

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

**PHYSICAL SETTING**  
**EARTH SCIENCE**

**Wednesday, January 27, 2010 — 9:15 a.m. to 12:15 p.m., only**

This is a test of your knowledge of Earth science. Use that knowledge to answer all questions in this examination. Some questions may require the use of the *2010 Edition Reference Tables for Physical Setting/Earth Science*. The reference tables are supplied separately. Be certain you have a copy of the *2010 Edition* of these reference tables before you begin the examination.

Your answer sheet for Part A and Part B–1 is the last page of this examination booklet. Turn to the last page and fold it along the perforations. Then, slowly and carefully, tear off your answer sheet and fill in the heading.

The answers to the questions in Part B–2 and Part C are to be written in your separate answer booklet. Be sure to fill in the heading on the front of your answer booklet.

You are to answer *all* questions in all parts of this examination according to the directions provided in the examination booklet. Record your answers to the Part A and Part B–1 multiple-choice questions on your separate answer sheet. Write your answers to the Part B–2 and Part C questions in your answer booklet. All work should be written in pen, except for graphs and drawings, which should be done in pencil. You may use scrap paper to work out the answers to the questions, but be sure to record all your answers on your separate answer sheet and in your answer booklet.

When you have completed the examination, you must sign the statement printed at the end of your separate answer sheet, indicating that you had no unlawful knowledge of the questions or answers prior to the examination and that you have neither given nor received assistance in answering any of the questions during the examination. Your answer sheet and answer booklet cannot be accepted if you fail to sign this declaration.

Notice. . .

A four-function or scientific calculator and a copy of the *2010 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.

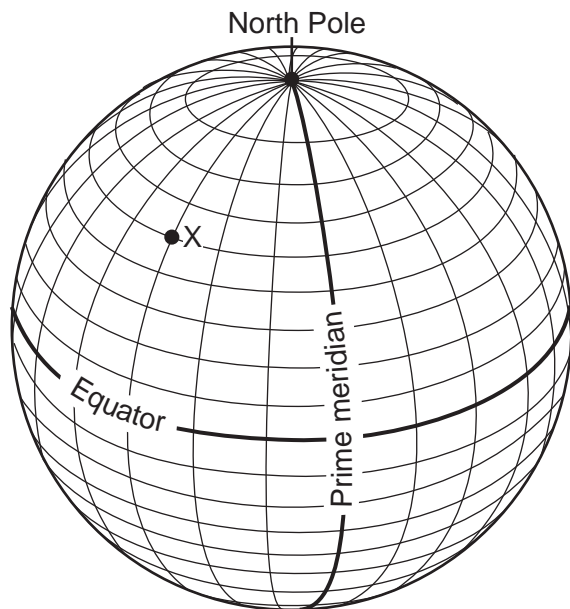
**DO NOT OPEN THIS EXAMINATION BOOKLET UNTIL THE SIGNAL IS GIVEN.**

## Part A

### Answer all questions in this part.

*Directions (1–35):* For *each* statement or question, write on your separate answer sheet the *number* of the word or expression that, of those given, best completes the statement or answers the question. Some questions may require the use of the *2010 Edition Reference Tables for Physical Setting/Earth Science*.

- 1 The diagram below shows latitude measurements every 10 degrees and longitude measurements every 15 degrees.



What is the latitude and longitude of point X?

- (1) 40° S 45° E                      (3) 60° S 30° W  
(2) 50° N 45° E                      (4) 75° N 30° E
- 2 In which sequence are the items listed from least total mass to greatest total mass?
- (1) solar system, Milky Way, universe  
(2) Milky Way, solar system, universe  
(3) universe, Milky Way, solar system  
(4) Milky Way, universe, solar system
- 3 The red shift of visible light waves that is observed by astronomers on Earth is used to determine the
- (1) sizes of nearby galaxies  
(2) relative motions of distant galaxies  
(3) densities of the planets  
(4) rotation periods of the planets

- 4 At which New York State location would an observer measure the highest altitude of *Polaris*?
- (1) New York City                      (3) Niagara Falls  
(2) Slide Mountain                      (4) Plattsburgh
- 5 How many days are required for the Moon to go from one full-Moon phase to the next full-Moon phase when viewed from Earth?
- (1) 24                                      (3) 29.5  
(2) 27.3                                      (4) 365
- 6 If the average distance between Earth and the Sun were doubled, what changes would occur in the Sun's gravitational pull on Earth and Earth's period of revolution?
- (1) Gravitational pull would decrease and period of revolution would increase.  
(2) Gravitational pull would decrease and period of revolution would decrease.  
(3) Gravitational pull would increase and period of revolution would increase.  
(4) Gravitational pull would increase and period of revolution would decrease.
- 7 The Foucault pendulum provides evidence of Earth's
- (1) revolution around the Sun in a geocentric solar system  
(2) revolution around the Sun in a heliocentric solar system  
(3) rotation on its axis in a geocentric solar system  
(4) rotation on its axis in a heliocentric solar system
- 8 The first *S*-wave arrived at a seismograph station 11 minutes after an earthquake occurred. How long after the arrival of the first *P*-wave did this first *S*-wave arrive?
- (1) 3 min 15 s                              (3) 6 min 05 s  
(2) 4 min 55 s                              (4) 9 min 00 s

9 An air mass classified as cT usually forms over which type of Earth surface?

- (1) cool water                      (3) warm water  
 (2) cool land                        (4) warm land

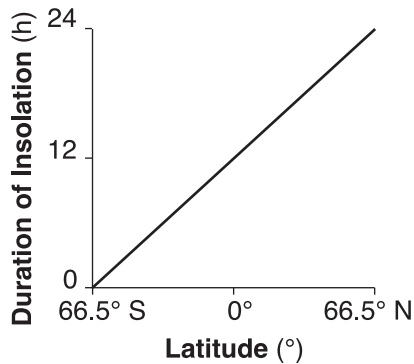
10 What is the dewpoint when the dry-bulb temperature is 24°C and the wet-bulb temperature is 21°C?

- (1) 16°C                              (3) 20°C  
 (2) 18°C                              (4) 21°C

11 During which process does water gain the most heat energy?

- (1) condensation                    (3) evaporation  
 (2) freezing                            (4) melting

12 The graph below shows the general relationship between latitude and the duration of insolation on a particular day of the year.



Which date is represented by the graph?

- (1) March 21                          (3) September 21  
 (2) June 21                            (4) December 21

13 Eurypterid fossils are abundant in the Bertie dolostone, a sedimentary rock layer found in western New York State. The presence of both the eurypterids and the dolostone indicates that, during the formation of this rock layer, this region of New York State was

- (1) covered by evaporating shallow seas  
 (2) uplifted and eroded  
 (3) buried beneath lava flows  
 (4) intensely metamorphosed

14 The table below shows information about the radioactive decay of carbon-14.

Half-Life	Mass of Original Carbon-14 Remaining (g)	Number of Years
0	1	0
1	$\frac{1}{2}$	5700
2	$\frac{1}{4}$	11,400
3	$\frac{1}{8}$	17,100

What is the amount of carbon-14 remaining after 28,500 years?

- (1)  $\frac{1}{16}$  g                              (3)  $\frac{1}{32}$  g  
 (2)  $\frac{15}{16}$  g                              (4)  $\frac{31}{32}$  g

15 Which coastal location experiences a cooler summer climate due to ocean currents?

- (1) southeast coast of North America  
 (2) northeast coast of Australia  
 (3) southwest coast of South America  
 (4) northwest coast of Europe

16 According to the fossil record, which group of organisms has existed for the greatest length of time?

- (1) gastropods                        (3) mammals  
 (2) corals                                (4) vascular plants

17 The division of Earth's geologic history into units of time called eons, eras, periods, and epochs is based on

- (1) absolute dating techniques  
 (2) fossil evidence  
 (3) climatic changes  
 (4) seismic data

- 18 Which statement is best supported by the fossil record?
- (1) Fossils are found in nearly all rocks.
  - (2) Fossils are found only in areas that were once under water.
  - (3) Most early life-forms that left fossil remains are now extinct.
  - (4) Most early life-forms that left fossil remains still exist today.

- 19 U-shaped valleys and parallel grooves in bedrock are characteristics of erosion by
- (1) mass movement
  - (2) wave action
  - (3) running water
  - (4) glacial ice

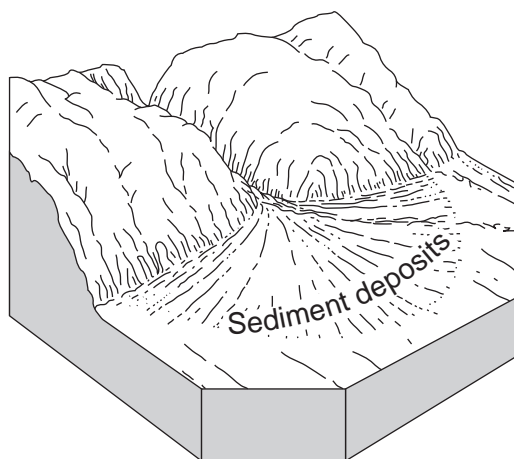
- 20 Which mineral is the major component of drywall?
- (1) talc
  - (2) calcite
  - (3) muscovite mica
  - (4) selenite gypsum

- 21 Which element is most abundant in Earth's crust?
- (1) nitrogen
  - (2) hydrogen
  - (3) oxygen
  - (4) silicon

- 22 What elevation and bedrock structure are generally found in the Catskills?
- (1) low elevation and horizontal sedimentary bedrock structure
  - (2) high elevation and horizontal sedimentary bedrock structure
  - (3) low elevation and folded metamorphic bedrock structure
  - (4) high elevation and folded metamorphic bedrock structure

- 23 The Mariana Trench was most likely created by the
- (1) convergence of the Pacific and Philippine Plates
  - (2) divergence of the Eurasian and Philippine Plates
  - (3) sliding of the Pacific Plate past the North American Plate
  - (4) movement of the Pacific Plate over the Hawaii Hot Spot

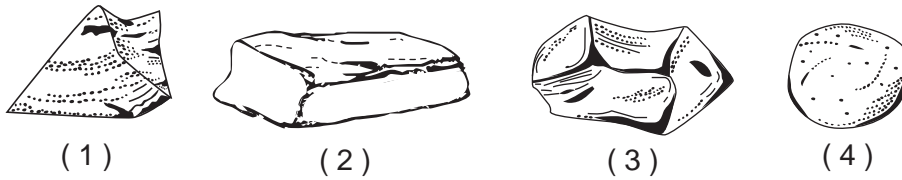
- 24 The landscape diagram below shows a fan-shaped pattern of sediment deposits.



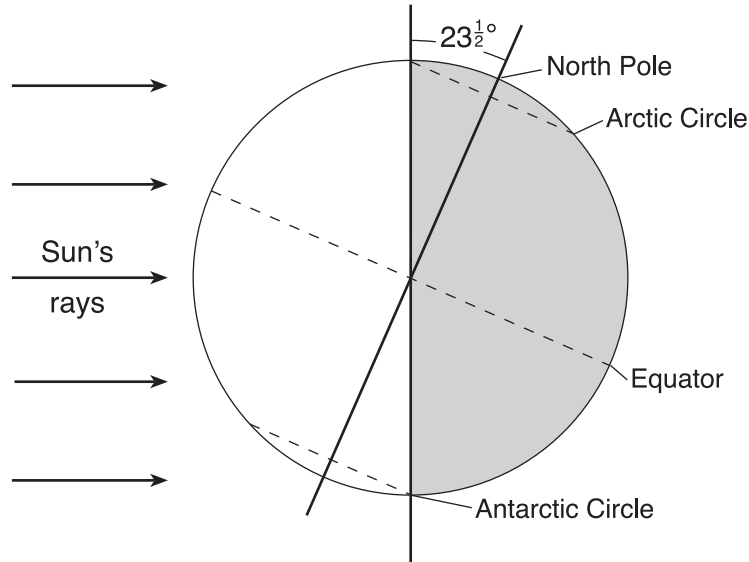
The fan-shaped pattern of these sediments is most likely the result of deposition by

- (1) glacial ice
- (2) ocean waves
- (3) running water
- (4) prevailing winds

25 Four quartz samples of equal size and shape were placed in a stream. Which of the four quartz samples below has most likely been transported farthest in the stream?



26 The diagram below shows Earth as viewed from space.



Which season is beginning in the Northern Hemisphere?

- (1) spring
- (2) summer
- (3) fall
- (4) winter

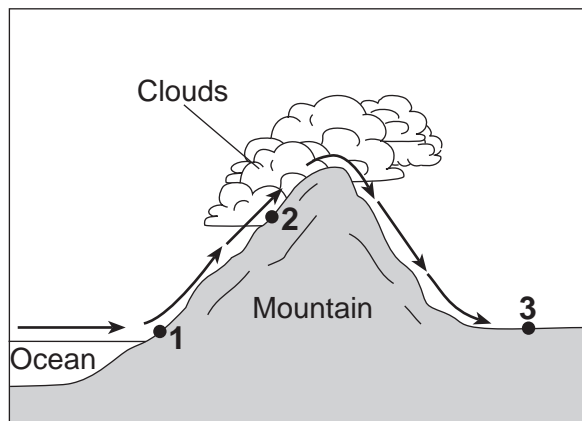
27 The table below shows the latitude and the average yearly temperature for four different cities.

City	Singapore	Calcutta	Washington, D.C.	Moscow
Latitude	1° N	23° N	39° N	56° N
Average Yearly Temperature	81°F	79°F	57°F	39°F

It can be inferred from this table that the cities at higher latitudes have

- (1) lower average yearly temperatures because these cities receive insolation at a higher angle during the year
- (2) lower average yearly temperatures because these cities receive insolation at a lower angle during the year
- (3) higher average yearly temperatures because these cities receive insolation at a higher angle during the year
- (4) higher average yearly temperatures because these cities receive insolation at a lower angle during the year

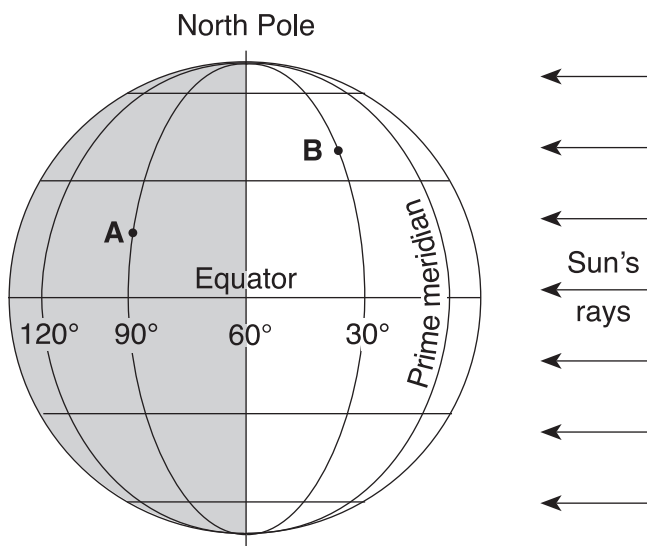
Base your answers to questions 28 and 29 on the diagram below, which shows air movement over a mountain range. The arrows indicate the direction of airflow. Points 1 through 3 represent locations on Earth's surface.



- 28 Compared to the climate at location 1, the climate at location 3 is
- |                       |                       |
|-----------------------|-----------------------|
| (1) cooler and drier  | (3) warmer and drier  |
| (2) cooler and wetter | (4) warmer and wetter |

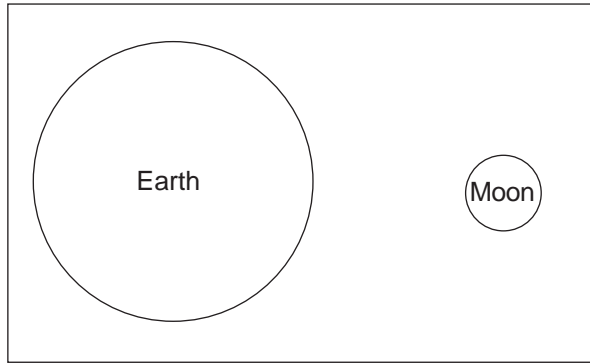
- 29 Cloud formation at location 2 is the direct result of air that is rising,
- |                            |                              |
|----------------------------|------------------------------|
| (1) expanding, and cooling | (3) compressing, and cooling |
| (2) expanding, and warming | (4) compressing, and warming |

30 The diagram below shows the latitude and longitude lines on Earth. Points A and B are locations on Earth's surface.

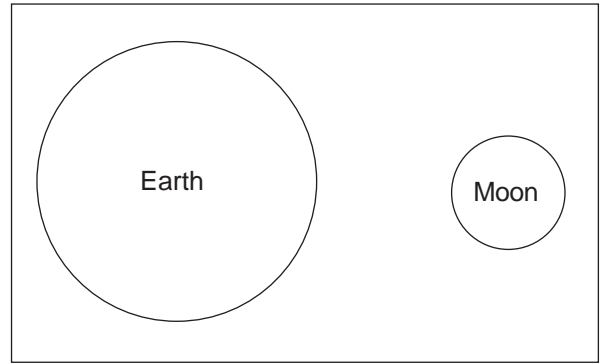


- If it is 4 a.m. at location A, what time is it at location B?
- |             |            |
|-------------|------------|
| (1) 10 a.m. | (3) 6 a.m. |
| (2) 2 a.m.  | (4) 8 a.m. |

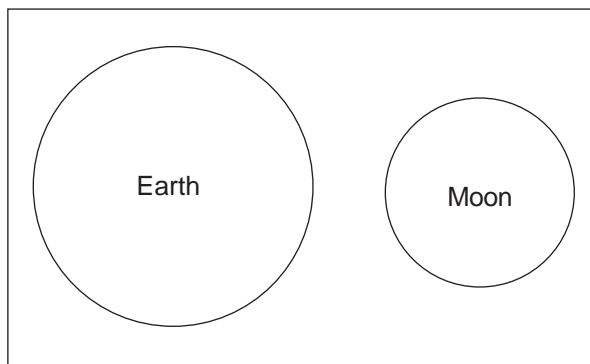
31 Which diagram best represents the size of the Moon, compared to Earth, when drawn to scale?



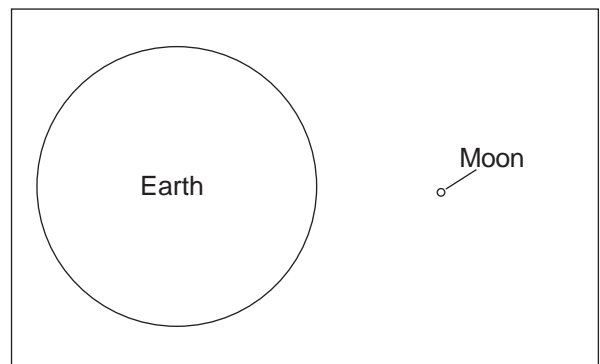
(1)



(3)

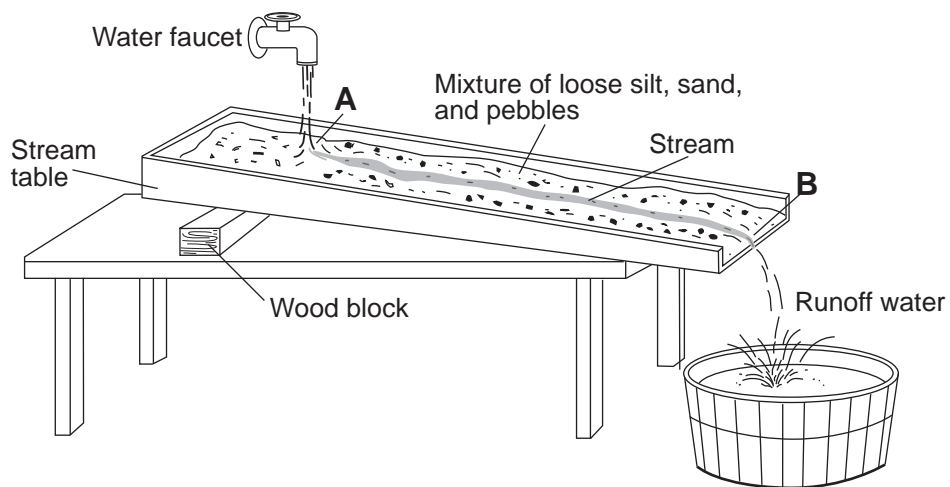


(2)



(4)

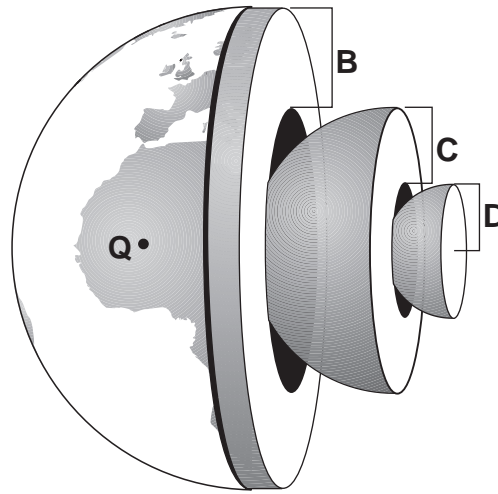
32 The model shown below illustrates stream erosion between locations A and B in the stream.



Placing a second block under location A will cause the stream's velocity to

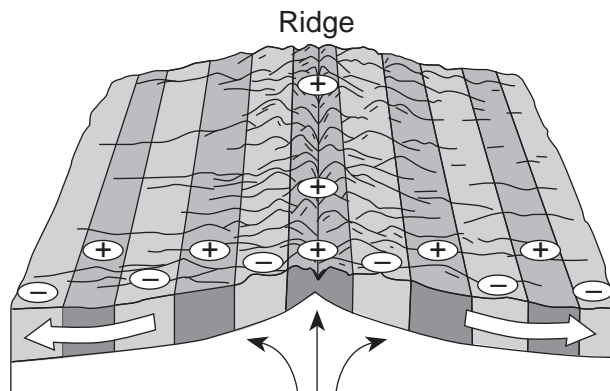
- (1) decrease and the rate of erosion to decrease
- (2) decrease and the rate of erosion to increase
- (3) increase and the rate of erosion to decrease
- (4) increase and the rate of erosion to increase

Base your answers to questions 33 and 34 on the diagram of Earth shown below. Letters *B*, *C*, and *D* represent layers of Earth. Letter *Q* represents a location on Earth's surface.



- 33 What is the probable density of the granitic bedrock at *Q*?
- |                           |                           |
|---------------------------|---------------------------|
| (1) 1.0 g/cm <sup>3</sup> | (3) 3.0 g/cm <sup>3</sup> |
| (2) 2.7 g/cm <sup>3</sup> | (4) 5.5 g/cm <sup>3</sup> |
- 34 Which letter best represents Earth's mantle?
- |              |              |
|--------------|--------------|
| (1) <i>Q</i> | (3) <i>C</i> |
| (2) <i>B</i> | (4) <i>D</i> |

35 The block diagram below represents the present ocean floor. The white arrows show the movement of the ocean floor and the black arrows show the movement of the asthenosphere.



Which characteristic of the ocean-floor bedrock is best described by the ⊕ and ⊖ symbols in the diagram?

- (1) ⊕ = older age; ⊖ = younger age
- (2) ⊕ = younger age; ⊖ = older age
- (3) ⊕ = reversed magnetic polarity; ⊖ = normal magnetic polarity
- (4) ⊕ = normal magnetic polarity; ⊖ = reversed magnetic polarity



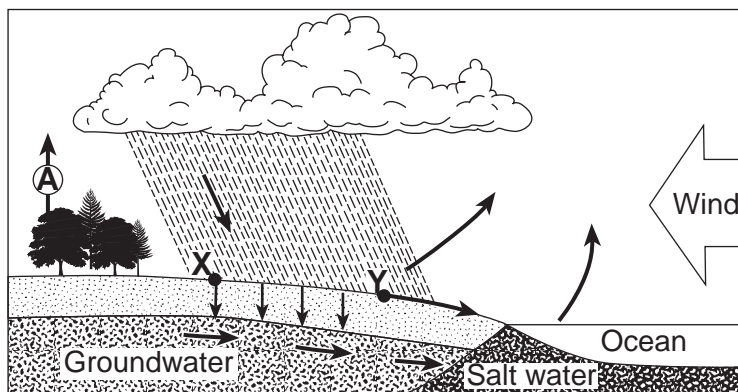
## Part B-1

### Answer all questions in this part.

*Directions (36–50): For each statement or question, write on your separate answer sheet the number of the word or expression that, of those given, best completes the statement or answers the question. Some questions may require the use of the 2010 Edition Reference Tables for Physical Setting/Earth Science.*

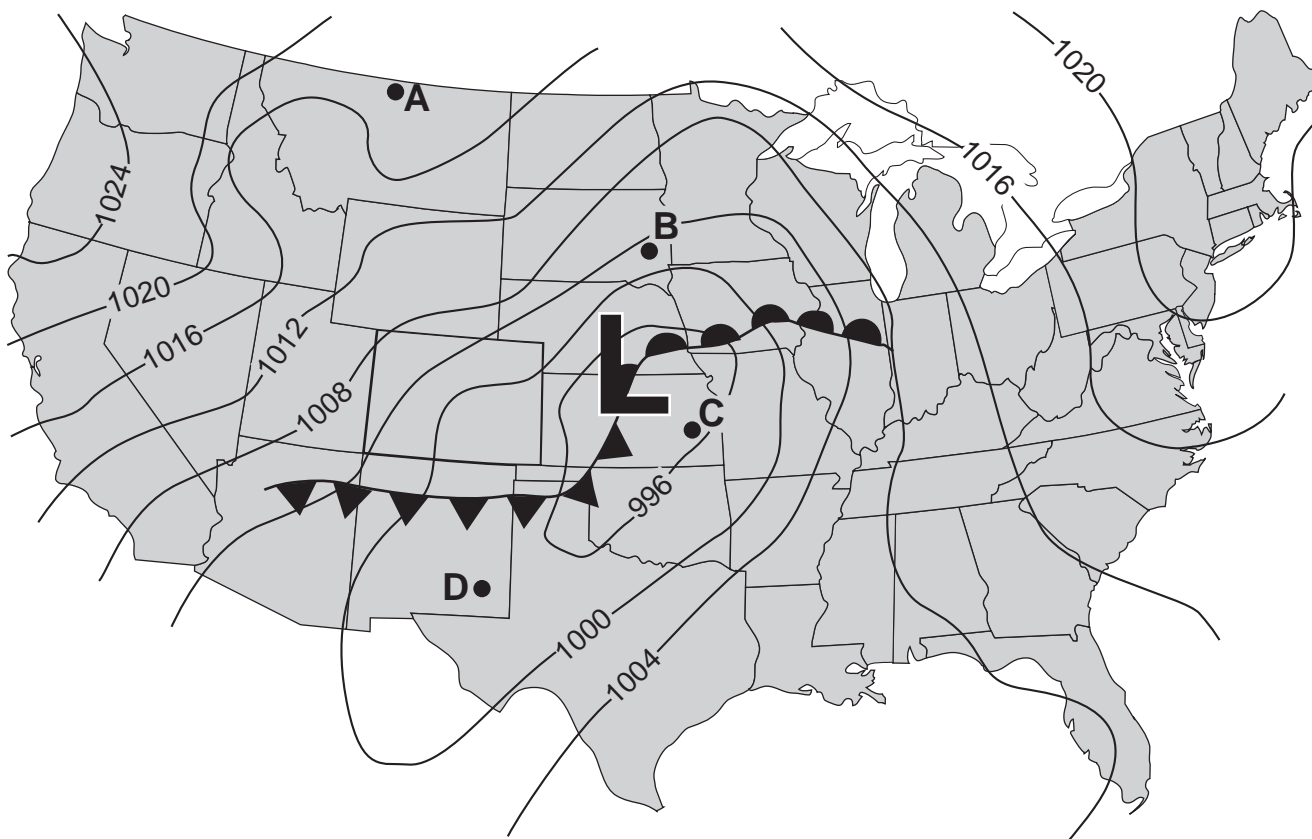
Base your answers to questions 36 through 39 on the diagram of the water cycle below. Letter A represents a process in the water cycle. Points X and Y represent locations on Earth's surface.

### Water Cycle



- 36 The process represented by A is
- |                   |                  |
|-------------------|------------------|
| (1) precipitation | (3) condensation |
| (2) transpiration | (4) saturation   |
- 37 Rainwater will enter the ground at X if the ground is
- |                               |                                 |
|-------------------------------|---------------------------------|
| (1) saturated and permeable   | (3) unsaturated and permeable   |
| (2) saturated and impermeable | (4) unsaturated and impermeable |
- 38 The amount of runoff at Y will increase as the
- |  |
|--|
| (1) slope of the land decreases                      |
| (2) porosity of the soil increases                   |
| (3) evaporation rate exceeds the infiltration rate   |
| (4) precipitation rate exceeds the infiltration rate |
- 39 Which process in the water cycle is directly responsible for cloud formation?
- |                  |                   |
|------------------|-------------------|
| (1) condensation | (3) precipitation |
| (2) infiltration | (4) evaporation   |
-

Base your answers to questions 40 through 43 on the weather map below, which shows a low-pressure system over the central United States. Isobars are labeled in millibars. Points A, B, C, and D represent locations on Earth's surface.



40 The circulation of surface winds associated with this low-pressure system is

- (1) clockwise and toward the center of the low
- (2) clockwise and away from the center of the low
- (3) counterclockwise and toward the center of the low
- (4) counterclockwise and away from the center of the low

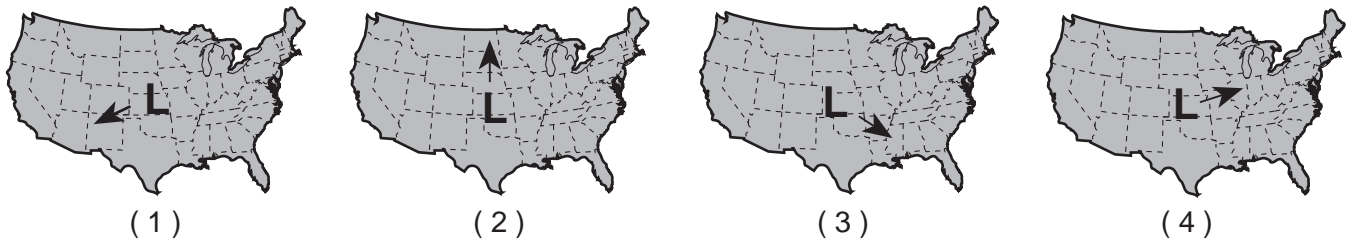
41 The air pressure at the center of this low is

- (1) 991 mb
- (2) 994 mb
- (3) 997 mb
- (4) 1001 mb

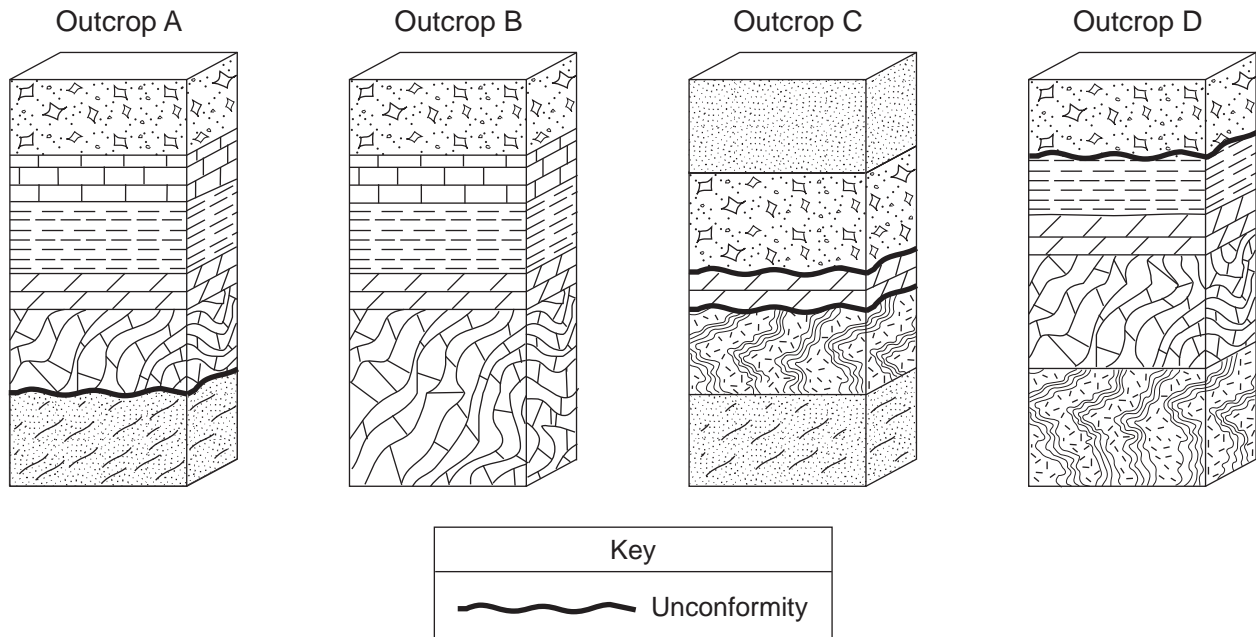
42 Which location is most likely experiencing the fastest wind speed?

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

43 Which map shows the most likely path this low-pressure center will follow during the next 12 hours?



Base your answers to questions 44 through 46 on the block diagrams of four rock outcrops, A, B, C, and D, located within 15 kilometers of each other. The rock layers have not been overturned.



44 When the rock layers at outcrops A, B, C, and D are correlated, which rock layer would be determined to be the oldest?

- (1) quartzite
- (2) marble
- (3) gneiss
- (4) sandstone

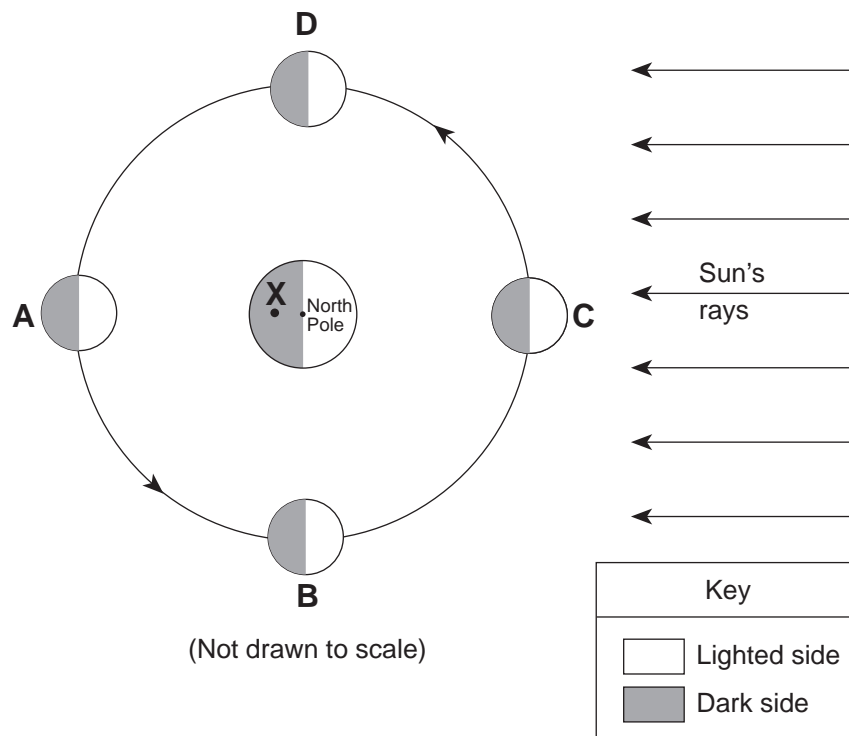
45 Which stream velocity carried only clay particles to the depositional environment where the shale formed?

- (1) 0.02 cm/s
- (2) 0.05 cm/s
- (3) 10 cm/s
- (4) 20 cm/s

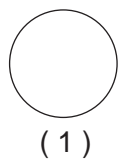
46 By which process was the quartzite formed?

- (1) deposition of clastic sediment
- (2) precipitation from seawater
- (3) metamorphism of sandstone
- (4) cementation of shells

Base your answers to questions 47 through 50 on the diagram below, which shows Earth and the Moon in relation to the Sun. Positions A, B, C, and D show the Moon at specific locations in its orbit. Point X is a location on Earth's surface.



- 47 What is the time of day at point X?
- |            |              |
|------------|--------------|
| (1) 6 a.m. | (3) 6 p.m.   |
| (2) noon   | (4) midnight |
- 48 On what date does the line separating day and night pass through Earth's North Pole, as shown in this diagram?
- |                 |              |
|-----------------|--------------|
| (1) December 21 | (3) March 21 |
| (2) January 21  | (4) June 21  |
- 49 A solar eclipse might occur when the Moon is at location
- |       |       |
|-------|-------|
| (1) A | (3) C |
| (2) B | (4) D |
- 50 Which phase of the Moon would be observed on Earth when the Moon is at location A?



## 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 *2010 Edition Reference Tables for Physical Setting/Earth Science*.

Base your answers to questions 51 through 54 on the passage below.

#### Earth's Early Atmosphere

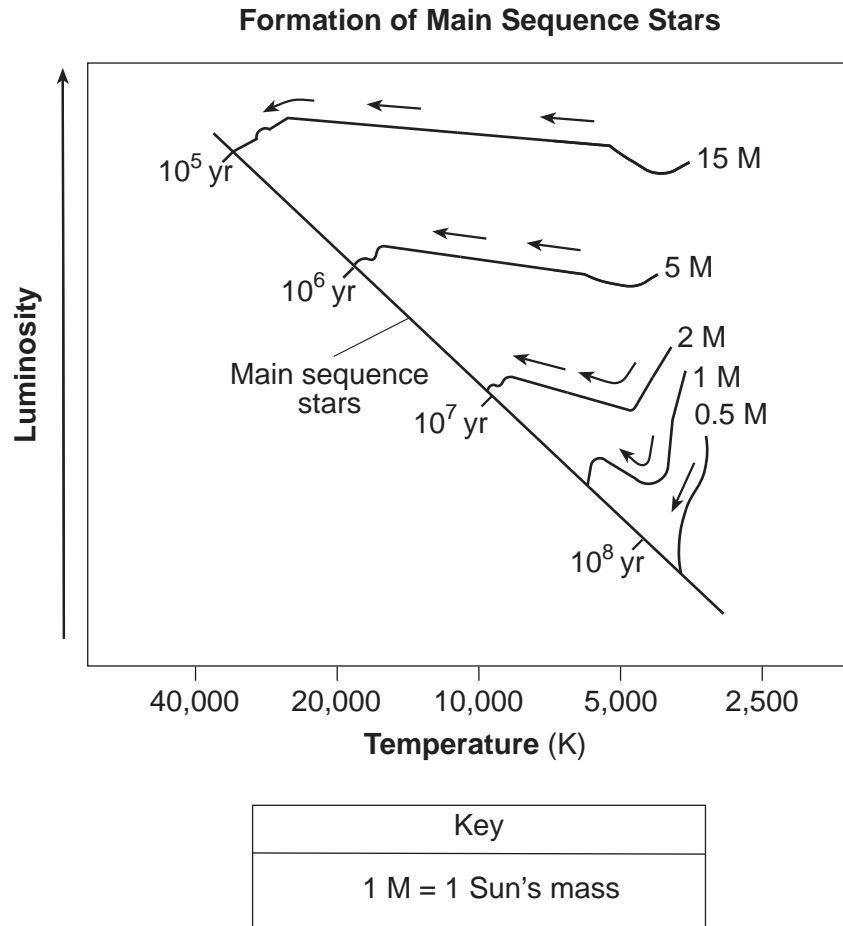
Early in Earth's history, the molten outer layers of Earth released gases to form an early atmosphere. Cooling and solidification of that molten surface formed the early lithosphere approximately 4.4 billion years ago. Around 3.3 billion years ago, photosynthetic organisms appeared on Earth and removed large amounts of carbon dioxide from the atmosphere, which allowed Earth to cool even faster. In addition, they introduced oxygen into Earth's atmosphere, as a by-product of photosynthesis. Much of the first oxygen that was produced reacted with natural Earth elements, such as iron, in the lithosphere and produced new varieties of rocks and minerals. Eventually, photosynthetic organisms produced enough oxygen so that it began to accumulate in Earth's atmosphere. About 450 million years ago, there was enough oxygen in the atmosphere to allow for the development of an ozone layer 30 to 50 kilometers above Earth's surface. This layer was thick enough to protect organisms developing on land from the ultraviolet radiation from the Sun.

- 51 State *one* reason why the first rocks on Earth were most likely igneous in origin. [1]
- 52 Identify *one* mineral with a red-brown streak that formed when oxygen in Earth's early atmosphere combined with iron. [1]
- 53 Identify the temperature zone of the atmosphere in which the ozone layer developed. [1]
- 54 Complete the pie graph *in your answer booklet* to show the percent by volume of nitrogen and oxygen gases currently found in Earth's troposphere. Label each section of the graph with the name of the gas. The percentage of other gases is shown. [1]
- 

Base your answers to questions 55 and 56 on the field map in your answer booklet. The field map shows temperatures, in degrees Fahrenheit, taken at several locations on a blacktop parking lot in New York State. The temperatures were recorded at 11:00 a.m. in early June.

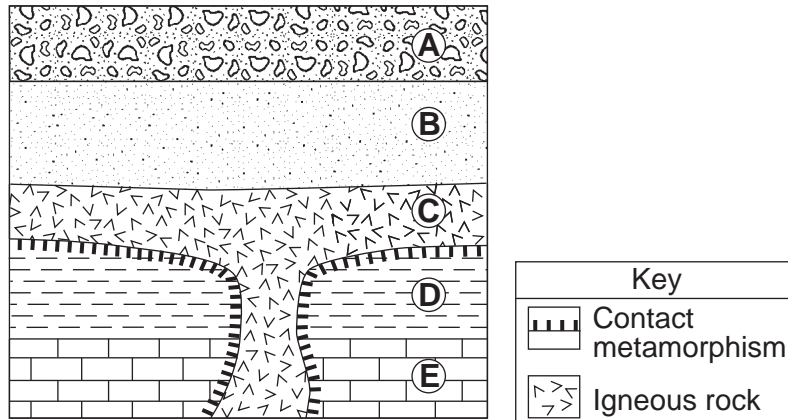
- 55 On the field map *in your answer booklet*, draw the 70°F and 80°F isotherms. The isotherms should be extended to the edges of the map. [1]
- 56 Explain why the surface of this parking lot usually becomes warmer from 11:00 a.m. to 12 noon each day. [1]
-

Base your answers to questions 57 through 59 on the graph below, which shows the early formation of main sequence stars of different masses (M). The arrows represent temperature and luminosity changes as each star becomes part of the main sequence. The time needed for each star to develop into a main sequence star is shown on the main sequence line.

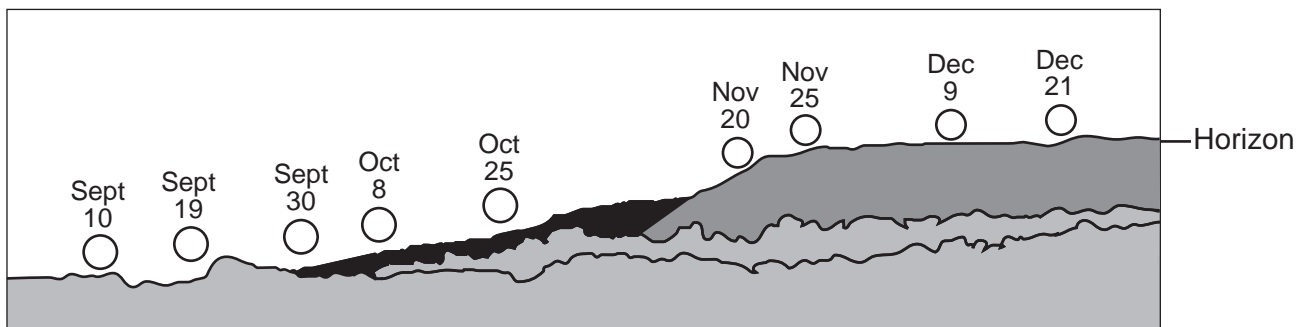


- 57 Describe the relationship between the original mass of a star and the length of time necessary for it to become a main sequence star. [1]
- 58 Describe the change in luminosity of a star that has an original mass of 0.5 M as it progresses to a main sequence star. [1]
- 59 Identify the force that causes the accumulation of matter that forms the stars. [1]
-

Base your answers to questions 60 through 62 on the cross section below, which shows rock units A through E that have not been overturned.



- 60 Identify *one* metamorphic rock that may be found along the boundary between rock units C and E. [1]
- 61 Describe *one* piece of evidence shown in the cross section that can be used to infer that rock unit A is younger than rock unit B. [1]
- 62 State the diameter of a particle normally found in rock unit B. [1]
- 
- 63 The diagram below shows the position of sunrise along the horizon for a period of time from September 10 until December 21, as seen by an observer near Binghamton, New York.

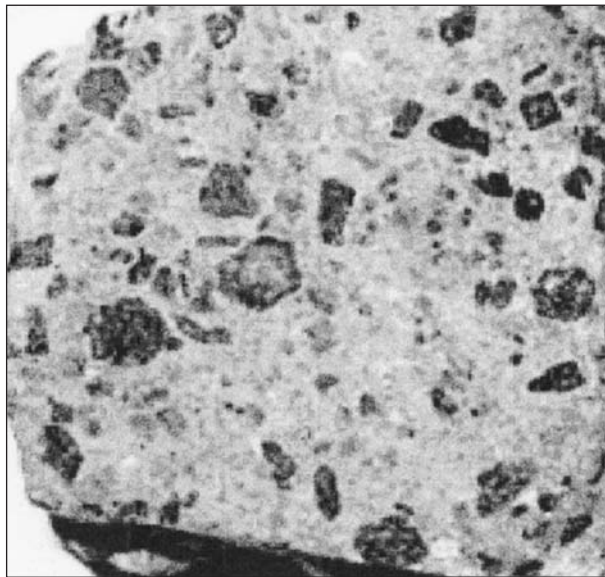


State *one* reason why the position of sunrise changes during this time period. [1]

Base your answers to questions 64 and 65 on the passage and photograph below. The passage describes the properties of porphyritic rocks. The photograph shows a sample of andesite rock that has a porphyritic texture.

### Porphyritic Rocks

Igneous rocks that have two distinctly different crystal sizes have a porphyritic texture. They contain large, coarse-grained crystals called phenocrysts, which are visible to the naked eye. These crystals are surrounded by fine-grained crystals called groundmass.



- 64 Identify the evidence shown by the photograph that indicates that two different cooling events occurred during the formation of this rock. [1]
- 65 The andesite sample in the photograph has a small percentage of quartz. List *three* other minerals that are found in this sample. [1]
-



### Part C

#### Answer all questions in this part.

*Directions (66–84):* Record your answers in the spaces provided in your answer booklet. Some questions may require the use of the *2010 Edition Reference Tables for Physical Setting/Earth Science*.

Base your answers to questions 66 and 67 on the data table below, which lists six stars, numbered 1 through 6, found in the constellation Taurus. The table shows the celestial coordinates for these six stars.

**Location of Six Stars in Taurus**

Star Number	Celestial Longitude (hours)	Celestial Latitude (degrees)	Name
1	5.6	21	<i>Zeta Tauri</i>
2	4.6	16	<i>Aldebaran</i>
3	4.3	15	<i>Gamma Tauri</i>
4	4.5	19	<i>Epsilon Tauri</i>
5	4.7	23	<i>Tau Tauri</i>
6	5.4	29	<i>Elnath</i>

66 On the grid *in your answer booklet*, use an **X** to plot the position of each of the six stars. Record the number of the plotted star beside each **X** and connect the **Xs** in the following order: 1, 2, 3, 4, 5, 6. The first star, *Zeta Tauri*, has been plotted for you. [1]

67 *In your answer booklet*, complete the data table that provides additional information about two of the stars in Taurus. [1]

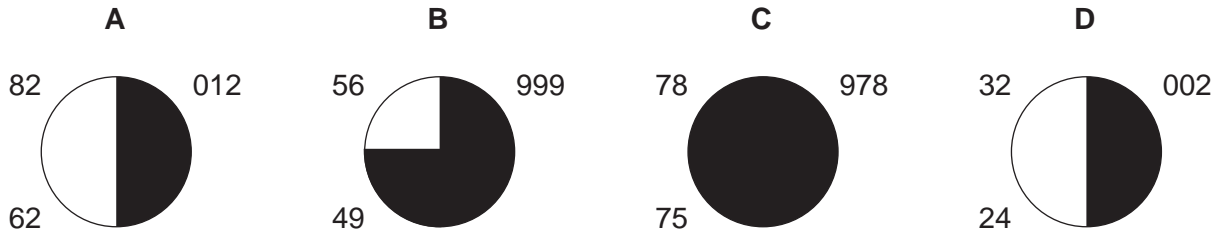
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68 The table below shows information about Earth's geologic history. Letter X represents information that has been omitted.

Period	Million Years Ago	Index Fossil Found in Bedrock	Important Geologic Event
Triassic	251 to 200	<i>Coelophysis</i>	X

Identify *one* important geologic event that occurred in New York State that could be placed in the box at X. [1]

Base your answers to questions 69 through 72 on the four weather station models, A, B, C, and D, below.



- 69 In your answer booklet, list the letters of the four station models, in order, from the station with the highest air-pressure reading to the station with the lowest air-pressure reading. [1]
- 70 Convert the air temperature at station A into degrees Celsius. [1]
- 71 What evidence indicates that station C has the highest relative humidity? [1]
- 72 On station model D in your answer booklet, draw the proper symbol to indicate a 25-knot wind coming from the west. [1]

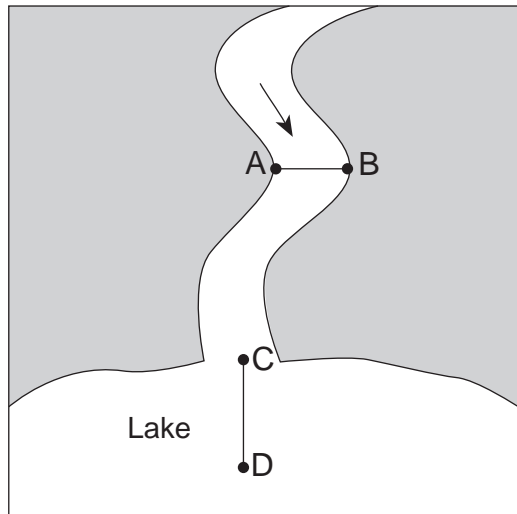
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Base your answers to questions 73 through 75 on the map in your answer booklet, which shows the inferred position of Earth's landmasses at a particular time in Earth's history. The Taconic Mountains are shown near a subduction zone where they formed after the coast of Laurentia collided with a volcanic island arc, closing the western part of the Iapetus Ocean.

- 73 On the map in your answer booklet, place an **X** to show the approximate location of the remaining part of the Iapetus Ocean. [1]
- 74 On the map in your answer booklet, draw an arrow on the Laurentia landmass to show its direction of movement relative to the subduction zone. [1]
- 75 Identify the geologic time period represented by the map. [1]

---

Base your answers to questions 76 through 78 on the map and the stream data table below. The map represents a stream flowing into a lake. An arrow shows the direction of streamflow. Points *A* and *B* are locations at the edge of the stream. Line *AB* is a reference line across the stream surface. Line *CD* is a reference line along the lake bottom from the mouth of the stream into the lake. The data table gives the depth of the water and distance from point *A*, in feet, along line *AB*.



	Point A	Stream Data Table								Point B
Distance from Point A (ft)	0	10	20	30	40	50	60	70	80	90
Depth of Water (ft)	0	2	4	7	11	13	16	17	10	0

76 On the grid in your answer booklet, construct a profile of the depth of water below line *AB*, following the directions below.

- Mark an appropriate numerical scale showing equal intervals on the axis labeled “Depth of Water.” The zero (0) on the depth of water axis represents the stream surface. [1]
- Using the data table, plot with an **X** the depth of water at each distance from point *A* to point *B*. Connect the **X**s with a smooth, curved line. Points *A* and *B* have already been plotted. [1]

77 Using the map and the data table, explain why the depth of water 20 feet from point *A* is different from the depth of water 20 feet from point *B*. [1]

78 The sediments being carried by the stream include clay, pebbles, sand, and silt. List these sediments in the most likely order of deposition from point *C* to point *D*. [1]

---

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

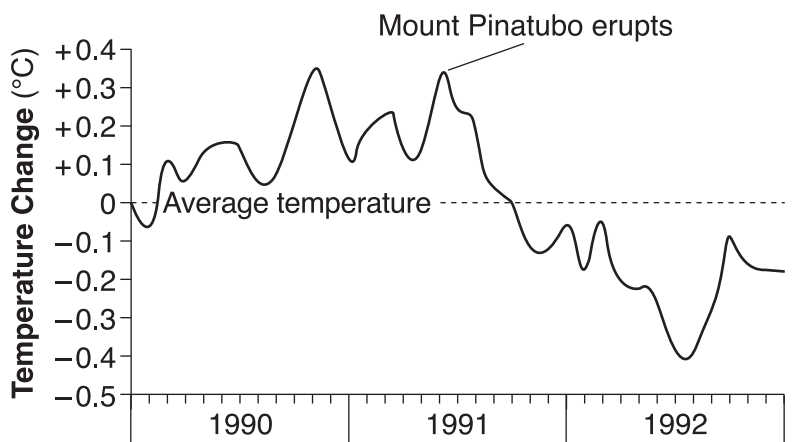
### Graywacke

Graywacke is a type of sandstone composed of a great variety of minerals. Unlike a “clean” sandstone where both the sand-sized grains and cement are composed mostly of quartz, graywacke is a “dirty” sandstone which can be composed of potassium feldspar, plagioclase feldspar, calcite, hornblende, and augite, as well as quartz.

Graywacke can be used for paving highways. The hard, massive bedrock is first drilled and then blasted into large chunks. Stone crushers grind these chunks into pebble-sized pieces. Truckloads of the graywacke pebbles are then hauled to plants where asphalt for paving is made.

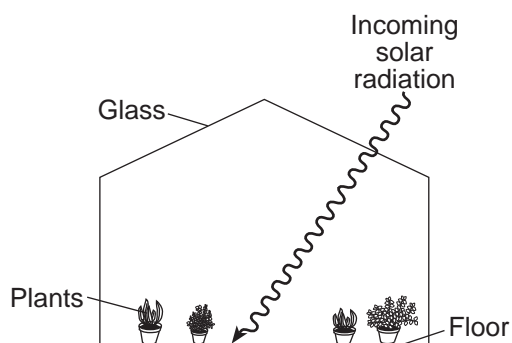
- 79 State *one* difference in the mineral composition of a “clean” sandstone and a “dirty” sandstone. [1]
- 80 Identify *one* rock-forming process that must have occurred after the sediments were deposited to form graywacke. [1]
- 81 State *one negative* environmental impact a graywacke quarry could have on the area where it is located. [1]

- 
- 82 The graph below shows the average changes in monthly global air temperatures from 1990 to 1992. The time of a major volcanic eruption of Mount Pinatubo in the Philippines is shown.



Explain how this volcanic eruption could have caused the general decrease in temperature shown by the graph. [1]

Base your answers to questions 83 and 84 on the diagram below, which shows incoming solar radiation passing through the glass of a greenhouse and then striking the floor.



83 Some of the incoming solar radiation is absorbed by the floor. Identify the type of electromagnetic energy reradiated by the floor. [1]

84 Describe *one* way the glass in the greenhouse acts like the greenhouse gases in Earth's atmosphere. [1]

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Tear Here

The University of the State of New York

REGENTS HIGH SCHOOL EXAMINATION

PHYSICAL SETTING  
EARTH SCIENCE

Wednesday, January 27, 2010 — 9:15 a.m. to 12:15 p.m., only

ANSWER SHEET

Student ..... Sex:  Male  Female Grade .....

Teacher ..... School .....

Record your answers to Part A and Part B-1 on this answer sheet.

Part A

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

Part A Score

Part B-1

- 36 ..... 44 .....
- 37 ..... 45 .....
- 38 ..... 46 .....
- 39 ..... 47 .....
- 40 ..... 48 .....
- 41 ..... 49 .....
- 42 ..... 50 .....
- 43 .....

Part B-1 Score

Write your answers to Part B-2 and Part C in your answer booklet.

The declaration below must be signed when you have completed the examination.

I do hereby affirm, at the close of this examination, that I had no unlawful knowledge of the questions or answers prior to the examination and that I have neither given nor received assistance in answering any of the questions during the examination.

Signature

Tear Here

Tear Here

Tear Here



**PHYSICAL SETTING  
EARTH SCIENCE**

Wednesday, January 27, 2010 — 9:15 a.m. to 12:15 p.m., only

**ANSWER BOOKLET**

Male

Student..... Sex:  Female

Teacher .....

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

Answer all questions in Part B-2 and Part C. Record your answers in this booklet.

<input type="text"/>	<b>Performance Test Score</b> (Maximum Score: 16)	
.....		
<b>Part</b>	<b>Maximum Score</b>	<b>Student's Score</b>
<b>A</b>	<b>35</b>	
<b>B-1</b>	<b>15</b>	
<b>B-2</b>	<b>15</b>	
<b>C</b>	<b>20</b>	
<b>Total Written Test Score</b> (Maximum Raw Score: 85)		<input type="text"/>
<b>Final Score</b> (from conversion chart)		<input type="text"/>
<b>Raters' Initials:</b> Rater 1 ..... Rater 2 .....		

<b>Part B-2</b>	
<b>51</b> _____	
_____	
<b>52</b> _____	
<b>53</b> _____	

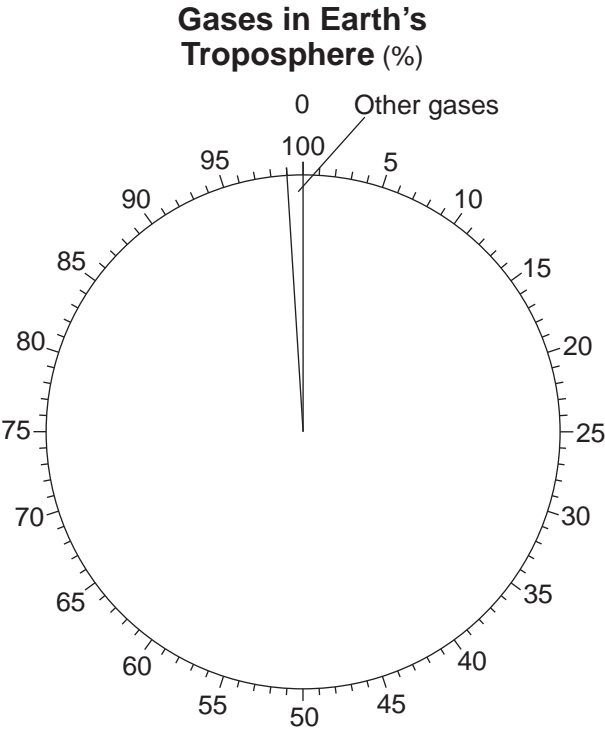
**For Raters Only**

51

52

53

54



54

55

77	75	73	71	68	65	63
78	78	77	73	69	65	62
82	80	78	74	70	68	65
81	80	77	75	70	67	64
79	77	76	73	68	66	62
75	75	72	69	65	63	61

55

56

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56

**For Raters  
Only**

57 \_\_\_\_\_

57

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58 \_\_\_\_\_

58

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59 \_\_\_\_\_

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60 \_\_\_\_\_

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61 \_\_\_\_\_

61

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62 \_\_\_\_\_ cm

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63 \_\_\_\_\_

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64 \_\_\_\_\_

64

\_\_\_\_\_

65 (1) \_\_\_\_\_

65

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

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

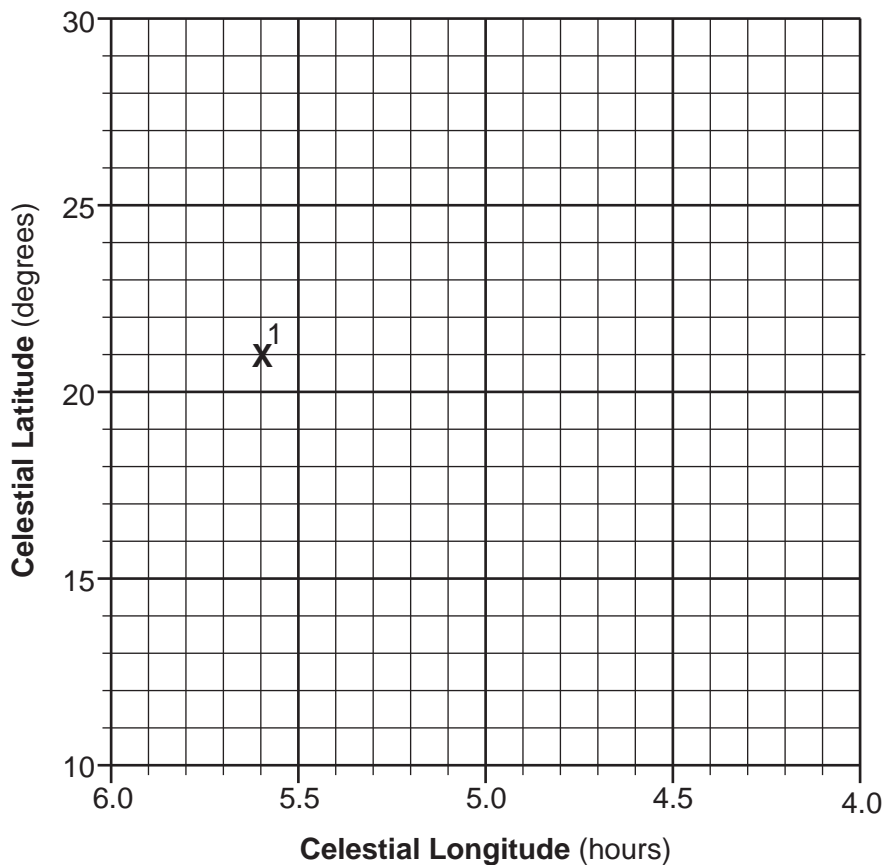
**Total Score for  
Part B-2**

Part C

For Raters Only

66

Location of Six Stars in Taurus



66

67

Stars	Temperature (K)	Luminosity (relative to the Sun)	Classification
<i>Aldebaran</i>		300	giant
<i>Elnath</i>	13,700	700	

67

68

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68

**For Raters  
Only**

69 Highest air-pressure station: \_\_\_\_\_



\_\_\_\_\_

\_\_\_\_\_

Lowest air-pressure station: \_\_\_\_\_

69

70 \_\_\_\_\_ °C

70

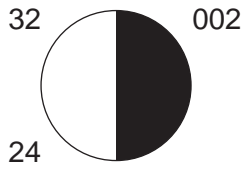
71 \_\_\_\_\_

71

\_\_\_\_\_

72

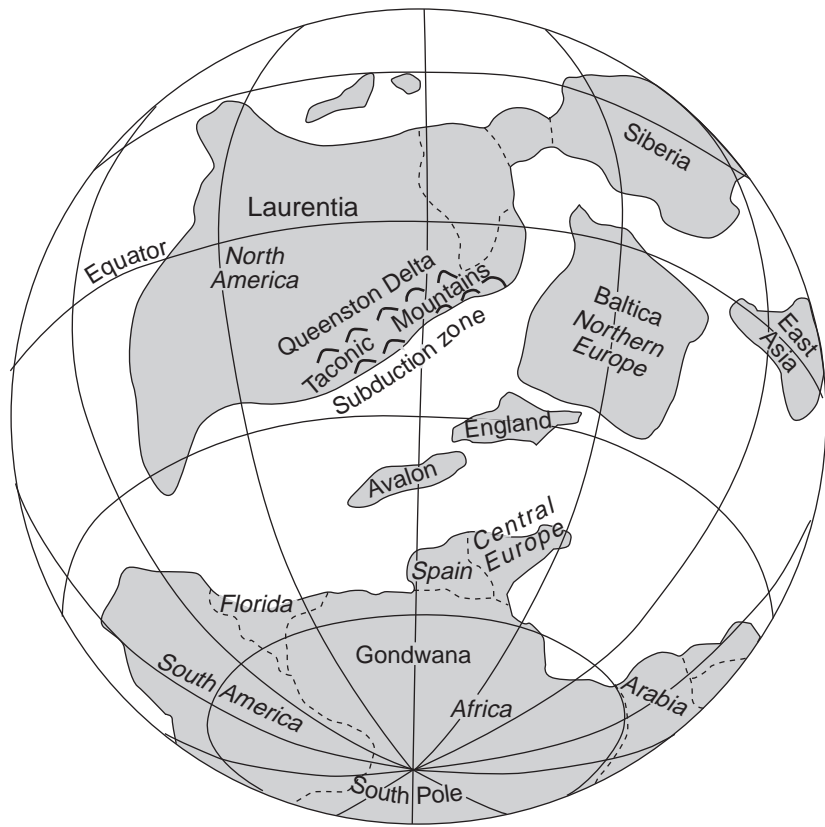
**D**



72

73-74

For Raters Only



73

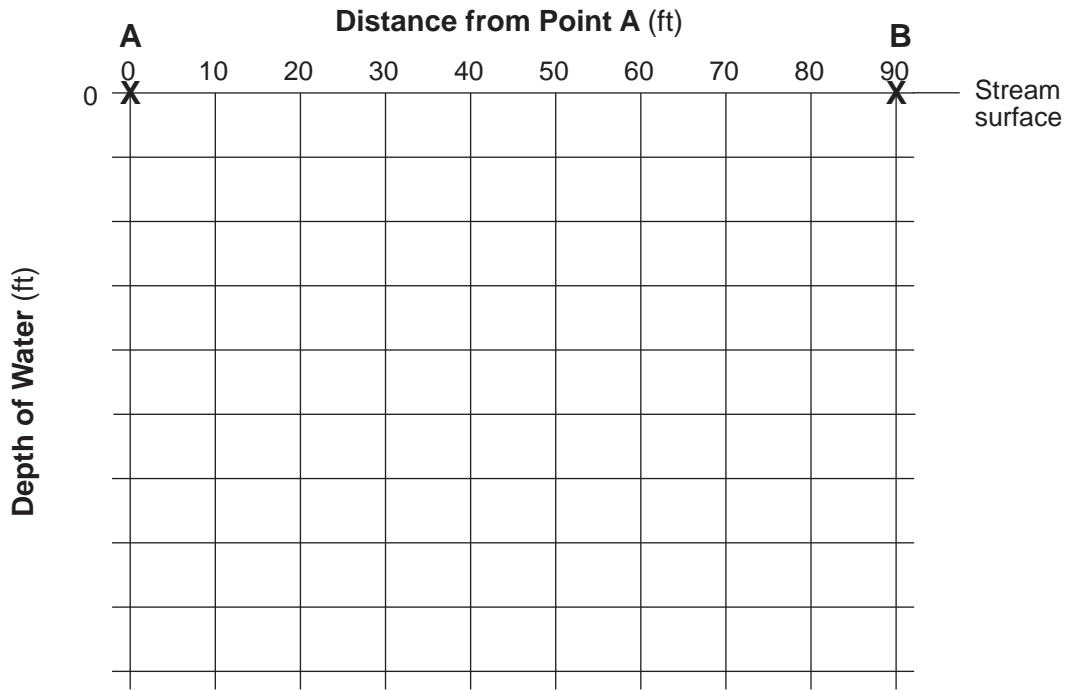
74

75 \_\_\_\_\_ Period

75

76

### Stream Profile



76

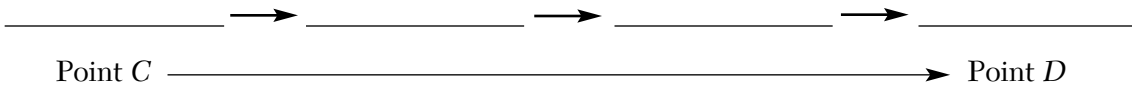
77

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77

78



78

79	_____
	_____
80	_____
	_____
81	_____
	_____
82	_____
	_____
83	_____
	_____
84	_____
	_____

**For Raters  
Only**

79

80

81

82

83

84

**Total Score  
for Part C**



# FOR TEACHERS ONLY

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

## PS-ES PHYSICAL SETTING/EARTH SCIENCE

Wednesday, January 27, 2010 — 9:15 a.m. to 12:15 p.m., only

### SCORING KEY AND RATING GUIDE

**Directions to the Teacher:**

Refer to the directions on page 3 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 <http://www.emsc.nysed.gov/osa/> and select the link "Examination 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			Part B-1	
1 . . . . . <b>2</b> . . . . .	13 . . . . . <b>1</b> . . . . .	25 . . . . . <b>4</b> . . . . .	36 . . . . . <b>2</b> . . . . .	44 . . . . . <b>1</b> . . . . .
2 . . . . . <b>1</b> . . . . .	14 . . . . . <b>3</b> . . . . .	26 . . . . . <b>4</b> . . . . .	37 . . . . . <b>3</b> . . . . .	45 . . . . . <b>1</b> . . . . .
3 . . . . . <b>2</b> . . . . .	15 . . . . . <b>3</b> . . . . .	27 . . . . . <b>2</b> . . . . .	38 . . . . . <b>4</b> . . . . .	46 . . . . . <b>3</b> . . . . .
4 . . . . . <b>4</b> . . . . .	16 . . . . . <b>1</b> . . . . .	28 . . . . . <b>3</b> . . . . .	39 . . . . . <b>1</b> . . . . .	47 . . . . . <b>4</b> . . . . .
5 . . . . . <b>3</b> . . . . .	17 . . . . . <b>2</b> . . . . .	29 . . . . . <b>1</b> . . . . .	40 . . . . . <b>3</b> . . . . .	48 . . . . . <b>3</b> . . . . .
6 . . . . . <b>1</b> . . . . .	18 . . . . . <b>3</b> . . . . .	30 . . . . . <b>4</b> . . . . .	41 . . . . . <b>2</b> . . . . .	49 . . . . . <b>3</b> . . . . .
7 . . . . . <b>4</b> . . . . .	19 . . . . . <b>4</b> . . . . .	31 . . . . . <b>1</b> . . . . .	42 . . . . . <b>2</b> . . . . .	50 . . . . . <b>1</b> . . . . .
8 . . . . . <b>2</b> . . . . .	20 . . . . . <b>4</b> . . . . .	32 . . . . . <b>4</b> . . . . .	43 . . . . . <b>4</b> . . . . .	
9 . . . . . <b>4</b> . . . . .	21 . . . . . <b>3</b> . . . . .	33 . . . . . <b>2</b> . . . . .		
10 . . . . . <b>3</b> . . . . .	22 . . . . . <b>2</b> . . . . .	34 . . . . . <b>2</b> . . . . .		
11 . . . . . <b>3</b> . . . . .	23 . . . . . <b>1</b> . . . . .	35 . . . . . <b>4</b> . . . . .		
12 . . . . . <b>2</b> . . . . .	24 . . . . . <b>3</b> . . . . .			



**Directions to the Teacher**

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

Use only *red* ink or *red* pencil in rating Regents papers. Do *not* correct the student's work by making insertions or changes of any kind.

On the detachable answer sheet for Part A and Part B–1, indicate by means of a check mark each incorrect or omitted answer. In the box provided at the end of each part, record the number of questions the student answered correctly for that part.

At least two science teachers must participate in the scoring of each student's responses to the Part B–2 and Part C open-ended questions. 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 all 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. In the student's answer booklet, record the number of credits earned for each answer in the box printed to the right of the answer lines or spaces for that question.

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

Raters should enter the scores earned for Part A, Part B–1, Part B–2, and Part C on the appropriate lines in the box printed on the answer booklet and then should add these four scores and enter the total in the box labeled "Total Written Test Score." The student's score for the Earth Science Performance Test should be entered in the space provided. Then, the student's raw scores on the performance test and written test should be converted to a scaled score by using the conversion chart that will be posted on the Department's web site <http://www.emsc.nysed.gov/osa/> on Wednesday, January 27, 2010. The student's scaled score should be entered in the labeled box on the student's answer booklet. The scaled score is the student's final examination score.

All student answer papers that receive a scaled score of 60 through 64 **must** be scored a second time. For the second scoring, a different committee of teachers may score the student's paper or the original committee may score the paper, except that no teacher may score the same open-ended questions that he/she scored in the first rating of the paper. The school principal is responsible for assuring that the student's final examination score is based on a fair, accurate, and reliable scoring of the student's answer paper.

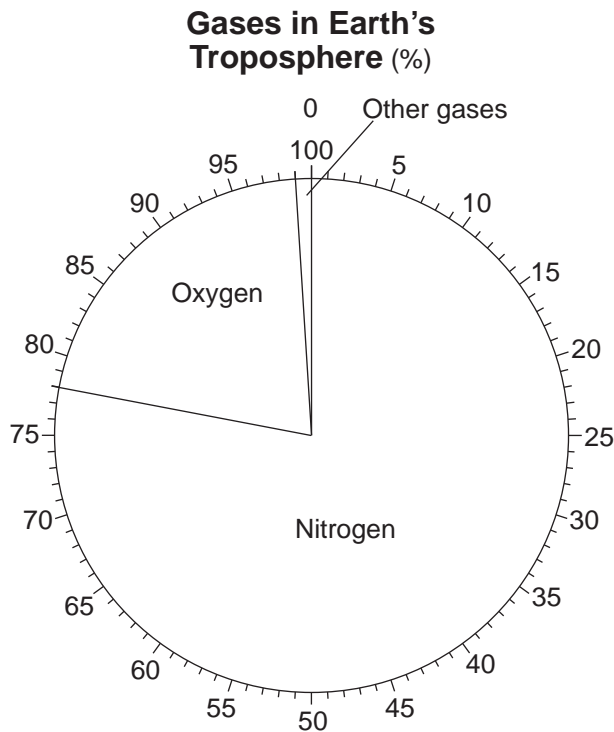
Because scaled scores corresponding to raw scores in the conversion chart may change from one examination to another, it is crucial that for each administration, the conversion chart provided for that administration be used to determine the student's final score.

**Part B–2**

**Allow a total of 15 credits for this part. The student must answer all questions in this part.**

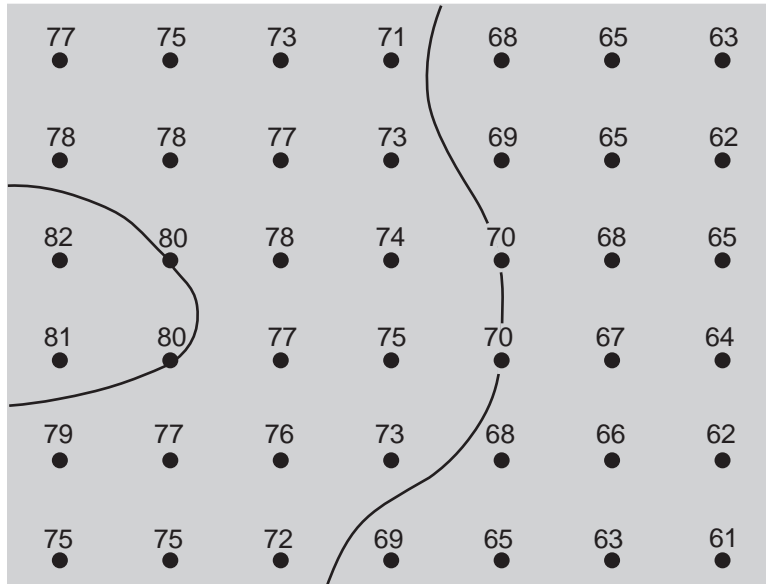
- 51 [1] Allow 1 credit. Acceptable responses include, but are not limited to:
- Cooling and solidification are processes that form igneous rocks.
  - As early Earth cooled and solidified, igneous rocks were formed.
  - The once molten Earth formed igneous rocks as it solidified.
- 52 [1] Allow 1 credit for hematite.
- 53 [1] Allow 1 credit for stratosphere.
- 54 [1] Allow 1 credit if the student-graphed sections are correctly drawn and labeled. The sections may be graphed in any order.

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



- 55 [1] Allow 1 credit if *both* isotherms are correctly drawn to the edges of the map. If additional isotherms are drawn, all isotherms must be correct to receive credit.

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



- 56 [1] Allow 1 credit. Acceptable responses include, but are not limited to:
- The intensity of insolation increases from 11:00 a.m. to 12 noon.
  - The Sun’s energy becomes more concentrated.
  - Sunlight becomes more direct.
  - The Sun rises higher in the sky.
- 57 [1] Allow 1 credit. Acceptable responses include, but are not limited to:
- Stars with larger masses reach the main sequence faster.
  - Small stars take more time to become main sequence stars.
  - inverse relationship between mass and time
- 58 [1] Allow 1 credit. Acceptable responses include, but are not limited to:
- The luminosity will decrease.
  - The star will be less luminous.
- 59 [1] Allow 1 credit for gravity *or* gravitational.

- 60** [1] Allow 1 credit. Acceptable responses include, but are not limited to:
- marble
  - hornfels
- 61** [1] Allow 1 credit. Acceptable responses include, but are not limited to:
- Rock unit *A* is above rock unit *B*.
  - Older sedimentary rock unit *B* is found beneath younger sedimentary rock unit *A*.
- 62** [1] Allow 1 credit for any value from 0.006 to 0.2 cm.
- 63** [1] Allow 1 credit. Acceptable responses include, but are not limited to:
- Earth is revolving around the Sun.
  - tilt of Earth's axis
  - parallelism of Earth's axis
- 64** [1] Allow 1 credit. Acceptable responses include, but are not limited to:
- two different crystal sizes
  - Coarse and fine crystals are found together.
- 65** [1] Allow 1 credit if all *three* minerals are correct.
- (1) plagioclase *or* plagioclase feldspar
  - (2) biotite *or* biotite mica
  - (3) amphibole *or* hornblende

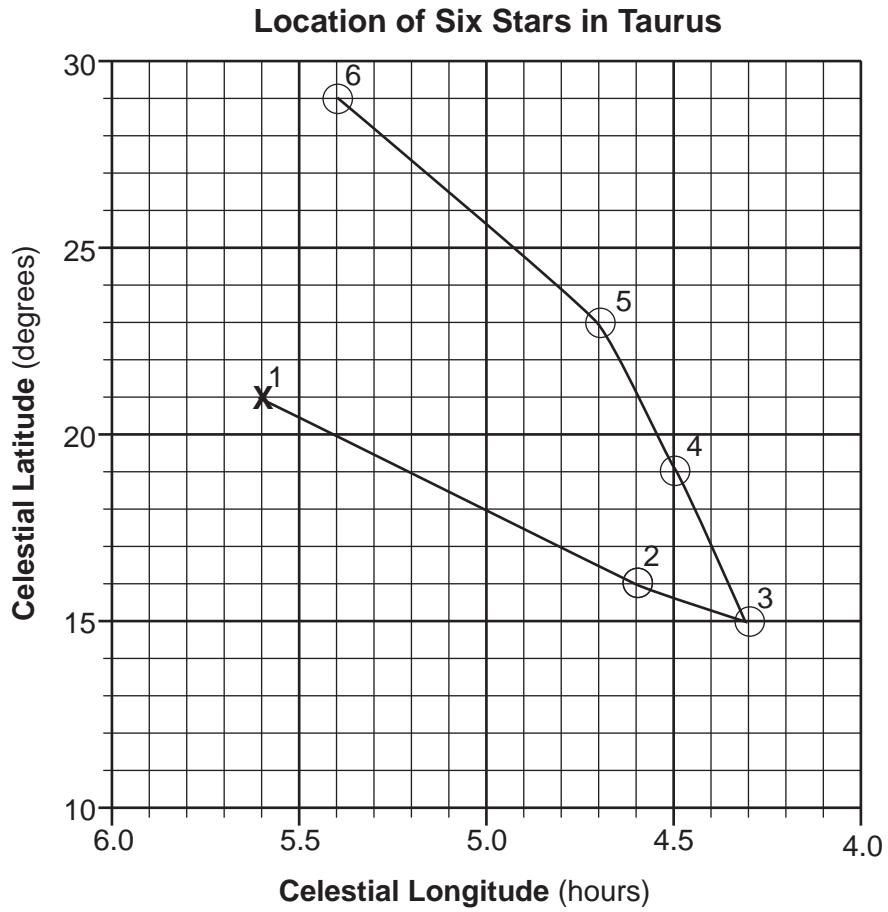
**Note:** Do *not* allow credit for feldspar, mica, *or* pyroxene.

**Part C**

**Allow a total of 20 credits for this part. The student must answer all questions in this part.**

- 66** [1] Allow 1 credit if all **Xs** are correctly plotted, numbered, and connected with a line that passes through the circles as shown below.

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



67 [1] Allow 1 credit if *both* the temperature and classification are correct.

Stars	Temperature (K)	Luminosity (relative to the Sun)	Classification
<i>Aldebaran</i>	3500 to 4100		
<i>Elnath</i>			main sequence

68 [1] Allow 1 credit. Acceptable responses include, but are not limited to:

- intrusion of the Palisades sill
- breakup of Pangaea

69 [1] Allow 1 credit for the letters in the order shown below.

Highest air-pressure station:     A    

    D    

    B    

Lowest air-pressure station:     C    

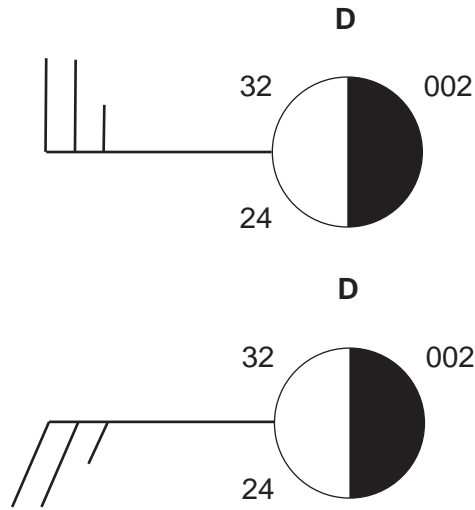
70 [1] Allow 1 credit for any value from 27°C to 28°C.

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

- The difference between air temperature and dewpoint is smallest at station C.
- Station C has the lowest air pressure.
- Station C has 100% overcast skies.



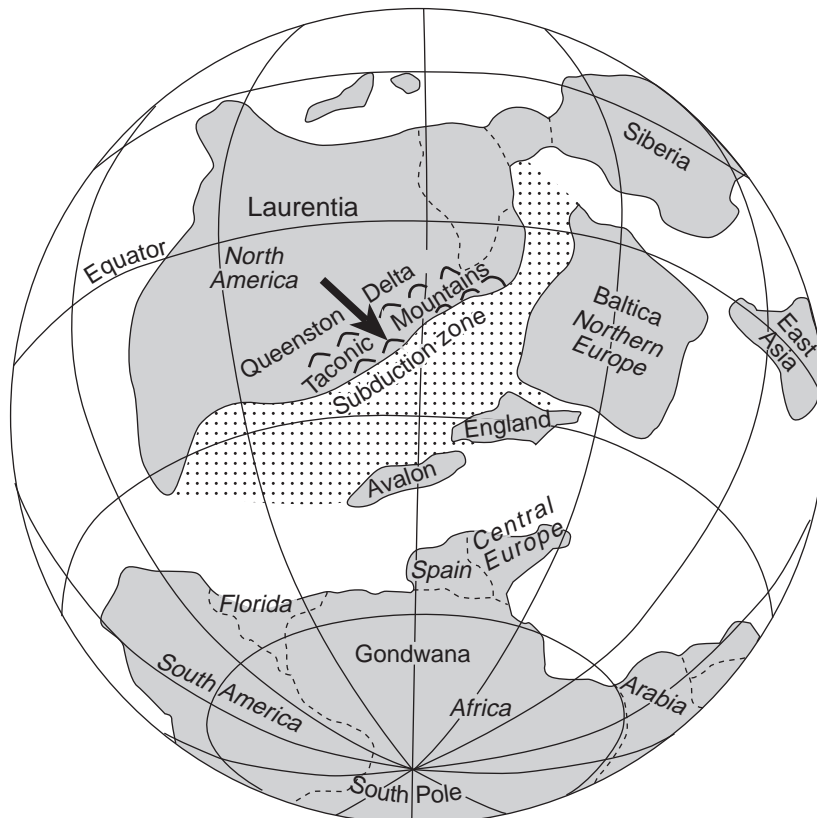
72 [1] Allow 1 credit if *both* wind direction and wind speed are correct as shown below.



73 [1] Allow 1 credit if the center of the student's **X** is within the stippled area.

74 [1] Allow 1 credit for an arrow that shows Laurentia moving to the southeast, south, *or* east.

**2-credit response for questions 73 and 74:**

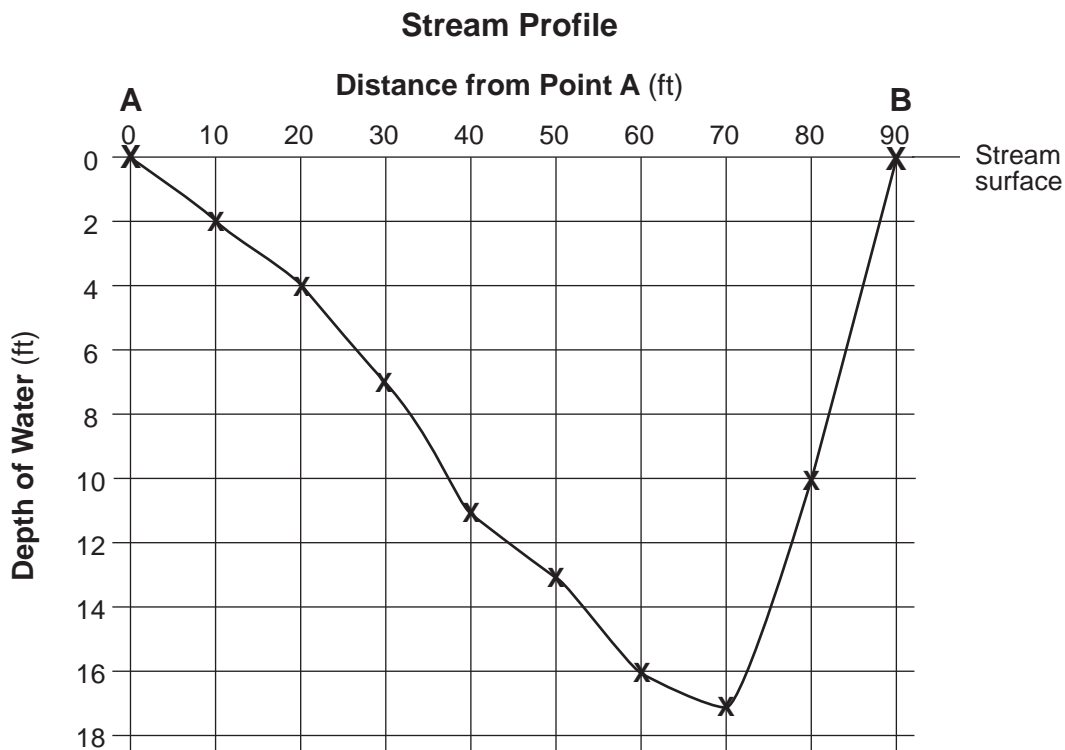


75 [1] Allow 1 credit for Ordovician Period.

76 [2] Allow a maximum of 2 credits, allocated as follows:

- Allow 1 credit for a scale that has numbers at equal intervals indicating an increasing depth from the stream surface and incorporates all data.
- Allow 1 credit if the centers of seven or eight student drawn **X**s are located within  $\pm 0.5$  feet, according to the student's scale, and are correctly connected with a line.

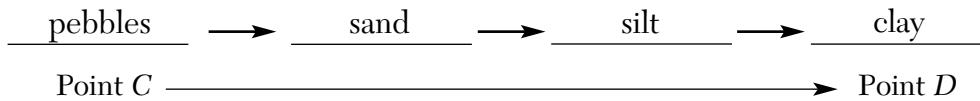
**Example of a 2-credit response:**



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

- More deposition has occurred on the inside of the meander.
- Stream water moves slower on the inside curve.
- More erosion occurs on the outside of a bend.
- B is located on the outside of a meander.

**78** [1] Allow 1 credit for listing all sediments in the order shown below.



**79** [1] Allow 1 credit. Acceptable responses include, but are not limited to:

- A “clean” sandstone contains mostly quartz, while a “dirty” sandstone can contain other minerals, such as plagioclase feldspar and calcite.
- A “dirty” sandstone contains many different minerals, while a “clean” sandstone contains mostly one kind of mineral.

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

- burial
- compaction
- cementation

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

- noise or dust from drilling, blasting, grinding, and/or truck traffic
- pollution of streams and groundwater
- increased erosion
- habitat destruction/deforestation

- 82** [1] Allow 1 credit. Acceptable responses include, but are not limited to:
- Dust from the volcanic eruption carried high in the atmosphere reflected and reduced the sunlight reaching Earth’s surface.
  - The eruption caused a decrease in atmospheric transparency.
  - Ash blocks insolation from reaching Earth’s surface.
- 83** [1] Allow 1 credit. Acceptable responses include, but are not limited to:
- infrared
  - microwaves
  - radio waves
- 84** [1] Allow 1 credit. Acceptable responses include, but are not limited to:
- allows most solar radiation to pass through
  - prevents some terrestrial radiation from escaping
  - traps heat

## Regents Examination in Physical Setting/Earth Science

January 2010

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

**The *Chart for Determining the Final Examination Score for the January 2010 Regents Examination in Physical Setting/Earth Science* will be posted on the Department's web site <http://www.emsc.nysed.gov/osa/> on Wednesday, January 27, 2010. 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.**

#### Submitting Online 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 [www.emsc.nysed.gov/osa/exameval](http://www.emsc.nysed.gov/osa/exameval).
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>January 2010 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		54, 55	66, 76
Math Key Idea 2	6, 10, 12, 14, 30	45, 57, 58	67
Math Key Idea 3		41, 42	
Science Inquiry Key Idea 1	3, 4, 7, 13, 25, 28, 29	37, 38, 39, 46, 51, 59, 64	80, 82, 83, 84
Science Inquiry Key Idea 2			
Science Inquiry Key Idea 3	4		
Engineering Design Key Idea 1			
<b>Standard 2</b>			
Key Idea 1		43	
Key Idea 2			
Key Idea 3			
<b>Standard 6</b>			
Key Idea 1	9, 19, 32	40, 51, 52, 59	71, 77, 78, 80
Key Idea 2	1, 16, 17, 23, 24, 26, 28, 30, 32, 33, 34, 35	36, 41, 42, 43, 44, 47, 48, 49, 50, 54, 55, 57, 58, 60, 61, 62, 63	69, 70, 71, 72, 73, 74, 75, 76, 84
Key Idea 3	2, 31		
Key Idea 4			
Key Idea 5	18, 26, 27, 28, 32	38, 41, 42, 43, 44, 51, 56, 57, 58, 63	74, 75
Key Idea 6			81
<b>Standard 7</b>			
Key Idea 1			81
Key Idea 2			
<b>Standard 4</b>			
Key Idea 1	1, 2, 3, 4, 5, 6, 7, 11, 13, 14, 16, 17, 18, 26, 30, 31	36, 37, 38, 39, 44, 47, 48, 49, 50, 57, 58, 59, 61, 63	66, 67, 68, 73, 75
Key Idea 2	8, 9, 10, 12, 15, 19, 22, 23, 24, 25, 27, 28, 29, 32, 33, 34, 35	40, 41, 42, 43, 45, 53, 54, 55, 56	69, 70, 71, 72, 74, 76, 77, 78, 82, 83, 84
Key Idea 3	20, 21	46, 51, 52, 60, 62, 64, 65	79, 80, 81
ESRT 2010 Edition	4, 6, 8, 9, 10, 11, 13, 14, 15, 16, 17, 18, 20, 21, 22, 23, 27, 31, 33, 34	44, 45, 46, 52, 53, 54, 60, 62, 64, 65	67, 68, 69, 70, 71, 72, 74, 75, 78, 80, 83







# Regents Examination in Physical Setting/Earth Science – January 2010

## 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 71 would receive a final examination score of 90.

		<b>Total Performance Test Score</b>																
		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	96	95	95	95	94	94	93	92	91	91	89	88	87	86	84	83	81
	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	93	93	92	92	92	91	90	90	89	88	87	86	85	83	82	80	78
	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	92	91	91	90	90	89	89	88	87	86	85	84	83	82	80	78	77
	68	91	90	90	89	89	88	88	87	86	85	84	83	82	81	79	77	76
	67	90	90	89	89	88	88	87	86	85	85	84	82	81	80	78	77	75
	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	88	88	87	87	86	86	85	85	84	83	82	81	80	78	77	75	73	
63	87	87	87	86	86	85	84	84	83	82	81	80	79	77	76	74	72	
62	86	86	86	85	85	84	84	83	82	81	80	79	78	77	75	73	71	
61	86	85	85	84	84	83	83	82	81	80	79	78	77	76	74	72	71	
60	85	84	84	84	83	82	82	81	80	79	78	77	76	75	73	72	70	
59	84	84	83	83	82	82	81	80	80	79	78	77	75	74	72	71	69	
58	83	83	82	82	81	81	80	79	79	78	77	76	74	73	71	70	68	
57	83	83	82	82	81	81	80	79	79	78	77	76	74	73	71	70	68	
56	82	82	81	81	81	80	79	79	78	77	76	75	74	72	71	69	67	
55	81	81	81	80	80	79	78	78	77	76	75	74	73	71	70	68	66	
54	80	80	80	79	79	78	78	77	76	75	74	73	72	71	69	67	65	
53	80	79	79	78	78	77	77	76	75	74	73	72	71	70	68	66	65	
52	79	78	78	78	77	77	76	75	74	74	72	71	70	69	67	66	64	
51	78	78	77	77	76	76	75	74	74	73	72	71	69	68	66	65	63	
50	77	77	76	76	75	75	74	73	73	72	71	70	69	67	66	64	62	
49	76	76	75	75	75	74	73	73	72	71	70	69	68	66	65	63	61	
48	75	75	75	74	74	73	73	72	71	70	69	68	67	65	64	62	60	
47	75	74	74	73	73	72	72	71	70	69	68	67	66	65	63	61	60	
46	74	73	73	72	72	71	71	70	69	68	67	66	65	64	62	60	59	
45	73	73	72	72	71	71	70	69	68	68	67	65	64	63	61	60	58	
44	72	72	71	71	70	70	69	68	68	67	66	65	63	62	60	59	57	

**Final Examination Scores  
January 2010 Examination in Physical Setting/Earth Science – continued**

**Total Performance Test Score**

	<b>16</b>	<b>15</b>	<b>14</b>	<b>13</b>	<b>12</b>	<b>11</b>	<b>10</b>	<b>9</b>	<b>8</b>	<b>7</b>	<b>6</b>	<b>5</b>	<b>4</b>	<b>3</b>	<b>2</b>	<b>1</b>	<b>0</b>
<b>43</b>	71	71	70	70	69	69	68	68	67	66	65	64	63	61	60	58	56
<b>42</b>	70	70	70	69	69	68	67	67	66	65	64	63	62	60	59	57	55
<b>41</b>	69	68	68	67	67	66	66	65	64	63	62	61	60	59	57	55	54
<b>40</b>	68	67	67	67	66	65	65	64	63	62	61	60	59	58	56	55	53
<b>39</b>	67	67	66	66	65	65	64	63	63	62	61	60	58	57	55	54	52
<b>38</b>	66	66	65	65	64	64	63	62	62	61	60	59	57	56	54	53	51
<b>37</b>	65	65	64	64	64	63	62	62	61	60	59	58	57	55	54	52	50
<b>36</b>	63	63	63	62	62	61	61	60	59	58	57	56	55	54	52	50	48
<b>35</b>	63	62	62	61	61	60	60	59	58	57	56	55	54	53	51	49	48
<b>34</b>	62	61	61	61	60	60	59	58	57	57	55	54	53	52	50	49	47
<b>33</b>	61	61	60	60	59	59	58	57	57	56	55	54	52	51	49	48	46
<b>32</b>	59	59	58	58	58	57	56	56	55	54	53	52	51	49	48	46	44
<b>31</b>	58	58	58	57	57	56	56	55	54	53	52	51	50	48	47	45	43
<b>30</b>	58	57	57	56	56	55	55	54	53	52	51	50	49	48	46	44	43
<b>29</b>	56	56	55	55	54	54	53	52	51	51	50	48	47	46	44	43	41
<b>28</b>	55	55	54	54	53	53	52	51	51	50	49	48	46	45	43	42	40
<b>27</b>	54	54	53	53	52	52	51	51	50	49	48	47	46	44	43	41	39
<b>26</b>	52	52	52	51	51	50	50	49	48	47	46	45	44	43	41	39	37
<b>25</b>	52	51	51	50	50	49	49	48	47	46	45	44	43	42	40	38	37
<b>24</b>	50	50	49	49	48	48	47	46	46	45	44	43	41	40	38	37	35
<b>23</b>	49	49	48	48	47	47	46	45	45	44	43	42	40	39	37	36	34
<b>22</b>	47	47	47	46	46	45	44	44	43	42	41	40	39	37	36	34	32
<b>21</b>	46	46	46	45	45	44	44	43	42	41	40	39	38	37	35	33	31
<b>20</b>	45	44	44	44	43	43	42	41	40	40	38	37	36	35	33	32	30
<b>19</b>	44	44	43	43	42	42	41	40	40	39	38	37	35	34	32	31	29
<b>18</b>	42	42	41	41	41	40	39	39	38	37	36	35	34	32	31	29	27
<b>17</b>	41	41	41	40	40	39	39	38	37	36	35	34	33	31	30	28	26
<b>16</b>	40	39	39	38	38	37	37	36	35	34	33	32	31	30	28	26	25
<b>15</b>	38	38	37	37	36	36	35	34	34	33	32	31	29	28	26	25	23
<b>14</b>	37	37	36	36	35	35	34	34	33	32	31	30	29	27	26	24	22
<b>13</b>	35	35	35	34	34	33	33	32	31	30	29	28	27	26	24	22	20
<b>12</b>	34	33	33	33	32	31	31	30	29	28	27	26	25	24	22	21	19
<b>11</b>	32	32	31	31	30	30	29	28	28	27	26	25	23	22	20	19	17
<b>10</b>	31	31	30	30	30	29	28	28	27	26	25	24	23	21	20	18	16
<b>9</b>	29	29	29	28	28	27	27	26	25	24	23	22	21	20	18	16	14
<b>8</b>	28	27	27	27	26	26	25	24	23	23	21	20	19	18	16	15	13
<b>7</b>	26	26	25	25	24	24	23	22	22	21	20	19	18	16	15	13	11
<b>6</b>	25	25	24	24	24	23	22	22	21	20	19	18	17	15	14	12	10
<b>5</b>	24	23	23	22	22	21	21	20	19	18	17	16	15	14	12	10	9
<b>4</b>	22	22	21	21	20	20	19	18	17	17	16	14	13	12	10	9	7
<b>3</b>	20	20	19	19	18	18	17	17	16	15	14	13	12	10	9	7	5
<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