

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

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

**Thursday, August 13, 2015 — 12:30 to 3:30 p.m., only**

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

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

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

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

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

Notice . . .

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

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

## Part A

### Answer all questions in this part.

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

- 1 Which characteristics best describe the star *Betelgeuse*?
  - (1) reddish orange with low luminosity and high surface temperature
  - (2) reddish orange with high luminosity and low surface temperature
  - (3) blue white with low luminosity and low surface temperature
  - (4) blue white with high luminosity and high surface temperature
- 2 Which motion occurs at a rate of approximately one degree per day?
  - (1) the Moon revolving around Earth
  - (2) the Moon rotating on its axis
  - (3) Earth revolving around the Sun
  - (4) Earth rotating on its axis
- 3 If the tilt of Earth's axis were increased from  $23.5^\circ$  to  $30^\circ$ , summers in New York State would become
  - (1) cooler, and winters would become cooler
  - (2) cooler, and winters would become warmer
  - (3) warmer, and winters would become cooler
  - (4) warmer, and winters would become warmer
- 4 Which object in space emits light because it releases energy produced by nuclear fusion?
  - (1) Earth's Moon
  - (2) Halley's comet
  - (3) Venus
  - (4) *Polaris*
- 5 Since Denver's longitude is  $105^\circ$  W and Utica's longitude is  $75^\circ$  W, sunrise in Denver occurs
  - (1) 2 hours earlier
  - (2) 2 hours later
  - (3) 3 hours earlier
  - (4) 3 hours later
- 6 A major piece of evidence supporting the Big Bang theory is the observation that wavelengths of light from stars in distant galaxies show a
  - (1) redshift, appearing to be shorter
  - (2) redshift, appearing to be longer
  - (3) blueshift, appearing to be shorter
  - (4) blueshift, appearing to be longer
- 7 During the month of January, at which location in New York State is the Sun lowest in the sky at solar noon?
  - (1) Massena
  - (2) Niagara Falls
  - (3) Utica
  - (4) New York City
- 8 Which process releases 2260 joules of heat energy per gram of water into the environment?
  - (1) melting
  - (2) freezing
  - (3) condensation
  - (4) evaporation
- 9 When snow cover on the land melts, the water will most likely become surface runoff if the land surface is
  - (1) frozen
  - (2) porous
  - (3) grass covered
  - (4) unconsolidated gravel
- 10 Which area is the most common source region for cold, dry air masses that move over New York State?
  - (1) North Atlantic Ocean
  - (2) Gulf of Mexico
  - (3) central Canada
  - (4) central Mexico



- 16 Earth's magnetic field has reversed itself several times during the past. This pattern of magnetic reversal is best preserved in
- (1) metamorphic bedrock in mountain ranges
  - (2) bedrock with fossils containing radioactive carbon-14
  - (3) layers of sedimentary bedrock of the Grand Canyon
  - (4) igneous bedrock of the oceanic crust
- 17 Which two features are commonly found at divergent plate boundaries?
- (1) mid-ocean ridges and rift valleys
  - (2) wide valleys and deltas
  - (3) ocean trenches and subduction zones
  - (4) hot spots and island arcs
- 18 New York State bedrock of which age contains salt, gypsum, and hematite?
- (1) Cambrian
  - (2) Devonian
  - (3) Mississippian
  - (4) Silurian
- 19 Scientists infer that oxygen in Earth's atmosphere did *not* exist in large quantities until after
- (1) the first multicellular, soft-bodied marine organisms appeared on Earth
  - (2) the initial opening of the Atlantic Ocean
  - (3) the first sexually reproducing organisms appeared on Earth
  - (4) photosynthetic cyanobacteria evolved in Earth's oceans
- 20 Which organisms were alive when New York State was last covered by a continental ice sheet?
- (1) *Eurypterus* and *Cooksonia*
  - (2) *Aneurophyton* and Naples Tree
  - (3) mastodont and Beluga whale
  - (4) *Coelophysis* and *Elliptocephala*
- 21 One difference between a breccia rock and a conglomerate rock is that the particles in a breccia rock are
- (1) more aligned
  - (2) more angular
  - (3) harder
  - (4) land derived

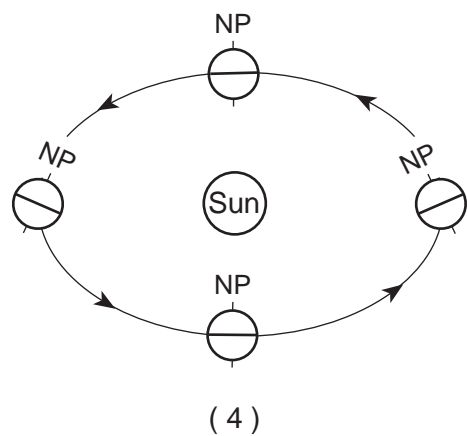
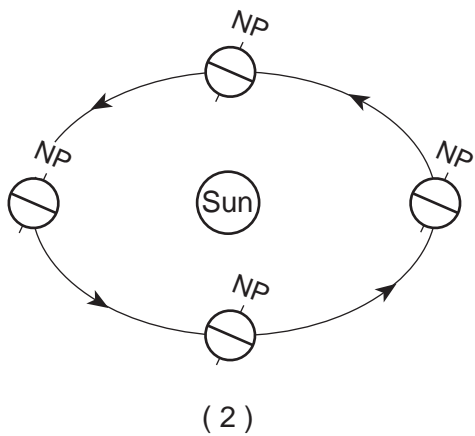
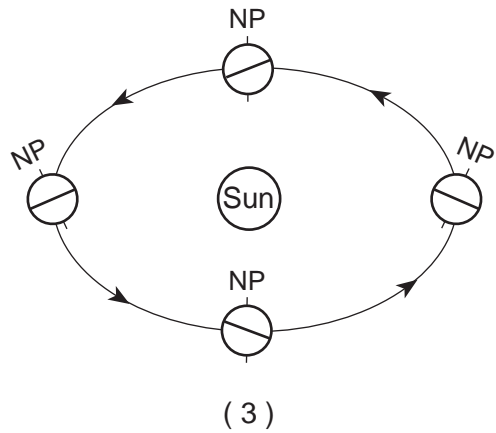
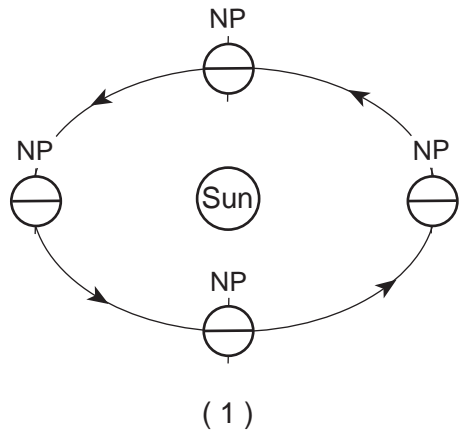
- 22 The photograph below shows rock layers separated by unconformity XY.



Which sequence of events most likely produced this unconformity?

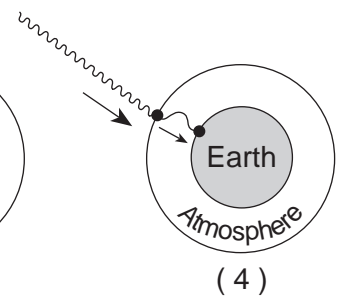
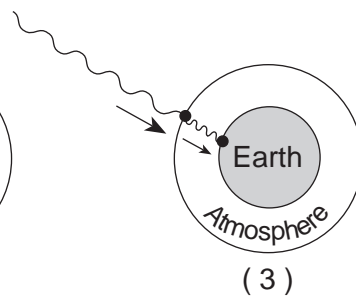
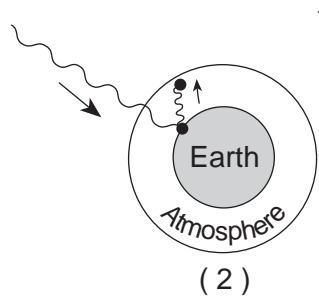
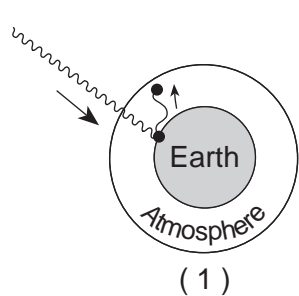
- (1) uplift and erosion of bedrock, followed by subsidence and more deposition
  - (2) intrusion of magma into preexisting rock, causing contact metamorphism
  - (3) eruption of a volcano, spreading lava over horizontal sedimentary rock layers
  - (4) separation of one rock layer, by movement along a plate boundary
- 23 The igneous rock gabbro most likely formed from molten material that cooled
- (1) rapidly at Earth's surface
  - (2) slowly at Earth's surface
  - (3) rapidly, deep underground
  - (4) slowly, deep underground
- 24 Which statement best supports the inference that most of Earth's present-day land surfaces have, at one time, been covered by water?
- (1) Volcanic eruptions contain large amounts of water vapor.
  - (2) Coral reefs formed, in the past, along the edges of many continents.
  - (3) Seafloor spreading has pulled landmasses apart and pushed them together.
  - (4) Sedimentary bedrock of marine origin covers large areas of Earth's continents.

25 Which diagram best represents the correct orientation of the North Pole [NP] as Earth revolves around the Sun? [Diagrams are not drawn to scale.]



26 Which diagram best represents how greenhouse gases in our atmosphere trap heat energy?

Key		
Visible light radiation	Infrared radiation	Absorbed energy



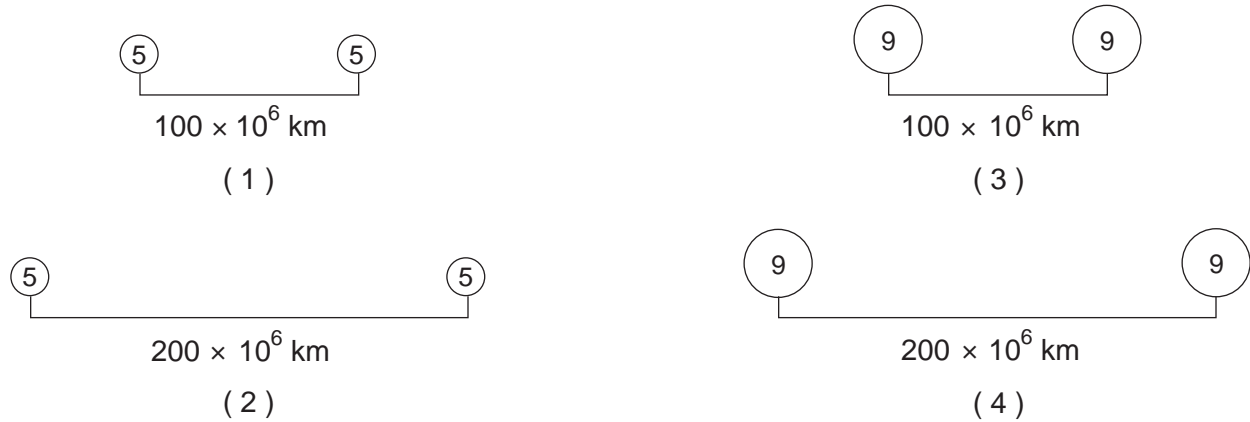
(Not drawn to scale)

27 The symbols below represent two planets.

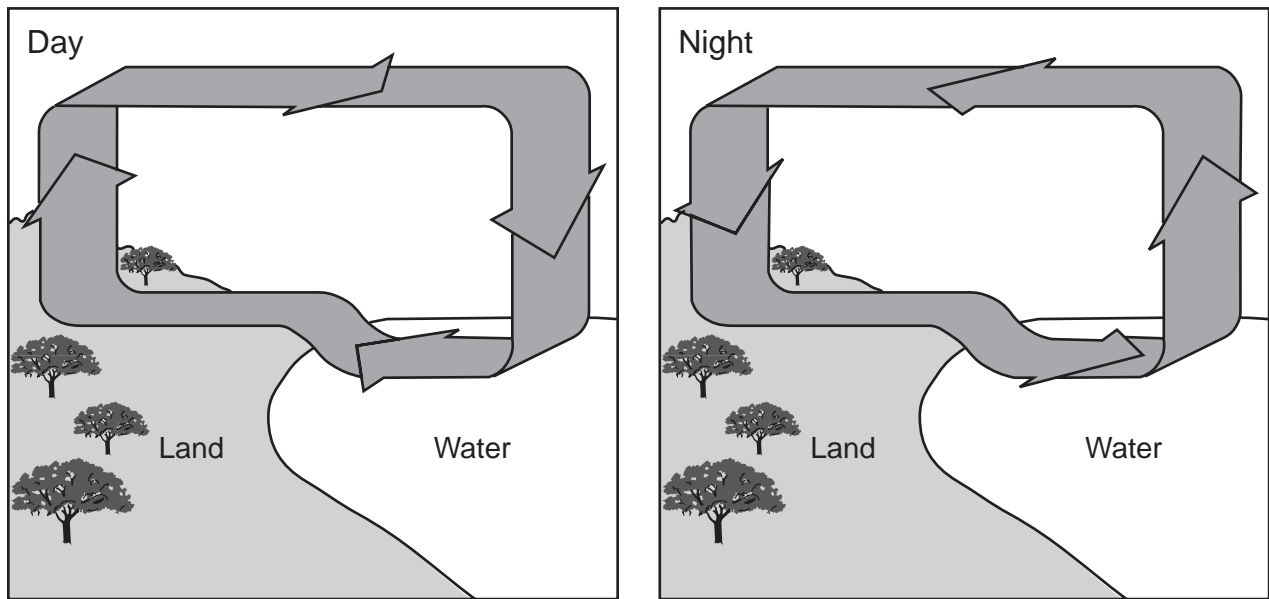
⑤ represents a planet with a mass 5 times Earth's mass.

⑨ represents a planet with a mass 9 times Earth's mass.

Which combination of planet masses and distances produces the greatest gravitational force between the planets?



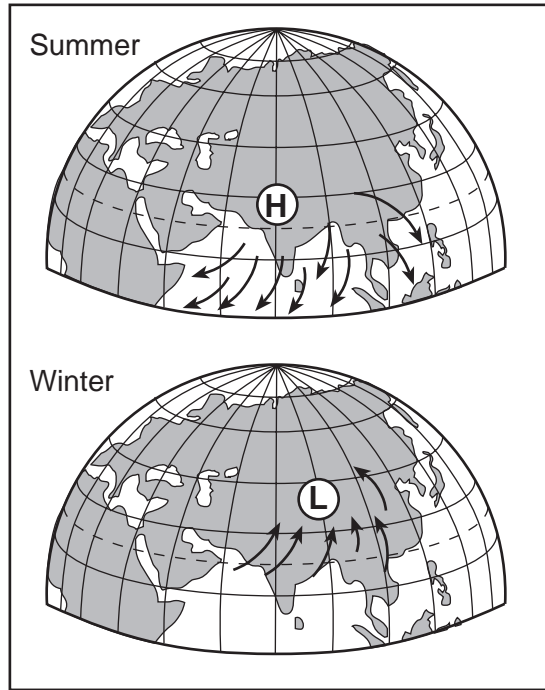
28 The diagram below represents the circulation of air above Earth's surface at a coastal location during the day and at night.



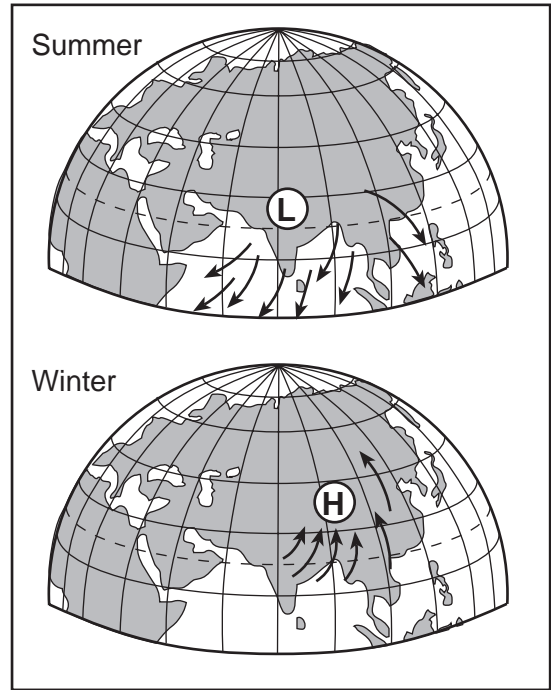
This local air movement is best described as an example of

- (1) conduction between Earth's surface and the atmosphere above it
- (2) condensation of water vapor during the day, and evaporation of water during the night
- (3) convection resulting from temperature and pressure differences above land and water
- (4) greater radiation from the warmer ocean during the day and from the warmer land at night

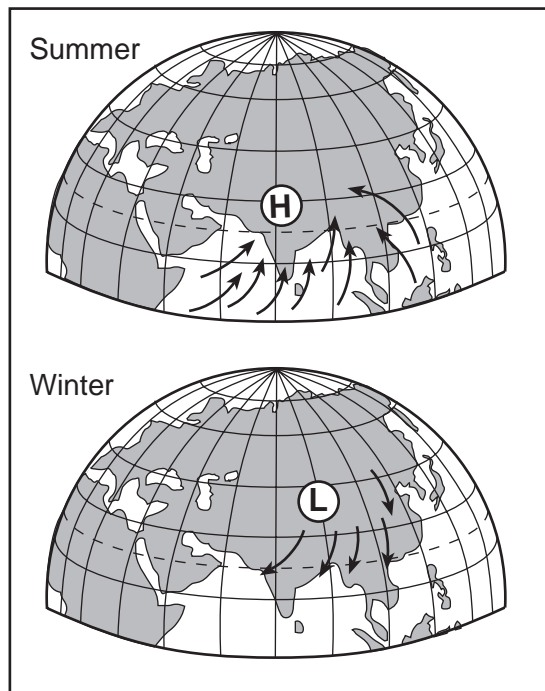
29 A change in the type and location of large high-pressure systems (**H**) and large low-pressure systems (**L**) over Asia creates shifts in prevailing winds that cause a rainy summer season and a dry winter season in southern Asia. Which set of maps below best represents the type and location of pressure systems and the wind pattern around these pressure systems that cause these seasonal changes?



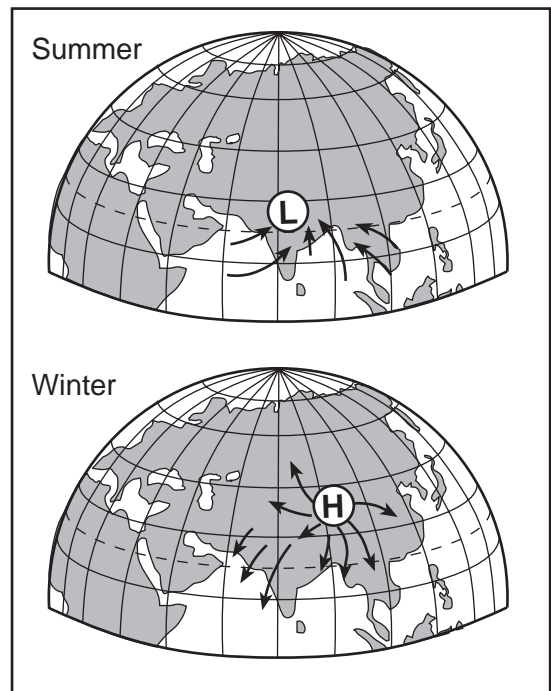
(1)



(3)



(2)



(4)

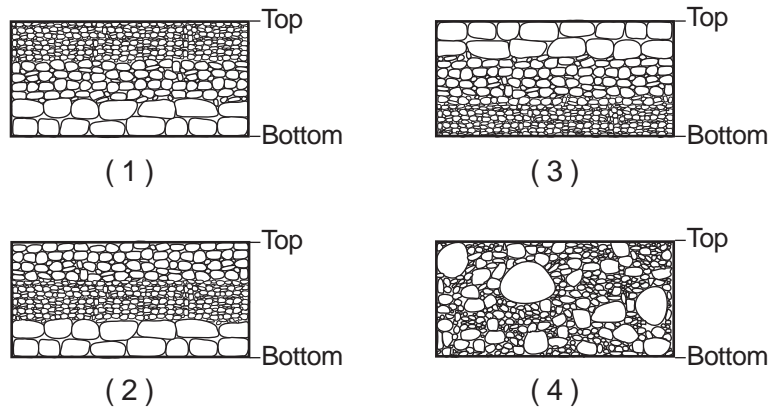
30 The photograph below shows both erosional and depositional features formed by an agent of erosion.



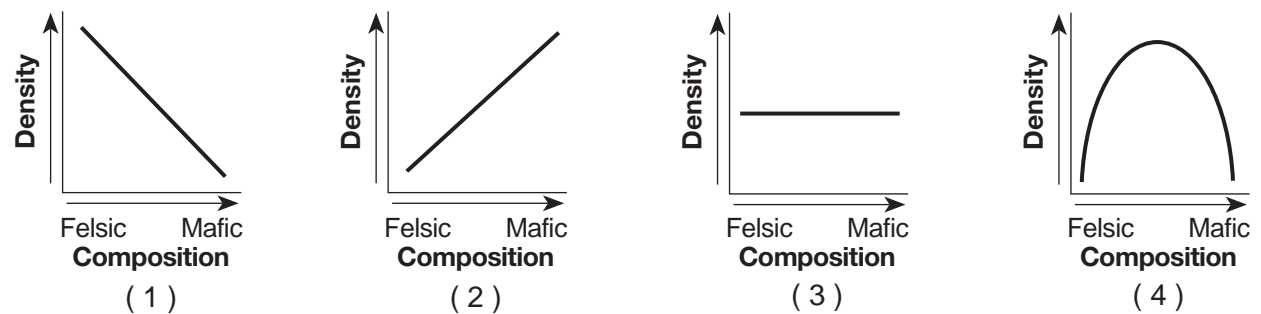
Which agent of erosion produced the features shown in the photograph?

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

31 Which cross section best represents the pattern of sediments deposited on the bottom of a lake as the velocity of the stream entering the lake steadily decreased?

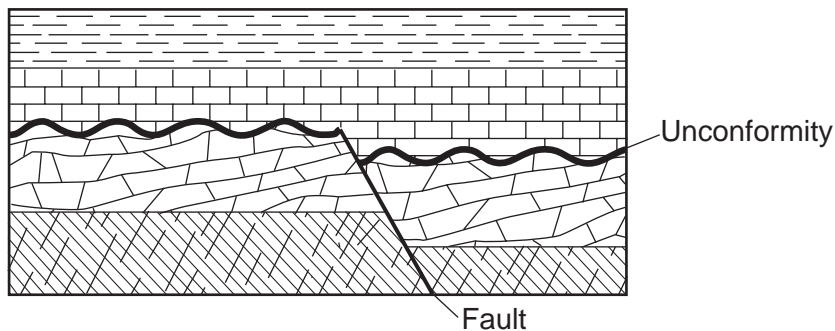


32 Which graph best shows the relationship between the compositions of different igneous rocks and their densities?





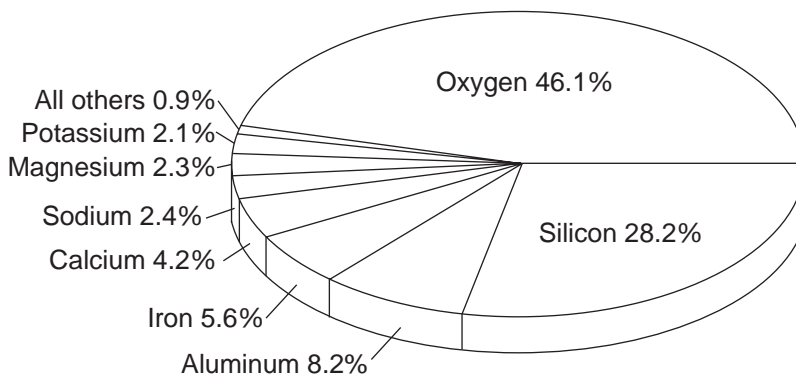
33 The geologic cross section below shows rock layers that have not been overturned.



The fault is older than the

- (1) slate
- (2) marble
- (3) unconformity
- (4) shale

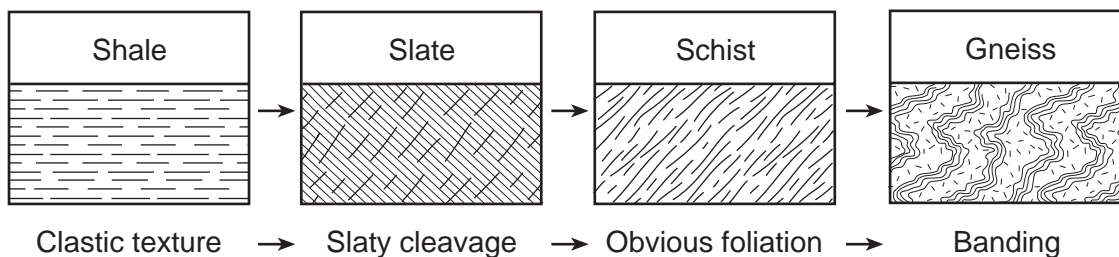
34 The pie graph below represents the composition, in percent by mass, of the chemical elements found in an Earth layer.



The composition of which Earth layer is represented by the pie graph?

- (1) crust
- (2) outer core
- (3) troposphere
- (4) hydrosphere

35 The diagram below indicates physical changes that accompany the conversion of shale to gneiss.



Which geologic process is occurring to cause this conversion?

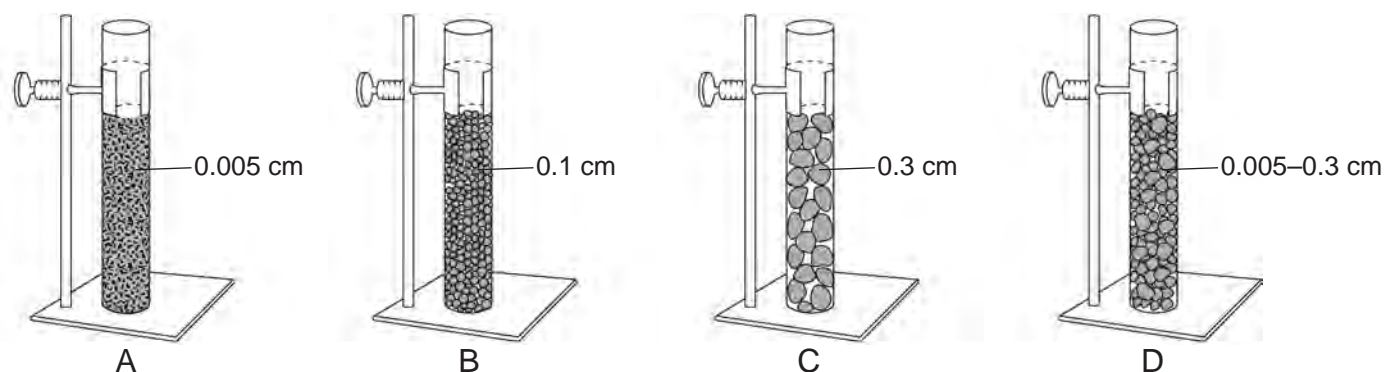
- (1) sedimentary layering
- (2) intrusion of magma
- (3) metamorphism
- (4) weathering

## Part B-1

### Answer all questions in this part.

*Directions (36–50):* For *each* statement or question, choose the word or expression that, of those given, best completes the statement or answers the question. Some questions may require the use of the *2011 Edition Reference Tables for Physical Setting/Earth Science*. Record your answers on your separate answer sheet.

Base your answers to questions 36 and 37 on the diagram below and on your knowledge of Earth science. The diagram represents four tubes, labeled A, B, C, and D, each containing 150 mL of sediments. Tubes A, B, and C contain well-sorted, closely packed sediments of uniform shape and size. Tube D contains uniformly shaped, closely packed sediments of mixed sizes. The particle size of the sediment in each tube is labeled.



(Not drawn to scale)

36 Water was added to each tube to just cover the sediments and the volumes of water added were recorded. These data can best be used to determine the

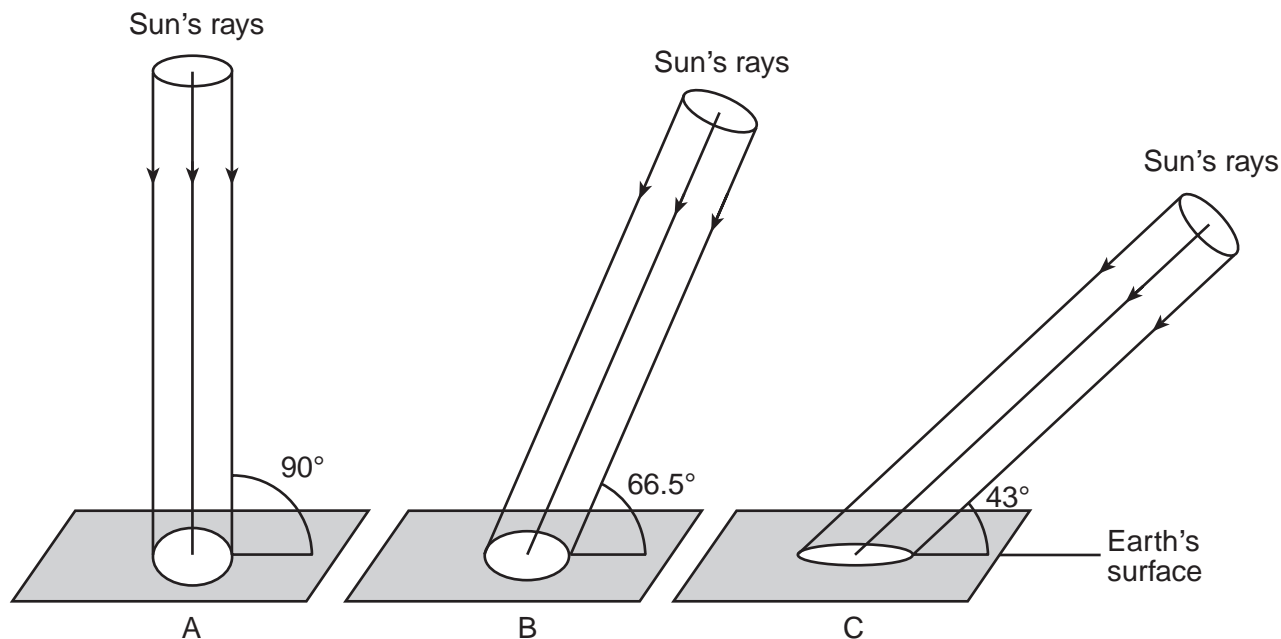
- (1) particle size of the sediments
- (2) particle shape of the sediments
- (3) water retention of the sediments
- (4) porosity of the sediments

37 If tubes A, B, and C were set up to test for capillarity, the data would show that capillarity is

- (1) greatest in tube A
- (2) greatest in tube B
- (3) greatest in tube C
- (4) the same for tubes A, B, and C



Base your answers to questions 41 through 43 on the diagrams below and on your knowledge of Earth science. The diagrams, labeled A, B, and C, represent equal-sized portions of the Sun's rays striking Earth's surface at 23.5° N latitude at noon at three different times of the year. The angle at which the Sun's rays hit Earth's surface and the relative areas of Earth's surface receiving the rays at the three different angles of insolation are shown.



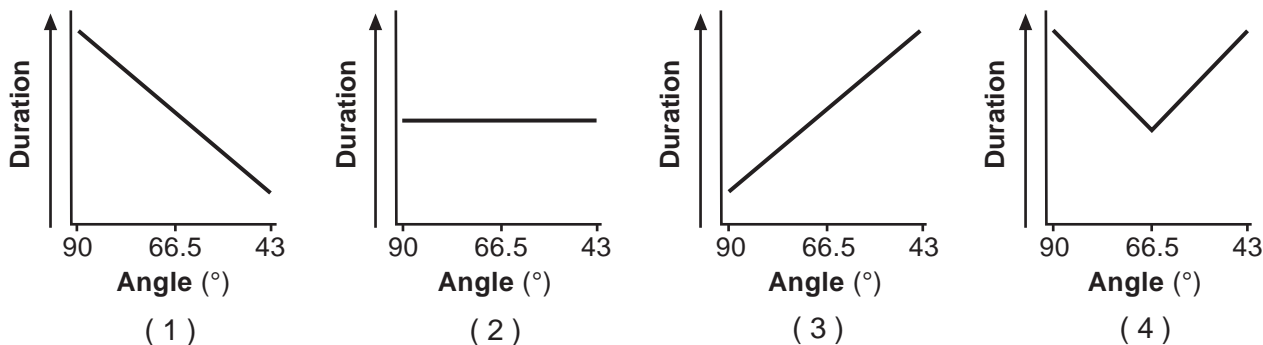
41 As viewed in sequence from A to B to C, these diagrams represent which months and which change in the intensity of insolation?

- (1) December → March → June; and decreasing intensity
- (2) December → March → June; and increasing intensity
- (3) June → September → December; and decreasing intensity
- (4) June → September → December; and increasing intensity

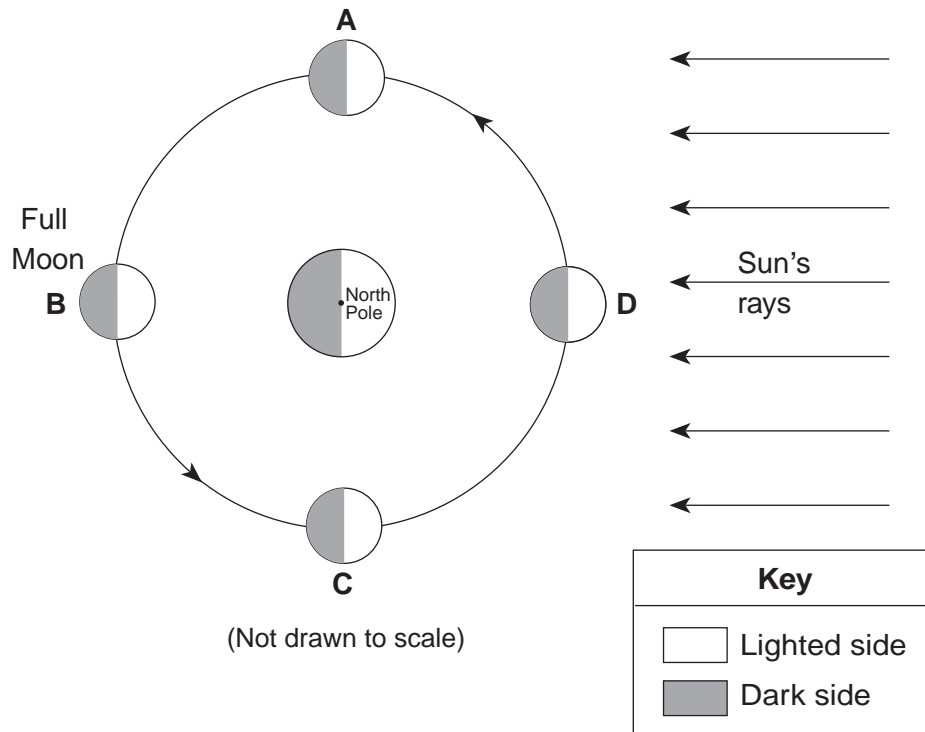
42 As the angle of the Sun's rays striking Earth's surface at noon changes from 90° to 43°, the length of a shadow cast by an object will

- (1) decrease
- (2) increase
- (3) decrease, then increase
- (4) increase, then decrease

43 Which graph best shows the duration of insolation at this location as the angle of insolation changes?



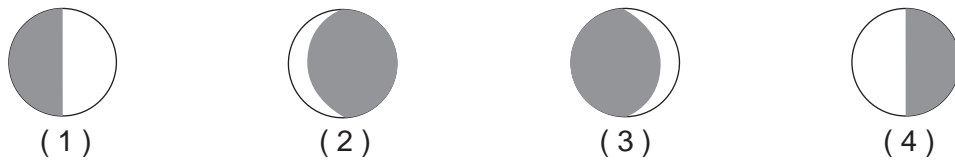
Base your answers to questions 44 through 47 on the diagram below and on your knowledge of Earth science. The diagram represents the Moon at four positions, labeled A, B, C, and D, in its orbit around Earth. The position of the full-Moon phase is labeled.



44 Approximately how many days (d) does it take for the Moon to move from the phase shown at position A to the full-Moon phase?

- (1) 7.4 d
- (2) 14.7 d
- (3) 27.3 d
- (4) 29.5 d

45 Which phase of the Moon could be observed from New York State when the Moon is at position C?



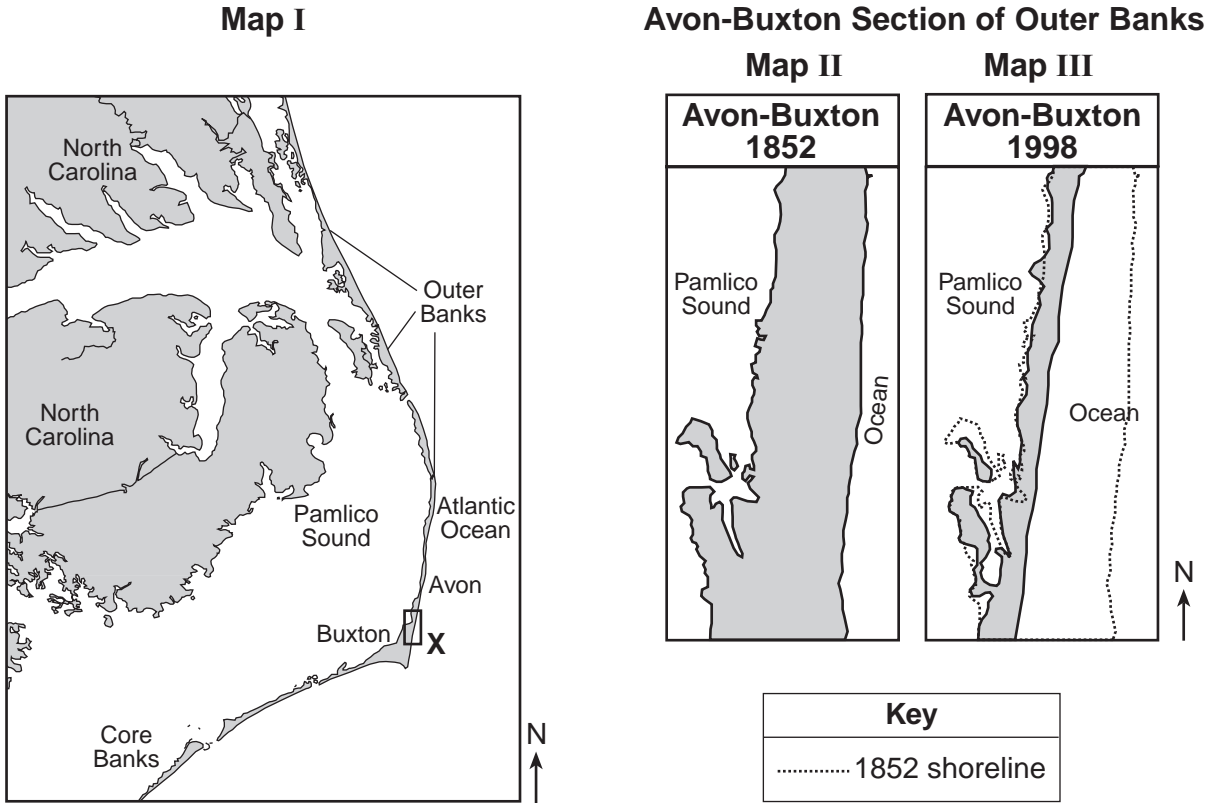
46 The same side of the Moon always faces Earth because the Moon's period of revolution

- (1) is longer than the Moon's period of rotation
- (2) equals the Moon's period of rotation
- (3) is longer than Earth's period of rotation
- (4) equals Earth's period of rotation

47 Solar and lunar eclipses rarely happen during a cycle of phases because the

- (1) Moon's orbit is circular and Earth's orbit is elliptical
- (2) Moon's orbit is elliptical and Earth's orbit is elliptical
- (3) plane of the Moon's orbit is different from the plane of Earth's orbit
- (4) plane of the Moon's orbit is the same as the plane of Earth's orbit

Base your answers to questions 48 through 50 on the maps and data table below and on your knowledge of Earth science. Map I shows the Outer Banks and part of North Carolina along the southeastern coast of the United States. Maps II and III show enlargements of the Avon-Buxton section of the Outer Banks indicated by box **X** on map I. Map II shows the land and shoreline in 1852. Map III shows the land and shoreline in 1998. The dotted line on map III shows the location of the 1852 shoreline. The data table shows the average width, in meters, at various years, of the Avon-Buxton section.



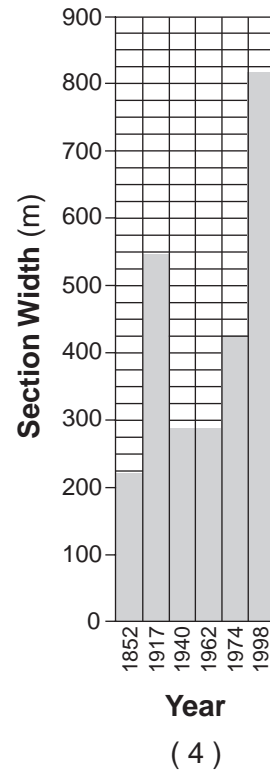
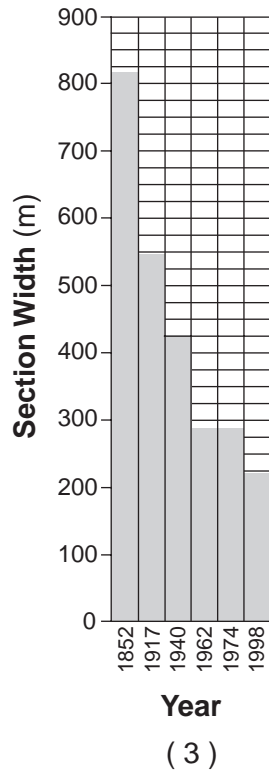
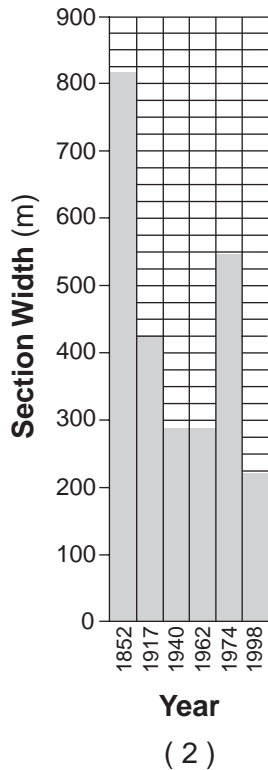
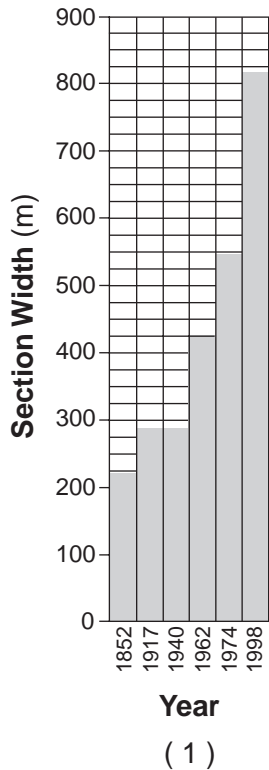
**Avon-Buxton Section Width from 1852 to 1998**

Year	Average Width (m)
1852	813
1917	547
1940	426
1962	284
1974	284
1998	219

48 The Outer Banks were formed primarily from sediments eroded and deposited by ocean waves. Which type of landform are the Outer Banks?

- (1) outwash plains
- (2) moraine deposits
- (3) river deltas
- (4) barrier islands

49 Which bar graph best shows the average width of the Avon-Buxton section of the Outer Banks from 1852 to 1998?



50 Which ocean current has the greatest warming influence on the climate of the Outer Banks of North Carolina?

- (1) Gulf Stream Current
- (2) North Atlantic Current
- (3) Labrador Current
- (4) Canary Current

**Part B-2**

**Answer all questions in this part.**

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

Base your answers to questions 51 through 54 on the passage and the graph below and on your knowledge of Earth science.

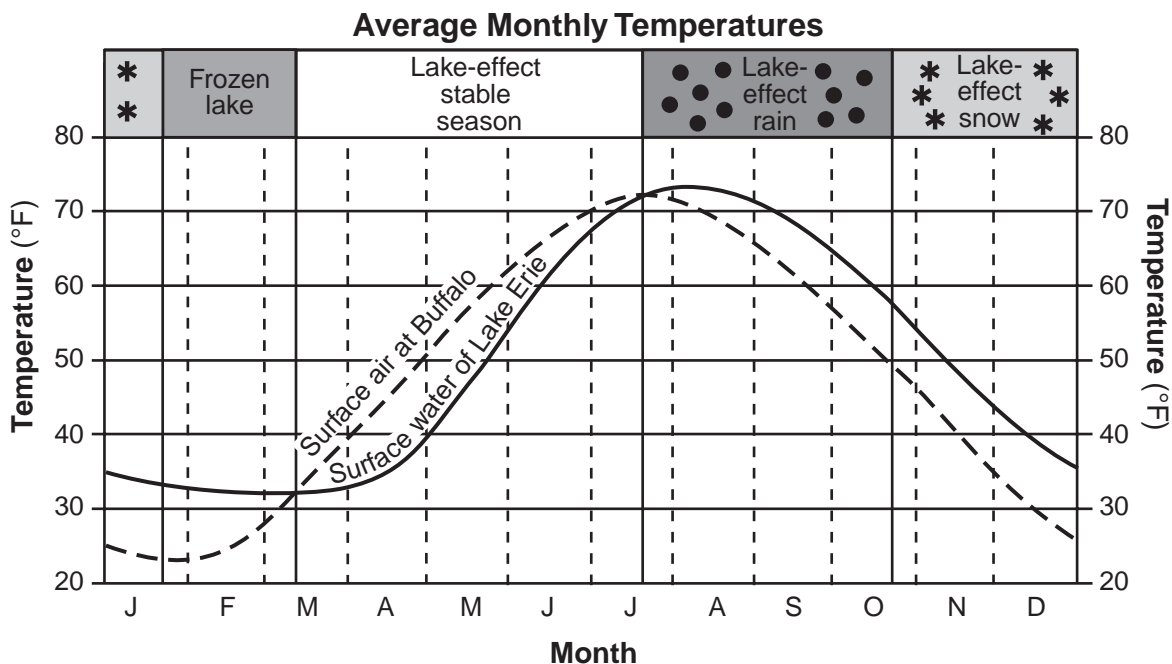
**Great Lake Effects**

The Great Lakes influence the weather and climate of nearby land regions at all times of the year. Much of this lake effect is determined by the relative temperatures of surface lake water compared to the surface air temperatures over those land areas. The graph below shows the average monthly temperature of the surface water of Lake Erie and the surface air temperature at Buffalo, New York.

In an average year, four lake-effect seasons are experienced. When surface lake temperatures are colder than surface air temperatures, a stable season occurs. The cooler lake waters suppress cloud development and reduce the strength of rainstorms. As a result, late spring and early summer in the Buffalo region tends to be very sunny.

A season of lake-effect rains follows. August is usually a time of heavy nighttime rains, and much of the rainy season is marked by heavy, localized rainstorms downwind from the lake. Gradually, during late October, lake-effect rains are replaced by snows. Generally, the longer the time the wind travels over the lake, the heavier the lake effect becomes in Buffalo.

Finally, conditions stabilize again, as the relatively shallow Lake Erie freezes over, usually near the end of January. Very few lake-effect storms occur during this time period.



Source: www.erh.noaa.gov (adapted)



- 51 The passage states, “The cooler lake waters suppress cloud development...” because the water cools the air above its surface. Explain why this cool air above the lake surface reduces the amount of cloud development. [1]
- 52 Identify *one* weather variable that determines whether Buffalo receives rain or snow from a lake-effect storm in October. [1]
- 53 On the map *in your answer booklet*, draw *one* straight arrow in Lake Erie to show the winter wind direction most likely to bring the heaviest lake-effect snows to Buffalo. [1]
- 54 Explain why the Buffalo surface air temperatures increase faster and earlier in the year than do the surface water temperatures of Lake Erie. [1]
- 

Base your answers to questions 55 through 58 on the graph in your answer booklet and on your knowledge of Earth science. The graph shows planet equatorial diameters and planet mean distances from the Sun. Neptune is *not* shown.

- 55 *In your answer booklet*, place an **X** on the graph to indicate where Neptune would be plotted, based on its mean distance from the Sun and its equatorial diameter. [1]
- 56 The diagram in your answer booklet represents Earth drawn to a scale of 1 cm = 2000 km. Centimeter markings along the equatorial diameter of Earth are also shown on the diagram. On the diagram *in your answer booklet*, shade in the space between the centimeter markings to represent the equatorial diameter of Earth’s Moon at this same scale. [1]
- 57 Compared to the periods of revolution and periods of rotation of the terrestrial planets, how are the periods of revolution and periods of rotation for the Jovian planets different? [1]
- 58 The center of the asteroid belt is approximately 404 million kilometers from the Sun. State the name of the planet that is closest to the center of the asteroid belt. [1]
-

Base your answers to questions 59 through 61 on the map of Haiti's location and portion of the Modified Mercalli Intensity Scale below, on the Haiti Earthquake Intensity Map in your answer booklet, and on your knowledge of Earth science. The map shows the location of Haiti in the Atlantic Ocean. The Modified Mercalli Intensity Scale describes the amount and type of damage caused by an earthquake on a scale from I to XII. A portion of this scale is shown below. Modified Mercalli intensity values for the January 12, 2010, earthquake in Haiti are represented on the Haiti Earthquake Intensity Map in your answer booklet.

**Map of Haiti's Location**



**A Portion of the Modified Mercalli Intensity Scale**

<b>Intensity</b>	<b>Description of Effects</b>
IV	Generally felt by people in motion, loose objects disturbed
V	Felt by nearly everyone; some dishes, windows broken
VI	Felt by all; slight damage to ordinary structures
VII	Damage rare in buildings of good design and construction; slight to moderate in ordinary structures; considerable damage in poorly built structures; some chimneys broken
VIII	Damage slight in specially designed structures; considerable damage in ordinary substantial buildings with partial collapse; damage great in poorly built structures; falling chimneys, columns, monuments, walls
IX	Damage considerable in specially designed structures; damage great in substantial buildings, with partial collapse; buildings shifted off foundations
X	Some well-built wooden structures destroyed; most concrete and frame structures destroyed along with foundations

- 59 On the earthquake intensity map in your answer booklet, boundary lines have been drawn between the Modified Mercalli intensity values of IV and V. On the map *in your answer booklet*, draw boundary lines between the Modified Mercalli intensity values of V and VI. [1]
- 60 State the latitude and longitude of Savane Baptiste. Include the units and compass directions in your answer. [1]
- 61 Haiti is located at a transform boundary between which two tectonic plates? [1]
- 

Base your answers to questions 62 through 65 on the passage below and on your knowledge of Earth science.

### Dinosaur Fossils

Bones of juvenile long-necked sauropod dinosaurs, *Abydosaurus mcintoshi*, have recently been found in 105-million-year-old sandstone at the Dinosaur National Monument in Utah. The remains of four individual dinosaurs were found, including two intact skulls. This find is unusual because the softer tissue holding the thin sauropod dinosaur skull bones together usually disintegrates, allowing the skull bones to separate. Only 8 of 120 types of sauropods discovered have complete skull specimens. These dinosaurs were herbivores, with large numbers of sharp teeth that were probably replaced five to six times each year. These teeth allowed only for the harvesting of plant material, but not for chewing it afterward. The plant-harvesting teeth and long neck identify *Abydosaurus mcintoshi* as a descendant of the brachiosaurs.

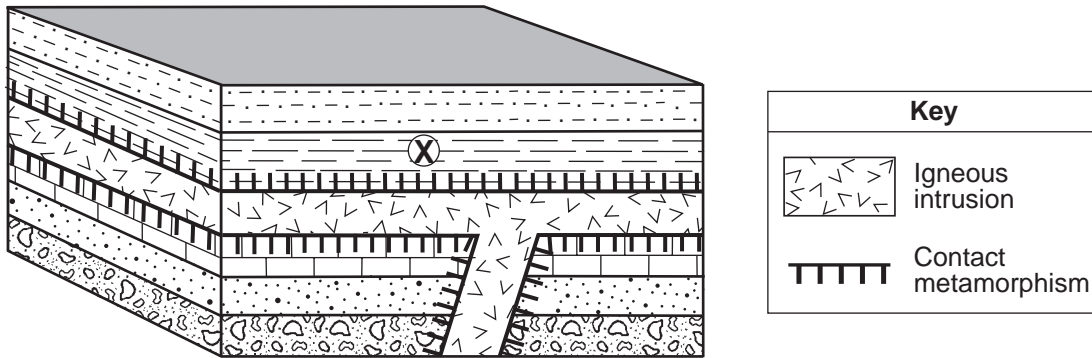
- 62 On the timeline *in your answer booklet*, place an **X** on line *AB* to indicate the time when *Abydosaurus mcintoshi* lived. [1]
- 63 Indicate the range of grain sizes in the type of bedrock in which *Abydosaurus mcintoshi* bones were found. [1]
- 64 Identify *one* group of organisms that was a likely food source for *Abydosaurus mcintoshi*. [1]
- 65 State a natural event that is inferred by most scientists to be the cause of extinction of the last of the dinosaurs. [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 block diagram below and on your knowledge of Earth science. The diagram represents an igneous intrusion that solidified between some layers of sedimentary rock. Letter *X* represents an index fossil in a sedimentary rock layer. The rock layers have *not* been overturned.



(Not drawn to scale)

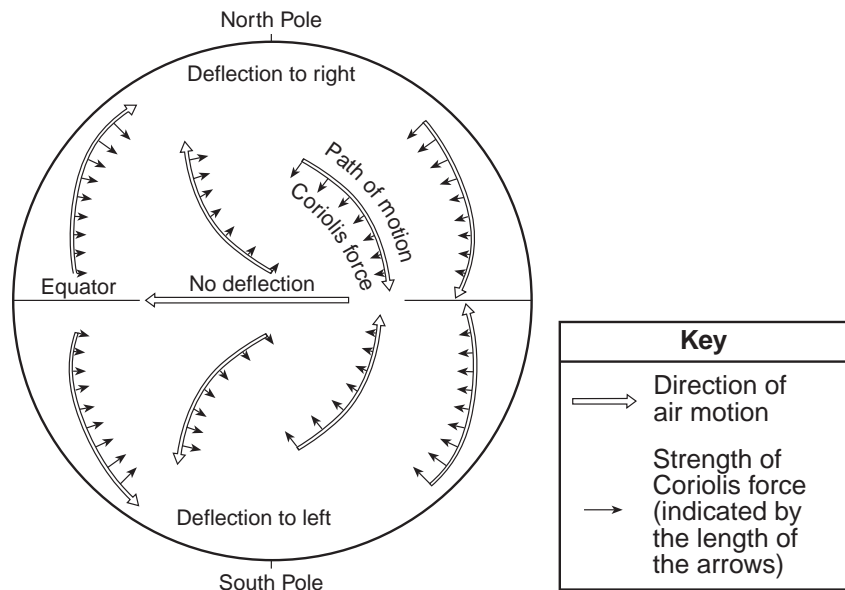
- 66 Describe the evidence represented in the diagram that indicates that the shale layer and the limestone layer are older than the igneous intrusion. [1]
- 67 The limestone layer is composed mostly of what mineral? [1]
- 68 Describe *one* characteristic of fossil *X* that makes it a good index fossil. [1]
- 69 The igneous intrusion contains the radioactive isotope potassium-40, which is used in radioactive dating to determine the age of rocks. State *one* property of potassium-40 that allows it to be useful in the radioactive dating of rocks. [1]
-

Base your answers to questions 70 through 73 on the data table below and on your knowledge of Earth science. The data show the rate of change in the apparent direction of the swing of a Foucault pendulum at various latitudes on Earth, in degrees per hour.

**A Foucault Pendulum's Swing**

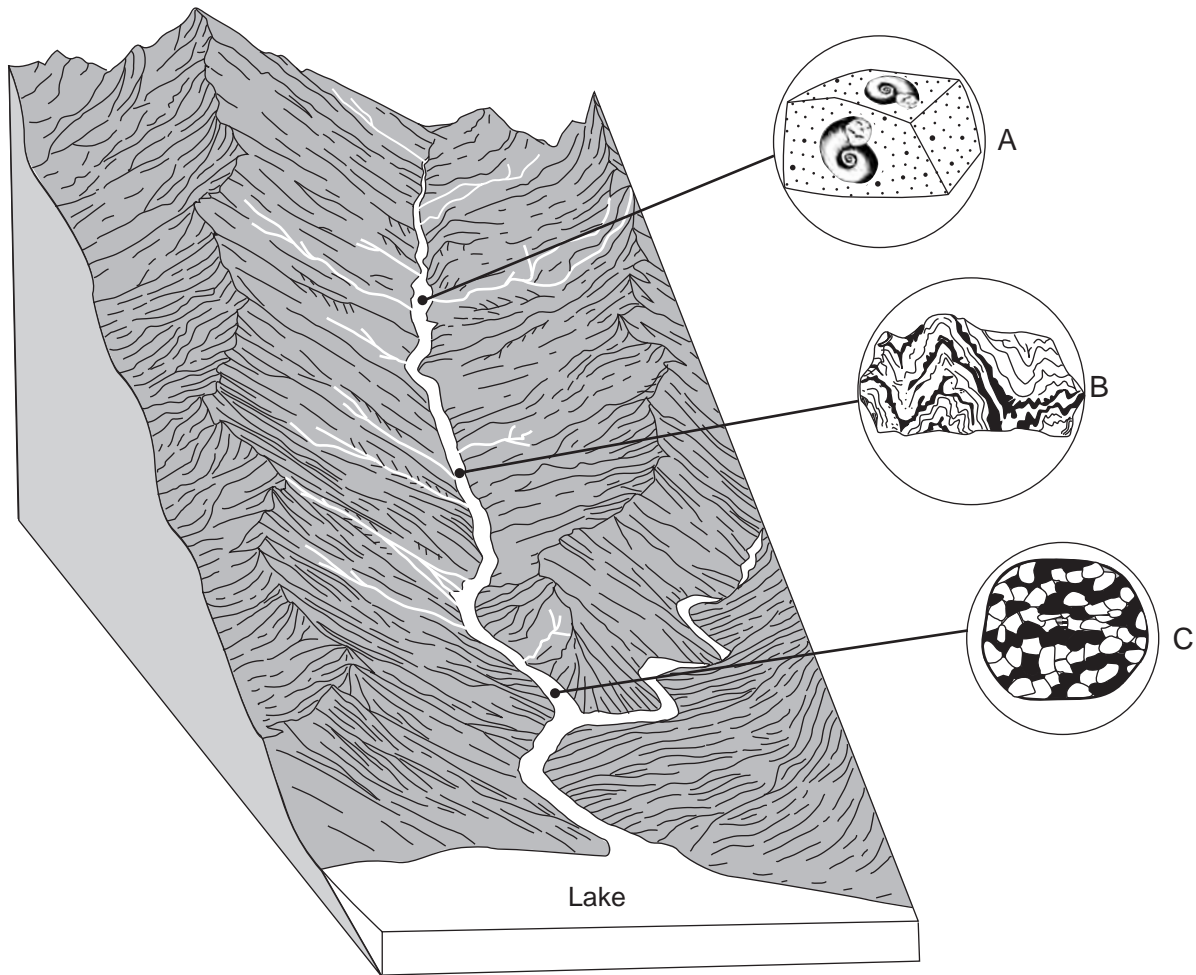
Latitude (°)	Rate of Change in Apparent Direction of Swing (°/h)
0	0.0
10	2.6
20	5.1
30	7.5
40	9.6
50	11.5
60	13.0
70	14.1
80	14.8
90	15.0

- 70 On the grid *in your answer booklet*, plot the hourly change in a Foucault pendulum's apparent direction of swing at the latitudes shown on the data table. Connect the plots with a line. [1]
- 71 Calculate how many hours are needed for a Foucault pendulum located at the North Pole to complete a 360° change in its apparent direction of swing. [1]
- 72 If a Foucault pendulum were set up on Mars, it would most likely show similar changes in the pendulum's apparent direction of swing. Identify the motion of the planet Mars that would cause this change. [1]
- 73 The Coriolis force results from the same motion that causes the Foucault pendulum to change its apparent direction of swing. The diagram below represents the relative strength of the Coriolis force acting on air moving over Earth's surface.

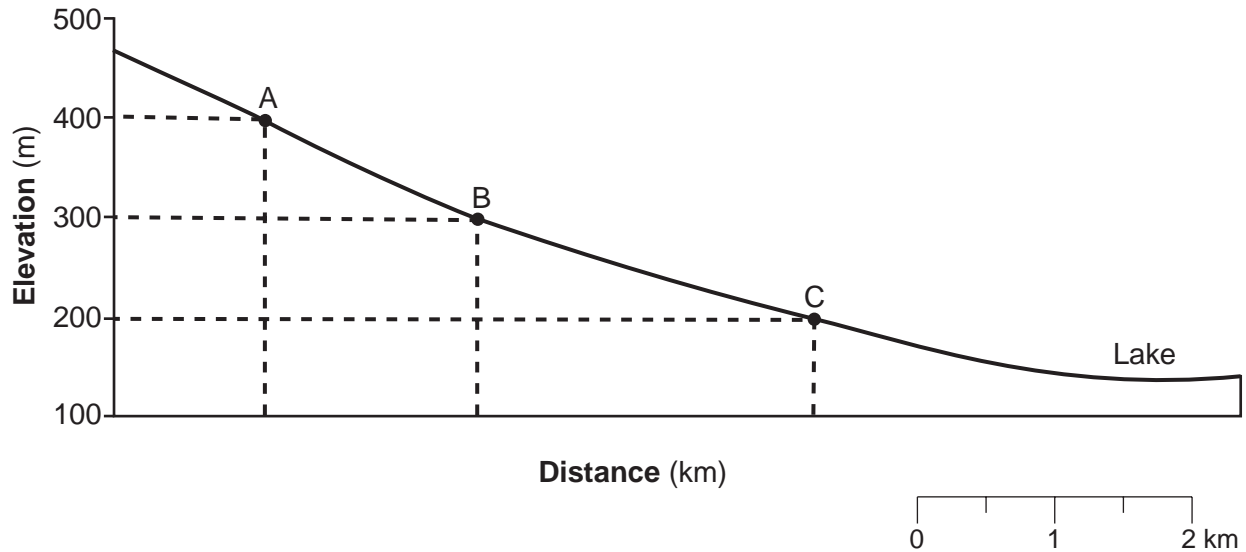


Describe how the strength of the Coriolis force changes with latitude. [1]

Base your answers to questions 74 through 76 on the block diagram below, which represents a landscape drained by a stream system, and on your knowledge of Earth science. The actual sizes and shapes of three rock samples, labeled *A*, *B*, and *C*, and the locations where they were found in the stream are indicated in the diagram. A New York State index fossil is shown in rock sample *A*.



- 74 Explain how the appearance of rock sample *A* indicates that the sample has spent very little time being transported by the stream. [1]
- 75 Rock sample *C* has a diameter of 2 centimeters. Determine the minimum stream velocity needed to transport rock sample *C* to its present location. [1]
- 76 The stream profile below shows the locations of rock samples *A*, *B*, and *C* in the streambed.



Calculate the stream gradient between the locations of rock sample *A* and rock sample *C*. [1]

---

Base your answers to questions 77 through 80 on the map in your answer booklet and on your knowledge of Earth science. The map shows the path of a tornado that moved through a portion of Nebraska on May 22, 2004 between 7:30 p.m. and 9:10 p.m. The path of the tornado along the ground is indicated by the shaded region. The width of the shading indicates the width of destruction on the ground. Numbers on the tornado's path indicate the Fujita intensity at those locations. The Fujita Intensity Scale (F-Scale), in the left corner of the map, provides information about wind speed and damage at various F-Scale intensities.

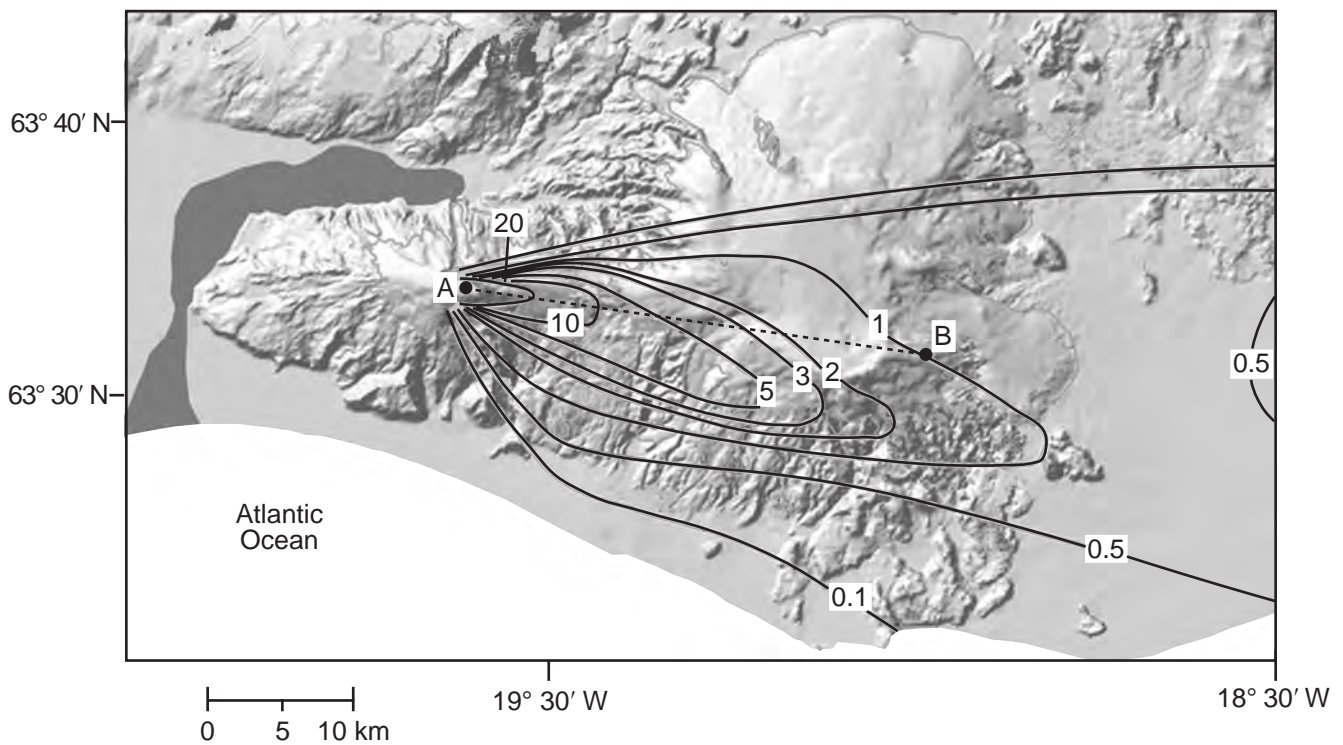
- 77 On the map *in your answer booklet*, place an **X** at a location where the tornado damage was greatest. [1]
- 78 State a possible wind speed of the tornado, in kilometers per hour (km/h), when it was moving through the town of Bennet. [1]
- 79 Identify the weather instrument usually used to measure wind speed. [1]
- 80 Describe *one* safety precaution that should be taken if a tornado has been sighted approaching your home. [1]
-

Base your answers to questions 81 through 85 on the reading passage and map below and on your knowledge of Earth science. The passage provides information regarding the eruption of a volcano in Iceland. The map shows the thickness of ash deposits, in centimeters (cm), during the first three days of the eruption. Point A, representing the volcano's location, and point B, representing a location on Earth's surface, are connected with a reference line.

### Iceland Volcano Eruption Spreads Ash Cloud over Europe

On April 14, 2010, Eyjafjallajökull volcano, located in southern Iceland, explosively erupted, sending large volumes of volcanic ash high into the atmosphere. Much of the ash fell quickly to Earth, as seen in the map, but large quantities remained airborne and spread over Europe. Most of the ash was transported within the atmosphere below 10 kilometers. Air traffic across the Atlantic and throughout Europe was severely disrupted, as airlines were forced to keep jet aircraft on the ground.

**Ash Fall (cm) April 14–16 in Iceland**

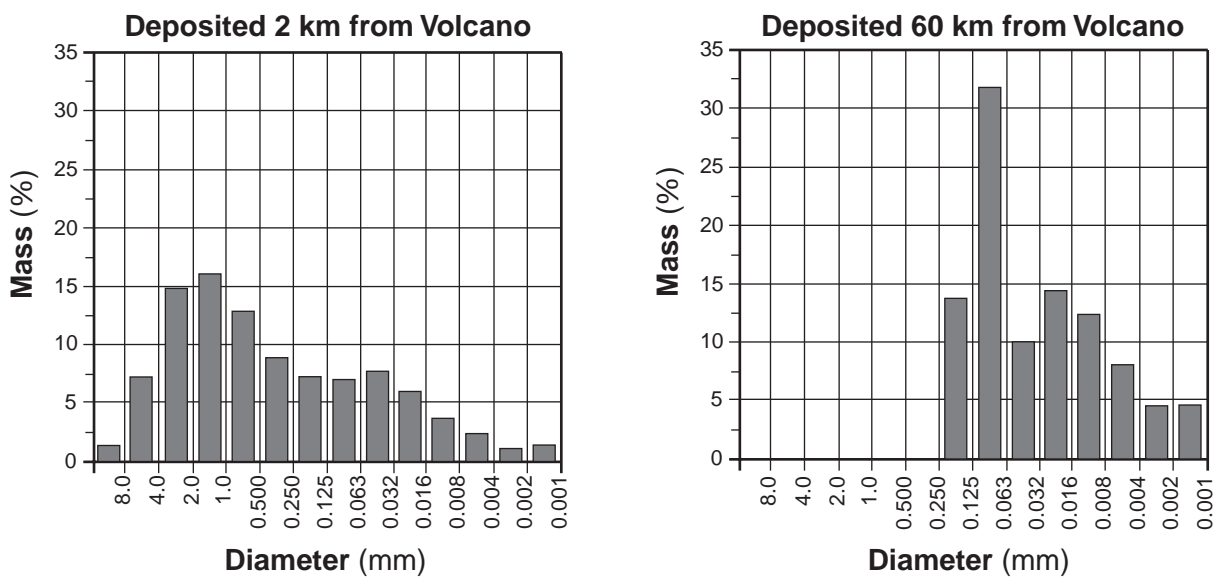


Source: Ash generation and distribution from the April-May 2010 eruption of Eyjafjallajökull, Iceland, Gudmundsson et al., *Scientific Reports*, August 14, 2012 (adapted)



- 81 On the grid *in your answer booklet*, construct a profile of the thickness of the volcanic ash deposits by plotting the ash fall along line *AB*. Plot *each* point where an isoline showing thickness is crossed by line *AB*. Ash thickness at location *A* has been plotted. Complete the profile by connecting *all seven* plots with a line. [1]
- 82 Identify the atmospheric layer within which most of the volcanic ash was transported. [1]
- 83 Describe *one* way the volcanic ash cloud may have contributed to cooler weather conditions in Europe. [1]
- 84 The graphs below indicate the percent by mass of different diameters of ash particles deposited at 2 kilometers and 60 kilometers from the volcanic eruption. [1]

**Volcanic Ash Deposited from  
the April 14-16 Eruption**



Describe how the size of the deposited ash particles changed with increased distance from the volcano. [1]

- 85 Explain why the lithosphere in the vicinity of Eyjafjallajökull is more volcanically active than most other regions of Earth's surface. [1]
-







# PHYSICAL SETTING EARTH SCIENCE

Thursday, August 13, 2015 — 12:30 to 3:30 p.m., only

## ANSWER BOOKLET

Student ..... Sex:  Male  
 Female  
Teacher .....  
School ..... Grade .....

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

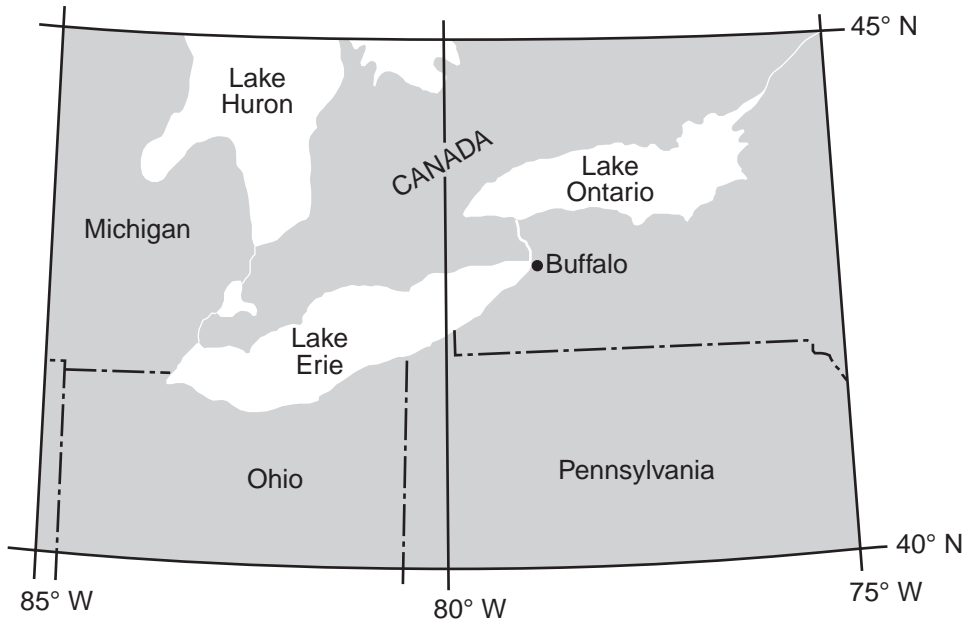
### Part B–2

51 \_\_\_\_\_

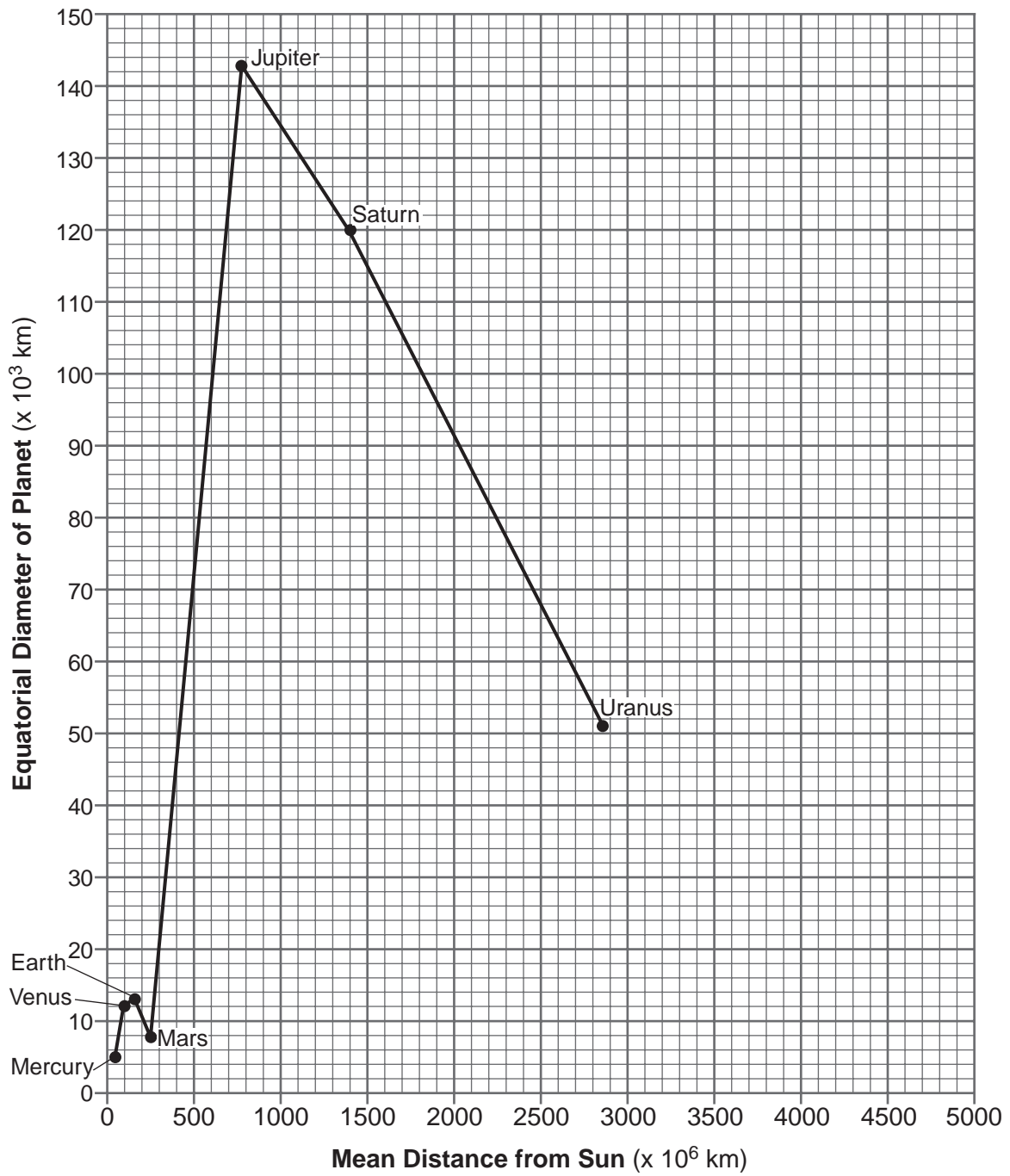
\_\_\_\_\_

52 \_\_\_\_\_

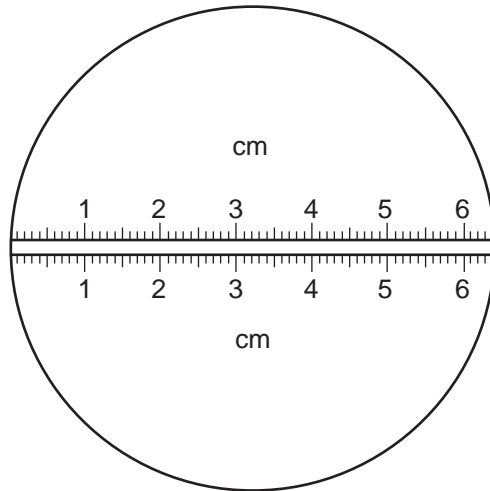
53



**Planet Diameters and Planet Distances from the Sun**



56



Scale: 1 cm = 2000 km

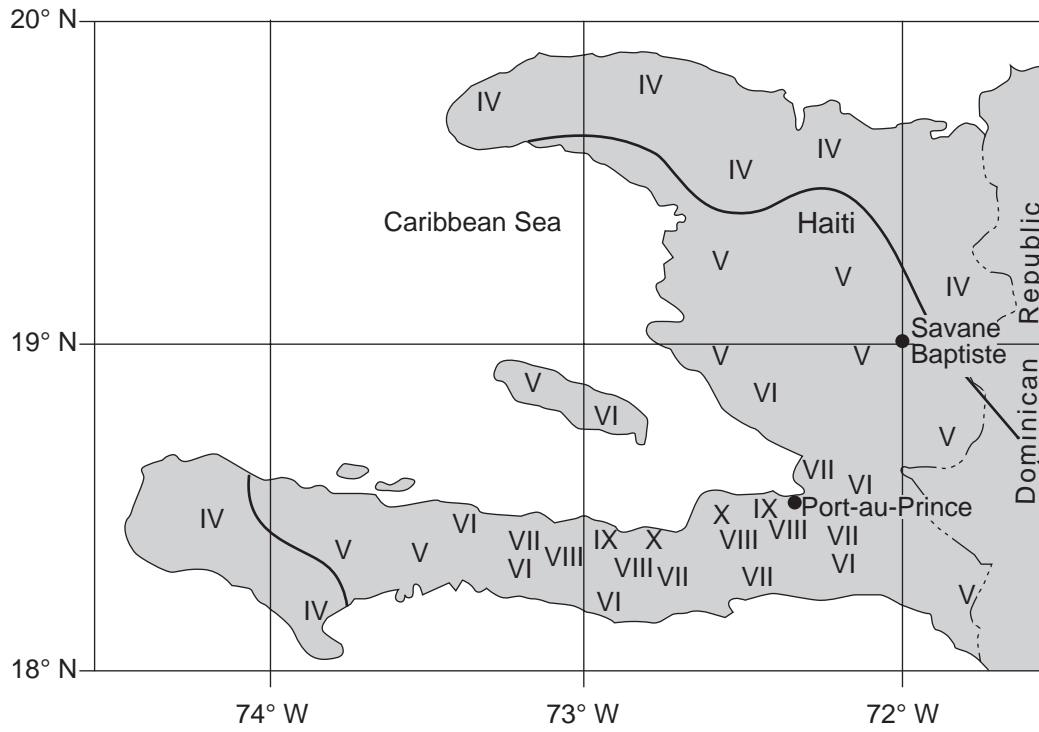
57 Jovian periods of revolution: \_\_\_\_\_

Jovian periods of rotation: \_\_\_\_\_

58 \_\_\_\_\_

59

### Haiti Earthquake Intensity Map

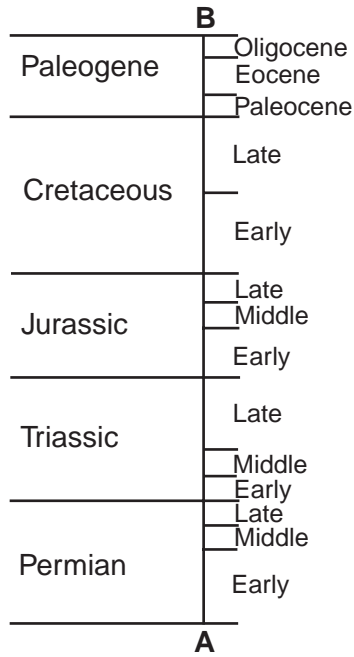


60 Latitude: \_\_\_\_\_ Longitude: \_\_\_\_\_

61 \_\_\_\_\_ **Plate** and \_\_\_\_\_ **Plate**



62



63 \_\_\_\_\_ **cm** to \_\_\_\_\_ **cm**

64 \_\_\_\_\_

65 \_\_\_\_\_

**Part C**

66 \_\_\_\_\_

\_\_\_\_\_

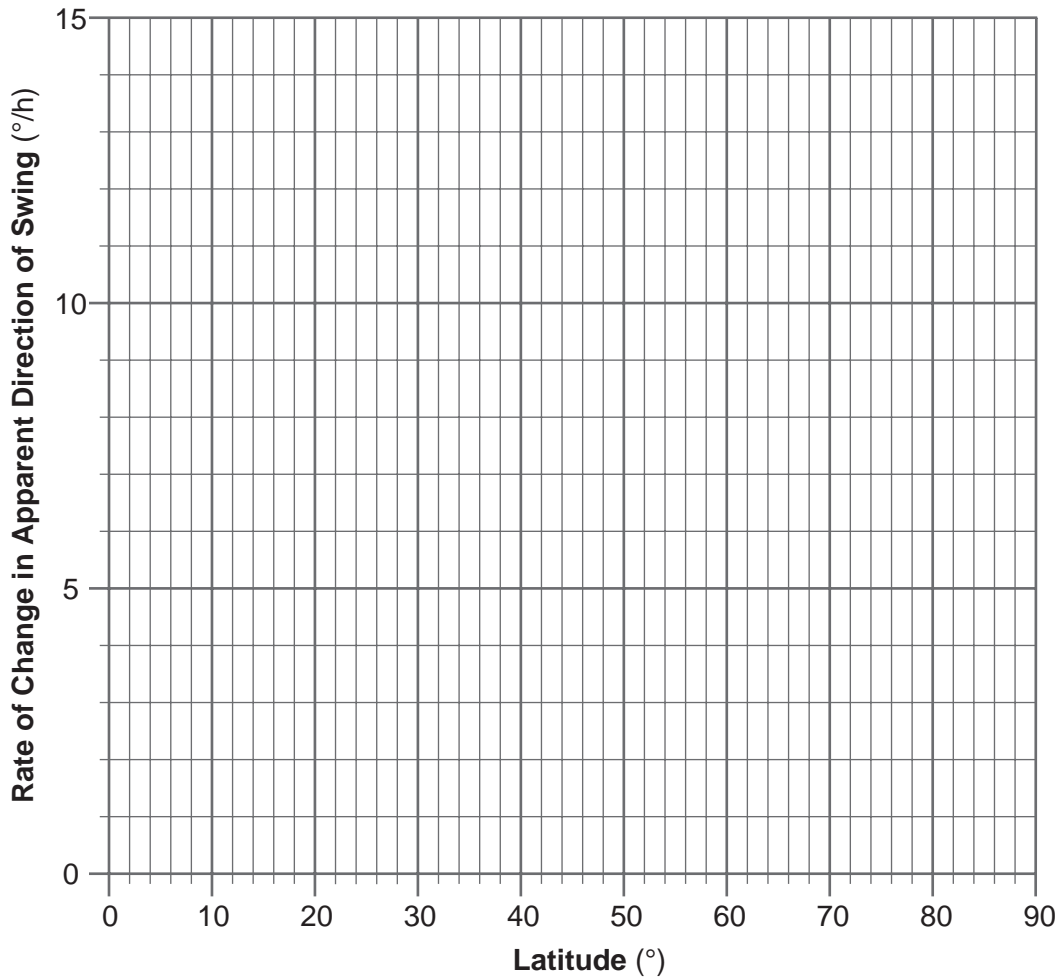
67 \_\_\_\_\_

68 \_\_\_\_\_

69 \_\_\_\_\_

70

**A Foucault Pendulum's Swing**



71 \_\_\_\_\_ h

72 \_\_\_\_\_

73 \_\_\_\_\_

\_\_\_\_\_

74 \_\_\_\_\_

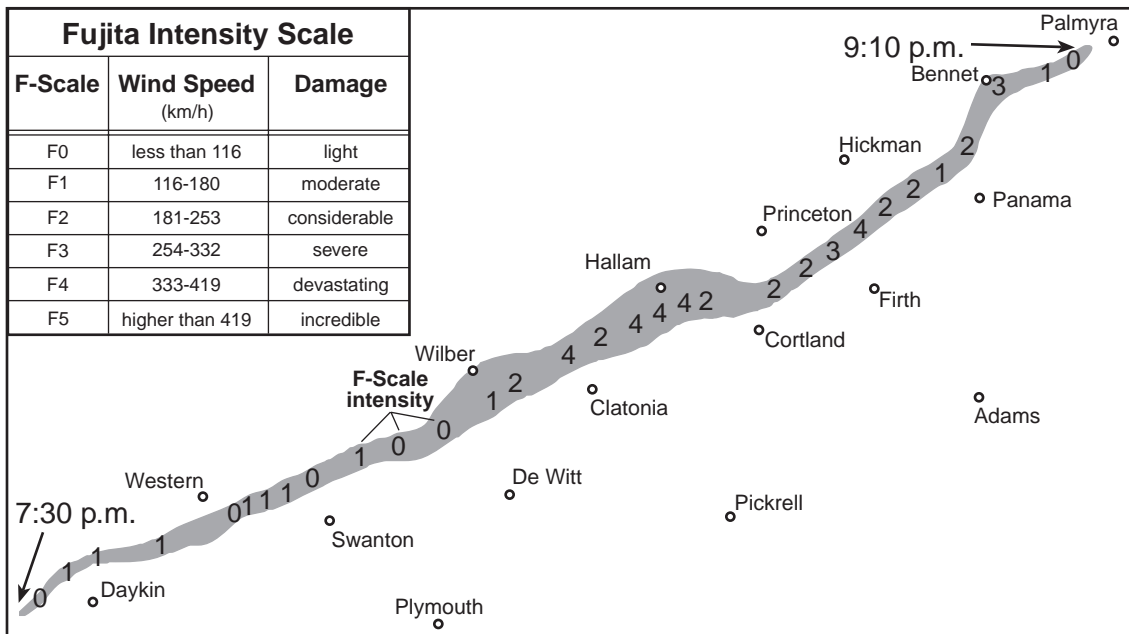
\_\_\_\_\_

75 \_\_\_\_\_ cm/s

76 \_\_\_\_\_ m/km

77

Path of Nebraska Tornado

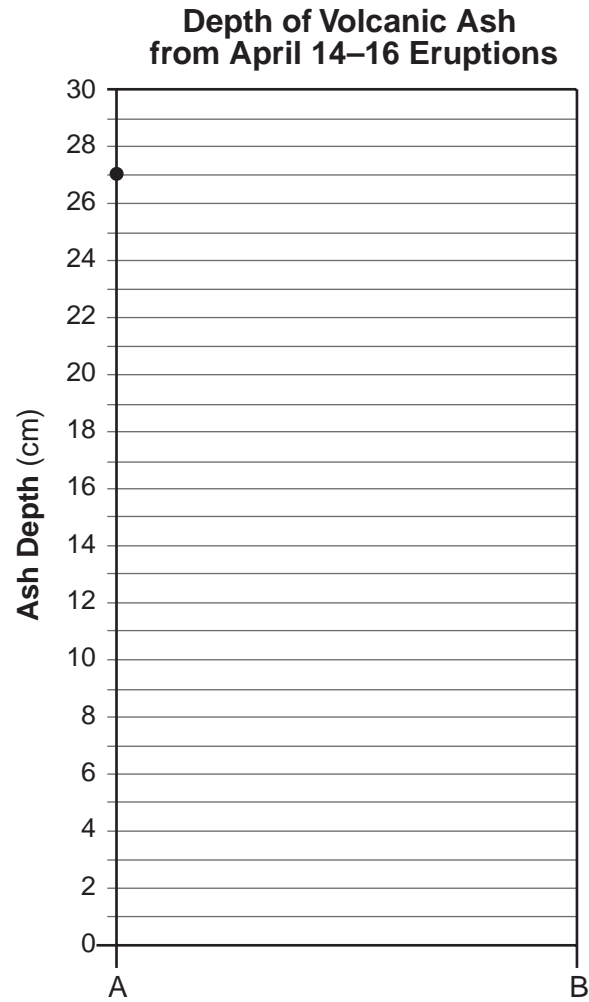


78 \_\_\_\_\_ km/h

79 \_\_\_\_\_

80 \_\_\_\_\_

81



82 \_\_\_\_\_

83 \_\_\_\_\_  
\_\_\_\_\_

84 \_\_\_\_\_

85 \_\_\_\_\_  
\_\_\_\_\_

# FOR TEACHERS ONLY

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

## PHYSICAL SETTING/EARTH SCIENCE

Thursday, August 13, 2015 — 12:30 to 3:30 p.m., only

### SCORING KEY AND RATING GUIDE

**Directions to the Teacher:**

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

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

**Part A and Part B-1**

Allow 1 credit for each correct response.

**Part A**

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

**Part B-1**

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

## Directions to the Teacher

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

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

Allow 1 credit for each correct response.

At least two science teachers must participate in the scoring of the Part B–2 and Part C open-ended questions on a student's paper. Each of these teachers should be responsible for scoring a selected number of the open-ended questions on each answer paper. No one teacher is to score more than approximately one-half of the open-ended questions on a student's answer paper. Teachers may not score their own students' answer papers.

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

Fractional credit is *not* allowed. Only whole-number credit may be given for a response. If the student gives more than one answer to a question, only the first answer should be rated. Units need not be given when the wording of the questions allows such omissions.

For hand scoring, raters should enter the scores earned in the appropriate boxes printed on the separate answer sheet. Next, the rater should add these scores and enter the total in the space provided. The student's score for the Earth Science Performance Test should be recorded in the space provided. Then the student's raw scores on the written test and the performance test should be converted to a scale score by using the conversion chart that will be posted on the Department's web site at: <http://www.p12.nysed.gov/assessment/> on Thursday, August 13, 2015. The student's scale score should be entered in the box labeled "Scale Score" on the student's answer sheet. The scale score is the student's final examination score.

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

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

**Part B-2**

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

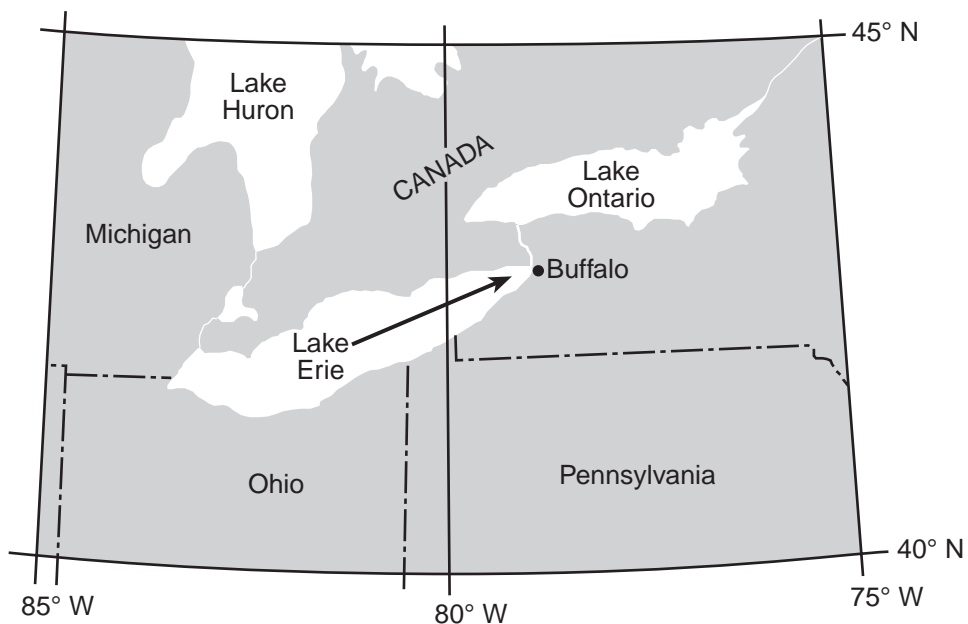
- 51** [1] Allow 1 credit. Acceptable responses include, but are not limited to:
- Cooler air near the lake remains close to the surface because it is more dense than the surrounding air.
  - Cold air over the lake is more dense.
  - Cooler air over Lake Erie is less likely to rise.
  - Convection is reduced.
  - Less evaporation occurs when the air is colder.
  - lack of moisture
  - Warm air rises to form clouds.

- 52** [1] Allow 1 credit. Acceptable responses include, but are not limited to:
- temperature/air temperature
  - The average temperature of the air is colder when Buffalo receives snow.

- 53** [1] Allow 1 credit for any arrow drawn from a southwest to northeast orientation on Lake Erie pointing toward Buffalo.

**Note:** Allow credit even if the arrow extends before Lake Erie or beyond Buffalo. If additional arrows are drawn, they need not be over Lake Erie, but must have a general SW to NE direction.

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



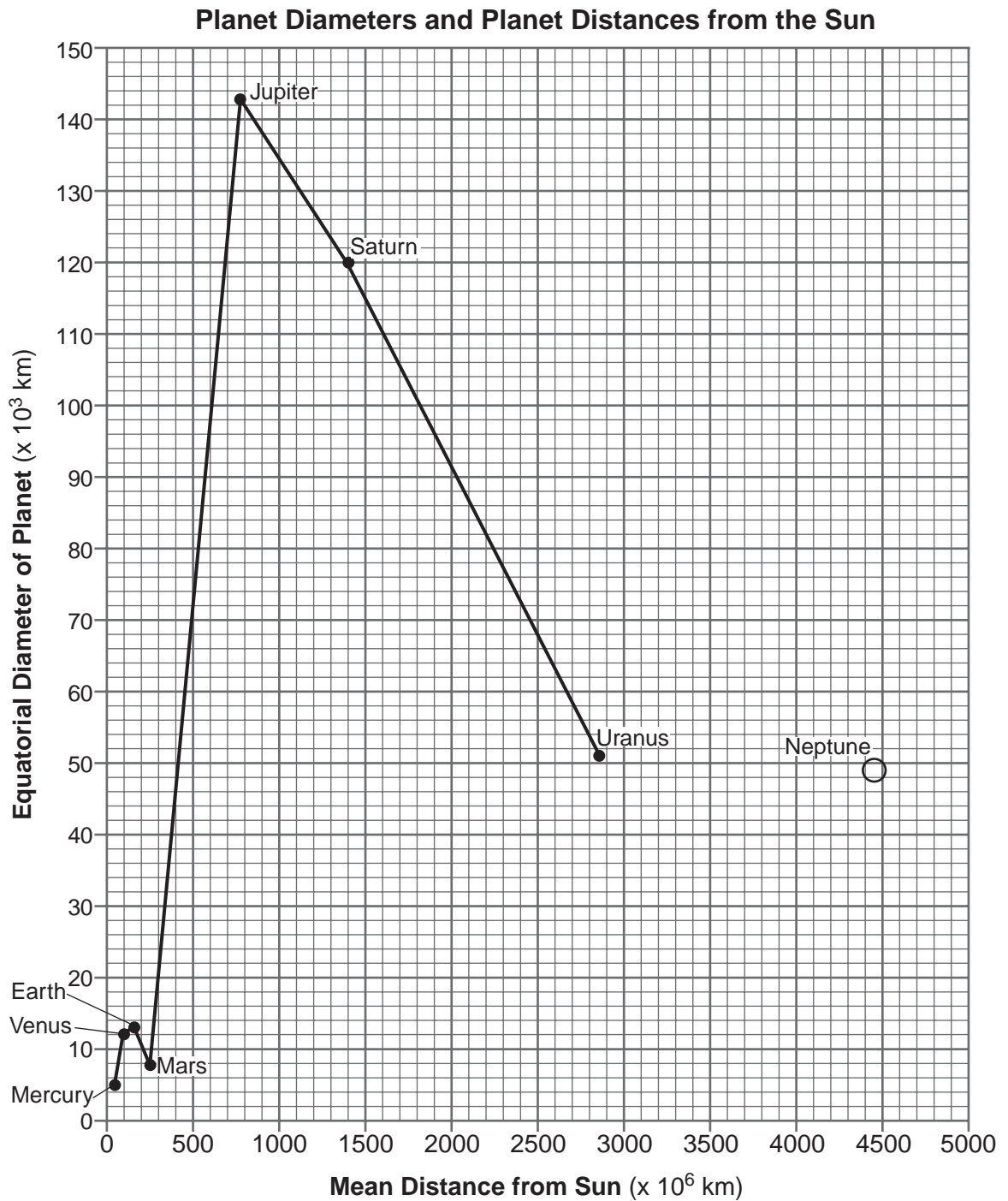
**54** [1] Allow 1 credit. Acceptable responses include, but are not limited to:

- The specific heat of water is greater than the specific heat of land or dry land, so the air over the land heats up faster than the air over the lake.
- More energy is required to heat up the same amount of water than to heat the same amount of land.
- Air has a lower specific heat than water.
- A lot of energy is used to melt the ice on Lake Erie.
- Lake Erie is still covered by ice.
- The darker land surface absorbs greater insolation.
- Land heats up faster than water.



55 [1] Allow 1 credit if the center of the **X** for Neptune is plotted within or touches the grid square that is circled as shown below.

**Note:** Allow credit if a symbol other than an **X** is used. Neptune need not be labeled.



56 [1] Allow 1 credit for indicating a diameter of any value from 1.6 cm to 1.9 cm.

**Note:** Allow credit for a shading anywhere along or on the centimeter scale as long as it is 1.6 cm to 1.9 cm long.

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

Jovian periods of revolution: — longer  
— greater  
— more time

Jovian periods of rotation: — shorter  
— less time

**Note:** Allow credit if the student answers “slower” for periods of revolution and “faster” for periods of rotation, even though these refer to rate, not to periods of time.

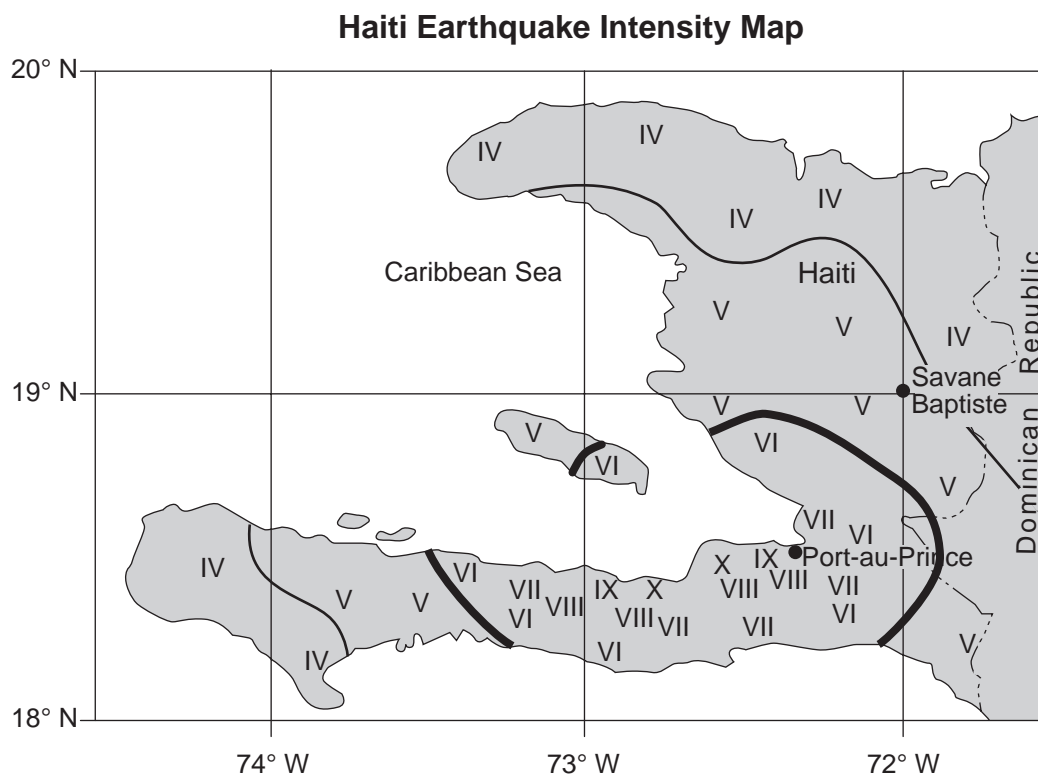
58 [1] Allow 1 credit for Mars.

59 [1] Allow 1 credit if boundary lines between V and VI are correctly drawn.

**Note:** Allow a credit even if a student-drawn line extends into the water.

Do *not* allow credit if the student-drawn line touches or passes through any Mercalli value. If extra Mercalli lines are drawn, all must be correct to receive credit.

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



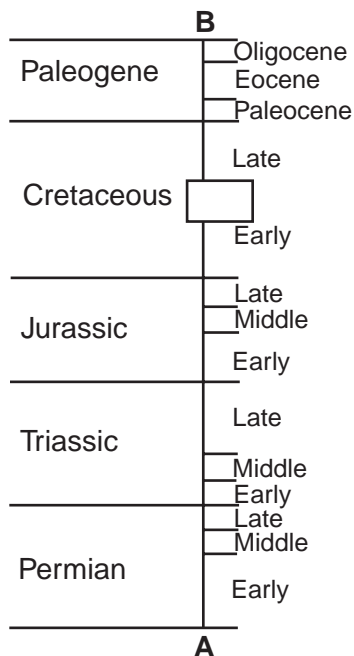
60 [1] Allow 1 credit if *both* responses are correct.

Latitude: 19° N

Longitude: 72° W

61 [1] Allow 1 credit for North American Plate and Caribbean Plate.

62 [1] Allow 1 credit for the center of an **X** within or touching the box shown below.



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

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

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

— 0.006 cm to 0.2 cm

— 0.2 cm to 0.006 cm

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

- vascular plants
- flowering plants
- trees
- ferns
- plants
- plant materials

**Note:** Do *not* accept grasses because the earliest grasses appeared in the Oligocene.  
Do *not* accept the name of any index fossil found in the Earth Science Reference Tables because they did not live during the time that *Abysosaurus mcintoshii* lived.

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

- an asteroid impact
- an impact event
- a meteorite/meteor/meteoroid collision with Earth
- climate change
- a disruption of food chains/food webs
- comet impact

**Note:** Do *not* allow credit for “meteorite,” “meteor,” “meteoroid,” or “comet” alone because they do not describe a natural event.  
Do *not* allow credit for volcanic eruption because this is not the most widely inferred cause of dinosaur extinction.

## Part C

- 66 [1] Allow 1 credit. Acceptable responses include, but are not limited to:
- Both layers have contact metamorphism.
  - The layers were changed by the igneous intrusion.
  - The intrusion could only metamorphose layers that are already existing.
  - contact metamorphism

**Note:** Do *not* allow credit for “igneous intrusions are younger than the rock they cut across” because the intrusion does not cut across the shale layer.

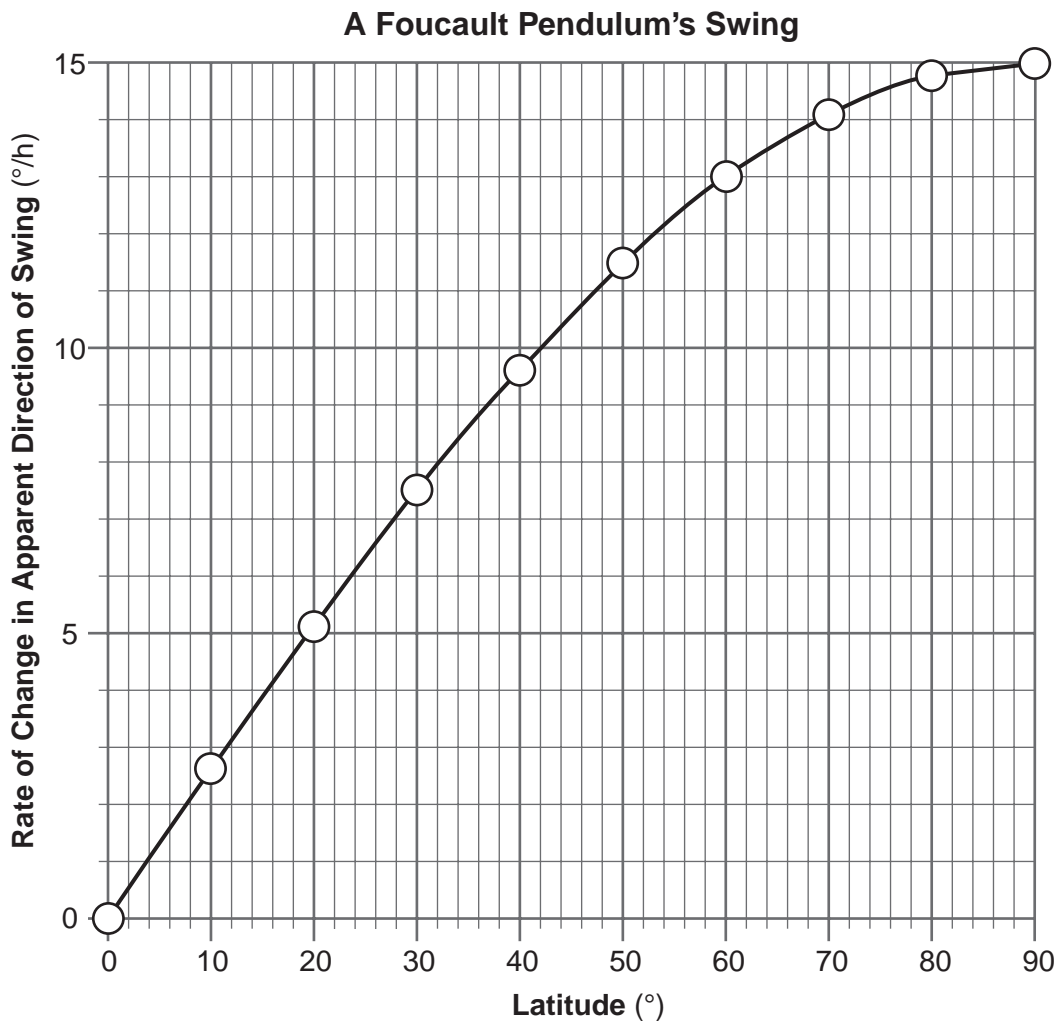
- 67 [1] Allow 1 credit for calcite.

- 68 [1] Allow 1 credit. Acceptable responses include, but are not limited to:
- widespread distribution
  - lived for a short time
  - easily identified

- 69 [1] Allow 1 credit. Acceptable responses include, but are not limited to:
- Potassium-40 decays at a specific rate.
  - K-40 has a known half-life.
  - K-40 has a constant rate of decay.
  - K-40 decays at a rate independent of external factors.
  - Potassium-40 has a long half-life.
  - The half-life of K-40 is  $1.3 \times 10^9$  years.

70 [1] Allow 1 credit if the centers of *all ten* plots are within or touch the circles shown below and are correctly connected with a line passing within or touching the circles.

**Note:** Allow credit if a line misses a plot, but is still within or touches the circle.  
It is recommended that an overlay of the same scale as the student answer booklet be used to ensure reliability in rating.



71 [1] Allow 1 credit for 24 h.

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

- rotation
- spin
- turning on its axis

**Note:** Do not allow credit for “faster rotation” or “shorter rotation” because these are scientifically incorrect with respect to the rotation of Mars compared to the rotation of Earth.

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

- As latitude increases, the Coriolis force increases.
- the closer to the equator, the weaker the Coriolis force
- The Coriolis force is strongest by the poles.
- direct relationship

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

- The sample is angular in appearance.
- It is not rounded.
- The edges are not worn off.

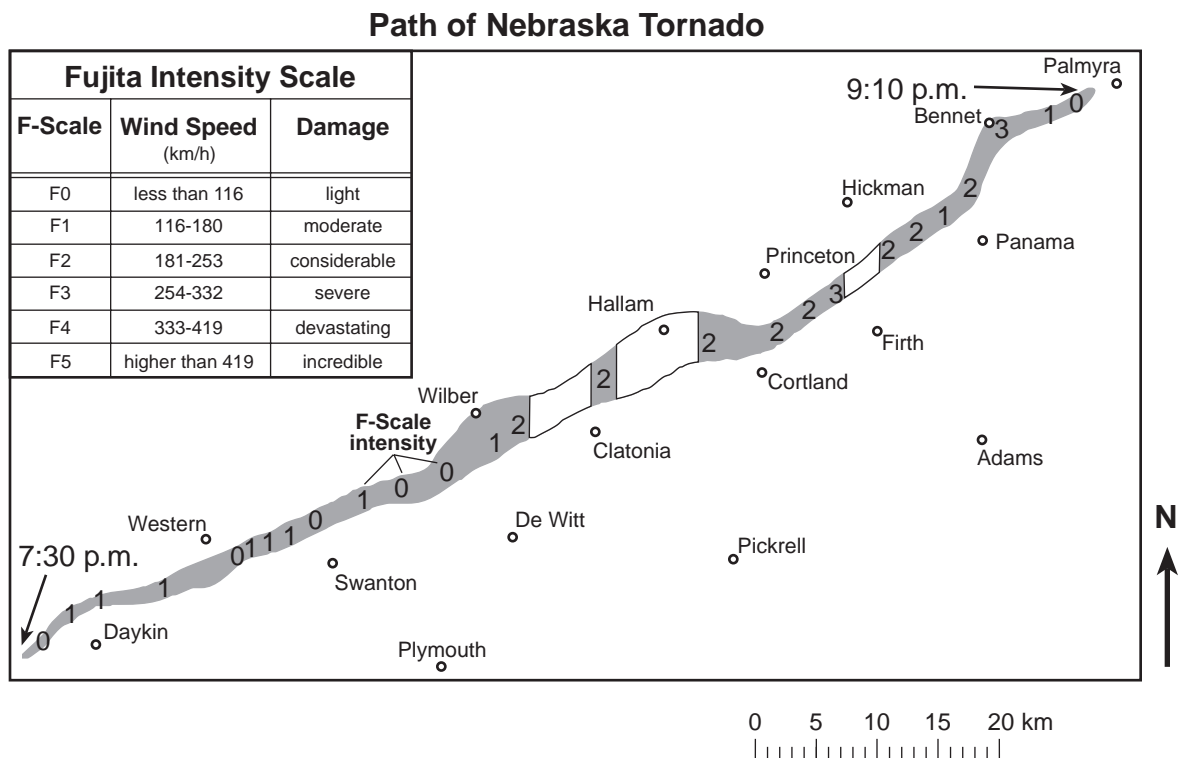
**Note:** Do *not* accept “not very weathered” or “no abrasion” because this does not describe an appearance or observable characteristic of the rock sample.

75 [1] Allow 1 credit for any value from 70 cm/s to 110 cm/s.

76 [1] Allow 1 credit for any value from 48 m/km to 52 m/km.

77 [1] Allow 1 credit if the center of the **X** is within or touches any of the clear areas along the path of the tornado shown below.

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



78 [1] Allow 1 credit for any value from 254 km/h to 332 km/h.

79 [1] Allow 1 credit for anemometer *or* wind speed meter.

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

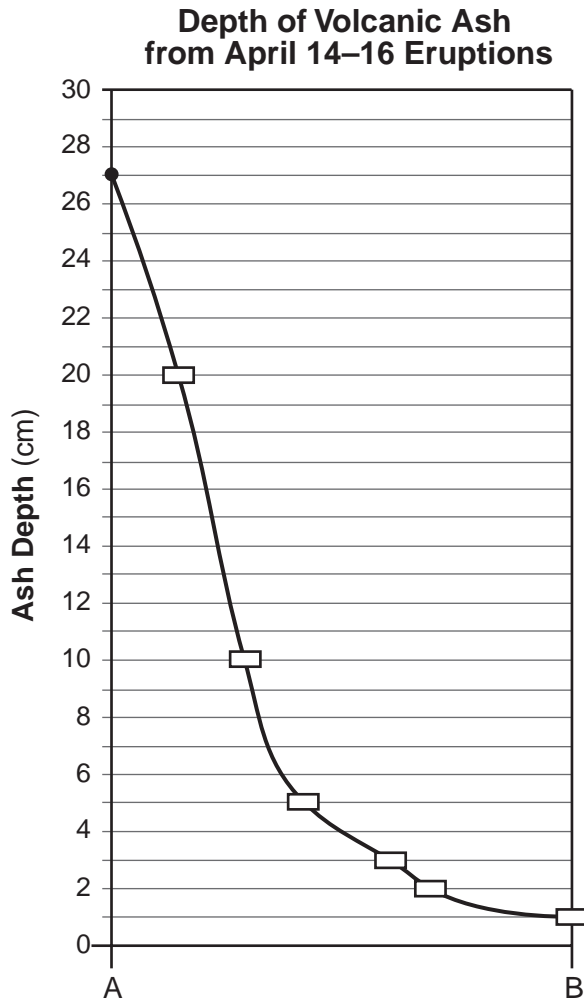
- go into a basement or underground storm shelter
- go to an interior room
- stay away from windows
- get under something sturdy

**Note:** Do *not* allow credit for a response that indicates a safety precaution to prepare for a future tornado.



- 81 [1] Allow 1 credit if the centers of *all six* student plots are within or touch the rectangles shown below and *all seven* plots are correctly connected with a line that passes within or touches the rectangles from point A to point B.

**Note:** Allow credit if the line misses a plot but is still within or touches the rectangle.  
It is recommended that an overlay of the same scale as the student answer booklet be used to ensure reliability in rating.



- 82 [1] Allow 1 credit for troposphere.

- 83 [1] Allow 1 credit. Acceptable responses include, but are not limited to:
- The ash most likely reflected/scattered the incoming solar radiation.
  - Less sunlight was received at Earth's surface.
  - The ash most likely blocked some of the sunlight.
  - Atmospheric transparency was reduced.
  - The cloud blocked the Sun.

- 84** [1] Allow 1 credit. Acceptable responses include, but are not limited to:
- A greater percentage by mass of smaller ash particles was carried farther.
  - The larger particles were carried shorter distances.
  - They tend to be a smaller size.

- 85** [1] Allow 1 credit. Acceptable responses include, but are not limited to:
- Iceland is located above a mantle hotspot.
  - A tectonic plate boundary passes through Iceland.
  - Iceland is on a divergent plate boundary.
  - Iceland is located on a mid-ocean ridge.

## Regents Examination in Physical Setting/Earth Science

August 2015

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

**The Chart for Determining the Final Examination Score for the August 2015 Regents Examination in Physical Setting/Earth Science will be posted on the Department's web site at: <http://www.p12.nysed.gov/assessment/> on Thursday, August 13, 2015. Conversion charts provided for previous administrations of the Regents Examination in Physical Setting/Earth Science must NOT be used to determine students' final scores for this administration.**

#### Online Submission of Teacher Evaluations of the Test to the Department

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

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

## Map to Core Curriculum

<b>August 2015 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		44, 55	70, 76, 78, 81
Math Key Idea 2	5, 15, 25, 27, 32, 34	37, 38, 40, 42, 43, 49, 59	75, 84
Math Key Idea 3			71
Science Inquiry Key Idea 1	6, 27	36, 37, 41, 45, 47, 51, 55	66, 68, 72, 74, 79, 83, 85
Science Inquiry Key Idea 2			
Science Inquiry Key Idea 3	1, 2, 7, 8, 12, 13, 14, 15, 17, 18, 19, 20, 21, 23, 32, 33, 34, 35	38, 39, 50, 53, 54, 55, 56, 57, 58, 61, 62, 63, 64, 65	67, 69, 75, 76, 82, 85
Engineering Design Key Idea 1			
<b>Standard 2</b>			
Key Idea 1			
Key Idea 2			
Key Idea 3			
<b>Standard 6</b>			
Key Idea 1	8	39, 40	
Key Idea 2	7, 11, 12, 14, 15, 17, 18, 22, 25, 26, 27, 28, 29, 30, 31, 33, 35	36, 37, 38, 39, 40, 41, 42, 43, 44, 45, 46, 47, 48, 49, 50, 52, 53, 57, 58, 59, 60, 61, 62, 66	66, 68, 73, 77, 81
Key Idea 3		56, 57	
Key Idea 4			
Key Idea 5	3	46, 49, 53, 65	75, 83, 84
Key Idea 6			
<b>Standard 7</b>			
Key Idea 1			
Key Idea 2			80
<b>Standard 4</b>			
Key Idea 1	1, 2, 3, 4, 5, 6, 8, 9, 18, 19, 20, 22, 24, 25, 27, 33	36, 37, 42, 44, 45, 46, 47, 55, 56, 57, 58, 60, 62, 64, 65	66, 68, 69, 70, 71, 72, 73
Key Idea 2	7, 10, 11, 12, 13, 14, 15, 16, 17, 26, 28, 29, 30, 31	38, 39, 40, 41, 43, 48, 49, 50, 51, 52, 53, 54, 59, 61	74, 75, 76, 77, 78, 79, 80, 81, 82, 83, 84, 85
Key Idea 3	21, 23, 32, 34, 35	63	67
<b>Reference Tables</b>			
ESRT 2011 Edition (Revised)	1, 2, 7, 8, 12, 13, 14, 15, 17, 18, 19, 20, 21, 23, 32, 33, 34, 35	38, 46, 50, 53, 54, 55, 56, 57, 58, 61, 62, 63, 64, 65	67, 69, 75, 76, 82, 85

The State Education Department / The University of the State of New York  
**Regents Examination in Physical Setting/Earth Science – August 2015**  
**Chart for Converting Total Test Raw Scores to Final Examination Scores (Scale Scores)**  
**(Not to be used for the Braille Edition)**

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

		<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	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	91	90	90	89	89	88	88	87	86	85	84	83	82	81	79	77	76
	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	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	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	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	71	71	70	70	69	69	68	68	67	66	65	64	63	61	60	58	56	

**Final Examination Scores  
 Regents Examination in Physical Setting/Earth Science – August 2015 – continued**

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