

# PHYSICAL SETTING EARTH SCIENCE

Wednesday, August 17, 2022 — 8:30 to 11:30 a.m., only

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

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

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

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

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

**Notice ...**

A four-function or scientific calculator and a copy of the *2011 Edition Reference Tables for Physical Setting/Earth Science* must be available for you to use while taking this examination.

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

**Part A**

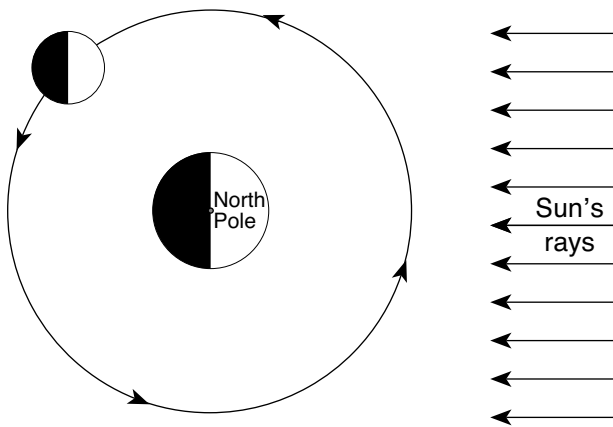
**Answer all questions in this part.**

*Directions (1–35):* For *each* statement or question, choose the word or expression that, of those given, best completes the statement or answers the question. Some questions may require the use of the *2011 Edition Reference Tables for Physical Setting/Earth Science*. Record your answers on your separate answer sheet.

- 1 Compared to the masses and densities of terrestrial planets, Jovian planets have
- (1) less mass and are less dense
  - (2) less mass and are more dense
  - (3) greater mass and are less dense
  - (4) greater mass and are more dense

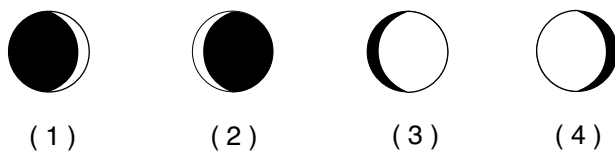
- 2 The star *Vega* has an average surface temperature of 10,000 K and has a luminosity 70 times greater than that of the Sun. Which type of star is *Vega*?
- (1) supergiant
  - (2) giant
  - (3) white dwarf
  - (4) main sequence

- 3 The diagram below represents the Moon at one position in its orbit around Earth.

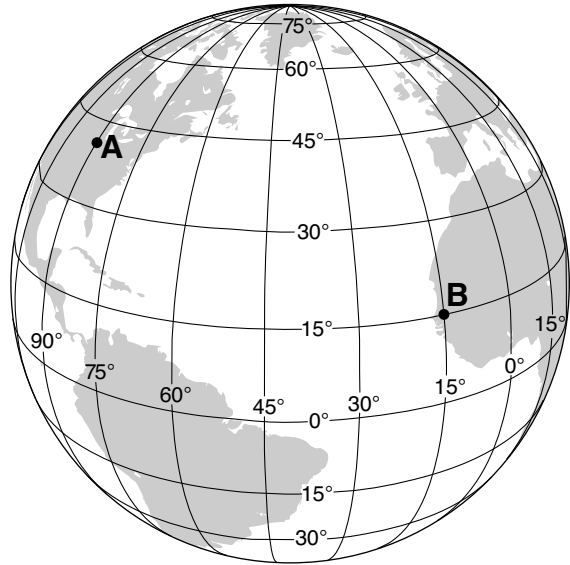


(Not drawn to scale)

Which diagram represents the phase of the Moon as viewed by an observer in New York State when the Moon is located at the position shown?



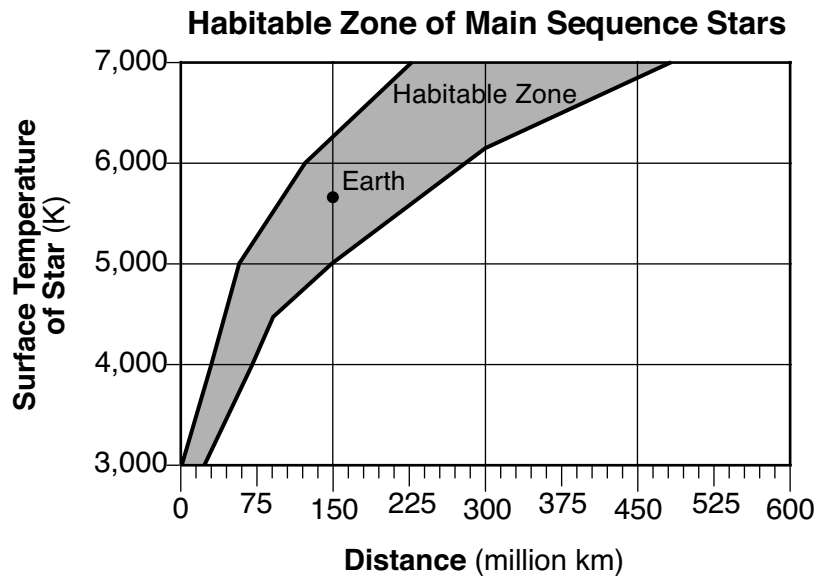
- 4 The diagram below represents latitudes and longitudes on Earth. Locations A and B are surface locations.



The solar time difference between location A and location B is

- (1) 5 hours
  - (2) 2 hours
  - (3) 3 hours
  - (4) 6 hours
- 5 The constellation Orion can be observed from New York State in the night sky during winter, but it can *not* be observed in the night sky during summer due to
- (1) Earth's rotation on its axis
  - (2) Earth's revolution around the Sun
  - (3) Orion's rotation on its axis
  - (4) Orion's revolution around Earth
- 6 What is Earth's approximate rate of movement along its orbit?
- (1) 1° per day
  - (2) 1° per hour
  - (3) 15° per day
  - (4) 15° per hour

7 The graph below shows the possible distances, in millions of kilometers, that a planet could be from a star in order to possibly support life as we know it (the Habitable Zone), based on the star's surface temperature in Kelvin (K). The location of Earth has been plotted based on our Sun's surface temperature of 5778 K.



Which planet in our solar system would be in the Habitable Zone, if the Sun's surface temperature was 4000 K?

- (1) Mercury
- (2) Venus
- (3) Mars
- (4) Jupiter

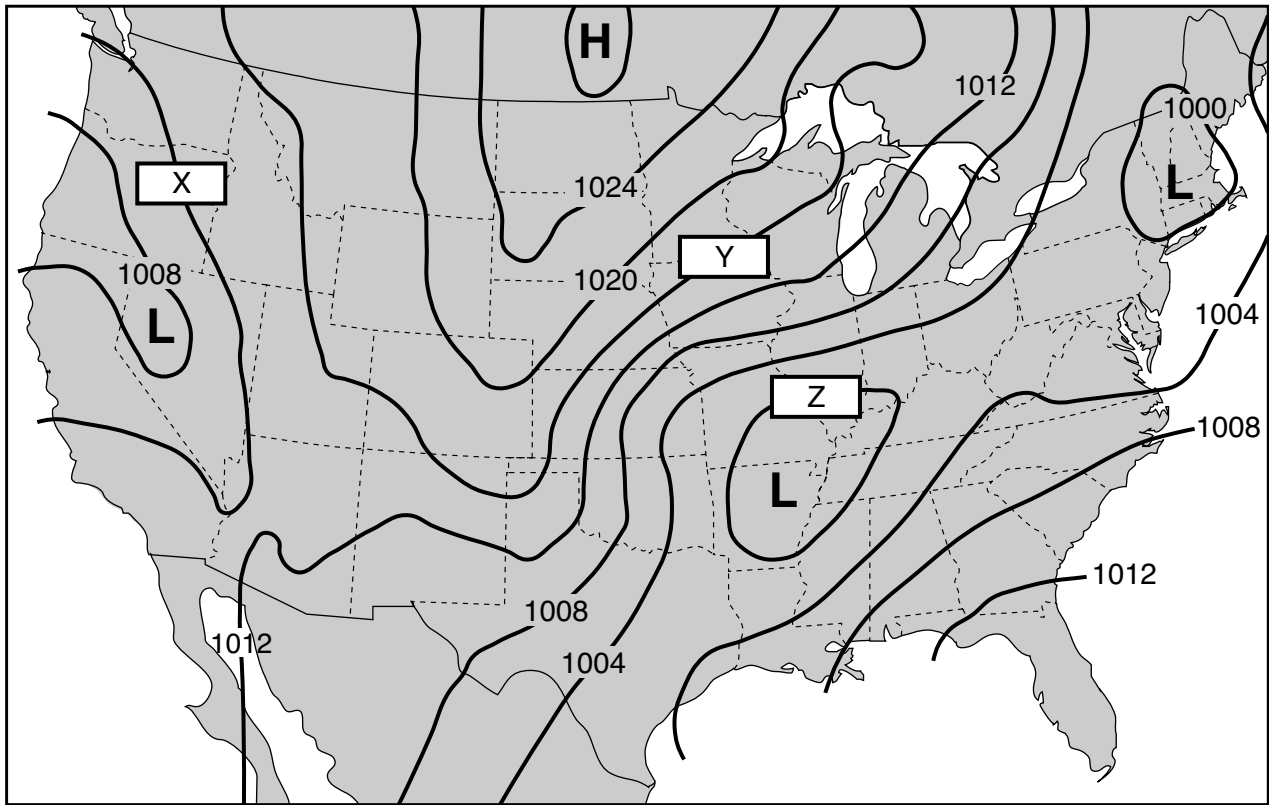
8 The map below shows the location of Chicxulub Crater, formed approximately 65 million years ago by an asteroid impact.



This impact crater has been most closely linked to

- (1) meteor showers
- (2) worldwide mass extinctions
- (3) the eccentricity of Earth's orbit
- (4) the formation of the Gulf of Mexico

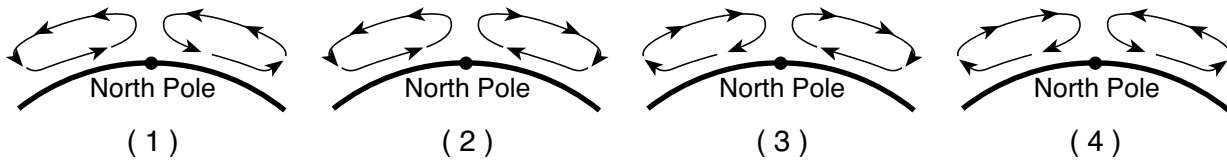
9 The weather map below shows isobars that are labeled in millibars (mb). Three isobars are labeled X, Y, and Z.



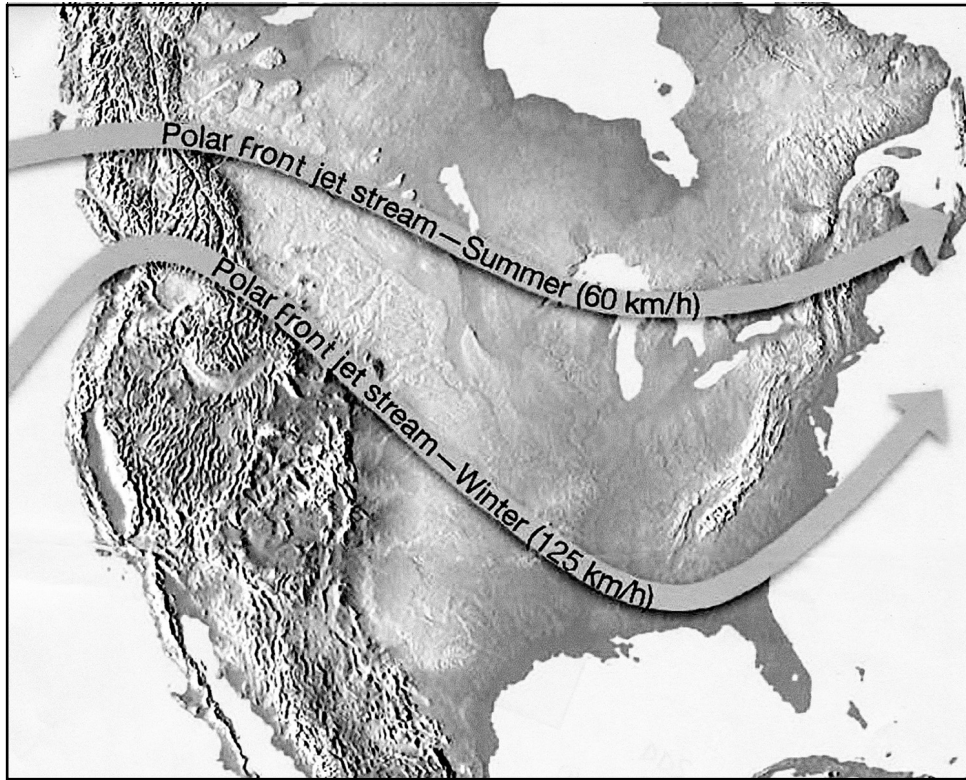
What are the values for the isobars labeled X, Y, and Z?

- |   |   |
|---|---|
| (1) X = 1012 mb; Y = 1016 mb; Z = 1000 mb | (3) X = 1010 mb; Y = 1024 mb; Z = 1000 mb |
| (2) X = 1010 mb; Y = 1016 mb; Z = 1008 mb | (4) X = 1012 mb; Y = 1024 mb; Z = 1008 mb |

10 Which cross section best represents the general atmospheric circulation over the North Pole?



11 The map below shows the most likely positions and speeds of the polar front jet stream in summer and in winter.



*The Atmosphere*, 7th ed., Lutgens and Tarbuck, p. 174 (Fig. 7-11)

In winter, the polar front jet stream has a more southerly path with winds traveling at speeds that are generally

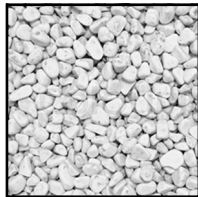
- (1) less than in summer, and Earth's Northern Hemisphere tilts away from the Sun
- (2) less than in summer, and Earth's Northern Hemisphere tilts toward the Sun
- (3) greater than in summer, and Earth's Northern Hemisphere tilts away from the Sun
- (4) greater than in summer, and Earth's Northern Hemisphere tilts toward the Sun

12 Equal areas of which surface will typically absorb the greatest amount of insolation?



Smooth  
White Marble  
Tile

( 1 )



Rough  
White Marble  
Gravel

( 2 )



Smooth  
Black Marble  
Tile

( 3 )



Rough  
Black Marble  
Gravel

( 4 )

- 13 At a location in the Northern Hemisphere, a camera was placed outside at night with the lens pointing at a group of stars. The shutter was left open for a few hours, resulting in the photograph of star trails shown below.



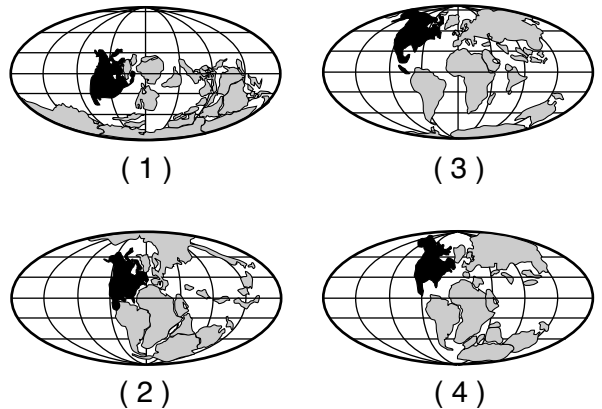
Source: <https://www.leyetscapes.com/edu/how-to-shoot-star-trails.html>

What is the name of the star in the center of the photograph that did not leave a star trail?

- (1) *Betelgeuse* (3) the Sun  
 (2) *Polaris* (4) *Sirius*
- 14 Outgassing of water vapor, carbon dioxide, and nitrogen initially formed Earth's early
- (1) lithosphere (3) asthenosphere  
 (2) hydrosphere (4) atmosphere
- 15 Which type of electromagnetic radiation listed below has the longest wavelength?
- (1) infrared (3) red visible light  
 (2) ultraviolet (4) violet visible light
- 16 When major volcanic eruptions send large amounts of ash and dust into the atmosphere, worldwide air temperatures usually become
- (1) warmer, because the atmosphere is less transparent  
 (2) warmer, because the atmosphere is more transparent  
 (3) cooler, because the atmosphere is less transparent  
 (4) cooler, because the atmosphere is more transparent

- 17 From September 1 to June 1, the number of daylight hours observed each day in New York State will
- (1) decrease, only  
 (2) increase, only  
 (3) decrease, then increase  
 (4) increase, then decrease

- 18 Which map best shows the inferred positions of Earth's landmasses between the Alleghenian orogeny and the initial opening of the Atlantic Ocean?



- 19 In the past, cyanobacteria produced oceanic oxygen that combined with iron in seawater to form iron oxide layers on ocean floors. These iron oxide layers were formed during the
- (1) Early Archean (3) Late Archean  
 (2) Early Carboniferous (4) Late Carboniferous
- 20 Which group of organisms are found only as fossils today?
- (1) vascular plants (3) brachiopods  
 (2) nautiloids (4) placoderm fish
- 21 Compared to the granitic continental crust, the basaltic oceanic crust is
- (1) thinner and less dense  
 (2) thinner and more dense  
 (3) thicker and less dense  
 (4) thicker and more dense

22 Which table correctly matches the layers of Earth's interior with the appropriate description?

Earth's Layer	Description
Lithosphere	Lowest density and rigid
Mantle	Partial melting and convection currents in upper region
Outer Core	Completely liquid
Inner Core	Highest pressure, composed of iron and nickel

(1)

Earth's Layer	Description
Lithosphere	Lowest density and rigid
Mantle	Partial melting and convection currents in upper region
Outer Core	Highest pressure, composed of iron and nickel
Inner Core	Completely liquid

(3)

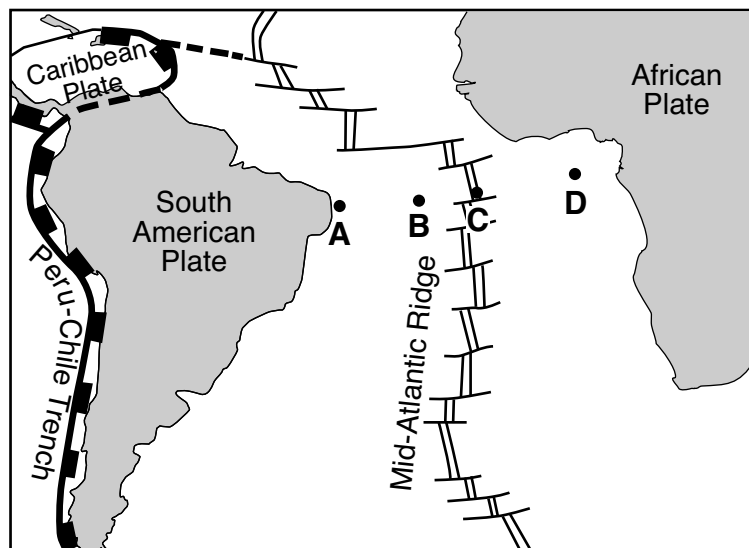
Earth's Layer	Description
Lithosphere	Partial melting and convection currents in upper region
Mantle	Lowest density and rigid
Outer Core	Completely liquid
Inner Core	Highest pressure, composed of iron and nickel

(2)

Earth's Layer	Description
Lithosphere	Lowest density and rigid
Mantle	Completely liquid
Outer Core	Partial melting and convection currents in upper region
Inner Core	Highest pressure, composed of iron and nickel

(4)

23 The map below shows a tectonic plate boundary in the Atlantic Ocean between South America and Africa. Letters A, B, C, and D represent locations on Earth's surface.



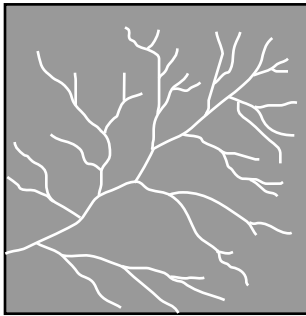
The most recently formed oceanic crust would be located closest to location

- (1) A
- (2) B

- (3) C
- (4) D

- 24 Most of the tectonic plate boundaries of the Scotia Plate are classified as
- (1) transform boundaries with the plates moving in a relative east–west direction
  - (2) transform boundaries with the plates moving in a relative north–south direction
  - (3) divergent boundaries with the plates moving in a relative east–west direction
  - (4) divergent boundaries with the plates moving in a relative north–south direction

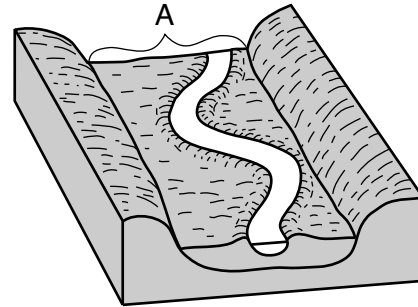
25 The diagram below represents a stream drainage pattern.



This stream drainage pattern is most likely a direct result of the

- (1) elevation of the bedrock above sea level
  - (2) type of fossils in the bedrock
  - (3) age of the bedrock
  - (4) underlying bedrock structure
- 26 Which New York State river generally flows southward?
- (1) Genesee
  - (2) Hudson
  - (3) Niagara
  - (4) St. Lawrence
- 27 The sediment deposited by a landslide is usually
- (1) sorted and layered
  - (2) sorted and non-layered
  - (3) unsorted and layered
  - (4) unsorted and non-layered
- 28 Which rock exhibits a bubbling reaction when hydrochloric acid is placed on it?
- (1) rock gypsum
  - (2) limestone
  - (3) obsidian
  - (4) slate

29 The block diagram below represents a portion of a meandering stream and the valley it has produced. One landscape feature is labeled A.



The landscape feature labeled A is best described as

- (1) a delta
  - (2) a flood plain
  - (3) a water table
  - (4) an escarpment
- 30 The photograph below shows an elongated hill that was originally deposited by a glacier.



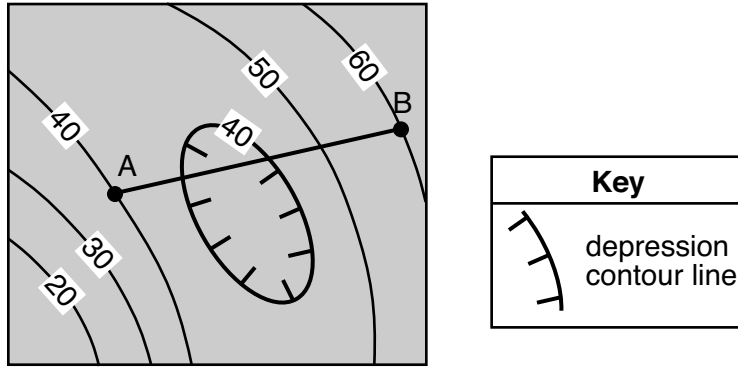
<https://www.geocaching.com/>

This landscape feature is identified as a

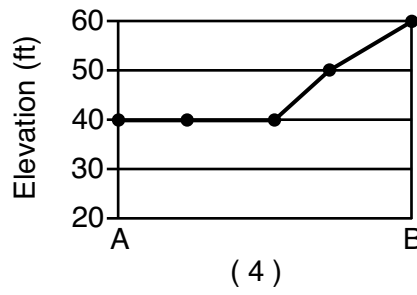
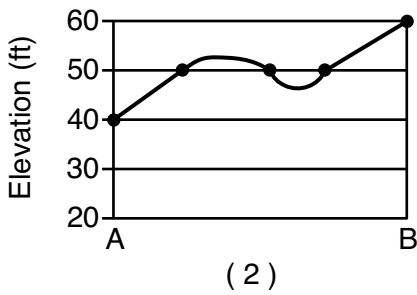
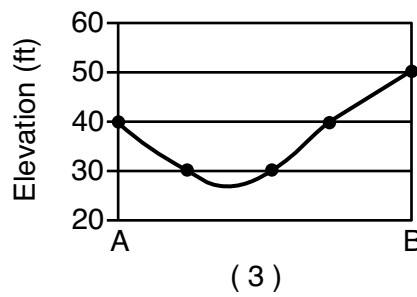
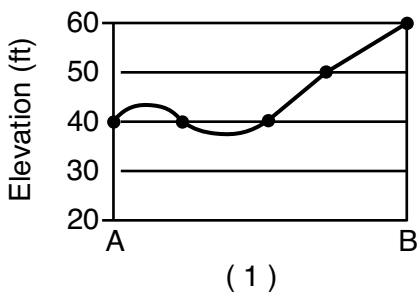
- (1) dune
  - (2) terminal moraine
  - (3) drumlin
  - (4) outwash plain
- 31 Which particles most likely will be deposited first as the velocity of a stream carrying a mixture of particles decreases?
- (1) small, flat, low-density particles
  - (2) small, round, low-density particles
  - (3) large, flat, high-density particles
  - (4) large, round, high-density particles



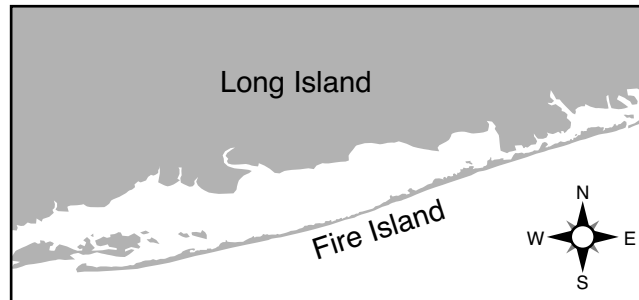
32 The topographic map below shows elevations in feet. Line *AB* is a reference line.



Which profile best represents the change in elevation along the line from *A* to *B*?



33 The map below shows Fire Island, located on the southern coast of Long Island.



Which agent of erosion deposited the sediments that formed Fire Island, and continues to shape it?

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

34 Which chart correctly matches rock salt and rock gypsum with how the minerals from these rocks are used?

Rock Type	Mineral Use
Rock salt	ore of lead
Rock gypsum	building stones

(1)

Rock Type	Mineral Use
Rock salt	food additive
Rock gypsum	ore of iron

(3)

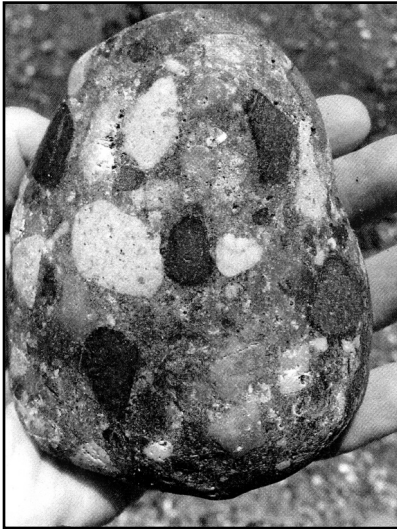
Rock Type	Mineral Use
Rock salt	roofing
Rock gypsum	jewelry

(2)

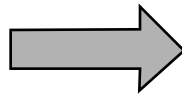
Rock Type	Mineral Use
Rock salt	melts ice
Rock gypsum	plaster of paris

(4)

35 The photographs below show samples of two different rocks, labeled A and B. The arrow represents the process by which a rock like rock A can change into a rock like rock B.



**Rock A**



**Rock B**

Which process does the arrow represent?

(1) metamorphism

(3) melting

(2) erosion

(4) cementation

**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 table below and on your knowledge of Earth science. The table below lists the half-lives for five radioactive isotopes.

<b>Radioactive Isotope</b>	<b>Half-life</b>
holmium-166	26.80 hours
gold-198	2.70 days
iodine-131	8.02 days
beryllium-10	1.39 million years
lutetium-176	37.8 billion years

36 After 8.1 days, how much of a 100-gram sample of gold-198 will remain?

- (1) 6.25 g
- (2) 12.5 g
- (3) 25 g
- (4) 50 g

37 Which radioactive isotope has a half-life closest to the half-life of the radioactive isotope rubidium-87?

- (1) iodine-131
- (2) gold-198
- (3) beryllium-10
- (4) lutetium-176

38 A sample of holmium-166, located deep underground, is subjected to high temperature and pressure. The half-life of this sample of holmium-166 will be

- (1) 13.40 hours
  - (2) 24.30 hours
  - (3) 26.80 hours
  - (4) 28.70 hours
-

Base your answers to questions 39 through 41 on the passage and photograph below and on your knowledge of Earth science. The photograph shows the coastal area of Crescent City, California.

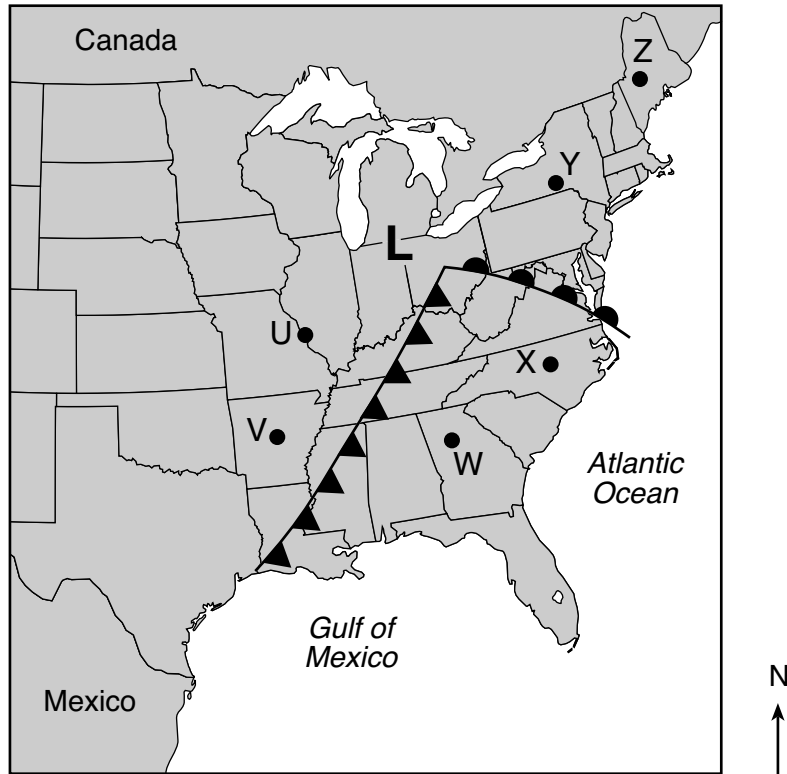
### Tsunami Capital

The tsunami capital of the continental United States is Crescent City, located on the coast in northern California. Since 1933, thirty-one tsunamis have been observed there. Crescent City is vulnerable to tsunamis because of the low elevation of the land and the shape of its shoreline. The wave energy from a tsunami is funneled into a narrow stretch of shoreline. This causes the wave height to grow very tall, flooding more land. The largest and most destructive tsunami to hit Crescent City occurred in March 1964, killing eleven people. The epicenter of a very large earthquake, located at  $60^{\circ}$  N and  $147^{\circ}$  W, caused this destructive tsunami.



- 39 Which factor causes Crescent City, California, to be highly vulnerable to tsunamis?
- |                              |                                   |
|------------------------------|-----------------------------------|
| (1) coastal (marine) climate | (3) direction of prevailing winds |
| (2) monsoon events           | (4) topography of the shoreline   |
- 40 The distance from the epicenter of the March 1964 earthquake to Crescent City is 2600 kilometers. How long did it take the first *P*-wave to reach Crescent City?
- |                          |                          |
|--------------------------|--------------------------|
| (1) 3 minutes 20 seconds | (3) 5 minutes 0 seconds  |
| (2) 4 minutes 10 seconds | (4) 9 minutes 10 seconds |
- 41 Once a tsunami warning is issued, which action should residents of Crescent City take to prevent loss of life?
- |                               |                                      |
|-------------------------------|--------------------------------------|
| (1) evacuate to higher ground | (3) go into their basements          |
| (2) board up windows          | (4) get under a sturdy desk or table |
-

Base your answers to questions 42 and 43 on the map below and on your knowledge of Earth science. The map shows a low-pressure system over the eastern United States. Points *U* through *Z* represent locations on Earth's surface.



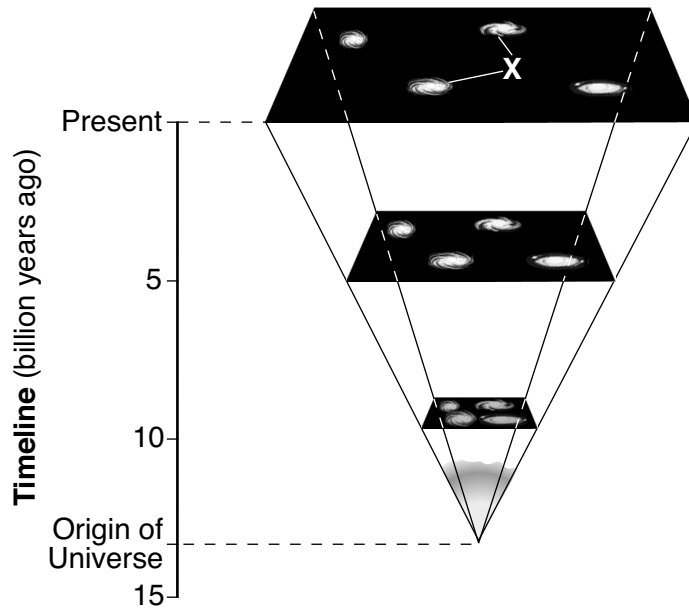
42 Which two locations most likely have the warmest air temperatures?

- |             |             |
|-------------|-------------|
| (1) Y and Z | (3) V and W |
| (2) U and V | (4) W and X |

43 The winds at location *U* are most likely coming from the

- |               |               |
|---------------|---------------|
| (1) northeast | (3) southeast |
| (2) northwest | (4) southwest |

Base your answers to questions 44 through 46 on the diagram below and on your knowledge of Earth science. The diagram represents the expansion of a portion of the universe from its origin until the present. The timeline represents billions of years. Letter X indicates two celestial objects.



44 Approximately how many billion years ago (bya) did the Big Bang occur?

- |              |              |
|--------------|--------------|
| (1) 4.6 bya  | (3) 13.8 bya |
| (2) 10.0 bya | (4) 15.0 bya |

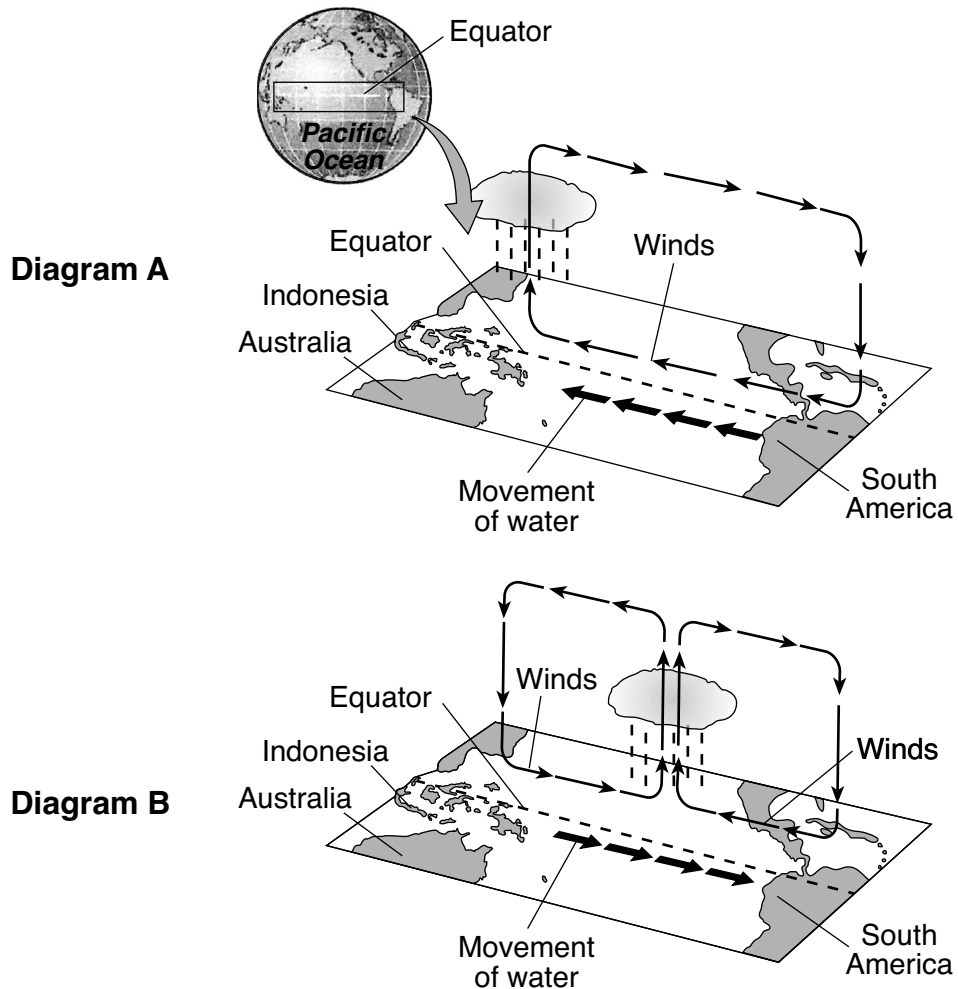
45 The two spiral-shaped celestial objects labeled X are

- |              |               |
|--------------|---------------|
| (1) galaxies | (3) asteroids |
| (2) planets  | (4) comets    |

46 Two pieces of evidence that support the theory that the universe is expanding are the

- (1) red shift of light from distant stars and the existence of nuclear fusion
  - (2) red shift of light from distant stars and the existence of cosmic background radiation
  - (3) blue shift of light from distant stars and the existence of nuclear fusion
  - (4) blue shift of light from distant stars and the existence of cosmic background radiation
-

Base your answers to questions 47 and 48 on the diagrams below and on your knowledge of Earth science. The diagrams, labeled A and B, represent two different types of oceanic and atmospheric conditions that occur across the Pacific Ocean in a region close to the equator. Bold arrows represent movement of surface water in the ocean. Thinner arrows represent circulation of air above the equator.



- 47 In diagram A, which location normally receives less precipitation due to higher atmospheric pressure?
- |                          |                             |
|--------------------------|-----------------------------|
| (1) Indonesian coast     | (3) middle of Pacific Ocean |
| (2) South American coast | (4) Australian coast        |
- 48 The pattern of the thinner arrows in the atmosphere in both diagrams indicates the presence of
- |                |                 |
|----------------|-----------------|
| (1) conduction | (3) evaporation |
| (2) convection | (4) radiation   |

Base your answers to questions 49 and 50 on the table below and on your knowledge of Earth science. The table lists the times of high and low tides in New York Harbor from December 4, 2017 through December 7, 2017. The time of the second low tide on December 6 has been left blank.

**New York Harbor Tides  
December 4 through 7, 2017**

	Low Tide	High Tide
Date	Time	Time
Dec 4	2:07 a.m.	8:02 a.m.
	2:56 p.m.	8:39 p.m.
Dec 5	2:58 a.m.	8:54 a.m.
	3:47 p.m.	9:38 p.m.
Dec 6	3:50 a.m.	9:52 a.m.
		10:40 p.m.
Dec 7	4:44 a.m.	10:54 a.m.
	5:33 p.m.	11:43 p.m.

- 49 According to the information provided in the New York Harbor Tides table, at approximately what time did the second low tide occur on December 6, 2017?
- (1) 4:01 a.m. (3) 4:39 a.m.  
(2) 4:01 p.m. (4) 4:39 p.m.
- 50 The highest high tides and lowest low tides in New York Harbor usually occur when the Moon is
- (1) closest to Earth, and the Sun, Moon, and Earth are aligned  
(2) closest to Earth, and the Sun, Moon, and Earth are at right angles  
(3) farthest from Earth, and the Sun, Moon, and Earth are aligned  
(4) farthest from Earth, and the Sun, Moon, and Earth are at right angles
-



## Part B–2

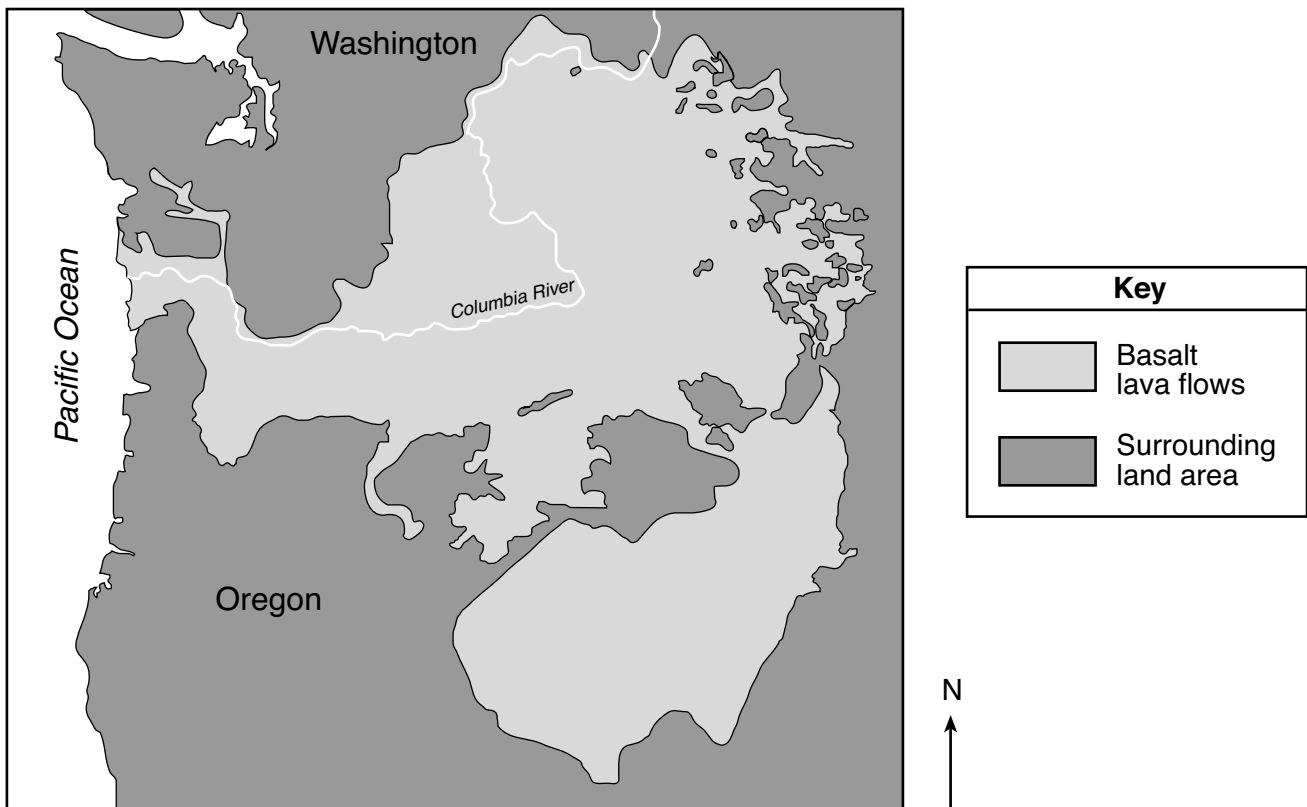
### Answer all questions in this part.

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

Base your answers to questions 51 through 53 on the passage and map below, and on your knowledge of Earth science. The map of the northwestern United States shows the location of the Columbia River Basalts.

### Columbia River Basalts

The Columbia River Basalts are a formation of several horizontal lava flows from eruptions that took place between 6 million and 17 million years ago. These flows covered a portion of the northwestern United States. The lava erupted from cracks in Earth's surface and flowed westward toward the Pacific Ocean. These horizontal basalt layers are currently about 1200 meters above sea level. The lava was created when the North American Plate moved over a mantle hot spot.

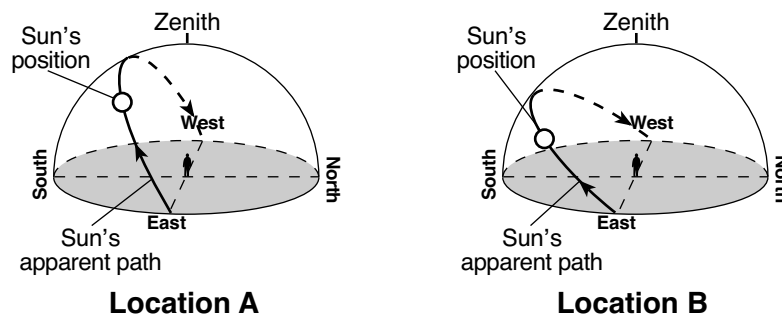


- 51 Identify the geologic epoch when the Columbia River Basalts formed. [1]
- 52 Identify the present mantle hot spot that most likely produced the lava that created the Columbia River Basalts. [1]
- 53 The mantle plumes that created the lava flows of the Columbia River Basalts are inferred to have risen from the boundary between the stiffer mantle and the outer core. Identify the interior temperature and depth at this boundary. [1]

Base your answers to questions 54 through 57 on the diagram *in your answer booklet* and on your knowledge of Earth science. The diagram represents the Moon's orbit around Earth.

- 54 On the diagram *in your answer booklet*, place an **X** on the Moon's orbit to show the Moon's position during a solar eclipse. [1]
- 55 State the average distance between Earth and the Moon. Include units with your answer. [1]
- 56 Describe the actual shape of the Moon's orbit. [1]
- 57 Explain why the Moon's period of revolution and period of rotation cause the same side of the Moon to always face Earth. [1]
- 

Base your answers to questions 58 through 60 on the two Sun's path diagrams below and on your knowledge of Earth science. The diagrams represent the apparent path of the Sun observed at locations A and B on Earth's surface on September 21. The positions of the Sun and the zenith (position directly overhead) are shown for an observer at each location.



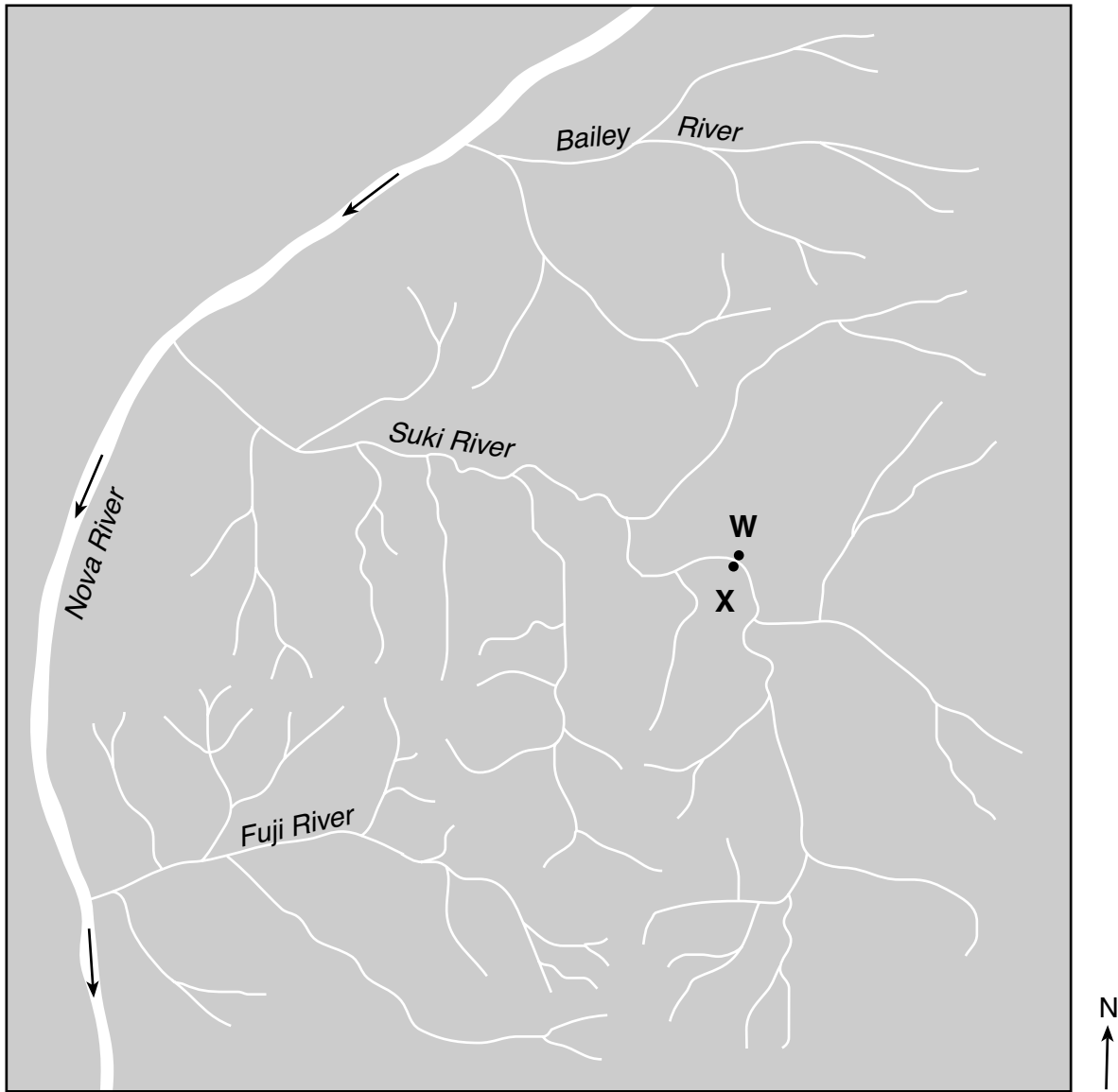
- 58 State the approximate time of day represented at location A, based on the Sun's present position. Include a.m. or p.m. in your answer. [1]
- 59 Describe the change in the length of a shadow cast by the observer at location B from sunrise to sunset. [1]
- 60 Identify Earth's motion that causes the Sun to appear to move along each path shown. [1]
-

Base your answers to questions 61 through 63 on the data table below, on the graph in your answer booklet, and on your knowledge of Earth science. The data table shows the air temperatures and dewpoints in degrees Celsius ( $^{\circ}\text{C}$ ) for a period of time at a location in New York State. The graph in your answer booklet shows the air temperatures from noon to 5 p.m. and the dewpoints from noon to 11 p.m.

<b>Time</b>	<b>Air Temperature (<math>^{\circ}\text{C}</math>)</b>	<b>Dewpoint (<math>^{\circ}\text{C}</math>)</b>
Noon	26.0	17.0
1 p.m.	27.0	16.0
2 p.m.	29.0	14.0
3 p.m.	29.5	14.0
4 p.m.	30.5	15.5
5 p.m.	29.0	16.5
6 p.m.	30.0	18.5
7 p.m.	29.5	16.5
8 p.m.	27.0	17.0
9 p.m.	26.5	17.0
10 p.m.	25.0	18.5
11 p.m.	19.0	18.5

- 61 Complete the line graph *in your answer booklet* by plotting the remaining air temperatures for each hour from 6 p.m. to 11 p.m. The data from noon to 5 p.m. have already been plotted. Connect *all six* plots with a line that starts at the 5 p.m. data plot. [1]
- 62 Identify the time shown in the data table when dew or fog would most likely form. Explain why that time has the greatest chance for the formation of dew or fog. [1]
- 63 Identify *one* weather instrument that consists of a dry-bulb thermometer and a wet-bulb thermometer that is used to determine dewpoint. [1]
-

Base your answers to questions 64 and 65 on the map below and on your knowledge of Earth science. The map shows a portion of the Nova River and three of its tributaries. Points W and X represent locations on the banks of the Suki River. The arrows on the map indicate the direction of flow of the Nova River.



- 64 Determine the minimum stream velocity, in centimeters per second (cm/s), required for the Nova River to transport a pebble with a diameter of 6.4 cm. [1]
- 65 Explain why the stream velocity and rate of erosion of the streambank are greater at location W than at location X. [1]
-

## Part C

### Answer all questions in this part.

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

Base your answers to questions 66 through 69 on the map in your answer booklet and on your knowledge of Earth science. The map shows the total amount of snowfall, measured in inches, from a lake-effect snowstorm that affected a portion of New York State from February 2 through February 4, 2017. The 10-inch and 50-inch snowfall isolines have been drawn. Oswego, Watertown, and Old Forge are labeled on the map. Points *A* and *B* represent locations on Earth's surface.

66 On the map *in your answer booklet*, draw the 20-, 30-, and 40-inch snowfall isolines. [1]

67 Calculate the snowfall gradient between locations *A* and *B* in inches per mile. [1]

68 Identify the name of the New York State landscape region where the greatest amount of snowfall occurred. [1]

69 The table below lists some weather conditions for Watertown near the end of this storm.

Dewpoint (°F)	Present Weather	Wind Direction	Wind Speed (knots)
23	snow showers	from the northwest	25

On the weather station model *in your answer booklet*, using the proper format, record the weather conditions listed in the table. [1]

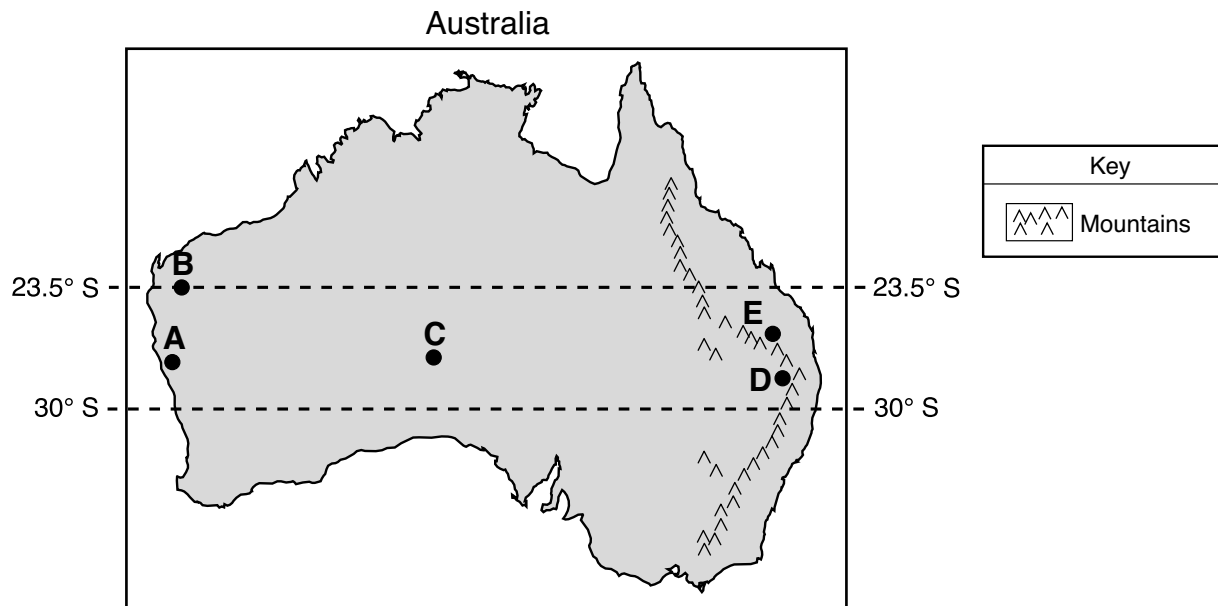
---

Base your answers to questions 70 through 73 on the data table below and on your knowledge of Earth science. The data table shows the range of temperatures at which different minerals crystallize as molten magma cools and solidifies.

<b>Mineral</b>	<b>Range of Temperatures at Which Each Mineral Crystallizes (°C)</b>
Olivine	1400 to 1150
Pyroxene	1300 to 1000
Amphibole	1100 to 800
Biotite Mica	950 to 750
Potassium Feldspar	800 to 600
Quartz	550 to 500
Plagioclase Feldspar	1300 to 600

- 70 Complete the graph *in your answer booklet* by drawing a bar to represent the range of temperatures at which each mineral crystallizes. Shade in each bar drawn. The bars for the range of temperatures at which olivine and pyroxene crystallize have already been drawn. [1]
- 71 Identify the mineral listed on the data table that would most likely be the last to crystallize as the magma cools and solidifies. [1]
- 72 List the *two* elements that are commonly found in olivine, pyroxene, and potassium feldspar. [1]
- 73 Identify the general characteristics of color and density of an igneous rock composed of only the minerals olivine and pyroxene. [1]
-

Base your answers to questions 74 through 77 on the map of Australia below and on your knowledge of Earth science. Points *A* through *E* on the map represent locations on Earth's surface that have different climates.



74 Identify the ocean current that most affects the climate of location *A*. [1]

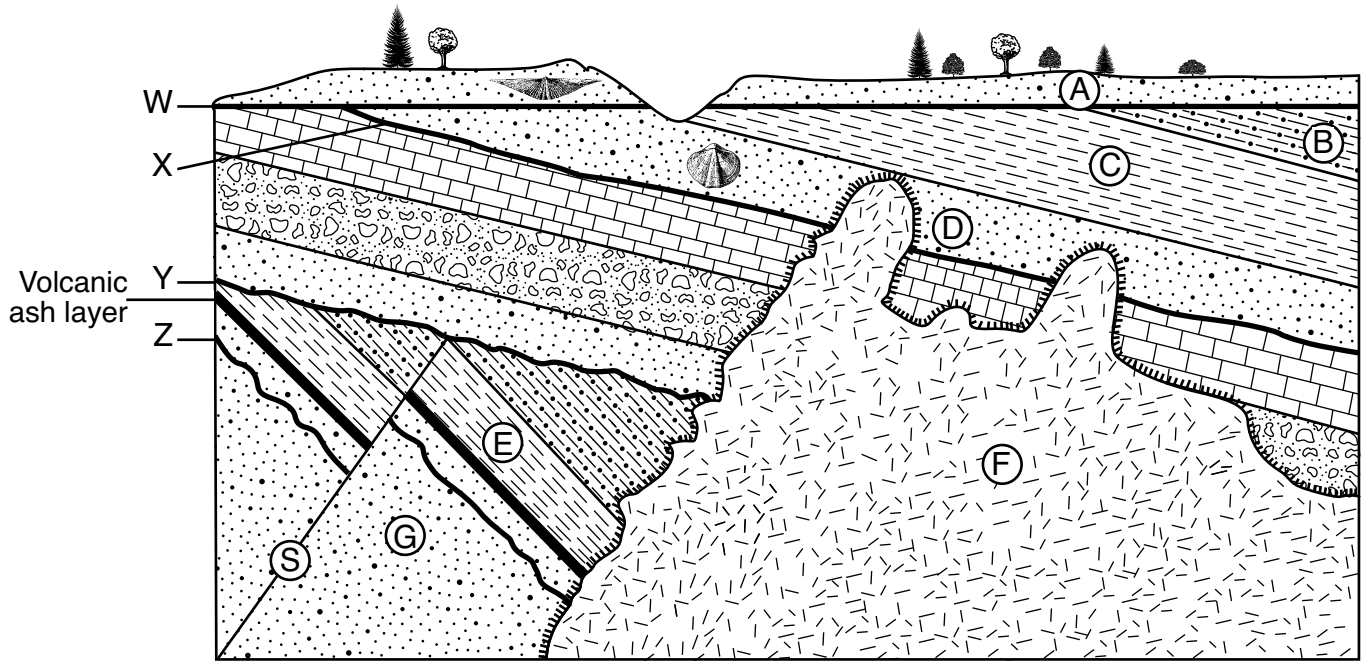
75 Identify the month and day when the noon sun would be directly overhead at location *B*. [1]

76 Write the two-letter air-mass symbol used to identify an air mass that originates over location *C*. [1]

77 Locations *D* and *E* are located the same distance from the Pacific Ocean. Explain why location *D* has a drier climate than location *E*. [1]

---

Base your answers to questions 78 through 80 on the cross section below and on your knowledge of Earth science. Letters A through G identify rock units. Letter S identifies a fault. Lines W, X, Y, and Z are unconformities. Index fossils are represented in two of the rock units, and a volcanic ash layer has been labeled. The rock units have *not* been overturned.



Key	
	Contact metamorphism
	Igneous rock

78 Describe *one* piece of evidence shown in the cross section that indicates that rock units B and C have been disturbed by crustal movement. [1]

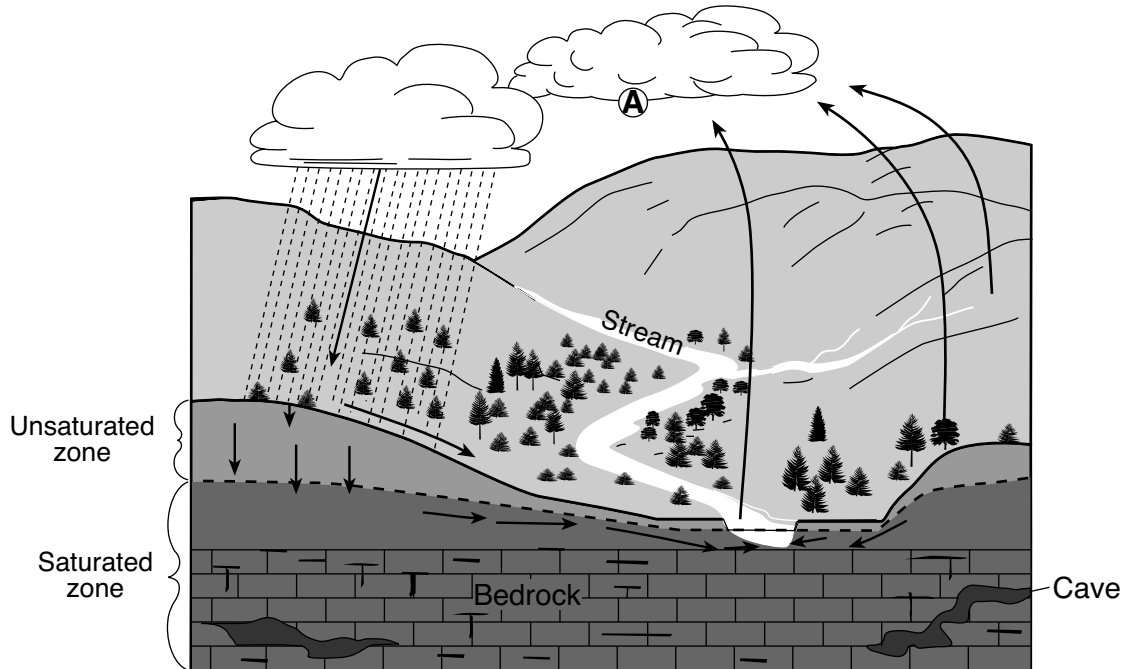
79 In the blanks in *your answer booklet*, place the letters E, F, G, S, and Z in the correct order to represent the relative ages of these rock units and features, from oldest to youngest. [1]

80 Based on the index fossils found in rock units A and D, determine approximately how many million years ago (mya) unconformity W formed. [1]

---



Base your answers to questions 81 and 82 on the diagram below and on your knowledge of Earth science. The diagram represents a landscape containing a stream. The arrows represent the movement of water in the water cycle. Letter A is a location where a certain water cycle process is occurring.



- 81 Identify the water cycle process causing cloud formation to occur at location A, and state whether energy is gained or released by the water vapor during this process. [1]
- 82 Describe how the rate of runoff and the rate of infiltration would be affected if the trees were removed from this landscape. [1]
-

Base your answers to questions 83 through 85 on the passage and diagrams below and on your knowledge of Earth science. Diagram A represents the path of a rocket launched from near the equator toward the North Pole on a nonrotating Earth. Diagram B represents the path of a rocket that appears to curve because Earth is rotating beneath the rocket. Earth's winds are affected in a similar way.

### The Coriolis Effect

Earth's rotation causes moving air to curve (deflect) in one direction in the Northern Hemisphere and curve in the opposite direction in the Southern Hemisphere. This is called the Coriolis effect. One factor that controls the amount of deflection of the winds is latitude. The deflection is greatest at the poles, and decreases to zero at the equator. The Coriolis effect is significant for winds that travel long distances over Earth. Other planets may have an even stronger Coriolis effect. There is a direct relationship between a planet's rate of rotation and the amount of deflection due to the Coriolis effect.

Diagram A

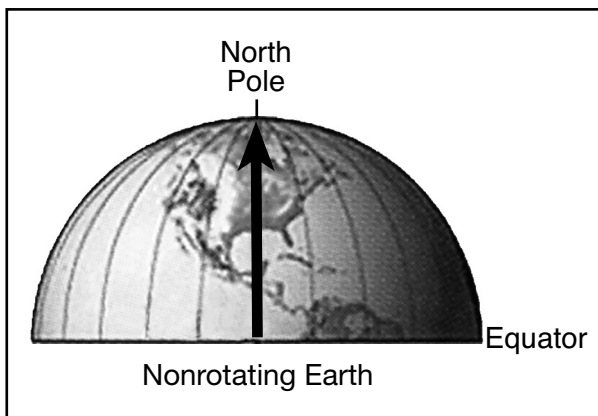
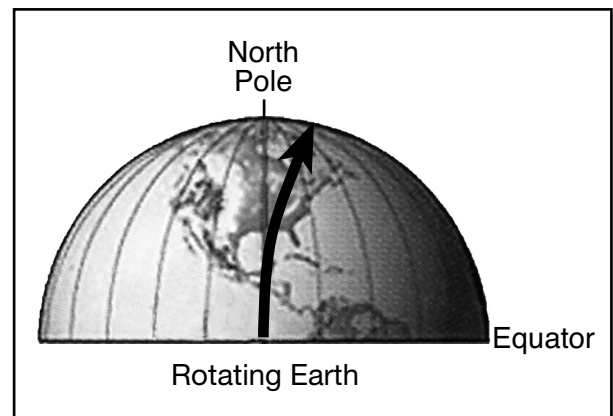


Diagram B



Adapted from: Bell, Trudy. 2001. *Science 101: Weather*.

- 83 For an observer on Earth, identify the direction a rocket's path appears to curve, due to the Coriolis effect, as it travels from near the equator toward the North Pole. [1]
- 84 Describe the relationship between latitude and the amount that the winds deflect due to the Coriolis effect. [1]
- 85 Identify the scientific device that is used on Earth to prove that Earth rotates on its axis. [1]
-





**Regents Examination in Physical Setting/Earth Science – August 2022****Scoring Key: Parts A and B-1 (Multiple-Choice Questions)**

<b>Examination</b>	<b>Date</b>	<b>Question Number</b>	<b>Scoring Key</b>	<b>Question Type</b>	<b>Credit</b>	<b>Weight</b>
Physical Setting/Earth Science	August '22	1	3	MC	1	1
Physical Setting/Earth Science	August '22	2	4	MC	1	1
Physical Setting/Earth Science	August '22	3	3	MC	1	1
Physical Setting/Earth Science	August '22	4	1	MC	1	1
Physical Setting/Earth Science	August '22	5	2	MC	1	1
Physical Setting/Earth Science	August '22	6	1	MC	1	1
Physical Setting/Earth Science	August '22	7	1	MC	1	1
Physical Setting/Earth Science	August '22	8	2	MC	1	1
Physical Setting/Earth Science	August '22	9	1	MC	1	1
Physical Setting/Earth Science	August '22	10	4	MC	1	1
Physical Setting/Earth Science	August '22	11	3	MC	1	1
Physical Setting/Earth Science	August '22	12	4	MC	1	1
Physical Setting/Earth Science	August '22	13	2	MC	1	1
Physical Setting/Earth Science	August '22	14	4	MC	1	1
Physical Setting/Earth Science	August '22	15	1	MC	1	1
Physical Setting/Earth Science	August '22	16	3	MC	1	1
Physical Setting/Earth Science	August '22	17	3	MC	1	1
Physical Setting/Earth Science	August '22	18	2	MC	1	1
Physical Setting/Earth Science	August '22	19	3	MC	1	1
Physical Setting/Earth Science	August '22	20	4	MC	1	1
Physical Setting/Earth Science	August '22	21	2	MC	1	1
Physical Setting/Earth Science	August '22	22	1	MC	1	1
Physical Setting/Earth Science	August '22	23	3	MC	1	1
Physical Setting/Earth Science	August '22	24	1	MC	1	1
Physical Setting/Earth Science	August '22	25	4	MC	1	1
Physical Setting/Earth Science	August '22	26	2	MC	1	1
Physical Setting/Earth Science	August '22	27	4	MC	1	1
Physical Setting/Earth Science	August '22	28	2	MC	1	1
Physical Setting/Earth Science	August '22	29	2	MC	1	1
Physical Setting/Earth Science	August '22	30	3	MC	1	1
Physical Setting/Earth Science	August '22	31	4	MC	1	1
Physical Setting/Earth Science	August '22	32	1	MC	1	1
Physical Setting/Earth Science	August '22	33	3	MC	1	1
Physical Setting/Earth Science	August '22	34	4	MC	1	1
Physical Setting/Earth Science	August '22	35	1	MC	1	1
Physical Setting/Earth Science	August '22	36	2	MC	1	1
Physical Setting/Earth Science	August '22	37	4	MC	1	1
Physical Setting/Earth Science	August '22	38	3	MC	1	1
Physical Setting/Earth Science	August '22	39	4	MC	1	1
Physical Setting/Earth Science	August '22	40	3	MC	1	1
Physical Setting/Earth Science	August '22	41	1	MC	1	1
Physical Setting/Earth Science	August '22	42	4	MC	1	1
Physical Setting/Earth Science	August '22	43	2	MC	1	1
Physical Setting/Earth Science	August '22	44	3	MC	1	1
Physical Setting/Earth Science	August '22	45	1	MC	1	1
Physical Setting/Earth Science	August '22	46	2	MC	1	1
Physical Setting/Earth Science	August '22	47	2	MC	1	1
Physical Setting/Earth Science	August '22	48	2	MC	1	1
Physical Setting/Earth Science	August '22	49	4	MC	1	1
Physical Setting/Earth Science	August '22	50	1	MC	1	1

## Regents Examination in Physical Setting/Earth Science – August 2022

### Scoring Key: Parts B-2 and C (Constructed-Response Questions)

Examination	Date	Question Number	Scoring Key	Question Type	Credit	Weight
Physical Setting/Earth Science	August '22	51		CR	1	1
Physical Setting/Earth Science	August '22	52		CR	1	1
Physical Setting/Earth Science	August '22	53		CR	1	1
Physical Setting/Earth Science	August '22	54		CR	1	1
Physical Setting/Earth Science	August '22	55		CR	1	1
Physical Setting/Earth Science	August '22	56		CR	1	1
Physical Setting/Earth Science	August '22	57		CR	1	1
Physical Setting/Earth Science	August '22	58		CR	1	1
Physical Setting/Earth Science	August '22	59		CR	1	1
Physical Setting/Earth Science	August '22	60		CR	1	1
Physical Setting/Earth Science	August '22	61		CR	1	1
Physical Setting/Earth Science	August '22	62		CR	1	1
Physical Setting/Earth Science	August '22	63		CR	1	1
Physical Setting/Earth Science	August '22	64		CR	1	1
Physical Setting/Earth Science	August '22	65		CR	1	1
Physical Setting/Earth Science	August '22	66		CR	1	1
Physical Setting/Earth Science	August '22	67		CR	1	1
Physical Setting/Earth Science	August '22	68		CR	1	1
Physical Setting/Earth Science	August '22	69		CR	1	1
Physical Setting/Earth Science	August '22	70		CR	1	1
Physical Setting/Earth Science	August '22	71		CR	1	1
Physical Setting/Earth Science	August '22	72		CR	1	1
Physical Setting/Earth Science	August '22	73		CR	1	1
Physical Setting/Earth Science	August '22	74		CR	1	1
Physical Setting/Earth Science	August '22	75		CR	1	1
Physical Setting/Earth Science	August '22	76		CR	1	1
Physical Setting/Earth Science	August '22	77		CR	1	1
Physical Setting/Earth Science	August '22	78		CR	1	1
Physical Setting/Earth Science	August '22	79		CR	1	1
Physical Setting/Earth Science	August '22	80		CR	1	1
Physical Setting/Earth Science	August '22	81		CR	1	1
Physical Setting/Earth Science	August '22	82		CR	1	1
Physical Setting/Earth Science	August '22	83		CR	1	1
Physical Setting/Earth Science	August '22	84		CR	1	1
Physical Setting/Earth Science	August '22	85		CR	1	1

Key
MC = Multiple-choice question
CR = Constructed-response question

The chart for determining students' final examination scores for the **August 2022 Regents Examination in Physical Setting/Earth Science** will be posted on the Department's web site at <https://www.nysedregents.org/EarthScience/> on the day of the examination. Conversion charts provided for the previous administrations of the Physical Setting/Earth Science examination must NOT be used to determine students' final scores for this administration.

# FOR TEACHERS ONLY

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

## PHYSICAL SETTING/EARTH SCIENCE

Wednesday, August 17, 2022 — 8:30 to 11:30 a.m., only

### 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.nysed.gov/state-assessment/high-school-regents-examinations> 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.

## 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*.

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 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. Do not attempt to correct the student’s work by making insertions or changes of any kind. 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. Then the student’s raw scores on the written 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.nysed.gov/state-assessment/high-school-regents-examinations> on the day of the exam. 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.**

To ensure the accuracy of overlays, select a printer setting such as *full*, *actual size*, or *100%* when printing this document. Do **not** select the *fit to page* setting.

51 [1] Allow 1 credit for Miocene Epoch.

52 [1] Allow 1 credit for Yellowstone Hot Spot.

53 [1] Allow 1 credit if *both* responses are correct.

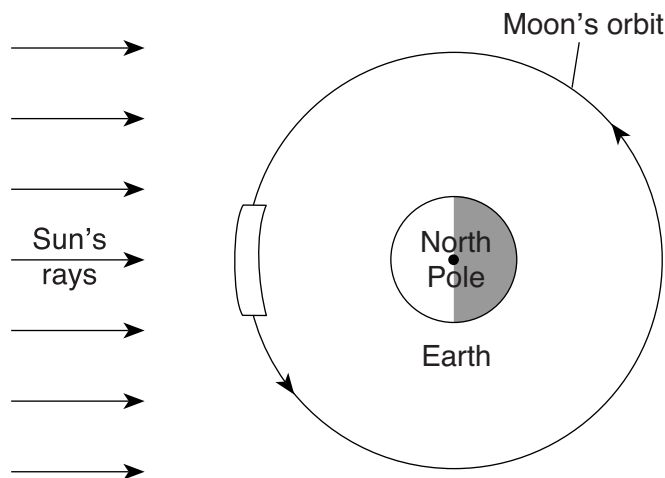
Interior temperature: any value from 4850°C to 5000°C

Depth: any value from 2850 to 2950 km

54 [1] Allow 1 credit if the center of the **X** is within or touches the clear banded region 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 sheet be used to ensure reliability in rating.



(Not drawn to scale)

55 [1] Allow 1 credit for 0.386 million km *or* 386,000 km.

**Note:** Correct units must be included in the student answer to receive credit.

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

- Elliptical/ellipse
- The Moon’s orbit is slightly eccentric.
- almost a circle/nearly circular
- oval

**Note:** Do *not* allow credit for “circle” or “circular” alone because the orbit is *not* a circle.

**57** [1] Allow 1 credit. Acceptable responses include, but are not limited to:

- The Moon’s revolution period equals the Moon’s rotation period.
- Revolution and rotation are both 27.3 days.
- The Moon makes one spin in exactly the same time that it makes one orbit around Earth.

**58** [1] Allow 1 credit for any time from 9 a.m. to 11 a.m.

**Note:** a.m. must be included in student answer.

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

- The shadow gets shorter until noon, then gets longer until sunset.
- decreases, then increases
- long, short, long

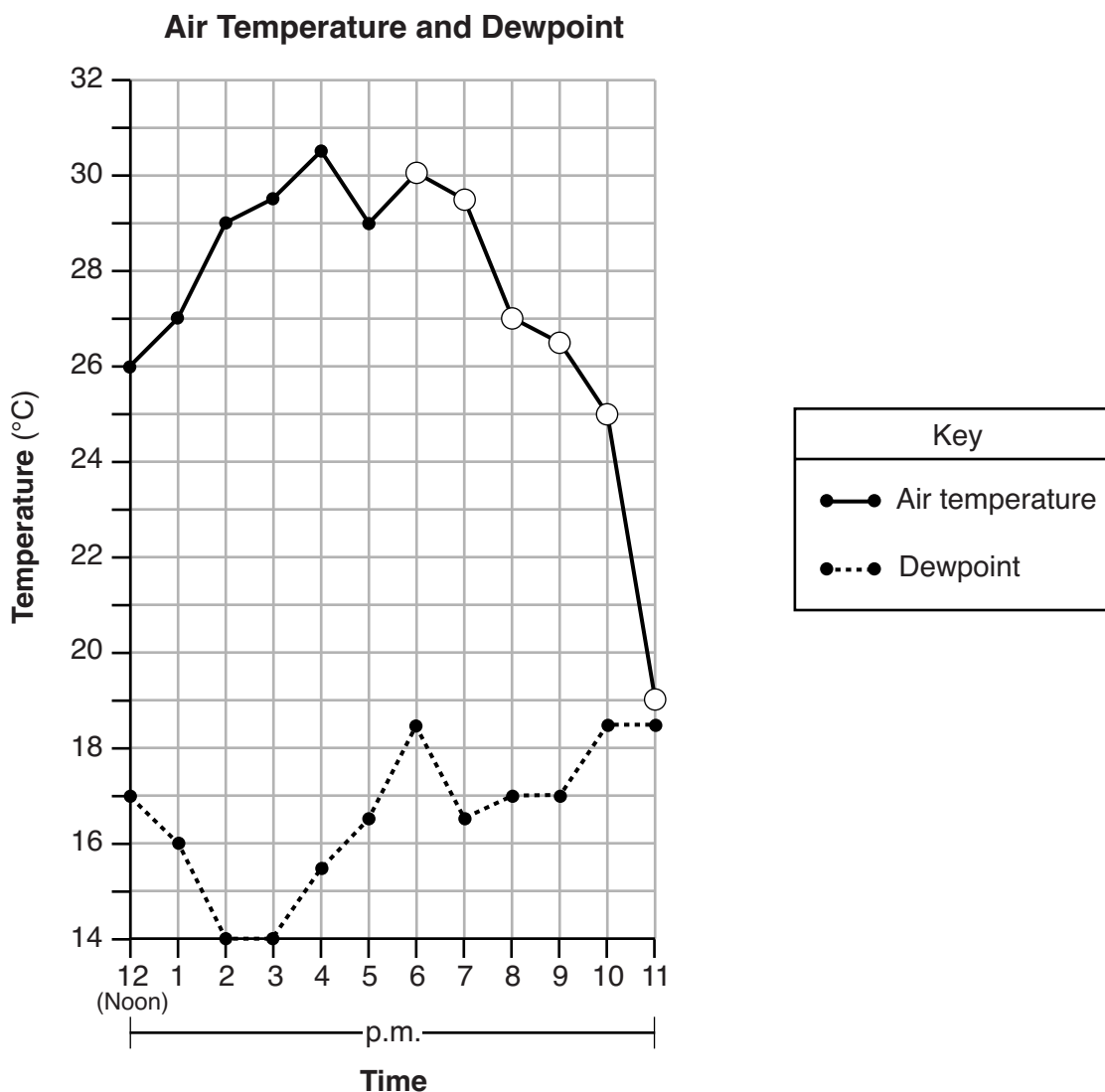
**60** [1] Allow 1 credit. Acceptable responses include, but are not limited to:

- rotation
- turning on its axis
- spinning

- 61 [1] Allow 1 credit if the centers of *all six* student plots are within or touch the circles shown below, and *all six* plots are correctly connected with a line that passes within or touches each circle and is connected to the 5 p.m. plot.

**Note:** Allow credit if the line does *not* pass through the student plots but is still within or touching the circles.

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



- 62 [1] Allow 1 credit for 11 p.m. with an acceptable explanation. Acceptable explanations include, but are not limited to:

- The air temperature and dewpoint temperatures are the closest at that time.
- The air temperature cooled to near the dewpoint.
- The relative humidity is close to 100%

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

- psychrometer/sling psychrometer
- hygrometer

**64** [1] Allow 1 credit for any value from 150 to 200 cm/s.

**65** [1] Allow 1 credit. Acceptable responses include, but are not limited to:

- *W* is located on the outside bend of a meander curve.
- Due to inertia, the stream tends to flow in a straight line into the outside bank with a greater force.

**Note:** Do *not* allow credit for “*W* is on the curve” because *X* is also on the curve.

Do *not* allow credit for “Water is moving slower at *X*” because the student is simply stating the opposite of what is provided in the question.

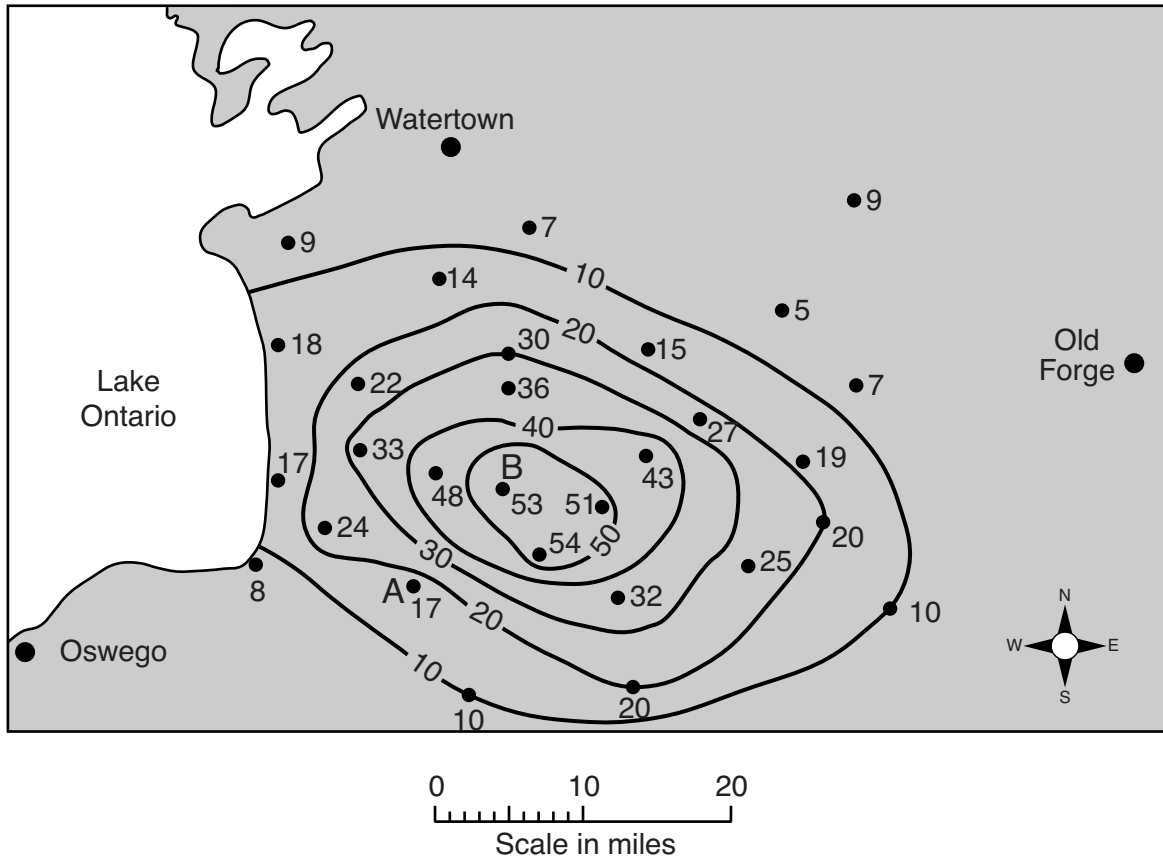
**Part C**

**Allow a maximum of 20 credits for this part.**

- 66** [1] Allow 1 credit if the 20-, 30-, and 40-inch isolines are correctly drawn. If additional lines are drawn, all isolines must be correct to receive credit. All isolines should form closed loops. The 20-inch isoline must pass through or touch the two 20 dots. The 30-inch isoline must pass through or touch the 30 dot.

**Examples of 1-credit responses:**

**Total Snowfall from February 2-4, 2017**

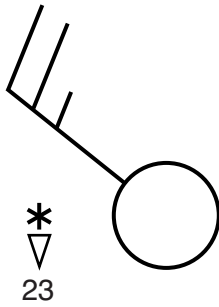


- 67** [1] Allow 1 credit for any value from 3.6 in/mi to 4.5 in/mi.

- 68** [1] Allow 1 credit for Tug Hill Plateau.

69 [1] Allow 1 credit if *all four* weather conditions are in the correct location and in the correct format.

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

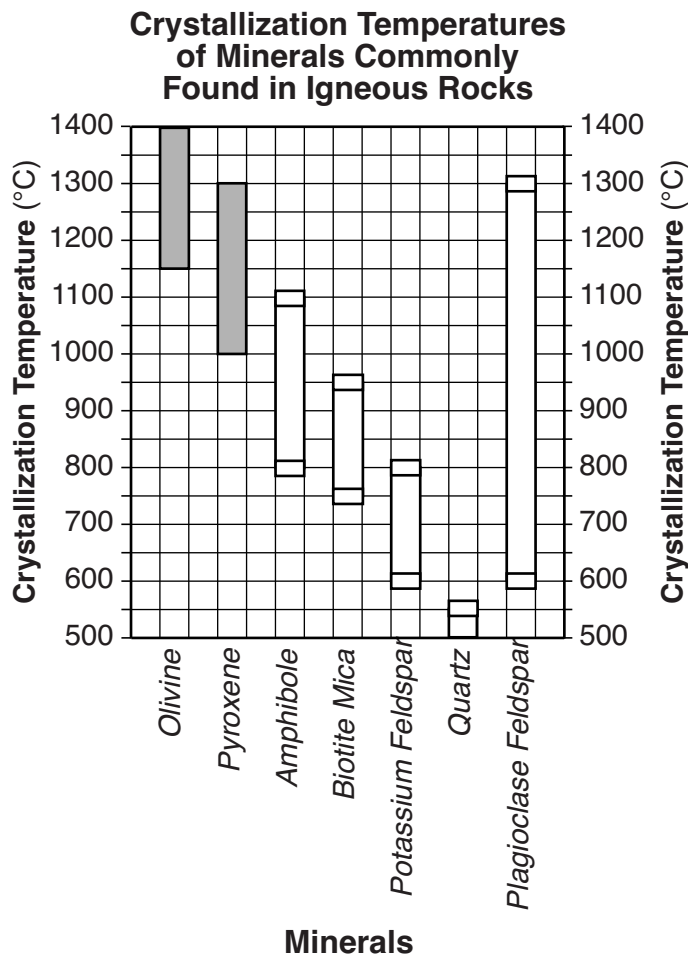


**Note:** The feathers representing wind speed may be drawn on either side on the line indicating wind direction.

70 [1] Allow 1 credit if *all five* student-drawn bars are drawn in the correct columns and the ends of the bars are within or touch the rectangular areas shown at the end of each bar.

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

Do *not* allow credit if any bar is not directly in the column above the mineral name.



71 [1] Allow 1 credit for quartz.

72 [1] Allow 1 credit for silicon/Si and oxygen/O.

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

Color:

- green
- dark/darker
- black
- brown
- gray

Density:

- high/higher
- very dense
- greater

**Note:** Do *not* allow credit for any numbers for density.

74 [1] Allow 1 credit for West Australia Current.

75 [1] Allow 1 credit. Acceptable responses include, but are not limited to:

- December 21 *or* 20 *or* 22
- 12/21 *or* 12/20 *or* 12/22

76 [1] Allow 1 credit for cT. Allow credit for either upper-case or lower-case letters.

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

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*.

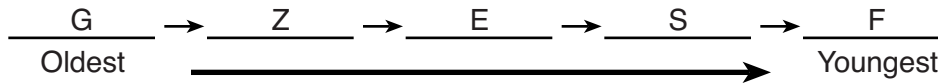
77 [1] Allow 1 credit. Acceptable responses include, but are not limited to:

- Location *D* is behind the mountain range and shielded from the prevailing winds.
- Air currents at location *D* are coming down the mountain, warming and causing a drier climate.
- Winds at location *E* are rising up the mountain and cooling, causing precipitation.
- There is a mountain range between *D* and *E*.
- Location *D* is on the leeward side of a mountain.
- Location *E* is on the windward side of a mountain.

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

- *B* and *C* do not show their original horizontality.
- Rock layers *B* and *C* have been tilted/slanted.
- The left sides of both layers are higher than the right sides.
- An unconformity is located above rock units *B* and *C*.

79 [1] Allow 1 credit for the correct order shown below:



80 [1] Allow 1 credit for any value from 387 mya to 435 mya.

81 [1] Allow 1 credit if *both* responses are correct.

Process:

- condensation *or* deposition

Energy is:

- released

82 [1] Allow 1 credit if *both* responses are correct. Acceptable responses include, but are not limited to:

Rate of runoff:

- increases
- is greater
- faster

Rate of infiltration:

- decreases
- is less
- slower



- 83** [1] Allow 1 credit. Acceptable responses include, but are not limited to:
- The rocket appears to curve/bend to the right.
  - It's deflected to a different longitude to the east/Northeast/NE.
  - clockwise

- 84** [1] Allow 1 credit. Acceptable responses include, but are not limited to:
- As latitude increases, the deflection is greater.
  - As latitude increases, the Coriolis effect increases.
  - From the equator to the North Pole, the Coriolis effect increases.
  - Winds curve more at higher latitudes.
  - As latitude decreases, the deflection of winds is less.
  - direct relationship

**Note:** Do *not* allow credit for “as latitude increases, there will be more/stronger winds” or “as latitude increases, there is a greater wind speed” because these responses do *not* directly relate latitude to the deflection of winds.

- 85** [1] Allow 1 credit for Foucault pendulum *or* pendulum *or* gyroscope.

## Regents Examination in Physical Setting/Earth Science

August 2022

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

**The Chart for Determining the Final Examination Score for the August 2022 Regents Examination in Physical Setting/Earth Science will be posted on the Department’s web site at: <http://www.nysed.gov/state-assessment/> on the day of the exam. 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 <https://www.surveymonkey.com/r/SLNLLDW>.
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 2022 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		61	67, 70
Math Key Idea 2	2, 7, 32	40, 44, 49, 52, 58, 62, 64	71, 82, 84
Math Key Idea 3		36	
Science Inquiry Key Idea 1	5, 14	38, 46, 50, 57, 59, 60, 65	77, 78, 80, 85
Science Inquiry Key Idea 2			79
Science Inquiry Key Idea 3	1, 2, 6, 8, 10, 15, 19, 20, 21, 22, 24, 26, 28, 34, 35	37, 39, 40, 51, 52, 53, 55, 56, 57, 64	60, 67, 68, 69, 72, 73, 74, 76, 80
Engineering Design Key Idea 1			
<b>Standard 2</b>			
Key Idea 1	63		
Key Idea 2			
Key Idea 3			
<b>Standard 6</b>			
Key Idea 1	23	38, 45, 65	77, 82
Key Idea 2	3, 4, 9, 10, 11, 12, 13, 15, 22, 23, 24, 25, 30, 32, 33, 35	36, 37, 42, 43, 44, 45, 47, 48, 49, 51, 52, 54, 56, 58, 63, 65	66, 68, 69, 70, 71, 72, 73, 74, 75, 76, 78, 79, 80, 81, 82, 83, 84
Key Idea 3			
Key Idea 4			
Key Idea 5	9, 11, 13, 16, 27, 33	47, 48, 49, 59, 62	78, 79, 82, 83, 84
Key Idea 6			
<b>Standard 7</b>			
Key Idea 1			
Key Idea 2		39, 41	
<b>Standard 4</b>			
Key Idea 1	1, 2, 3, 4, 5, 6, 7, 8, 13, 14, 19, 20	36, 37, 38, 44, 45, 46, 49, 50, 51, 54, 55, 56, 57, 58, 59, 60	75, 78, 79, 80, 81, 82, 83, 84, 85
Key Idea 2	9, 10, 11, 12, 15, 16, 17, 21, 22, 23, 24, 25, 26, 27, 29, 30, 31, 32, 33	39, 40, 41, 42, 43, 47, 48, 52, 53, 61, 62, 63, 64, 65	66, 67, 68, 69, 74, 76, 77
Key Idea 3	28, 34, 35		70, 71, 72, 73
<b>Reference Tables</b>			
ESRT 2011 Edition (Revised)	1, 2, 6, 8, 10, 15, 18, 19, 20, 21, 22, 24, 26, 28, 31, 34, 35,	37, 40, 51, 52, 53, 55, 57, 64	67, 68, 69, 72, 73, 74, 76, 80

The State Education Department / The University of the State of New York  
**Regents Examination in Physical Setting/Earth Science – August 2022**  
**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 9 and Total Written Test Score of 65 would receive a final examination score of 85.

		<b>Total Performance Test Score</b>																
		16	15	14	13	12	11	10	9	8	7	6	5	4	3	2	1	0
<b>Total Written Test Score</b>	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	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	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	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	82	82	81	81	81	80	79	79	78	77	76	75	74	72	71	69	67	
56	81	81	81	80	80	79	78	78	77	76	75	74	73	71	70	68	66	
55	80	80	80	79	79	78	78	77	76	75	74	73	72	71	69	67	65	
54	80	79	79	78	78	77	77	76	75	74	73	72	71	70	68	66	65	
53	79	78	78	78	77	77	76	75	74	74	72	71	70	69	67	66	64	
52	78	78	77	77	76	76	75	74	74	73	72	71	69	68	66	65	63	
51	77	77	76	76	75	75	74	73	73	72	71	70	69	67	66	64	62	
50	76	76	75	75	75	74	73	73	72	71	70	69	68	66	65	63	61	
49	75	75	75	74	74	73	73	72	71	70	69	68	67	65	64	62	60	
48	75	74	74	73	73	72	72	71	70	69	68	67	66	65	63	61	60	
47	74	73	73	72	72	71	71	70	69	68	67	66	65	64	62	60	59	
46	73	73	72	72	71	71	70	69	68	68	67	65	64	63	61	60	58	
45	72	72	71	71	70	70	69	68	68	67	66	65	63	62	60	59	57	

**Final Examination Scores  
Regents Examination in Physical Setting/Earth Science – August 2022 – continued**

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