science. The cross sections represent three bedrock outcrops, 1, 2, and 3, found several kilometers apart. The geologic time period when each sedimentary rock layer formed is shown. The symbols (☆, ○, X, □, and △) represent fossils of different types of organisms present in the rock layers.

Outcrop 1	Outcrop 2	Outcrop 3
Permian X	Devonian ○	Permian △ X
Pennsylvanian X △	Silurian △	Pennsylvanian △ X
Mississippian X	Ordovician □	Devonian ○ △
Devonian ○ □	Cambrian ☆	Silurian △

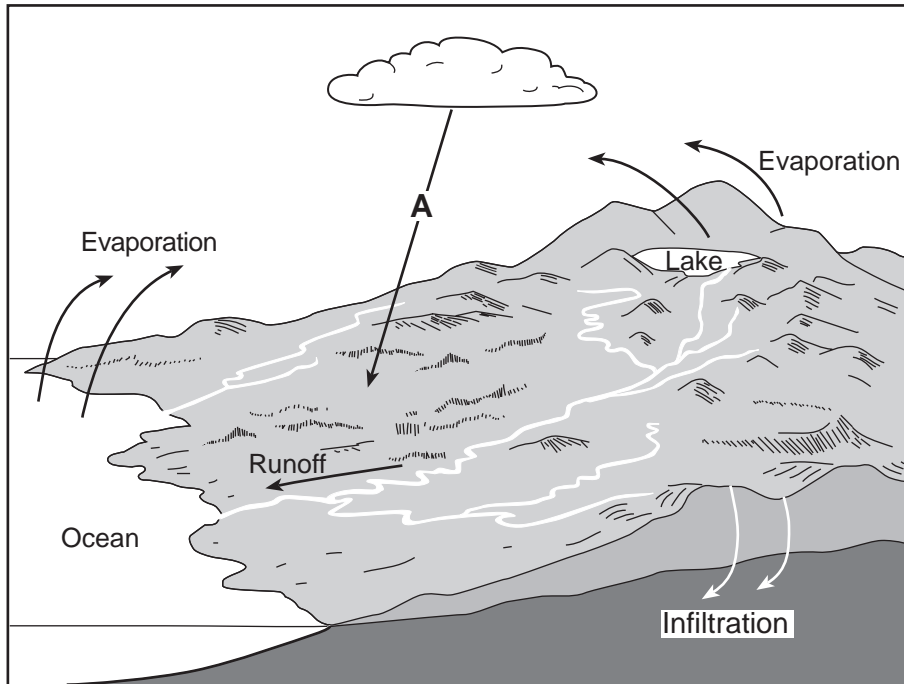
- 55 Draw the fossil symbol that represents the best index fossil. Describe *one* piece of evidence shown in the outcrops that indicates that this fossil has characteristics of a good index fossil. [1]
- 56 Write the outcrop number of the cross section that could be found in New York State. Describe the evidence that supports your answer. [1]
- 57 Explain why the geologic age of these rock layers could *not* be accurately dated using carbon-14. [1]
- 58 Explain why the index fossil *Coelophysis* is *not* preserved in any of the rock outcrops. [1]
-

Base your answers to questions 59 through 62 on the map below and on your knowledge of Earth science. The map shows a retreating valley glacier and the features that have formed because of the advance and retreat of the glacier.



- 59 Describe *one* piece of evidence likely to be found on the exposed bedrock surfaces that could indicate the direction this glacier moved. [1]
- 60 Describe *one* difference between the arrangement of sediment in the moraines and the arrangement of sediment in the outwash plain. [1]
- 61 Describe the most likely shape of the valley being formed due to erosion by this glacier. [1]
- 62 Explain why the glacial ice absorbs *less* solar radiation than the surrounding exposed bedrock and soil. [1]
-

Base your answers to questions 63 through 65 on the model below and on your knowledge of Earth science. The model shows the movement of water in the water cycle. Arrow A represents a process within the water cycle.



63 Identify *one* water cycle process represented by arrow A. [1]

64 How many joules of heat energy are required to evaporate 2 grams of water from the lake surface? [1]

65 A portion of the land surface shown was recently paved with asphalt and concrete. Describe the change in the amount of runoff and infiltration that will occur. [1]

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## 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 table below and on your knowledge of Earth science. The table lists the average surface temperature, in kelvins, and the average orbital velocity, in kilometers per second, of each planet of our solar system.

**Data Table**

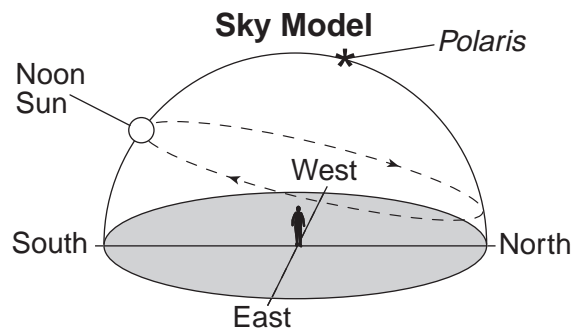
<b>Planet</b>	<b>Average Surface Temperature (K)</b>	<b>Average Orbital Velocity (km/s)</b>
Mercury	440	47.87
Venus	737	35.00
Earth	288	29.78
Mars	208	24.13
Jupiter	163	13.07
Saturn	133	9.69
Uranus	78	6.81
Neptune	73	5.43

- 66 On the grid *in your answer booklet*, construct a bar graph to represent the average surface temperature for *each* planet. [1]
- 67 Approximately 97% of Venus's atmosphere is carbon dioxide. Describe how carbon dioxide contributes to the unusually high average surface temperature of Venus. [1]
- 68 Use the set of axes *in your answer booklet* to draw a line that represents the general relationship between the mean distances of planets from the Sun and the average orbital velocities of the planets. [1]
- 69 The orbital velocity of Earth is sometimes faster and sometimes slower than its average orbital velocity. Explain why the orbital velocity of Earth varies in a cyclic pattern. [1]
-

Base your answers to questions 70 through 73 on the weather map in your answer booklet and on your knowledge of Earth science. The map shows air temperatures (in °F) at locations in the northeastern United States and part of Canada. Syracuse, New York, is labeled. Line *AB* represents a stationary frontal boundary.

- 70 On the map *in your answer booklet*, draw the isotherm for 0°F. Extend each end of the isotherm to the edge of the map. [1]
- 71 Convert the air temperature at Syracuse from degrees Fahrenheit to degrees Celsius. [1]
- 72 Write the two-letter weather map symbol for the type of air mass that is most likely located north of frontal boundary *AB*. [1]
- 73 Explain why locations near the Atlantic Ocean have air temperatures that are warmer than locations farther inland. [1]
- 

Base your answers to questions 74 through 76 on the sky model below and on your knowledge of Earth science. The model shows the Sun's apparent path through the sky as seen by an observer in the Northern Hemisphere on June 21.



- 74 Describe the evidence, shown in the sky model, which indicates that the observer is *not* located at the North Pole. [1]
- 75 The diagram *in your answer booklet* represents the position of Earth in its orbit on March 21. Place an **X** on Earth's orbit to represent Earth's orbital position when the apparent path of the Sun in the sky model was observed. [1]
- 76 Identify the cause of the apparent daily motion of the Sun through the sky. [1]
-

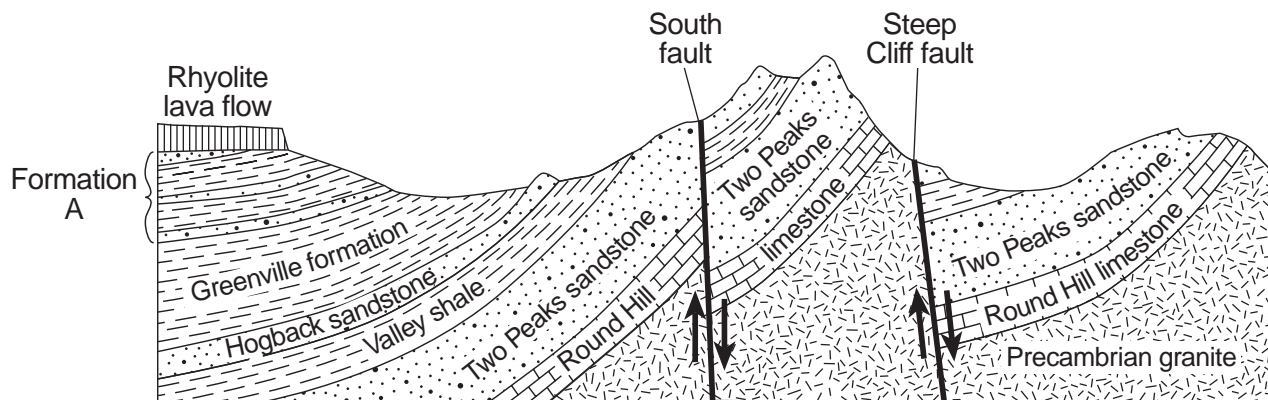
Base your answers to questions 77 through 79 on the passage below and on your knowledge of Earth science. The passage describes unusual lava from a volcano in Africa.

### Unusual Volcano

Nyiragongo, located at 2° S 29° E, is an active African volcano. It has the most fluid lava on Earth. The lava has a composition unlike any other lava in the world. The rare isotopes found in the lava are similar to those found in ancient asteroids. This fact leads scientists to infer that the lava may be as old as our solar system and that it comes from deep inside the mantle near Earth's outer core. Nyiragongo is one volcano in a ring of many volcanoes surrounding an area that is domed upward nearly a mile above sea level, causing scientists to infer that a new mantle hot spot is forming there.

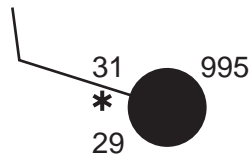
- 77 Two rocks, scoria and basalt, have formed from the cooled lava that erupted from Nyiragongo. Describe the texture of *each* rock. [1]
- 78 Identify the type of tectonic plate boundary found in the vicinity of Nyiragongo. [1]
- 79 Identify *two* other locations on Earth, *not* on a plate boundary, where mantle rock is rising to Earth's surface. [1]
- 

Base your answers to questions 80 through 82 on the cross section below and on your knowledge of Earth science. The cross section represents rock formations that exist in the southwestern part of the United States. Names of the faults and rock units are indicated on the diagram.



- 80 Formation A consists of three thin sandstone layers interbedded with shale layers. Hornfels and quartzite are found at the top of formation A. Describe how the hornfels and quartzite formed. [1]
- 81 Explain why the Two Peaks sandstone is *not* a continuous layer. [1]
- 82 List *three* minerals that are likely present in the Precambrian granite rock. [1]
-

Base your answers to questions 83 through 85 on the weather station model below and on your knowledge of Earth science. The model shows atmospheric conditions at Oswego, New York.



83 In your answer booklet, fill in the correct information for *each* weather variable listed for this station model. [1]

84 Explain how the data on the station model indicate a high relative humidity. [1]

85 Convert the coded air pressure shown on the station model into the actual millibars of air pressure. [1]

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# PHYSICAL SETTING EARTH SCIENCE

Wednesday, August 14, 2013 — 12:30 to 3:30 p.m., only

## ANSWER BOOKLET

Student ..... Sex:  Male  
 Female

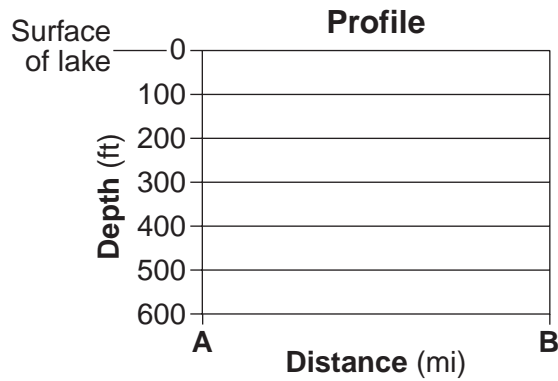
Teacher .....

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

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

### Part B–2

51



52 Gradient = \_\_\_\_\_

53 \_\_\_\_\_ ft

54 \_\_\_\_\_  
\_\_\_\_\_

**55** Fossil symbol: \_\_\_\_\_

Evidence: \_\_\_\_\_  
\_\_\_\_\_

**56** Outcrop number: \_\_\_\_\_

Evidence: \_\_\_\_\_  
\_\_\_\_\_

**57** \_\_\_\_\_  
\_\_\_\_\_

**58** \_\_\_\_\_  
\_\_\_\_\_

**59** \_\_\_\_\_  
\_\_\_\_\_

**60** Moraines: \_\_\_\_\_  
  
Outwash plain: \_\_\_\_\_

**61** \_\_\_\_\_

**62** \_\_\_\_\_  
\_\_\_\_\_

63 \_\_\_\_\_

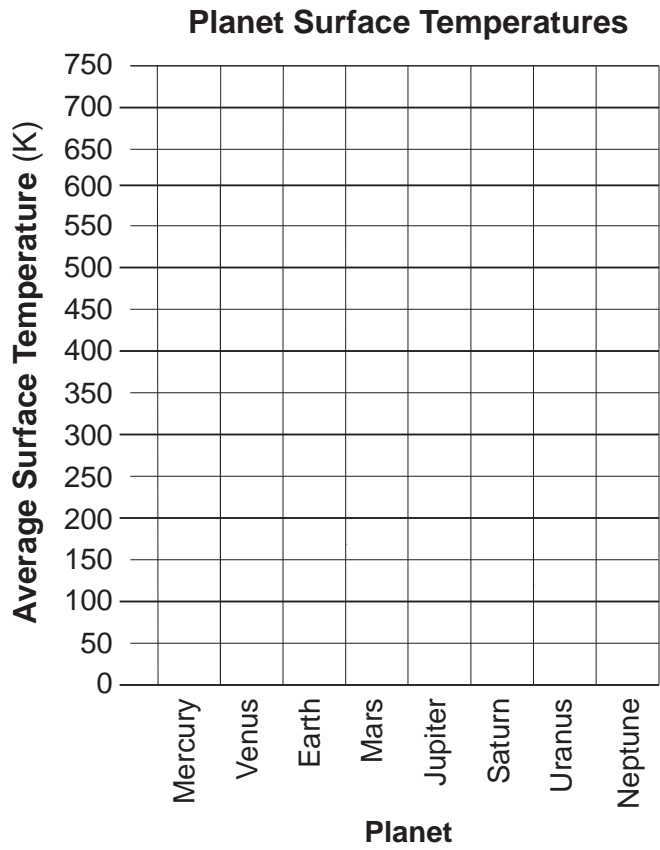
64 \_\_\_\_\_ J

65 Runoff: \_\_\_\_\_

Infiltration: \_\_\_\_\_

Part C

66

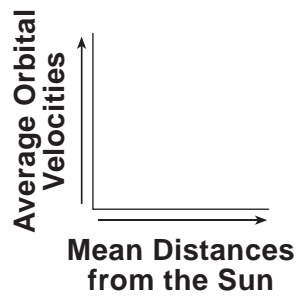


67

---

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68

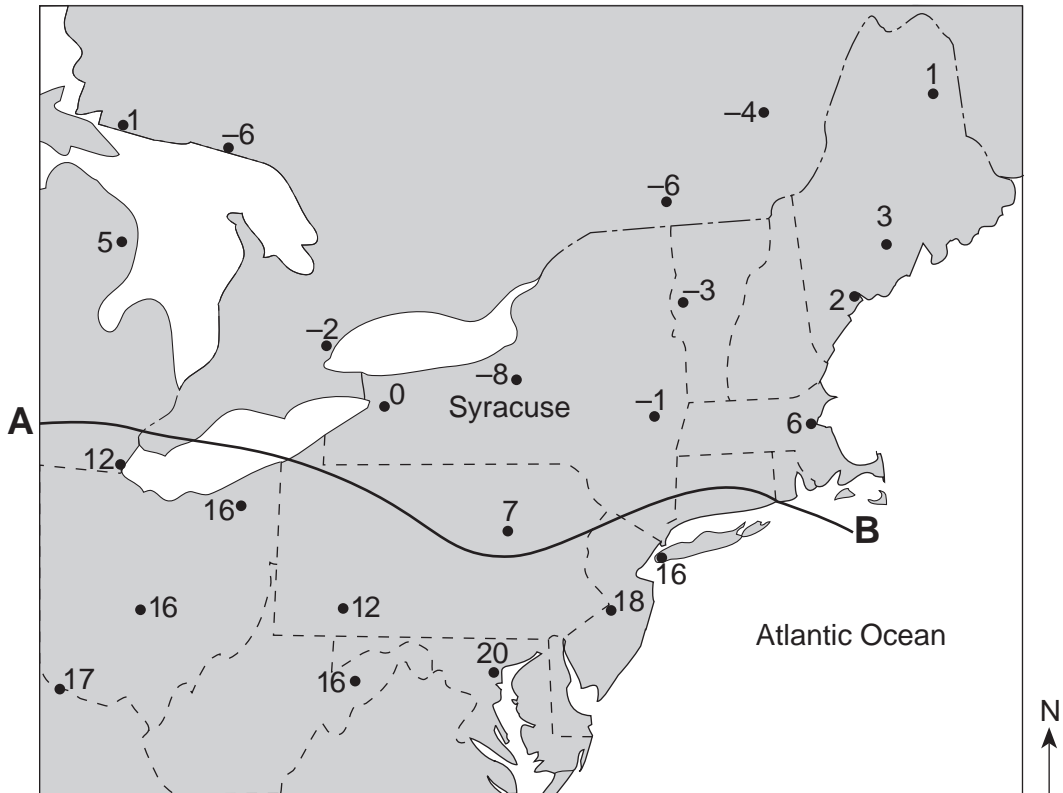


69

---

---

70



71 \_\_\_\_\_ °C

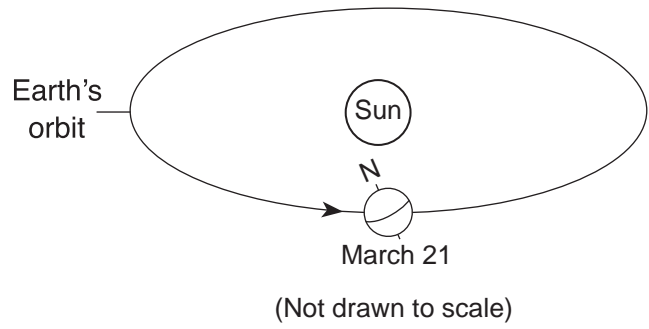
72 \_\_\_\_\_

73 \_\_\_\_\_

\_\_\_\_\_

74 \_\_\_\_\_

75



76 \_\_\_\_\_

77 Scoria: \_\_\_\_\_

Basalt: \_\_\_\_\_

78 \_\_\_\_\_

79 \_\_\_\_\_ and \_\_\_\_\_

80 \_\_\_\_\_

\_\_\_\_\_

81 \_\_\_\_\_

\_\_\_\_\_

82 (1) \_\_\_\_\_

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

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

83 Air temperature: \_\_\_\_\_ °F

Dewpoint: \_\_\_\_\_ °F

Wind speed: \_\_\_\_\_ knots

Cloud cover: \_\_\_\_\_ %

84 \_\_\_\_\_

\_\_\_\_\_

85 \_\_\_\_\_ mb





# FOR TEACHERS ONLY

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

## PS-ES PHYSICAL SETTING/EARTH SCIENCE

Wednesday, August 14, 2013 — 12:30 to 3:30 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/assessment/> 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 ..... 3 .....	10 ..... 1 .....	19 ..... 2 .....	28 ..... 2 .....
2 ..... 4 .....	11 ..... 2 .....	20 ..... 4 .....	29 ..... 2 .....
3 ..... 1 .....	12 ..... 4 .....	21 ..... 3 .....	30 ..... 4 .....
4 ..... 2 .....	13 ..... 4 .....	22 ..... 4 .....	31 ..... 4 .....
5 ..... 1 .....	14 ..... 3 .....	23 ..... 4 .....	32 ..... 1 .....
6 ..... 1 .....	15 ..... 1 .....	24 ..... 3 .....	33 ..... 1 .....
7 ..... 3 .....	16 ..... 1 .....	25 ..... 1 .....	34 ..... 2 .....
8 ..... 4 .....	17 ..... 2 .....	26 ..... 4 .....	35 ..... 3 .....
9 ..... 4 .....	18 ..... 1 .....	27 ..... 3 .....	

**Part B-1**

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

## 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. If the student's responses for the multiple-choice questions are being hand scored prior to being scanned, the scorer must be careful not to make any marks on the answer sheet except to record the scores in the designated score boxes. Marks elsewhere on the answer sheet will interfere with the accuracy of the scanning.**

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. Teachers may not score their own students' answer papers.

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. If the student gives more than one answer to a question, only the first answer should be rated. Units need not be given when the wording of the questions allows such omissions.

For hand scoring, 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/assessment/> on Wednesday, August 14, 2013. 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.**

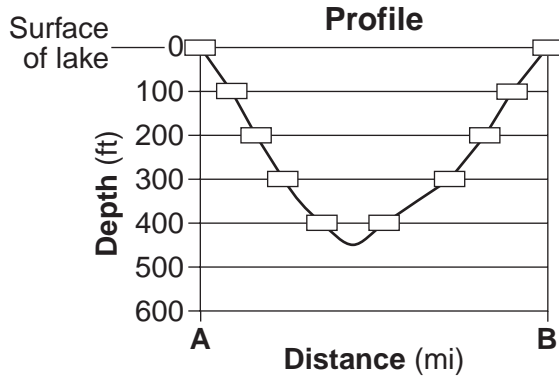
Because scale scores corresponding to raw scores in the conversion chart may change from one administration to another, it is crucial that, for each administration, the conversion chart provided for that administration be used to determine the student's final score.

**Part B–2**

**Allow a maximum of 15 credits for this part.**

- 51 [1] Allow 1 credit if the centers of *all ten* plots are located within the boxes shown and a correctly drawn line passes within each box. The low point of the line must extend below 400 feet but not below 500 feet.

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



- 52 [1] Allow 1 credit for any value from 18 to 23 with the correct units. Acceptable units include, but are not limited to:

- ft/mi
- feet/mile
- feet per mile
- ft/mile

- 53 [1] Allow 1 credit for any depth greater than 600 ft and less than 700 ft.

- 54 [1] Allow 1 credit. Acceptable responses include, but are not limited to:

- The isolines are close together.
- The spaces between the lines are small.
- There is a greater change in depth over a shorter distance.
- The deepest waters are closer to the southern shore than they are to the northern shore.

- 55 [1] Allow 1 credit if *both* the circle fossil symbol  $\bigcirc$  *and* the evidence are correct. Acceptable evidence includes, but is not limited to:

- The fossil was found only in the Devonian layer/one layer in each outcrop.
- The fossil was geographically widespread.
- The fossil indicates a short existence in geologic time/limited time interval.

- 56** [1] Allow 1 credit if *both* outcrop 2 is stated *and* the evidence is correct. Acceptable evidence includes, but is not limited to:
- The rock layers of the same age as those shown in outcrop 2 are all found in New York State.
  - Permian Period rock is not present in New York State, but is shown in outcrops 1 and 3.
- 57** [1] Allow 1 credit. Acceptable responses include, but are not limited to:
- Carbon-14 has a short half-life.
  - These rock layers are too old to contain measurable carbon-14.
  - Carbon-14 is used to date recent remains.
  - No organic material remains in the rock.
- 58** [1] Allow 1 credit. Acceptable responses include, but are not limited to:
- The bedrock in the outcrops formed during the Paleozoic Era, and *Coelophysis* lived during the Mesozoic Era.
  - The youngest rock layer is from the Permian, and *Coelophysis* did not exist yet.
  - *Coelophysis* lived at a much later time.
  - No Triassic bedrock is shown.
  - Layers containing *Coelophysis* have been removed by erosion.
- 59** [1] Allow 1 credit. Acceptable responses include, but are not limited to:
- scratches/striations on the bedrock surface
  - grooves in bedrock
  - a boulder transported from a more northerly outcrop on the bedrock
  - an erratic
  - drumlin
- 60** [1] Allow 1 credit if *both* responses are correct. Acceptable responses include, but are not limited to:
- Moraines:
- unsorted sediments/mixed particles
  - unlayered
- Outwash plain:
- sorted deposits
  - layered sediments

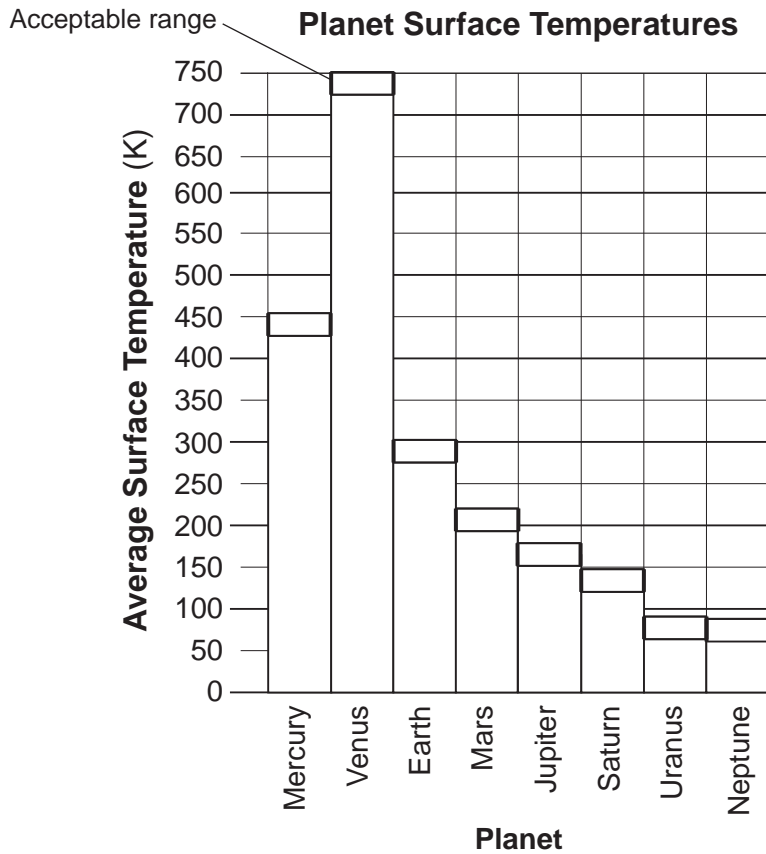
- 61** [1] Allow 1 credit. Acceptable responses include, but are not limited to:
- The valley would have a U-shaped appearance.
  - flat bottom and steep sides
  - rounded shape
- 62** [1] Allow 1 credit. Acceptable responses include, but are not limited to:
- The ice is white/light colored.
  - The smooth ice reflects better than rougher land terrain.
  - The bedrock/soil is darker colored.
  - Snow and ice reflect more insolation.
  - has a higher albedo
- 63** [1] Allow 1 credit. Acceptable responses include, but are not limited to:
- precipitation
  - raining
  - snowing
  - sleet
  - hailing
- 64** [1] Allow 1 credit for 4520 J.
- 65** [1] Allow 1 credit if *both* responses are correct. Acceptable responses include, but are not limited to:
- Runoff:
- increases
  - goes up
- Infiltration:
- decreases
  - less
  - would drop to zero/near zero

### Part C

Allow a maximum of 20 credits for this part.

- 66 [1] Allow 1 credit if the tops of *all eight* bars end within the acceptable range rectangles indicated below.

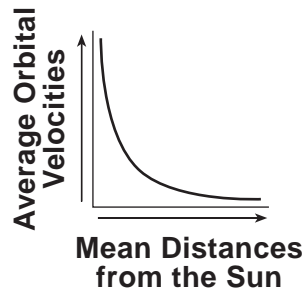
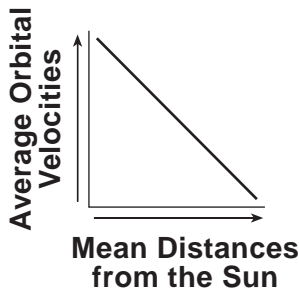
**Note:** It is recommended that an overlay of the same scale as the student answer booklet be used to ensure reliability in rating.



- 67 [1] Allow 1 credit. Acceptable responses include, but are not limited to:
- Carbon dioxide traps heat in the atmosphere.
  - Carbon dioxide absorbs infrared and reradiates it back to Venus.
  - Carbon dioxide is a greenhouse gas.

68 [1] Allow 1 credit for a line with a negative slope.

**Examples of 1-credit responses:**



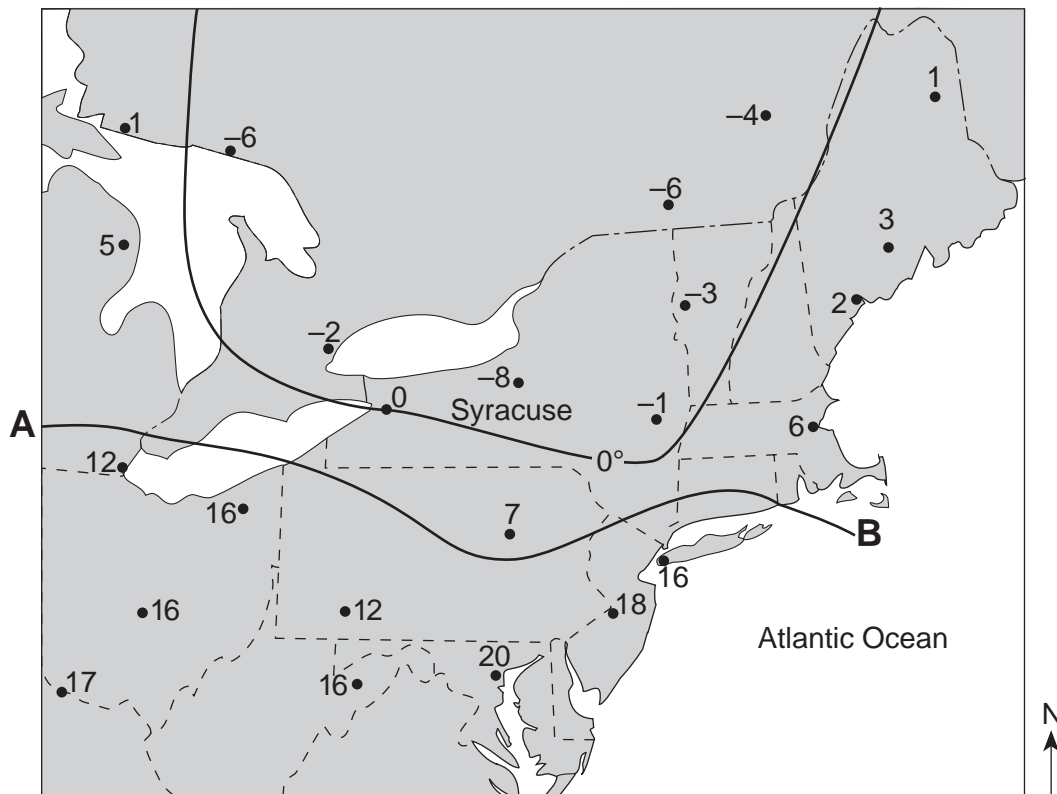
69 [1] Allow 1 credit. Acceptable responses include, but are not limited to:

- Earth's distance to the Sun changes in a cyclic pattern.
- Gravity is greater when Earth is closer to the Sun.
- Earth moves slower when it is farther from the Sun.
- Earth has an elliptical/slightly eccentric orbit.

70 [1] Allow 1 credit if the 0° isotherm is correctly drawn with each end drawn to the edge of the map. If additional isotherms are drawn, *all* isotherms must be correct to receive credit.

**Note:** The isotherm need not be continued over the lakes.

**Example of a 1-credit response:**



71 [1] Allow 1 credit for any value from  $-20^{\circ}\text{C}$  to  $-24^{\circ}\text{C}$ .

72 [1] Allow 1 credit for cP *or* cA *or* mP. Allow credit for either uppercase or lowercase letters.

**Note:** Do *not* allow credit if air-mass letters are reversed, such as Ac or Pc.

For students who used the Spanish edition, either exclusively or in conjunction with the English edition of the exam, allow credit for the correct two-letter air-mass symbol as it appears in either the English or Spanish *2011 Edition Reference Tables for Physical Setting/Earth Science*.

73 [1] Allow 1 credit. Acceptable responses include, but are not limited to:

- The ocean changes temperature more slowly than the nearby land does.
- Large bodies of water moderate climatic temperatures.
- A warm ocean current is flowing nearby.
- The water has a higher specific heat than the land does.

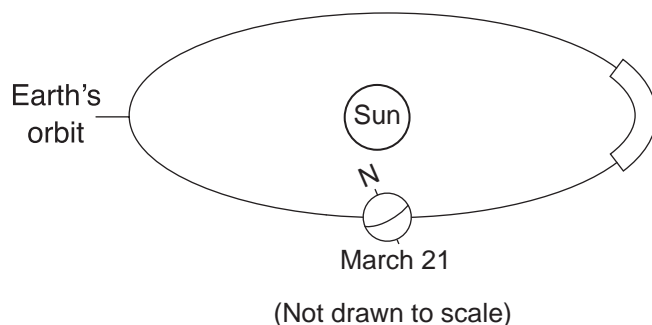
74 [1] Allow 1 credit. Acceptable responses include, but are not limited to:

- *Polaris* is not overhead.
- All compass directions are shown.
- The Sun's path is tilted.
- At the North Pole, the altitude of *Polaris* is  $90^{\circ}$ .

75 [1] Allow 1 credit if the center of the **X** is located within the clear outlined area shown below.

**Note:** Allow credit if a symbol other than an **X** is used.

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





- 76** [1] Allow 1 credit. Acceptable responses include, but are not limited to:
- the rotation of Earth
  - Earth is spinning on its axis.
- 77** [1] Allow 1 credit for an acceptable response for *both* rocks. Acceptable responses include, but are not limited to:
- Scoria:
- noncrystalline
  - glassy
  - vesicular
- Basalt:
- fine
  - nonvesicular
- 78** [1] Allow 1 credit. Acceptable responses include, but are not limited to:
- an uncertain or complex plate boundary
  - a divergent plate boundary
  - rift valley/East African Rift
- 79** [1] Allow 1 credit for *two* acceptable responses. Acceptable responses include, but are not limited to:
- Hawaii
  - Yellowstone
  - Canary Islands
  - Tasman Hot Spot
  - St. Helena Hot Spot
  - Galapagos Hot Spot
- Note:** Do *not* allow credit for Bouvet Hot Spot, Iceland Hot Spot, or Easter Island Hot Spot.
- 80** [1] Allow 1 credit. Acceptable responses include, but are not limited to:
- The shale and sandstone were metamorphosed by the heat of the lava.
  - The lava flow heated the rocks that it flowed over.
  - Contact metamorphism changed the top layer of formation A.
  - Heat and pressure formed hornfels and quartzite.
  - metamorphism/recrystallization

**81** [1] Allow 1 credit. Acceptable responses include, but are not limited to:

- Faulting displaced the sandstone layer.
- Two Peaks sandstone was broken by faults in two locations.
- faulting

**82** [1] Allow 1 credit for *three* acceptable responses. Acceptable responses include, but are not limited to:

- potassium feldspar *or* orthoclase
- quartz
- plagioclase feldspar
- biotite *or* mica
- muscovite
- amphibole *or* hornblende

**Note:** If a student answers “feldspar” as one of the three responses, credit is *not* allowed for other responses of specific feldspar minerals. If a student answers “mica” as one of the three responses, credit is *not* allowed for other responses of specific mica minerals.

**83** [1] Allow 1 credit if *all four* weather variables are correct.

Air temperature: 31°F

Dewpoint: 29°F

Wind speed: 10 knots

Cloud cover: 100%

**84** [1] Allow 1 credit. Acceptable responses include, but are not limited to:

- The dewpoint and air temperature are nearly the same.
- Snow is falling in Oswego.
- There is 100% cloud cover.
- Air pressure is low.

**85** [1] Allow 1 credit for 999.5 mb.

## Regents Examination in Physical Setting/Earth Science

August 2013

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

**The Chart for Determining the Final Examination Score for the August 2013 Regents Examination in Physical Setting/Earth Science will be posted on the Department's web site at: <http://www.p12.nysed.gov/assessment/> on Wednesday, August 14, 2013. 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

<b>August 2013 Physical Setting/Earth Science</b>			
<b>Question Numbers</b>			
Key Ideas/Performance Indicators	Part A	Part B	Part C
<b>Standard 1</b>			
Math Key Idea 1	32	49, 52, 54	66
Math Key Idea 2	27		68, 69
Math Key Idea 3	19		
Science Inquiry Key Idea 1	7, 33	36, 44, 45, 48, 57	67, 74, 76, 81
Science Inquiry Key Idea 2	8, 13		
Science Inquiry Key Idea 3	1, 2, 5, 8, 9, 10, 12, 15, 16, 17, 18, 19, 20, 23, 26, 28, 32, 33, 34, 35	37, 42, 43, 46, 55, 56, 57, 58, 64	71, 77, 78, 79, 82, 83, 85
Engineering Design Key Idea 1			
<b>Standard 2</b>			
Key Idea 1			
Key Idea 2			
Key Idea 3			
<b>Standard 6</b>			
Key Idea 1	1, 11, 22, 24, 25	38, 50, 59, 60, 61, 63	67, 72, 75, 79, 80
Key Idea 2	5, 20, 30, 31	39, 42, 48, 49, 51, 55, 62	73, 75, 80, 83, 84, 85
Key Idea 3		53, 54	70, 71, 72
Key Idea 4	28		
Key Idea 5	29, 30	37, 39, 40, 41, 47, 60, 61, 65	73, 84
Key Idea 6			
<b>Standard 7</b>			
Key Idea 1		65	
Key Idea 2			
<b>Standard 4</b>			
Key Idea 1	1, 2, 3, 4, 5, 6, 7, 8, 27, 28, 29, 30, 32	36, 39, 40, 41, 44, 45, 46, 47, 49, 50, 55, 56, 57, 58, 63, 64, 65	66, 68, 69, 74, 75, 76, 81
Key Idea 2	9, 10, 11, 12, 13, 14, 15, 16, 17, 18, 19, 20, 21, 22, 23, 24, 25, 31	37, 38, 42, 43, 48, 51, 52, 53, 54, 59, 60, 61, 62	67, 70, 71, 72, 73, 78, 79, 83, 84, 85
Key Idea 3	26, 33, 34, 35		77, 80, 82
<b>Reference Tables</b>			
ESRT 2011 Edition (Revised)	1, 2, 5, 8, 9, 10, 12, 15, 16, 17, 18, 19, 20, 23, 26, 28, 32, 33, 34, 35	37, 42, 43, 46, 55, 56, 57, 58, 64	71, 77, 78, 79, 82, 83, 85

The State Education Department / The University of the State of New York  
**Regents Examination in Physical Setting/Earth Science – August 2013**  
**Chart for Converting Total Test Raw Scores to Final Examination Scores (Scale Scores)**  
**(Not to be used for the Braille Edition)**

To determine the student's final score, locate the student's Total Performance Test Score across the top of the chart and the Total Written Test Score down the side of the chart. The point where the two scores intersect is the student's final examination score. For example, a student receiving a Total Performance Test Score of 10 and Total Written Test Score of 65 would receive a final examination score of 85.

		Total Performance Test Score																
		16	15	14	13	12	11	10	9	8	7	6	5	4	3	2	1	0
Total Written Test Score	85	100	99	99	99	98	98	97	96	96	95	94	93	91	90	88	87	85
	84	99	99	98	98	98	97	96	96	95	94	93	92	91	89	88	86	84
	83	99	99	98	98	98	97	96	96	95	94	93	92	91	89	88	86	84
	82	98	98	98	97	97	96	95	95	94	93	92	91	90	88	87	85	83
	81	98	98	98	97	97	96	95	95	94	93	92	91	90	88	87	85	83
	80	97	97	97	96	96	95	95	94	93	92	91	90	89	88	86	84	82
	79	97	96	96	95	95	94	94	93	92	91	90	89	88	87	85	83	82
	78	97	96	96	95	95	94	94	93	92	91	90	89	88	87	85	83	82
	77	96	95	95	95	94	94	93	92	91	91	89	88	87	86	84	83	81
	76	95	95	94	94	93	93	92	91	91	90	89	88	86	85	83	82	80
	75	95	95	94	94	93	93	92	91	91	90	89	88	86	85	83	82	80
	74	94	94	93	93	92	92	91	90	90	89	88	87	86	84	83	81	79
	73	93	93	92	92	92	91	90	90	89	88	87	86	85	83	82	80	78
	72	92	92	92	91	91	90	90	89	88	87	86	85	84	82	81	79	77
	71	92	92	92	91	91	90	90	89	88	87	86	85	84	82	81	79	77
	70	92	91	91	90	90	89	89	88	87	86	85	84	83	82	80	78	77
	69	91	90	90	89	89	88	88	87	86	85	84	83	82	81	79	77	76
	68	90	90	89	89	88	88	87	86	85	85	84	82	81	80	78	77	75
	67	89	89	88	88	87	87	86	85	85	84	83	82	80	79	77	76	74
66	89	89	88	88	87	87	86	85	85	84	83	82	80	79	77	76	74	
65	88	88	87	87	86	86	85	85	84	83	82	81	80	78	77	75	73	
64	87	87	87	86	86	85	84	84	83	82	81	80	79	77	76	74	72	
63	86	86	86	85	85	84	84	83	82	81	80	79	78	77	75	73	71	
62	86	85	85	84	84	83	83	82	81	80	79	78	77	76	74	72	71	
61	85	84	84	84	83	82	82	81	80	79	78	77	76	75	73	72	70	
60	84	84	83	83	82	82	81	80	80	79	78	77	75	74	72	71	69	
59	83	83	82	82	81	81	80	79	79	78	77	76	74	73	71	70	68	
58	82	82	81	81	81	80	79	79	78	77	76	75	74	72	71	69	67	
57	81	81	81	80	80	79	78	78	77	76	75	74	73	71	70	68	66	
56	80	80	80	79	79	78	78	77	76	75	74	73	72	71	69	67	65	
55	80	79	79	78	78	77	77	76	75	74	73	72	71	70	68	66	65	
54	79	78	78	78	77	77	76	75	74	74	72	71	70	69	67	66	64	
53	78	78	77	77	76	76	75	74	74	73	72	71	69	68	66	65	63	
52	77	77	76	76	75	75	74	73	73	72	71	70	69	67	66	64	62	
51	76	76	75	75	75	74	73	73	72	71	70	69	68	66	65	63	61	
50	75	75	75	74	74	73	73	72	71	70	69	68	67	65	64	62	60	
49	75	74	74	73	73	72	72	71	70	69	68	67	66	65	63	61	60	
48	74	73	73	72	72	71	71	70	69	68	67	66	65	64	62	60	59	
47	73	73	72	72	71	71	70	69	68	68	67	65	64	63	61	60	58	
46	72	72	71	71	70	70	69	68	68	67	66	65	63	62	60	59	57	
45	71	71	70	70	69	69	68	68	67	66	65	64	63	61	60	58	56	

**Final Examination Scores  
Regents Examination in Physical Setting/Earth Science – August 2013 – continued**

**Total Performance Test Score**

	16	15	14	13	12	11	10	9	8	7	6	5	4	3	2	1	0
<b>44</b>	70	70	70	69	69	68	67	67	66	65	64	63	62	60	59	57	55
<b>43</b>	69	69	69	68	68	67	67	66	65	64	63	62	61	60	58	56	54
<b>42</b>	68	67	67	67	66	65	65	64	63	62	61	60	59	58	56	55	53
<b>41</b>	67	67	66	66	65	65	64	63	63	62	61	60	58	57	55	54	52
<b>40</b>	66	66	65	65	64	64	63	62	62	61	60	59	57	56	54	53	51
<b>39</b>	65	65	64	64	64	63	62	62	61	60	59	58	57	55	54	52	50
<b>38</b>	64	64	64	63	63	62	61	61	60	59	58	57	56	54	53	51	49
<b>37</b>	63	62	62	61	61	60	60	59	58	57	56	55	54	53	51	49	48
<b>36</b>	62	61	61	61	60	60	59	58	57	57	55	54	53	52	50	49	47
<b>35</b>	61	61	60	60	59	59	58	57	57	56	55	54	52	51	49	48	46
<b>34</b>	60	60	59	59	58	58	57	56	56	55	54	53	52	50	49	47	45
<b>33</b>	58	58	58	57	57	56	56	55	54	53	52	51	50	48	47	45	43
<b>32</b>	58	57	57	56	56	55	55	54	53	52	51	50	49	48	46	44	43
<b>31</b>	57	56	56	55	55	54	54	53	52	51	50	49	48	47	45	43	42
<b>30</b>	55	55	54	54	53	53	52	51	51	50	49	48	46	45	43	42	40
<b>29</b>	54	54	53	53	52	52	51	51	50	49	48	47	46	44	43	41	39
<b>28</b>	52	52	52	51	51	50	50	49	48	47	46	45	44	43	41	39	37
<b>27</b>	52	51	51	50	50	49	49	48	47	46	45	44	43	42	40	38	37
<b>26</b>	51	50	50	50	49	48	48	47	46	45	44	43	42	41	39	38	36
<b>25</b>	49	49	48	48	47	47	46	45	45	44	43	42	40	39	37	36	34
<b>24</b>	48	48	47	47	47	46	45	45	44	43	42	41	40	38	37	35	33
<b>23</b>	46	46	46	45	45	44	44	43	42	41	40	39	38	37	35	33	31
<b>22</b>	46	45	45	44	44	43	43	42	41	40	39	38	37	36	34	32	31
<b>21</b>	44	44	43	43	42	42	41	40	40	39	38	37	35	34	32	31	29
<b>20</b>	43	43	42	42	41	41	40	39	39	38	37	36	35	33	32	30	28
<b>19</b>	41	41	41	40	40	39	39	38	37	36	35	34	33	31	30	28	26
<b>18</b>	41	40	40	39	39	38	38	37	36	35	34	33	32	31	29	27	26
<b>17</b>	39	39	38	38	37	37	36	35	34	34	33	31	30	29	27	26	24
<b>16</b>	38	38	37	37	36	36	35	34	34	33	32	31	29	28	26	25	23
<b>15</b>	36	36	36	35	35	34	33	33	32	31	30	29	28	26	25	23	21
<b>14</b>	35	35	35	34	34	33	33	32	31	30	29	28	27	26	24	22	20
<b>13</b>	34	33	33	33	32	31	31	30	29	28	27	26	25	24	22	21	19
<b>12</b>	32	32	31	31	30	30	29	28	28	27	26	25	23	22	20	19	17
<b>11</b>	31	31	30	30	30	29	28	28	27	26	25	24	23	21	20	18	16
<b>10</b>	29	29	29	28	28	27	27	26	25	24	23	22	21	20	18	16	14
<b>9</b>	28	27	27	27	26	26	25	24	23	23	21	20	19	18	16	15	13
<b>8</b>	27	27	26	26	25	25	24	23	23	22	21	20	18	17	15	14	12
<b>7</b>	25	25	24	24	24	23	22	22	21	20	19	18	17	15	14	12	10
<b>6</b>	24	23	23	22	22	21	21	20	19	18	17	16	15	14	12	10	9
<b>5</b>	23	22	22	21	21	20	20	19	18	17	16	15	14	13	11	9	8
<b>4</b>	21	21	20	20	19	19	18	17	17	16	15	14	12	11	9	8	6
<b>3</b>	19	19	19	18	18	17	16	16	15	14	13	12	11	9	8	6	4
<b>2</b>	18	18	18	17	17	16	16	15	14	13	12	11	10	9	7	5	3
<b>1</b>	17	16	16	16	15	14	14	13	12	11	10	9	8	7	5	4	2
<b>0</b>	15	15	14	14	13	13	12	11	11	10	9	8	6	5	3	2	0