The University of the State of New York

REGENTS HIGH SCHOOL EXAMINATION

PHYSICAL SETTING
EARTH SCIENCE
v202

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.

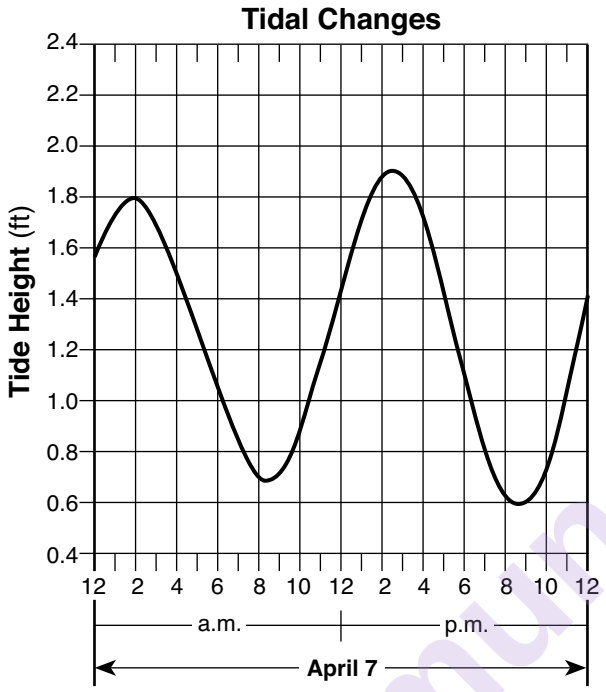
DO NOT OPEN THIS EXAMINATION BOOKLET UNTIL THE SIGNAL IS GIVEN.

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 The graph below shows changing ocean tide heights in feet (ft) on April 7 for a coastal location.



The next high tide will occur on April 8 at approximately

(1) 10 a.m.
(2) 10 p.m.
(3) 3 a.m.
(4) 3 p.m.

2 Scientists who proposed the Big Bang Theory were attempting to explain

(1) the origin of the universe
(2) why stars have different luminosities
(3) the formation of our solar system
(4) how Earth's atmosphere evolved

3 Which star type has a surface temperature of 4000 K and a luminosity 1000 times greater than the Sun?

(1) dwarf
(2) main sequence
(3) giant
(4) supergiant

4 The red shift in light from stars located in very distant galaxies suggests that these stars are

(1) decreasing in temperature
(2) increasing in temperature
(3) moving toward the Milky Way
(4) moving away from the Milky Way

5 A Foucault pendulum provides evidence that Earth

(1) orbits the Sun
(2) has a nearly spherical shape
(3) is tilted on an axis
(4) spins on an axis

6 How many days during one year is the Sun directly overhead at noon in New York City?

(1) one
(2) two
(3) three
(4) zero

7 Approximately which percentage of Earth's surface is exposed above water?

(1) 30%
(2) 50%
(3) 70%
(4) 90%

8 On June 21, an observer in New York State will see the Sun set

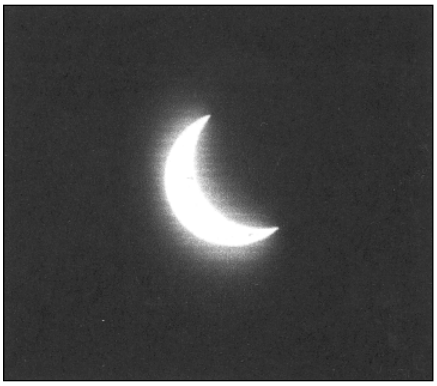
(1) north of due east
(2) north of due west
(3) south of due east
(4) south of due west

9 Compared to a well-sorted sample of larger-sized particles, a well-sorted sample of smaller-sized particles has greater

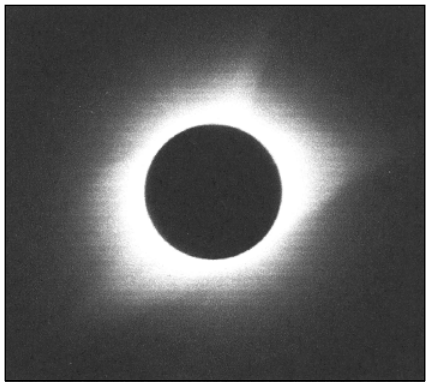
(1) capillarity
(2) transpiration
(3) permeability
(4) porosity

10 The photographs below show two celestial objects just before, during, and just after a total solar eclipse as viewed by an observer located in Kingston, Tennessee, on August 21, 2017.

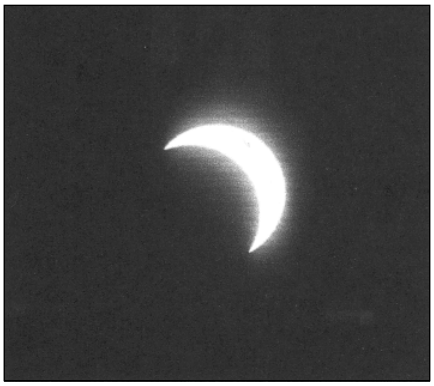
Photograph 1:
Just Before Eclipse



Photograph 2:
Total Solar Eclipse

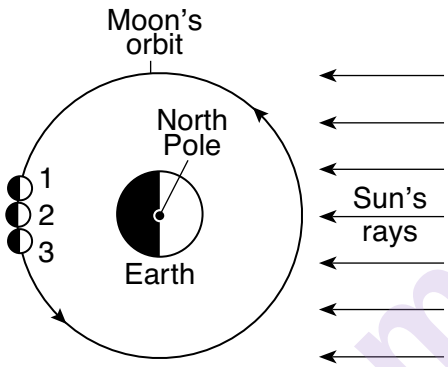


Photograph 3:
Just After Eclipse

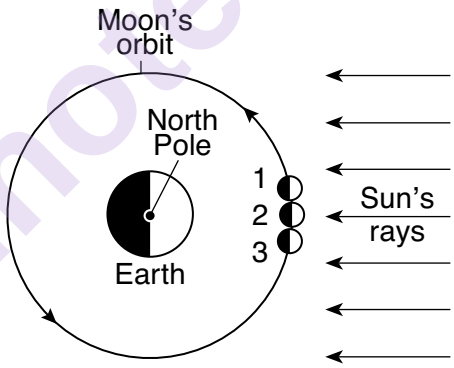


G. Meyer

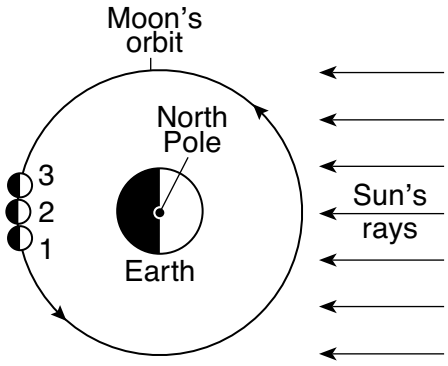
Which diagram represents the location of the Moon in its orbit at the time that each of these three photographs (1, 2, and 3) were taken? (Diagrams are not drawn to scale.)



(1)



(3)



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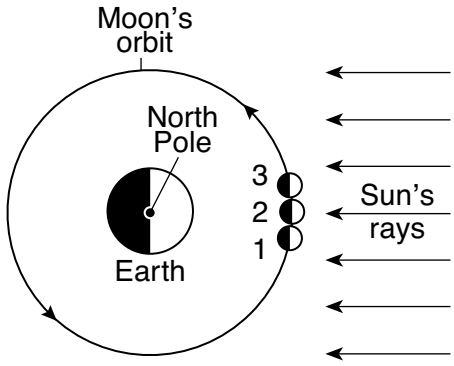
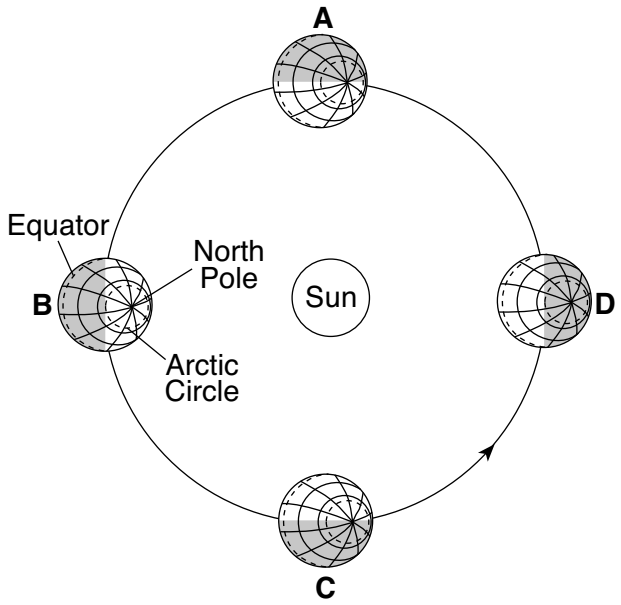


(4)

11 The diagram below represents Earth in four positions, labeled *A*, *B*, *C*, and *D*, in its orbit around the Sun on the first day of each season.



(Not drawn to scale)

Between which two consecutive positions is the summer season occurring in the Northern Hemisphere?

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

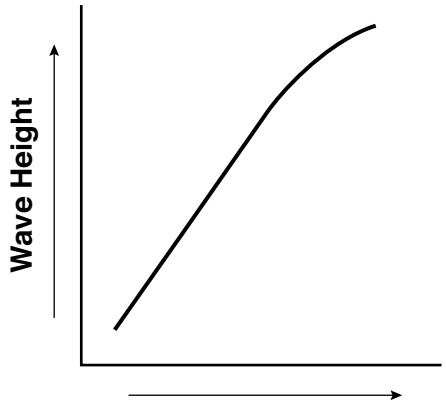
12 Which atmospheric conditions occur when the dry-bulb temperature is 30°C and the difference between the dry-bulb temperature and wet-bulb temperature is 1°C?

(1) warm and humid
(2) warm and dry
(3) cool and humid
(4) cool and dry

13 Which precaution is most appropriate during a blizzard?

(1) Take shelter in a basement.
(2) Avoid unnecessary travel.
(3) Evacuate to higher ground.
(4) Stay away from tall metal objects.

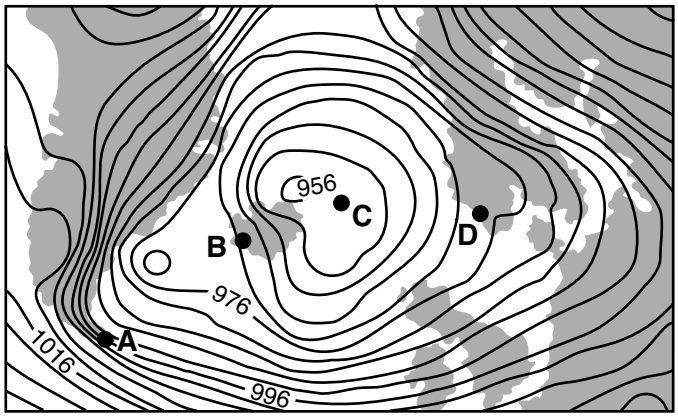
14 The graph below shows the relationship between the distance that wind blows over a body of water and the height of the waves that are generated.



A west wind blowing with the same velocity would generate the highest waves along the shoreline at

(1) Jamestown
(2) Oswego
(3) Plattsburgh
(4) Riverhead

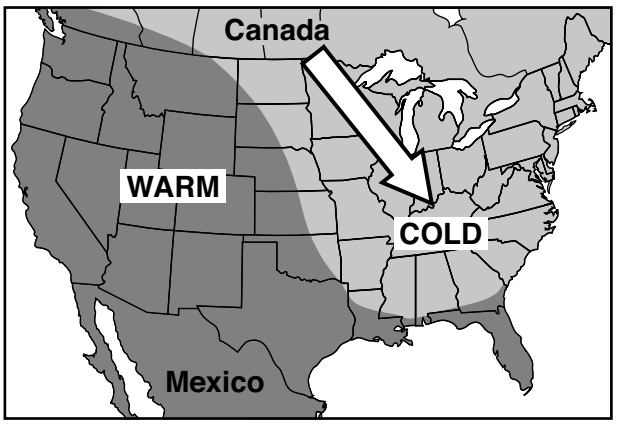
15 The weather map below shows a storm centered north of Iceland. Points *A*, *B*, *C*, and *D* indicate locations on Earth's surface. Isobars are labeled in millibars.



Which location was probably experiencing the highest wind speed?

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

16 The map below shows a cold, arctic air mass that moved southeast from Canada to cover most of the eastern half of the United States during January 2010.



Which shift caused this flow of cold air out of Canada?

(1) the northward shift of the global temperature zones
(2) the northward shift of the Sun's vertical rays
(3) a southward shift of the polar front jet stream
(4) a southward shift of the subtropical jet stream

17 Which surface ocean current cools the climate of the western coastline of South America?

(1) Brazil Current
(2) Peru Current
(3) Falkland Current
(4) California Current

18 When equal masses of ice and liquid water receive the same amount of energy, without a change in state, the ice changes temperature faster than the liquid water does because the

(1) specific heat of ice is less than the specific heat of liquid water
(2) specific heat of ice is greater than the specific heat of liquid water
(3) density of ice is less than the density of liquid water
(4) density of ice is greater than the density of liquid water

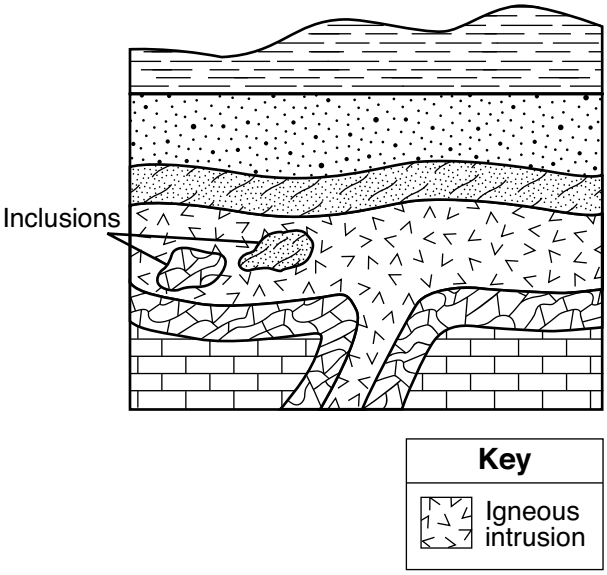
19 El Niño is a condition associated with a buildup of unusually warm water along the western coast of South America. Which changes in air temperature and precipitation usually occur in that region during El Niño?

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

20 Which conclusion can be drawn from the pattern of fossils found in Earth's rock record?

(1) Humans have existed for a longer period of time than dinosaurs.
(2) Complex land organisms have been replaced by simpler marine forms.
(3) Many species have existed in the past, and most have become extinct.
(4) Few life forms existed before the late Cretaceous period.

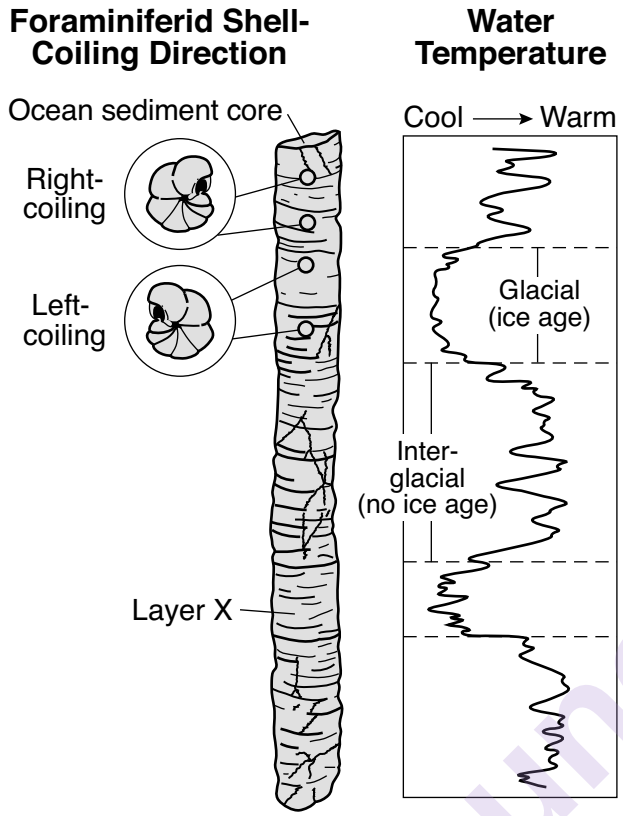
21 The geologic cross section below represents a portion of Earth's crust. The rock layers have *not* been overturned.



The inclusions were most likely broken off from their original rock layers

(1) at the same time as the intrusion of magma
(2) at the same time as the crystallization of magma
(3) before the formation of sandstone
(4) before the formation of limestone

22 While studying sediments deposited during and after the last ice age, scientists discovered that foraminiferid shells coil in different directions when they grow under different temperature conditions, as shown in the diagram below.



Foraminiferid shells found in layer *X* most likely coiled to the

(1) right, because water temperatures were cool
(2) right, because water temperatures were warm
(3) left, because water temperatures were cool
(4) left, because water temperatures were warm

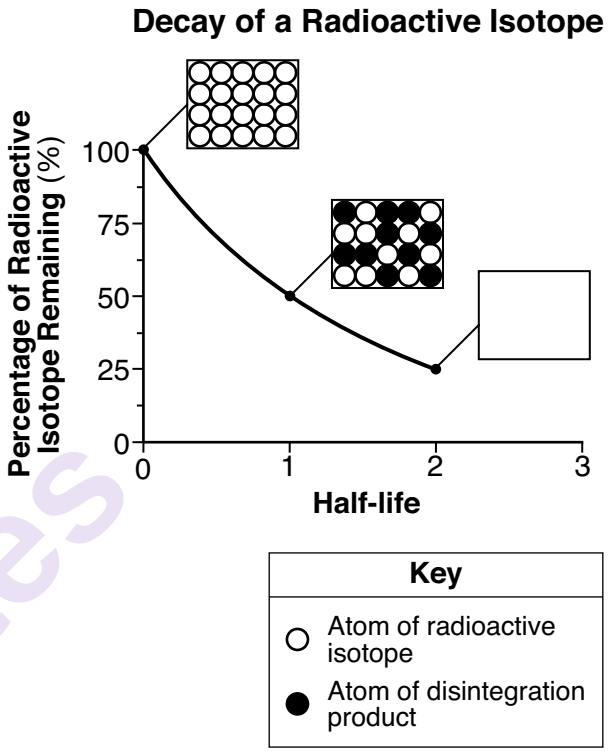
23 Approximately how many million years ago (mya) was the amount of Earth's total landmass located south of the equator the greatest?

(1) 119 mya
(2) 232 mya
(3) 359 mya
(4) 458 mya

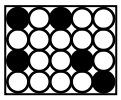
24 Which layer of Earth's interior is inferred to be composed of solid iron and nickel?

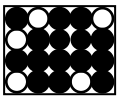
(1) asthenosphere
(2) stiffer mantle
(3) outer core
(4) inner core

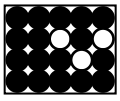
25 The graph below shows the rate of decay of a radioactive isotope through two half-lives. Each box shows the ratio of atoms of the radioactive isotope to atoms of the disintegration product. The box at two half-lives has been left blank.

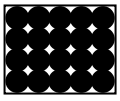


Which box best represents the ratio of these atoms at two half-lives?


(1)


(3)

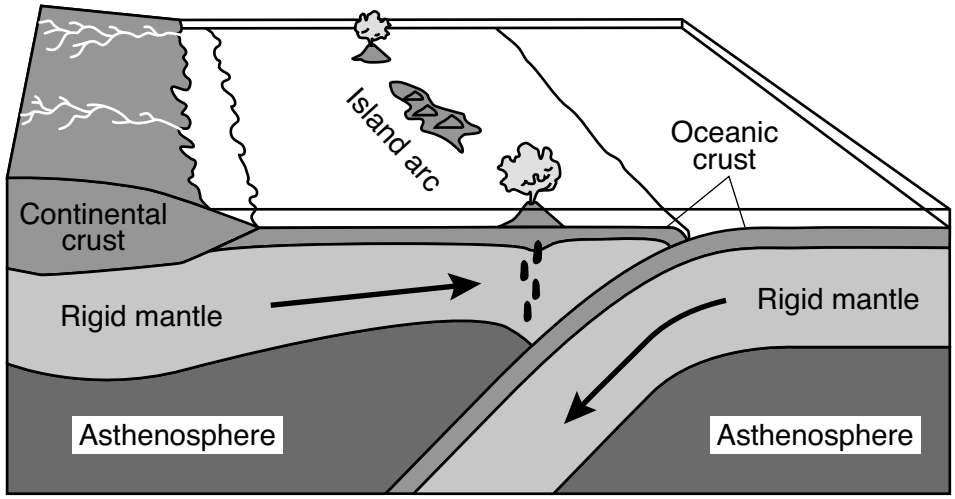

(2)


(4)

26 The first *S*-wave reaches a seismic station 22 minutes after an earthquake occurred. How long did it take the first *P*-wave to reach the same seismic station?

(1) 8 minutes 50 seconds
(2) 10 minutes 00 seconds
(3) 12 minutes 00 seconds
(4) 12 minutes 50 seconds

27 The block diagram below represents the formation of an island arc near a plate boundary.



An island arc is located near the boundary between which two tectonic plates?

(1) Antarctic Plate and Indian–Australian Plate
(2) Philippine Plate and Eurasian Plate
(3) African Plate and North American Plate
(4) Scotia Plate and South American Plate

28 Which table correctly matches the average density and composition of continental and oceanic crusts?

Type of Crust	Continental	Oceanic
Average Density	3.0 g/cm^3	2.7 g/cm^3
Composition	Felsic	Mafic

(1)

Type of Crust	Continental	Oceanic
Average Density	3.0 g/cm^3	2.7 g/cm^3
Composition	Mafic	Felsic

(2)

Type of Crust	Continental	Oceanic
Average Density	2.7 g/cm^3	3.0 g/cm^3
Composition	Mafic	Felsic

(3)

Type of Crust	Continental	Oceanic
Average Density	2.7 g/cm^3	3.0 g/cm^3
Composition	Felsic	Mafic

(4)

29 The photograph below shows a portion of the San Andreas Fault in the western United States.

http://education.nationalgeographic.com

The San Andreas Fault is an example of a

(1) transform plate boundary
(2) divergent plate boundary
(3) convergent plate boundary
(4) complex plate boundary

30 What is the minimum stream velocity necessary to transport a quartz particle that is 0.1 centimeter in diameter in a stream?

(1) 0.05 cm/s
(2) 0.5 cm/s
(3) 5.0 cm/s
(4) 50.0 cm/s

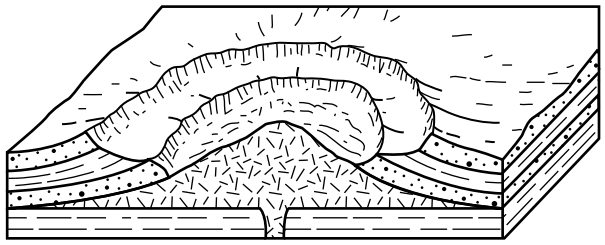
31 Scoria is a type of rock that forms most directly from the process of

(1) solidification
(2) cementation
(3) erosion
(4) metamorphism

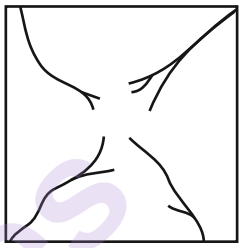
32 The element silicon (Si) is used in the production of cell phones. Which mineral could be a possible source of this silicon?

(1) calcite
(2) galena
(3) halite
(4) quartz

33 The block diagram below shows a portion of a deeply eroded dome landscape.

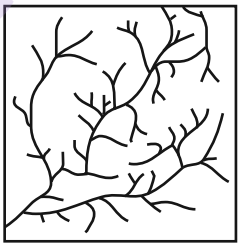


Which map shows the stream pattern that probably formed on the surface of this landscape?

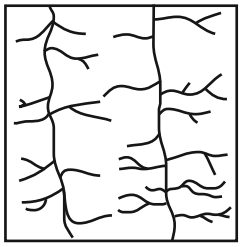


(1)

(3)



(2)



(4)

34 Which two New York State locations have surface bedrock of similar ages?

(1) Mt. Marcy and Slide Mt.
(2) Buffalo and Rochester
(3) Old Forge and Niagara Falls
(4) Watertown and Albany

35 The aerial photograph below shows small, circular bodies of water surrounded by sediment in an area that was once covered by glaciers.

www.arctic.uoguelph.ca

These bodies of water are known as

(1) finger lakes
(2) kettle lakes
(3) tributaries
(4) watersheds

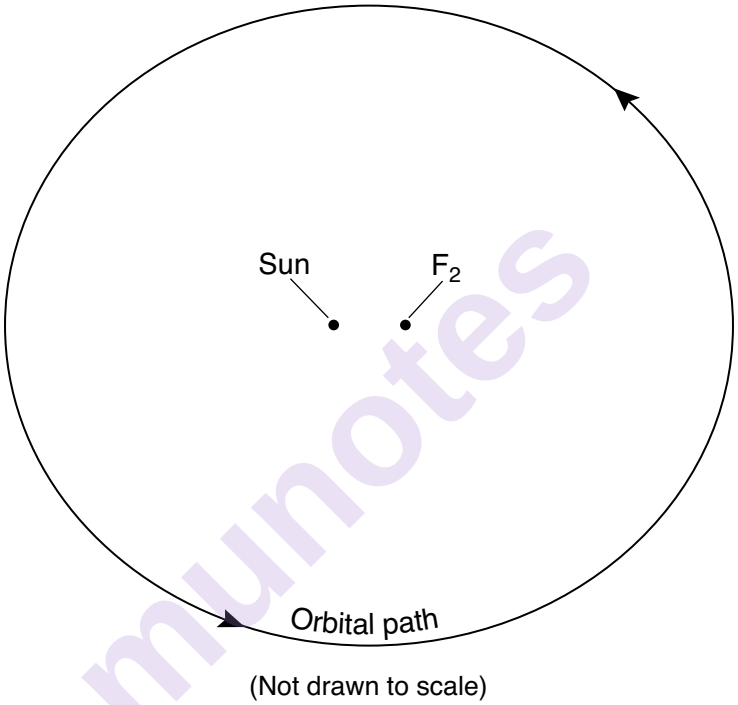
GO ON TO THE NEXT PAGE ⇨

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 the elliptical orbit for one planet in our solar system. The two foci of the orbit are shown as the Sun and F_2.



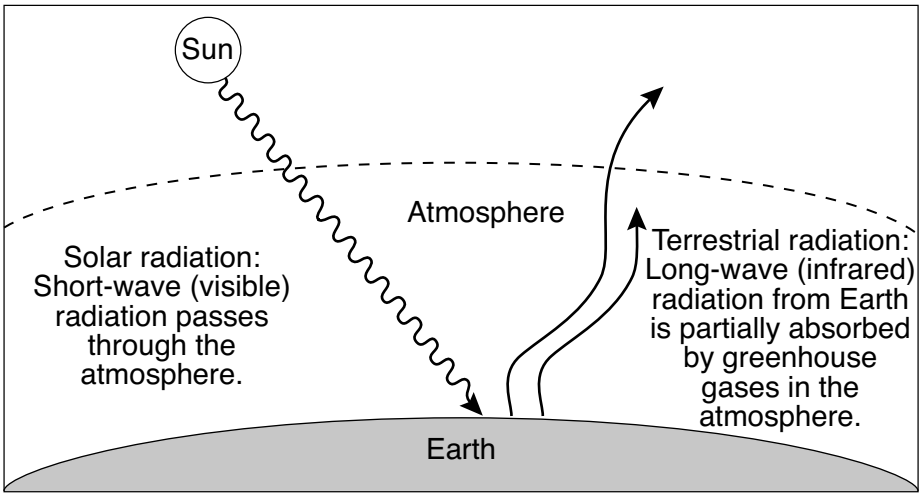
36 Which condition would produce an orbit with a greater eccentricity?

(1) a decrease in the distance between the Sun and F_2
(2) an increase in the distance between the Sun and F_2
(3) a constant decrease in the orbital velocity of the planet
(4) a constant increase in the orbital velocity of the planet

37 The arrangement and movement of celestial objects in our solar system is best described by the

(1) spiral model
(2) cosmic model
(3) geocentric model
(4) heliocentric model

Base your answers to questions 38 and 39 on the diagram below and on your knowledge of Earth science. The diagram represents a simplified model of the incoming (solar) and outgoing (terrestrial) electromagnetic radiation of Earth's energy budget.



(Not drawn to scale)

38 Which color and texture of Earth materials absorbs the greatest amount of short-wave radiation from the Sun?

(1) light color and smooth texture
(2) light color and rough texture
(3) dark color and smooth texture
(4) dark color and rough texture

39 Two major greenhouse gases that absorb outgoing long-wave radiation within the atmosphere are

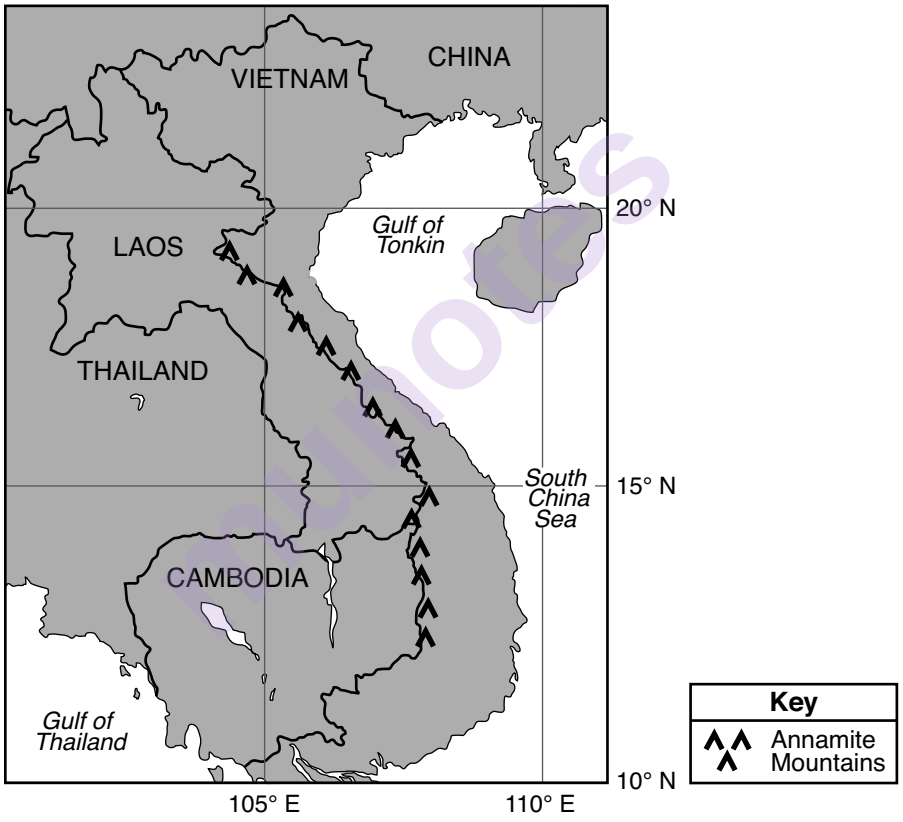
(1) methane and oxygen
(2) methane and carbon dioxide
(3) nitrogen and oxygen
(4) nitrogen and carbon dioxide

Base your answers to questions 40 and 41 on the passage and map below and on your knowledge of Earth science. The map shows a portion of Southeast Asia.

Southeast Asia Monsoons

The Southeast Asia monsoons are seasonal shifts in the direction of regional planetary winds. These shifts are related to the movement of air pressure belts as the Sun's vertical ray changes latitude. In the late spring, winds begin to blow from the southwest, bringing moisture from the Gulf of Thailand across Southeast Asia. Rainfall reaches a peak in July and August. This moisture is partially blocked by the Annamite Mountains, located along the border between Vietnam and Laos. Therefore, the rainfall in central Vietnam is somewhat less during these months. In September, the winds reverse direction and begin to flow from the northeast across the Gulf of Tonkin and South China Sea. This wind shift begins the season of heavy rainfall in central Vietnam that continues for months.

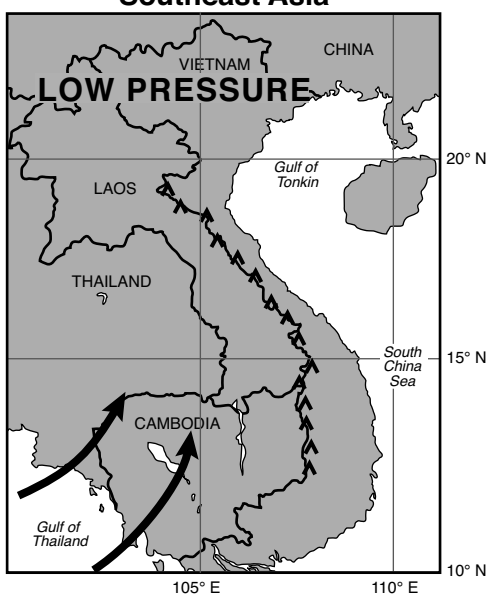
Southeast Asia



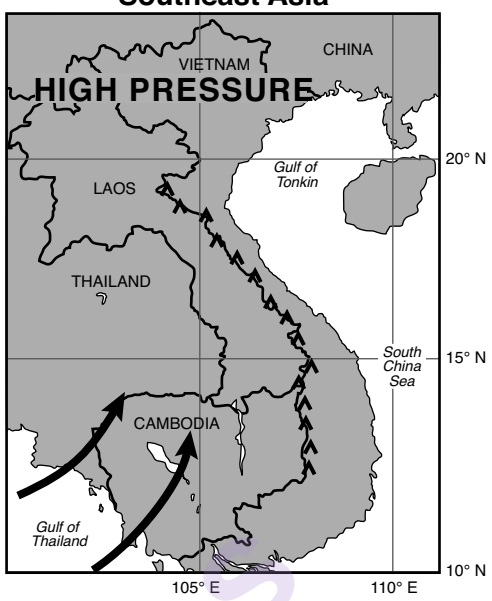
40 Heavy rains occur in Cambodia and Thailand when the moist air brought by the monsoon

(1) rises, expands, and cools
(2) rises, contracts, and warms
(3) sinks, expands, and cools
(4) sinks, contracts, and warms

41 Which map shows the most likely location and direction of the monsoon winds and regional atmospheric pressure occurring in Southeast Asia in July?



(1)



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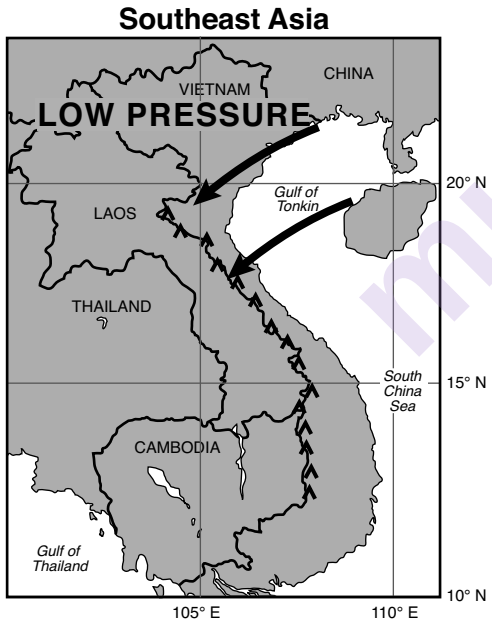

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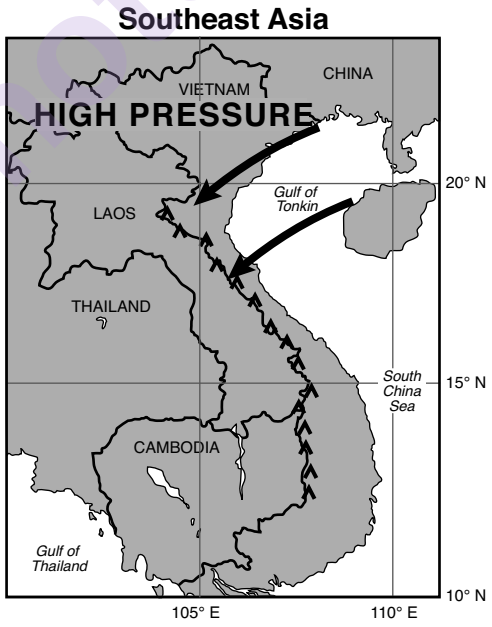
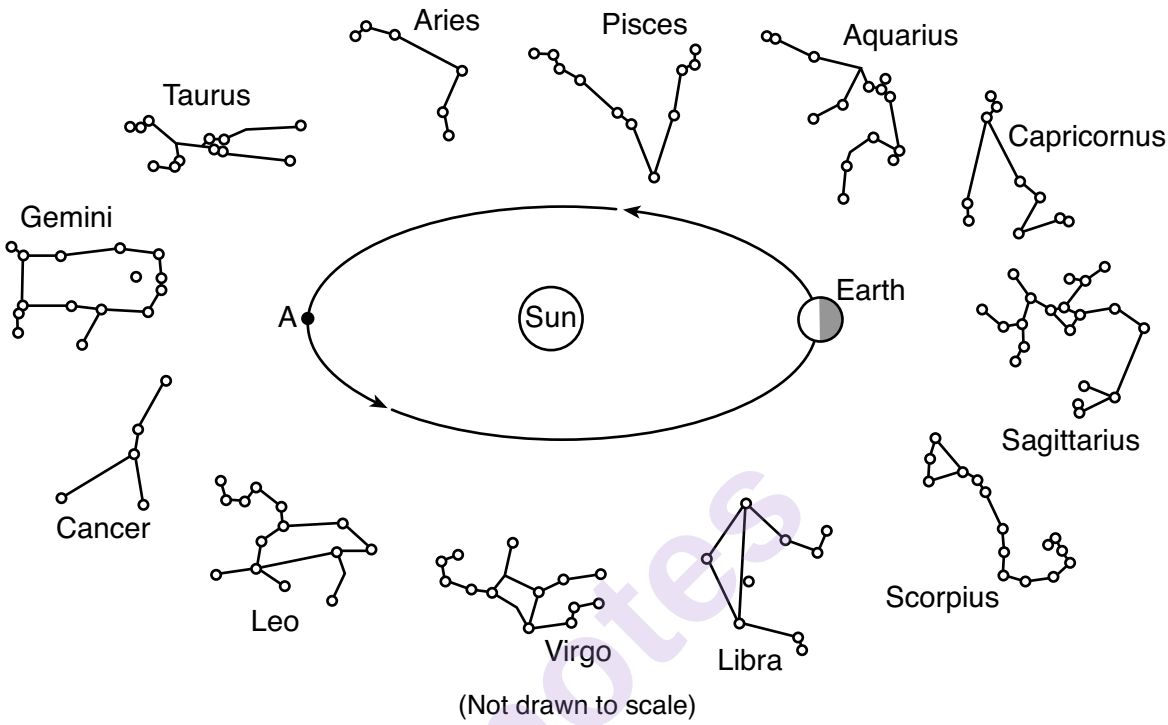


(4)

Base your answers to questions 42 and 43 on the diagram below and on your knowledge of Earth science. The diagram represents one position of Earth in its orbit around the Sun and 12 constellations that can be seen in the night sky by an observer in New York State at different times of the year. The approximate locations of the constellations in relation to Earth's orbit are shown. Point *A* represents another position in Earth's orbit.



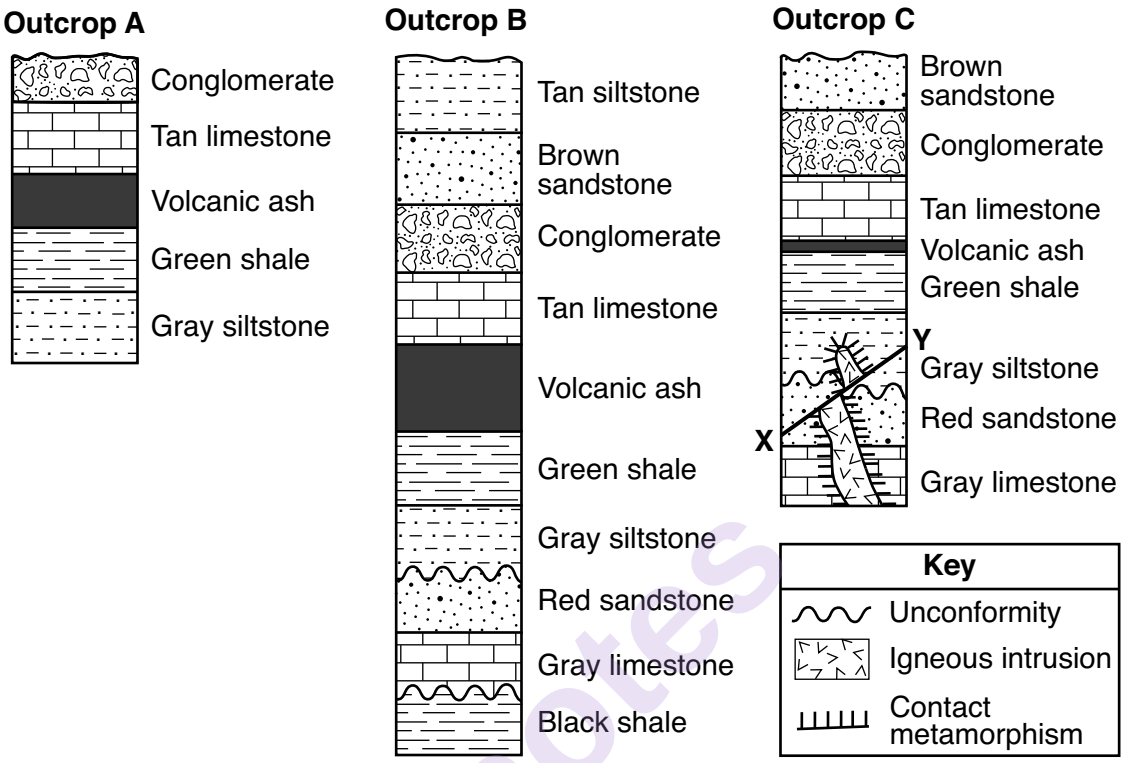
42 When Earth is located in the orbital position shown on the diagram, which constellation is visible to an observer in New York State at midnight?

(1) Gemini
(2) Pisces
(3) Scorpius
(4) Virgo

43 Approximately how many days (d) does it take for Earth to orbit from its present position to point *A*?

(1) 27 d
(2) 91 d
(3) 183 d
(4) 365 d

Base your answers to questions 44 through 47 on the cross sections below and on your knowledge of Earth science. The cross sections represent three widely spaced rock outcrops labeled *A*, *B*, and *C*. Line *XY* represents a fault. Overturning has *not* occurred.



44 What is the youngest sedimentary rock layer represented in these cross sections?

(1) black shale
(2) brown sandstone
(3) tan siltstone
(4) conglomerate

45 Which sequence shows the relative ages of the igneous intrusion, fault *X*–*Y*, unconformity, and red sandstone, from oldest to youngest, in outcrop *C*?

(1) unconformity → igneous intrusion → fault *X*–*Y* → red sandstone
(2) red sandstone → unconformity → igneous intrusion → fault *X*–*Y*
(3) fault *X*–*Y* → unconformity → red sandstone → igneous intrusion
(4) igneous intrusion → fault *X*–*Y* → red sandstone → unconformity

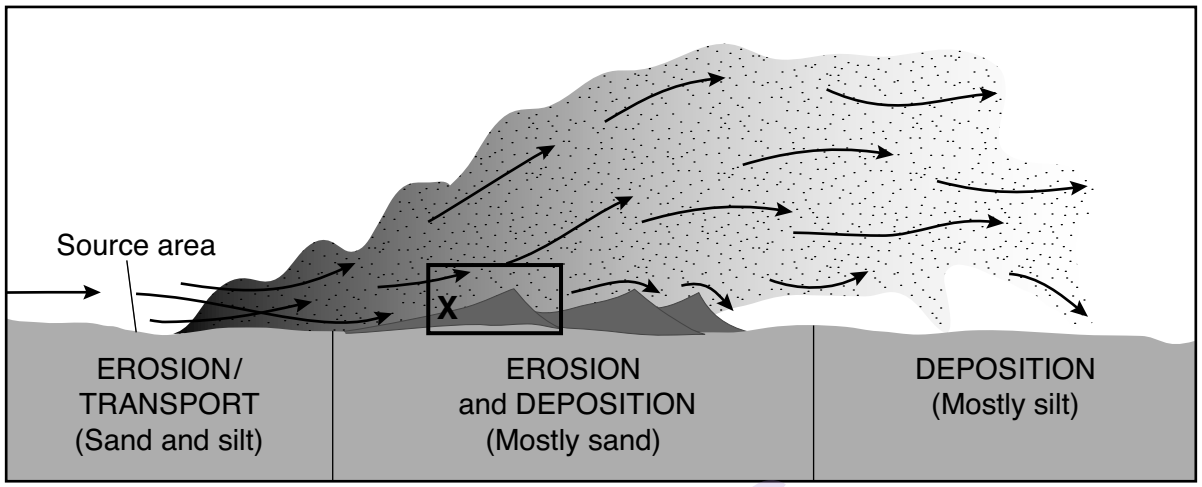
46 Which processes formed the unconformities shown in outcrops *B* and *C*?

(1) folding, faulting, and tilting
(2) uplift, erosion, and deposition
(3) weathering, abrasion, and igneous intrusion
(4) melting, contact metamorphism, and solidification

47 Which characteristic of the volcanic ash layer is most useful for correlating rock layers in outcrops *A*, *B*, and *C*?

(1) The ash was deposited over a large geographic area.
(2) The ash layer varies in thickness.
(3) Carbon-14 can be used to determine the age of the ash.
(4) Igneous rock particles are found in the ash.

Base your answers to questions 48 through 50 on the diagram below and on your knowledge of Earth science. The diagram represents an erosional-depositional system in an arid environment, and indicates the processes occurring at various locations within the atmosphere and on the land surface. The box labeled *X* identifies one sand dune. Arrows represent the movement of particles.



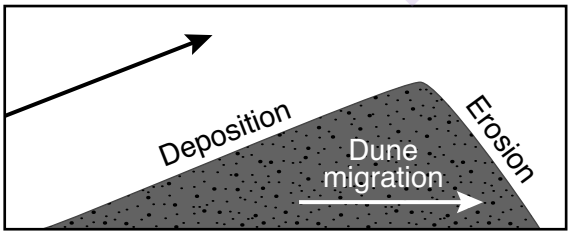
48 Which agent of erosion moves the particles within this erosional-depositional system?

(1) waves
(2) wind
(3) running water
(4) moving ice

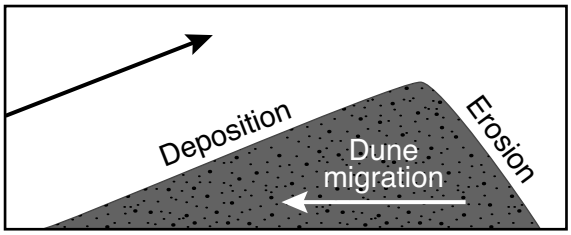
49 The total range of particle sizes indicated in this system is

(1) less than 0.0004 cm
(2) 0.0004 to 0.006 cm, only
(3) 0.006 to 0.2 cm, only
(4) 0.0004 to 0.2 cm

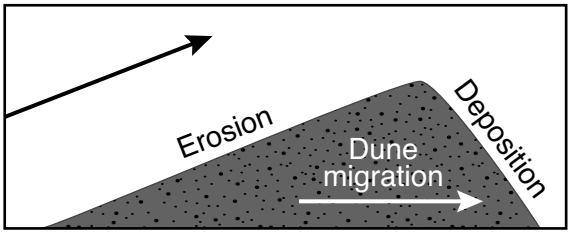
50 Which diagram indicates *both* the direction of dune migration (movement) and the dominant process occurring on each slope of the dune in box *X*?



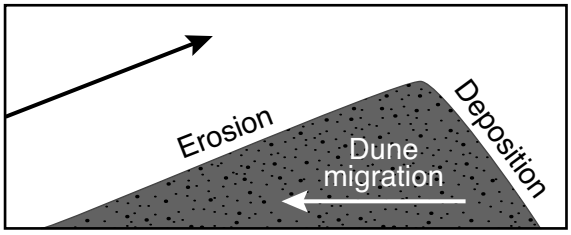
(1)



(3)



(2)



(4)

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 below and on your knowledge of Earth science.

Waimea Canyon

Waimea Canyon is located on the west side of the island of Kauai, Hawaii. Waimea Canyon has been referred to as the "Grand Canyon of the Pacific." But unlike the Grand Canyon, which was carved through horizontal layers of sedimentary rocks, Waimea Canyon was cut through basalt. The formation of this igneous rock began about 4 million years ago. Numerous lava flows followed as magma rose from deep within Earth. The canyon then was formed over time by erosional agents, causing deep, V-shaped valleys that exposed the basalt layers along the canyon walls.

Over time, the composition of the basalt, where it was exposed at the surface, was changed due to oxidation (rusting) of iron-bearing minerals, such as pyroxene and olivine. The result is a canyon with red rocks and soils.

51 Identify the epoch during which the first basalt lava flows occurred on Kauai. [1]

52 Identify the dominant agent of erosion that carved Waimea Canyon. [1]

53 In addition to pyroxene and olivine, identify the name of *one* other mineral commonly found in basalt that could oxidize to produce red soils. [1]

Base your answers to questions 54 through 56 on the map in your answer booklet, on the table below, and on your knowledge of Earth science. The map shows a portion of the Nazca Plate under the southeastern Pacific Ocean. Plate *A* represents another tectonic plate. The table shows some data for islands and seamounts (undersea volcanoes that do *not* rise above the ocean surface) that originally formed at the Easter Island Hot Spot.

Islands and Seamounts Formed By the Easter Island Hot Spot

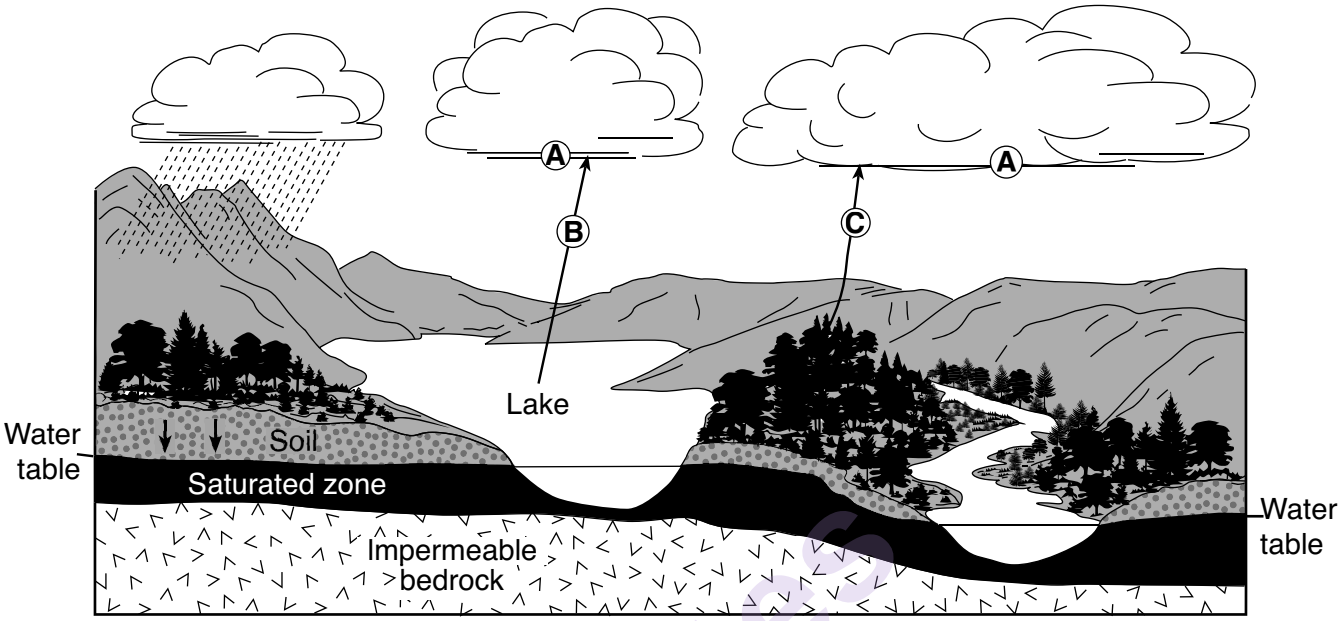
Name	**Island or Seamount**	**Latitude** (° S)	**Longitude** (° W)	**Distance from East Pacific Ridge** (km)	**Age of Oceanic Bedrock** (million years)
Easter Island	island	27	109	360	0.3
Sala y Gomez	island	26	105	750	1.7
GS57202-70	seamount	25	98	1500	7.9
18DS	seamount	26	93	2000	11.5
17DS	seamount	25	88	2500	14.9
12DS	seamount	23	83	3100	22.0

54 On the map *in your answer booklet*, plot with **X**s the locations of the six islands and seamounts formed by the Easter Island Hot Spot. [1]

55 Identify the name of tectonic plate *A*. [1]

56 Describe the general relationship between the distance from the East Pacific Ridge and the age of the oceanic bedrock of the islands and seamounts. [1]

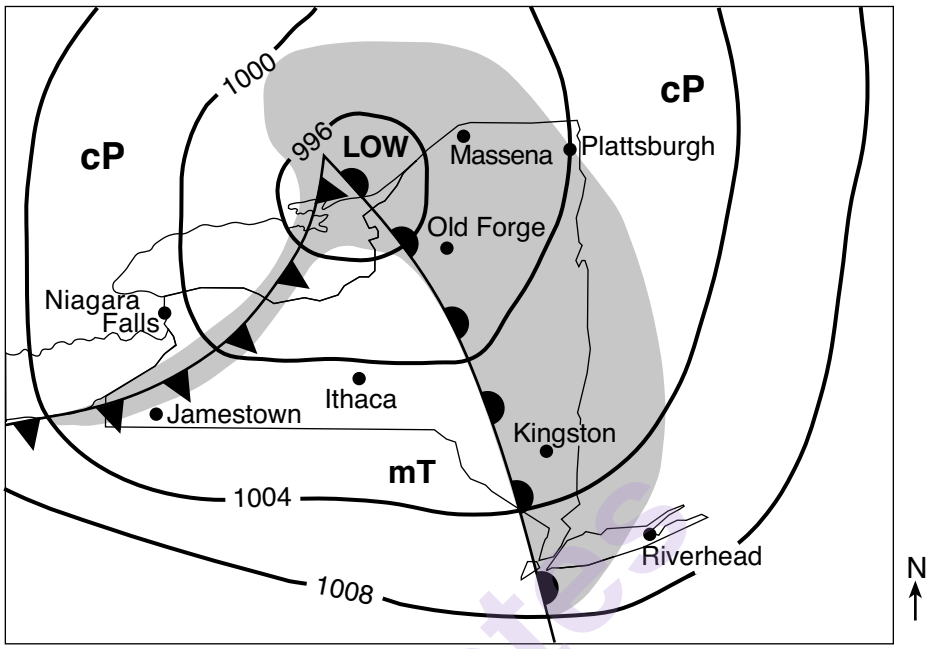
Base your answers to questions 57 and 58 on the diagram below and on your knowledge of Earth science. The diagram represents the water cycle. Letters *A* through *C* identify water cycle processes. Arrows represent movement of water or water vapor. The level of the water table is indicated.



57 Water vapor forms a cloud of liquid droplets at location *A*. State the number of joules per gram of heat energy that is released into the atmosphere during this process. [1]

58 Identify the names of the *two* different processes, represented by letters *B* and *C*, that return moisture to the atmosphere. [1]

Base your answers to questions 59 through 62 on the weather map below and on your knowledge of Earth science. The map shows the location of a low-pressure system over New York State during late summer. Isobar values are recorded in millibars. Shading indicates regions receiving precipitation. The air masses are labeled. Eight locations in New York State are indicated.



59 Identify the location labeled on the map that will next experience a short burst of heavy precipitation, a change in wind direction, and a rapid decrease in temperature. [1]

60 Convert the air pressure at Plattsburgh, New York, from millibars to inches of mercury. [1]

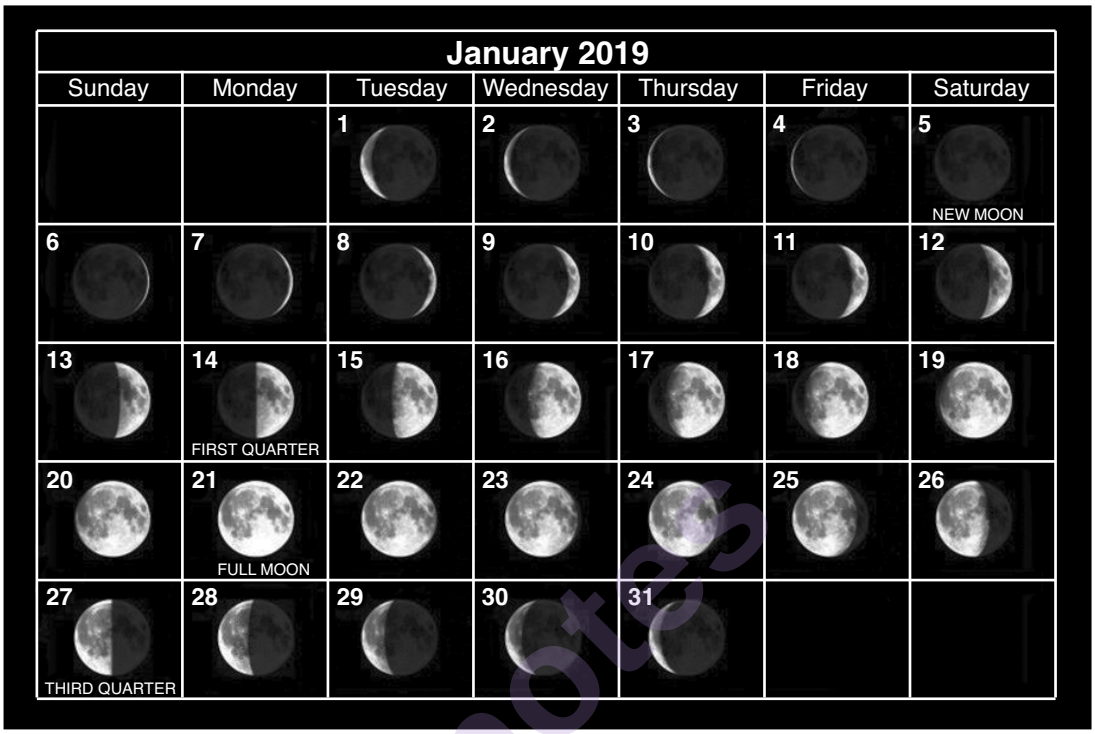
61 The table below lists the weather conditions at Old Forge, New York.

Weather Condition	Data
Temperature (°F)	85
Cloud cover (%)	100
Present weather	Rain showers
Visibility (mi)	$\frac{1}{4}$

On the station model *in your answer booklet*, record *all four* weather conditions for Old Forge using the proper format. [1]

62 Identify the weather instrument used to measure air pressure. [1]

Base your answers to questions 63 through 65 on the calendar below, on the diagram in your answer booklet, and on your knowledge of Earth science. The calendar shows the phases of the Moon for January 2019 as viewed by an observer in New York State. Some phases have been labeled. The diagram on your answer sheet represents eight positions of the Moon in its orbit around Earth.



63 *In your answer booklet*, circle the position of the Moon in its orbit that produced the moon phase observed on January 17, 2019. [1]

64 On the diagram *in your answer booklet*, place an **X** on each of the *two* positions of the Moon in its orbit where neap tides (the smallest difference in the water levels between high tide and low tide) occur. [1]

65 A New Moon occurred on January 5, 2019. Determine the date of the New Moon that occurred in February 2019. [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 topographic map in your answer booklet and on your knowledge of Earth science. Partially drawn contour lines are shown on the southern portion of the map. Points of elevation are recorded in meters. Points *A*, *B*, *C*, and *D* represent locations on Earth's surface. Line *AB* and dashed line *CD* are reference lines.

66 On the topographic map *in your answer booklet*, complete the 480-meter, 500-meter, and 520-meter contour lines on the southern portion of the map. [1]

67 On the grid *in your answer booklet*, construct a topographic profile along line *AB* by plotting the elevation of each contour line that crosses line *AB*. The elevations of points *A* and *B* have been plotted on the grid. Connect *all nine* plots with a line from *A* to *B* to complete the profile. [1]

68 Calculate the gradient, in meters per kilometer, from point *C* to point *D*. [1]

69 Describe the evidence shown by the contour lines that indicates that Bry Creek flows downhill in a southwesterly direction. [1]

Base your answers to questions 70 through 72 on the passage below and on your knowledge of Earth science.

Carrara Marble

Carrara marble is named for the town of Carrara on the west coast of Italy. This dazzling white marble has been mined since the time of the ancient Romans and remains the major industry of the area today. The marble has many commercial uses, such as tombstones, countertops, tiles, and building stones. Its chemical purity, uniform color, and hardness make this marble an ideal material for artists who carve statues from rock. Major museums around the world have statues carved from Carrara marble.

The formation of Carrara marble began 200 million years ago when a great thickness of tiny shells was deposited at the bottom of a warm, shallow sea. Over time, burial and compaction of these sediments formed sedimentary rock primarily composed of pure calcite. Approximately 27 million years ago, tectonic forces caused this area of the seafloor bedrock to be deformed and metamorphosed, forming the Carrara marble. Uplift and erosion later exposed huge formations of this famous marble.

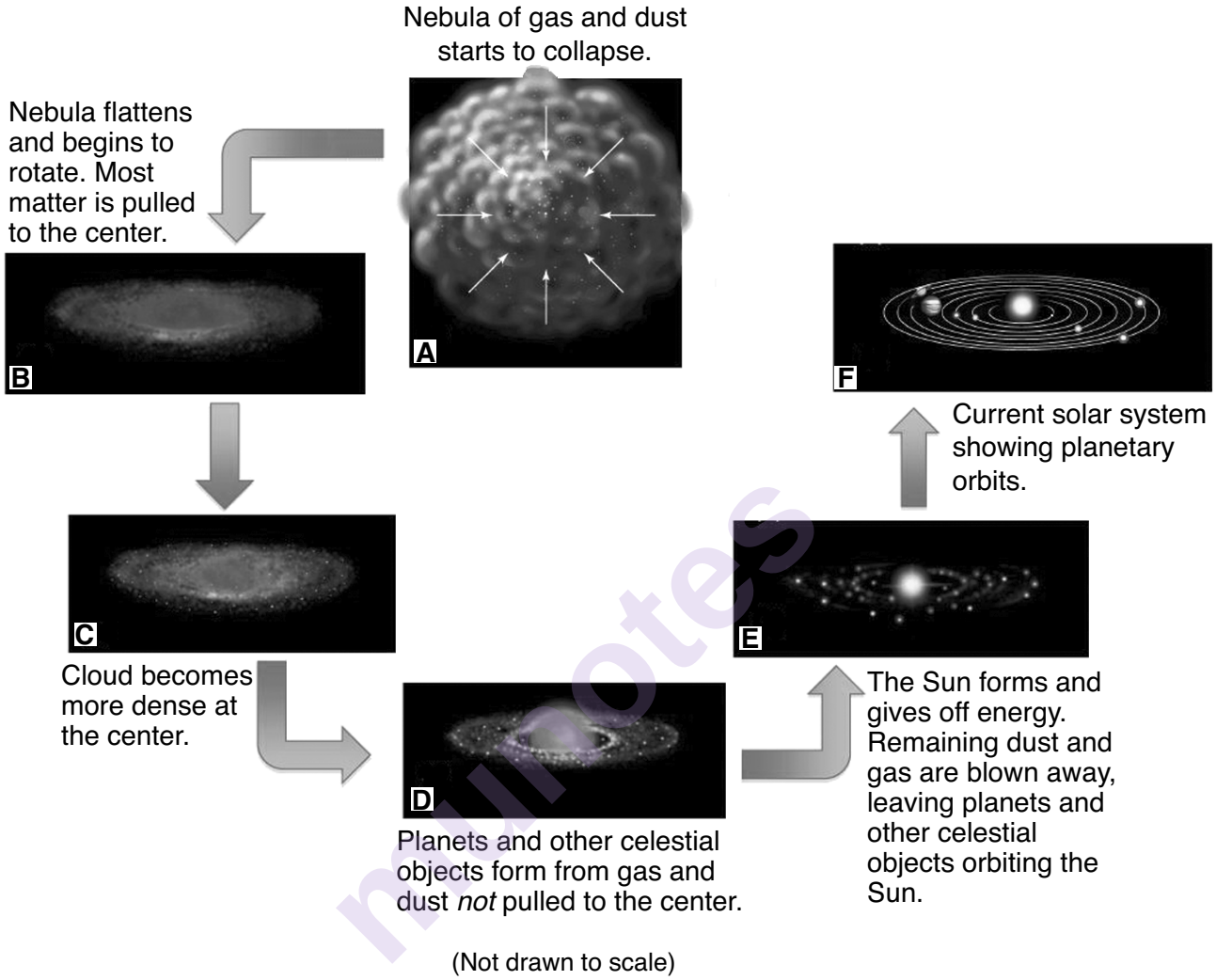
70 Identify the most likely sedimentary rock that formed when the sediments of tiny shells were buried and compacted. [1]

71 Identify the change in pressure and the change in temperature that most likely occurred to metamorphose the sedimentary seafloor bedrock into the Carrara marble. [1]

72 In terms of mineral properties, explain why a statue is easier to carve from pure white marble rather than from pure white quartzite. [1]

GO ON TO THE NEXT PAGE ⇨

Base your answers to questions 73 through 75 on the diagram below and on your knowledge of Earth science. The diagram represents the inferred sequence in which our solar system formed from a nebula of gas and dust. Letters *A* through *F* represent different stages in its development.



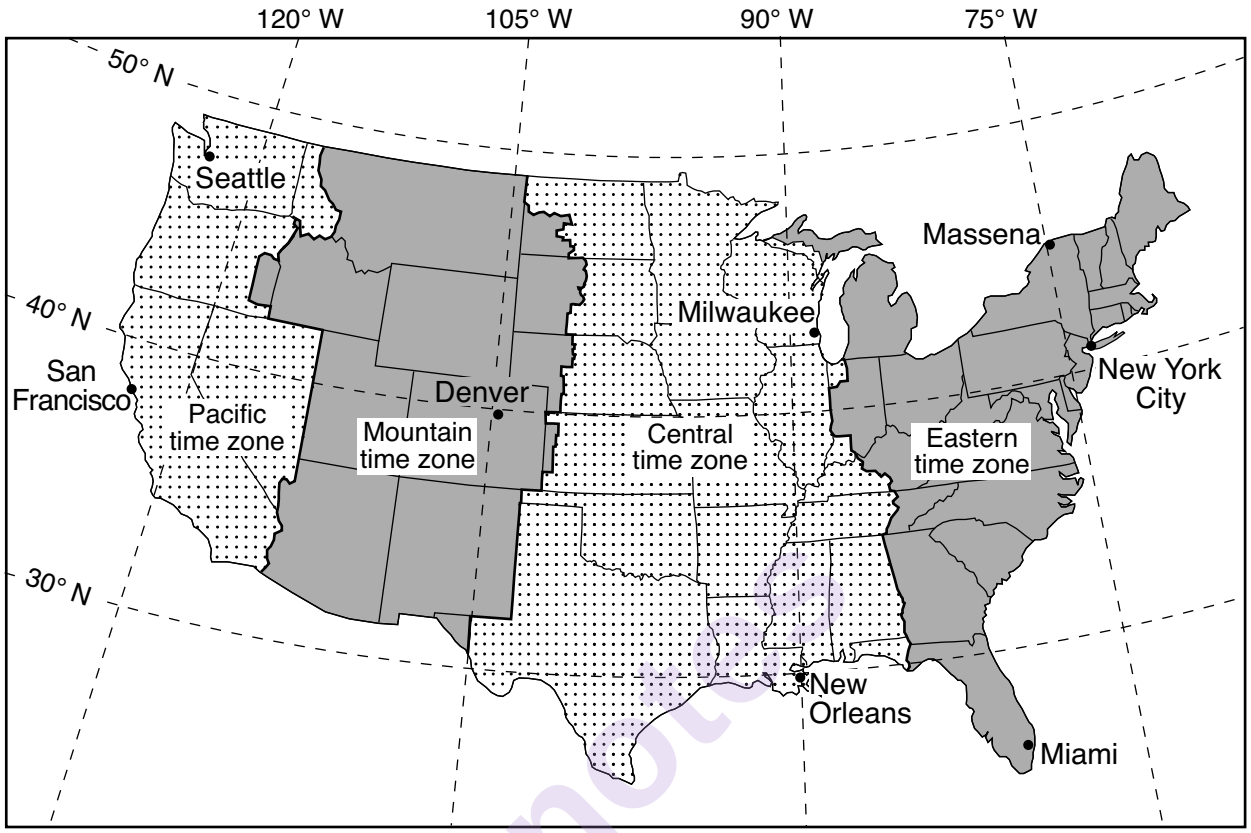
Adapted from www.astro.ufl.edu/~reyes/classes

73 Identify the force that pulled most matter to the center of the rotating disk in stage *B*. [1]

74 Identify the process that produces energy in the core of the Sun at stage *E* by combining lighter elements into heavier elements. [1]

75 Most asteroids formed in a belt located between 329 million and 478.7 million kilometers from the Sun. Identify the *two* planets located on either side of the asteroid belt. [1]

Base your answers to questions 76 and 77 on the map below and on your knowledge of Earth science. The map shows the four time zones across the continental United States. Eight cities are labeled on the map.

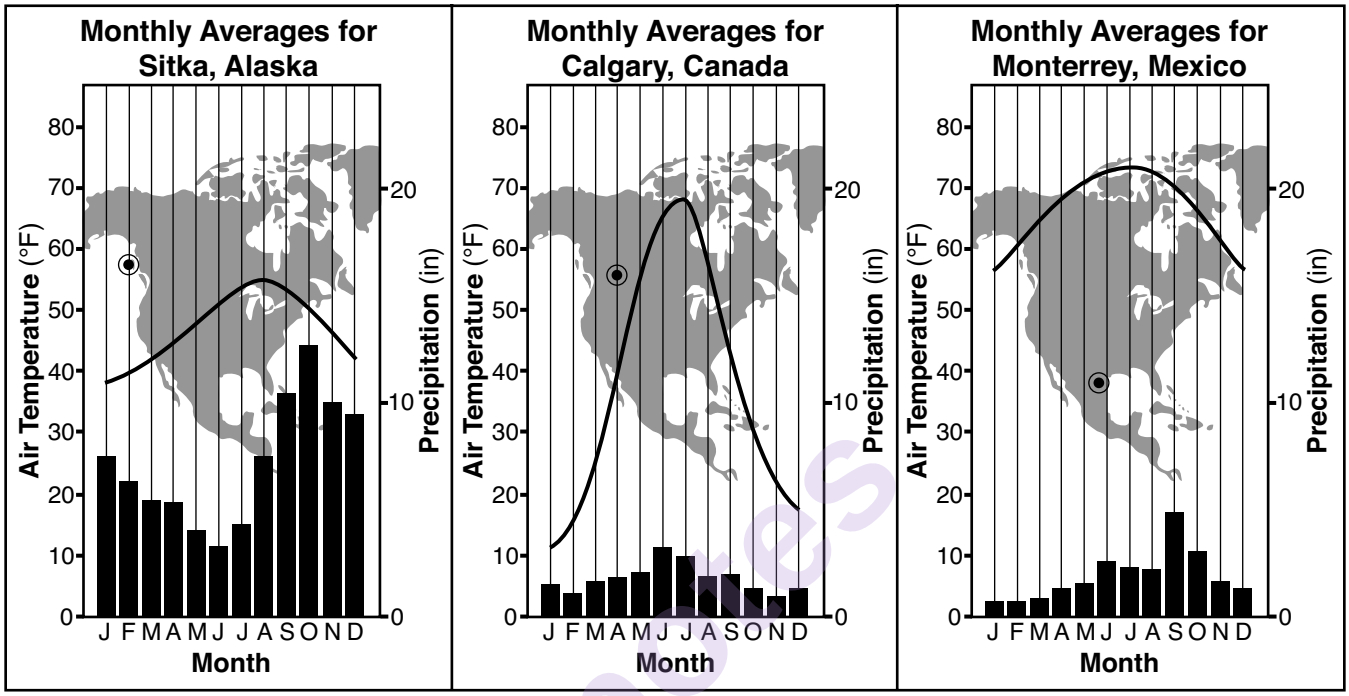


76 State the time at San Francisco, California, when it is 12 noon at New Orleans, Louisiana. Indicate a.m. or p.m. in your answer. [1]

77 Identify the city on the map where the altitude of *Polaris* is closest to 45 degrees. [1]

Base your answers to questions 78 through 80 on the graphs below and on your knowledge of Earth science. The climate graphs represent data for three different locations in North America. Line graphs show the average monthly air temperatures in degrees Fahrenheit (°F). Bar graphs show the average monthly precipitation in inches (in). A circled dot (⊙) indicates each location on the maps.

Climate Graphs

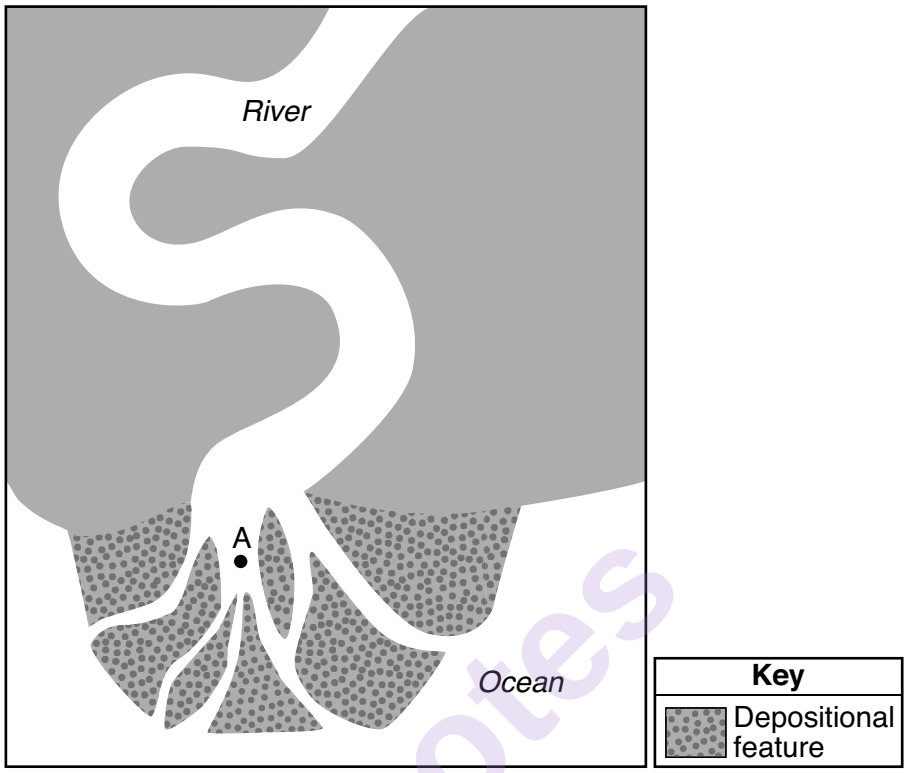


78 State *one* reason why the annual temperature range of Calgary, Canada, is greater than the annual temperature range in Sitka, Alaska. [1]

79 Explain why the noontime altitude of the Sun (angle of insolation) is greater at Monterrey, Mexico, than at Calgary, Canada, every day of the year. [1]

80 Identify the most likely types of precipitation that occur in Calgary, Canada, and Monterrey, Mexico, during January and February. [1]

Base your answers to questions 81 and 82 on the map below and on your knowledge of Earth science. The map shows a river and a depositional feature at an ocean shoreline. Point *A* indicates a location on Earth's surface.



81 Identify the name of the depositional feature surrounding location *A* that is forming where the river enters the ocean. [1]

82 Describe how the rocks and sediments are rounded and smoothed as they are being eroded by the water in this river. [1]

Base your answers to questions 83 through 85 on the timeline in your answer booklet and on your knowledge of Earth science. The timeline represents the last 600 million years of geologic time. Shaded area *A* represents the Neogene Period.

83 On the timeline *in your answer booklet*, accurately shade in an area to represent the entire Permian Period. [1]

84 Identify the name of *one* New York State landscape region where the index fossil *Phacops* may be found in the surface bedrock. [1]

85 List the following organisms in order of geologic age from youngest to oldest: earliest mammals, earliest stromatolites, earliest grasses, Earth's first forests. [1]

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