Large-Type Edition

The University of the State of New York

REGENTS HIGH SCHOOL EXAMINATION

PHYSICAL SETTING

EARTH SCIENCE

Tuesday, January 21, 2025 — 1:15 to 4:15 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 START THIS EXAMINATION 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 Ceres, a dwarf planet, is located approximately 413 million kilometers from the Sun and is located between the orbits of

(1) Mercury and Venus
(2) Earth and Mars
(3) Mars and Jupiter
(4) Saturn and Uranus

2 Observations made by astronomers indicate that the light from most galaxies shows a

(1) red shift because the galaxies are moving toward Earth
(2) red shift because the galaxies are moving away from Earth
(3) blue shift because the galaxies are moving toward Earth
(4) blue shift because the galaxies are moving away from Earth

3 Compared to the Jovian planets, the terrestrial planets are

(1) large, gaseous, and of low density
(2) large, gaseous, and of high density
(3) small, rocky, and of low density
(4) small, rocky, and of high density

4 The apparent shift in the direction of the swing of a Foucault pendulum is a direct result of the

(1) inclination of Earth's axis
(2) spinning of Earth on its axis
(3) orbiting of Earth around the Sun
(4) distance between Earth and the Sun

5 Which motion causes some constellations to be visible in New York State only during winter nights and other constellations to be visible only during summer nights?

(1) rotation of Earth on its axis
(2) revolution of Earth around the Sun
(3) rotation of the constellations around Earth
(4) revolution of the constellations around the Sun

6 Which set of New York State locations would have the greatest difference in the altitude of Polaris observed in the night sky?

(1) Niagara Falls and Albany
(2) Rochester and Ithaca
(3) Riverhead and Massena
(4) Plattsburgh and Jamestown

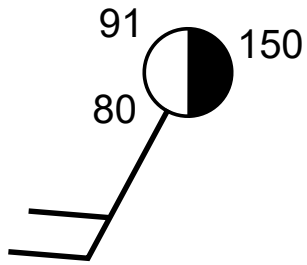
7 Which processes of the water cycle allow water vapor to enter the atmosphere?

(1) condensation and evaporation
(2) condensation and infiltration
(3) transpiration and evaporation
(4) transpiration and infiltration

8 What is the dewpoint when the dry-bulb temperature is 19°C and the relative humidity is 73%?

(1) 12°C
(2) 14°C
(3) 3°C
(4) 16°C

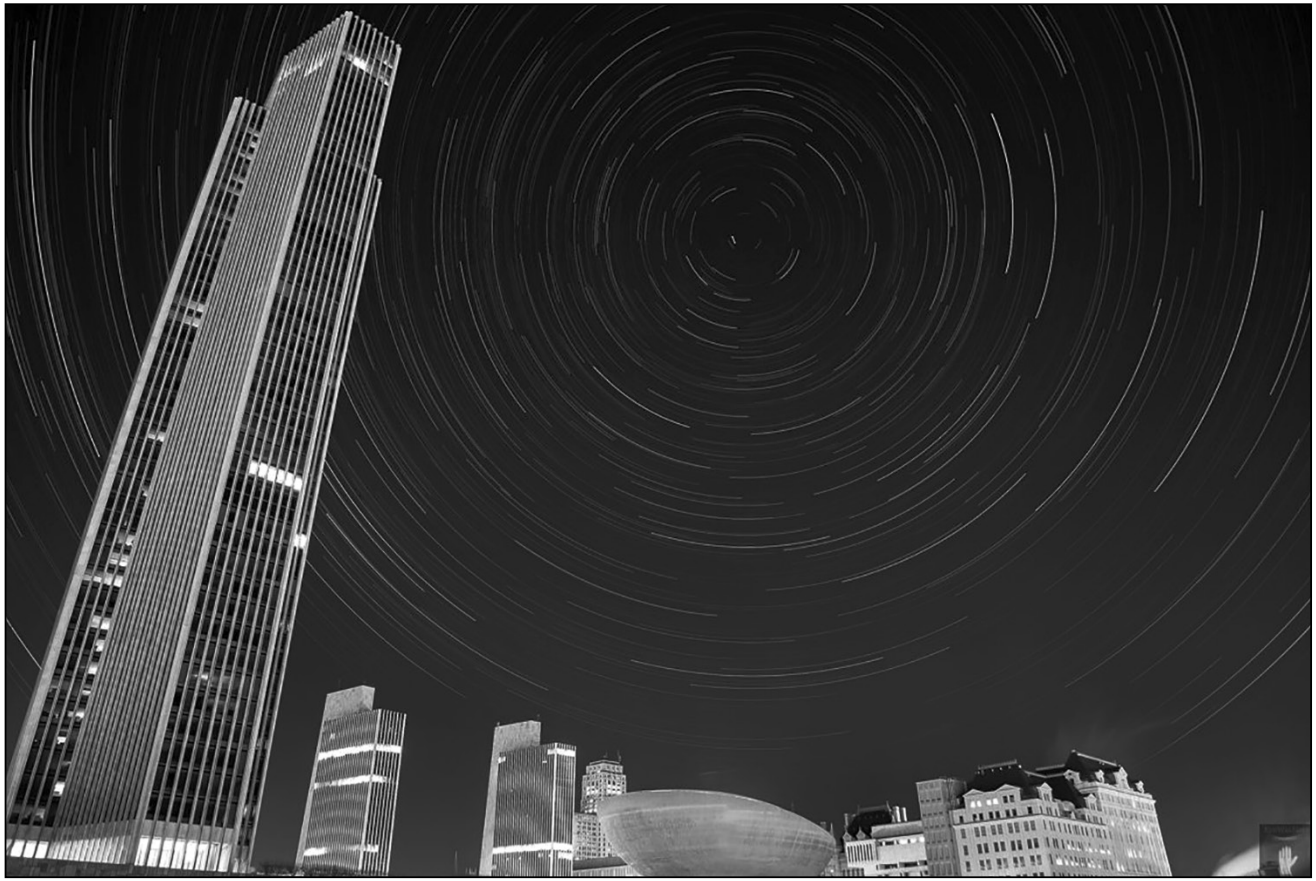
9 The diagram below shows a weather station model.



What is the air pressure, in millibars (mb), indicated by this station model?

(1) 1015.0 mb
(2) 915.0 mb
(3) 150 mb
(4) 15.0 mb

10 The photograph below was taken by aiming a camera at a portion of the night sky above Albany, New York, for a period of time to record the apparent star motion, resulting in star trails.

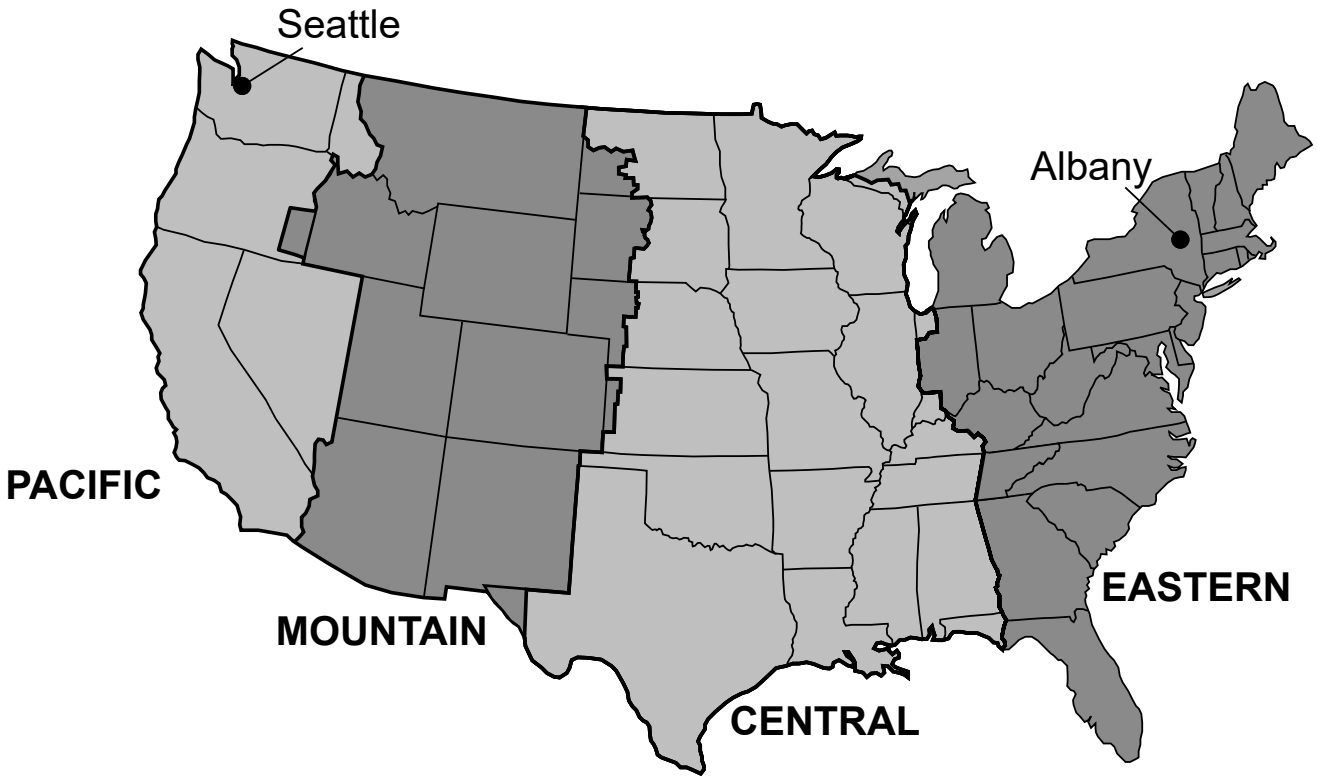


Source: https://eyewashere.net/portfolios/stars-shine-brightest/

Which celestial object is located at the center of the star trails?

(1) Polaris
(2) Alpha Centauri
(3) the Sun
(4) the Moon

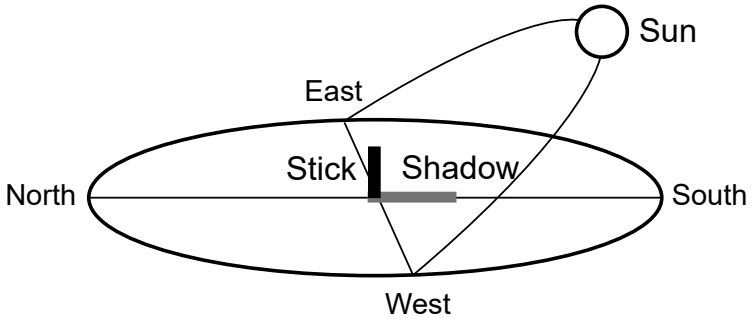
11 The map below shows the locations of four time zones in the United States. Seattle, Washington, and Albany, New York, are labeled on the map.



If the time in Albany, New York, is 10 a.m., what time would it be in Seattle, Washington?

(1) 1 p.m.
(2) 12 p.m.
(3) 8 a.m.
(4) 7 a.m.

12 Which diagram correctly matches the location of the Sun with the direction of the shadow cast by the stick?



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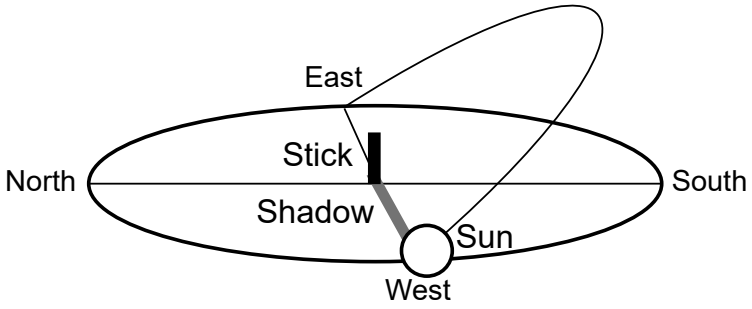

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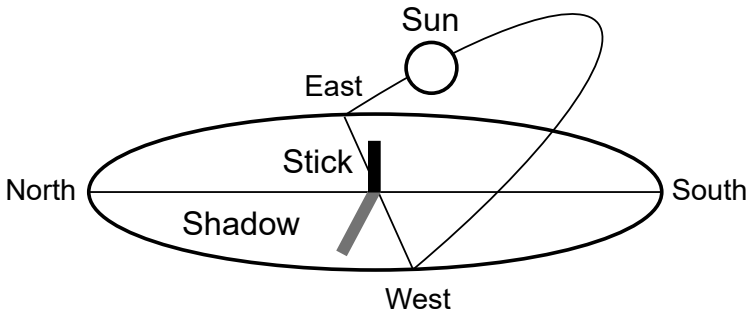

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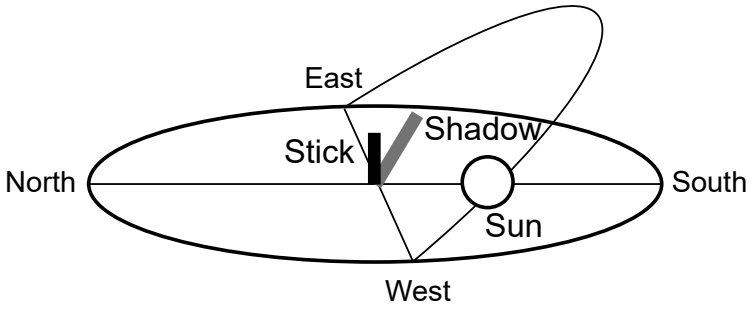
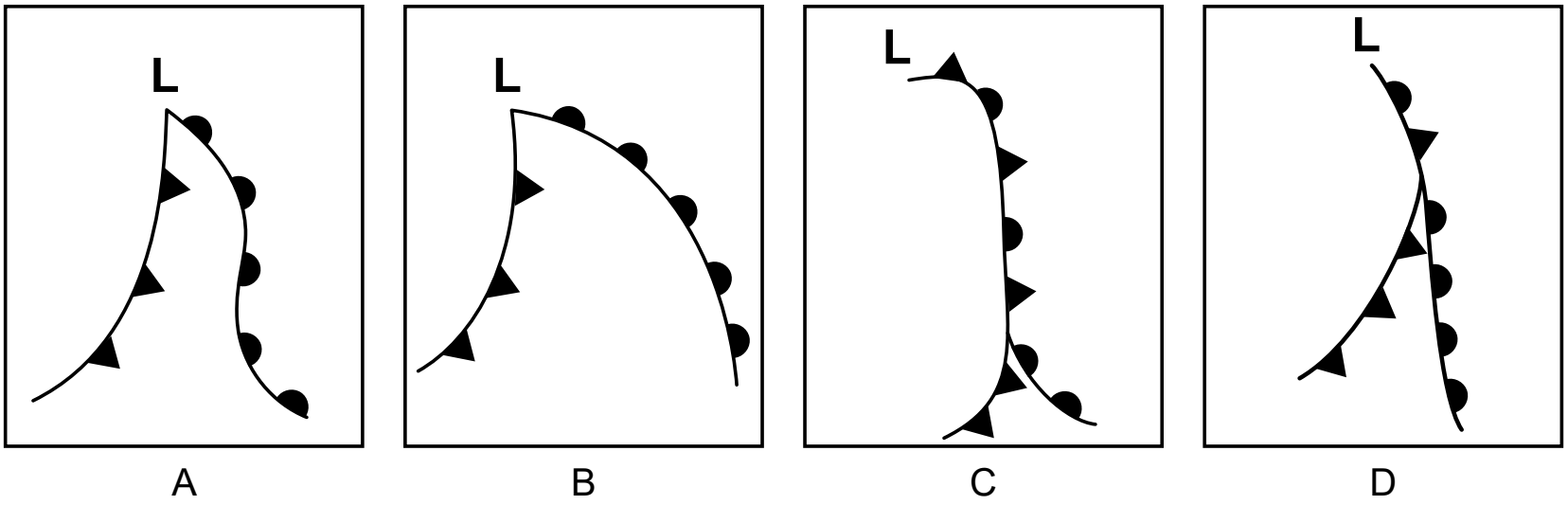


(4)

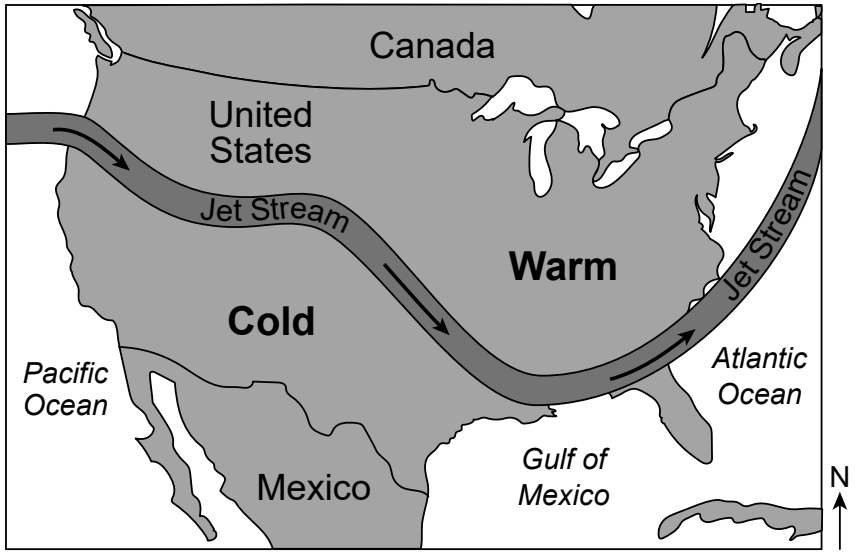
13 The diagrams below, labeled *A*, *B*, *C*, and *D*, represent fronts associated with a low pressure system (**L**).



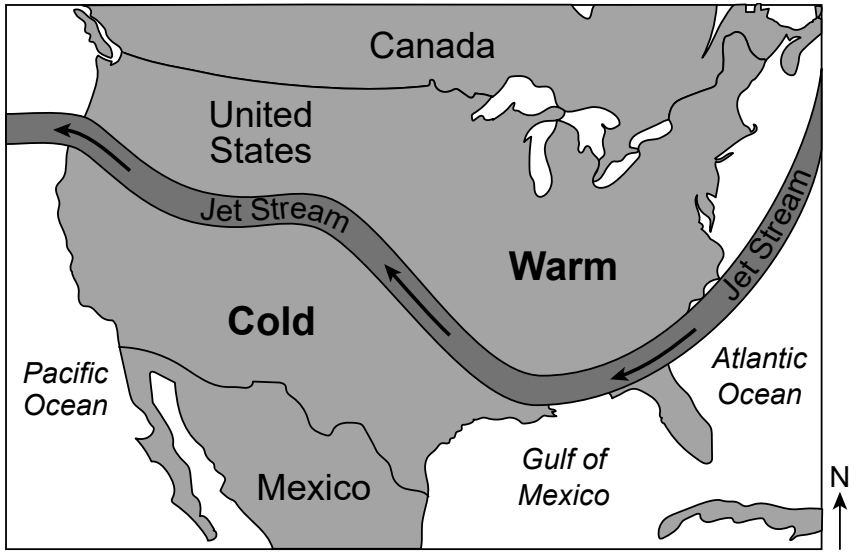
Which sequence best represents the order in the development of an occluded front from a cold front and warm front?

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

14 Which map shows the most likely direction of flow of the jet stream and the types of air masses found on either side?



(1)



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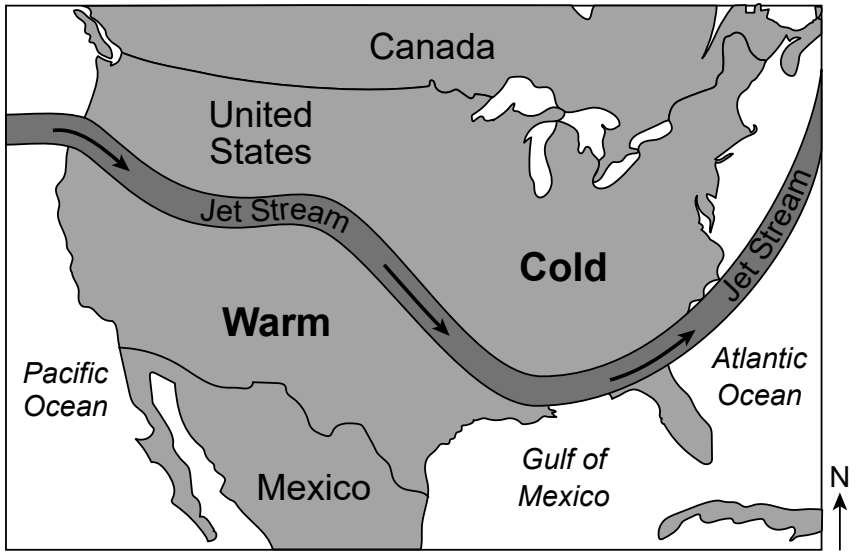

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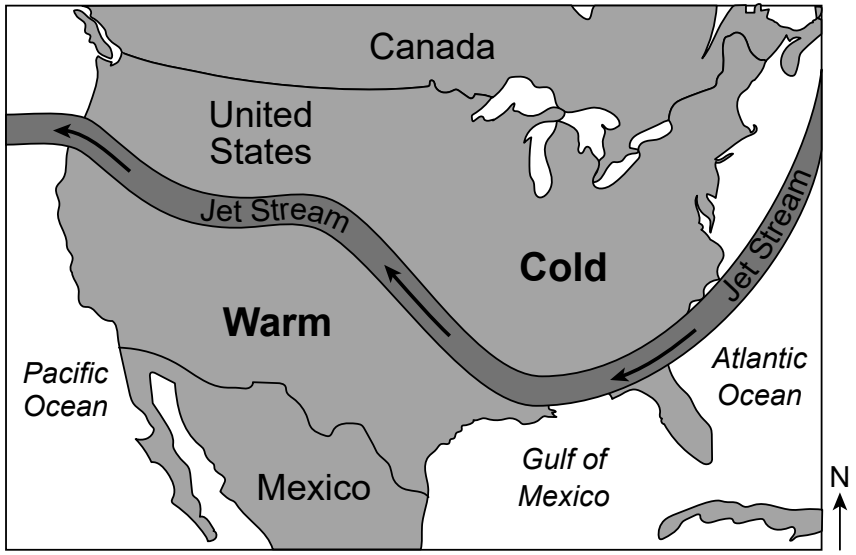


(4)

15 Which statement best explains why predictions for extreme weather events are more accurate today than in the past?

(1) There are fewer extreme weather events occurring now.
(2) Scientists control weather by using technology.
(3) Weather conditions change more slowly now than in the past.
(4) Advanced computer models use weather data to make predictions.

16 In order to maximize the amount of insolation absorbed by a roof in a colder climate, roofing materials should be

(1) dark-colored and rough-textured
(2) dark-colored and smooth-textured
(3) light-colored and rough-textured
(4) light-colored and smooth-textured

17 Uneven heating of Earth's surface and atmosphere, along with the Coriolis Effect, produces ocean currents with a general

(1) clockwise flow in both northern and southern hemispheres
(2) counterclockwise flow in both northern and southern hemispheres
(3) clockwise flow in the northern hemisphere and counterclockwise flow in the southern hemisphere
(4) counterclockwise flow in the northern hemisphere and clockwise flow in the southern hemisphere

18 Which human activity contributes to the high levels of greenhouse gases in Earth's atmosphere?

(1) burning fossil fuels
(2) watering farm crops
(3) using solar energy
(4) replanting forests

19 What is the main reason that locations near oceans have smaller annual temperature ranges than locations inland at the same latitude?

(1) Oceans have a lower elevation than land.
(2) Oceans cover a greater percentage of Earth's surface.
(3) Water has a lower density than land.
(4) Water has a higher specific heat than land.

20 The division of geologic time into eras, periods, and epochs is based primarily on

(1) celestial events
(2) tectonic events
(3) the absolute age of rocks
(4) the fossil record

21 During which geologic time period were thick layers of evaporites deposited in New York State?

(1) Triassic
(2) Permian
(3) Silurian
(4) Pennsylvanian

22 Earth's outer core is inferred to be a liquid because

(1) *P*-waves cannot travel through it
(2) *S*-waves cannot travel through it
(3) *P*-waves travel faster than *S*-waves through it
(4) *S*-waves travel faster than *P*-waves through it

23 A seismograph detects an earthquake that occurred 5600 km away. The *P*-waves arrived at 10:36:00 a.m. What time did the earthquake occur?

(1) 09:00:00 a.m.
(2) 10:19:50 a.m.
(3) 10:27:00 a.m.
(4) 10:45:00 a.m.

24 The Mariana Trench has formed because the Pacific Plate is

(1) overriding the Philippine Plate
(2) overriding the Indian-Australian Plate
(3) subducting beneath the Philippine Plate
(4) subducting beneath the Indian-Australian Plate

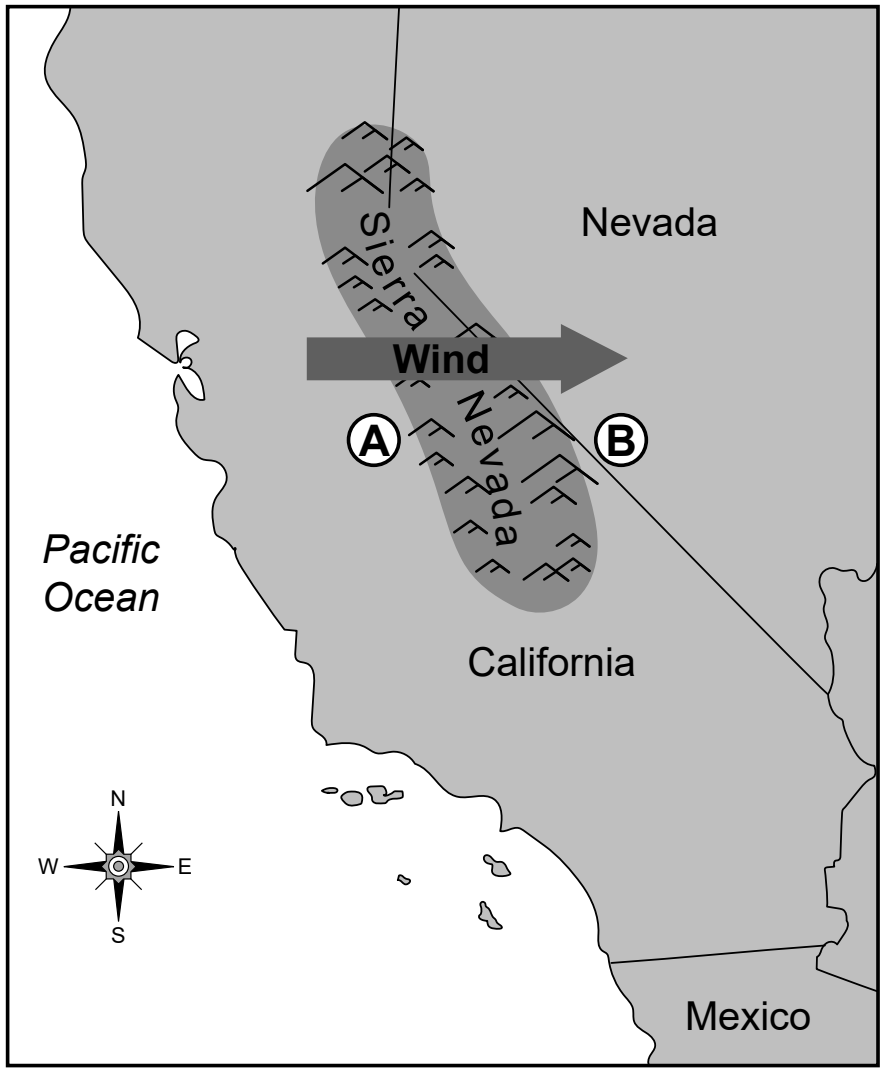
25 Rock primarily composed of which mineral would be most resistant to physical weathering?

(1) calcite
(2) gypsum
(3) halite
(4) olivine

26 Which agent of erosion produces parallel scratches and grooves in surface bedrock?

(1) glacier
(2) wind
(3) running water
(4) ocean waves

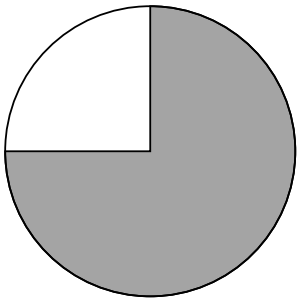
27 The map below shows the prevailing wind direction over the Sierra Nevada, a mountain range in California. Letters *A* and *B* represent locations on Earth's surface.



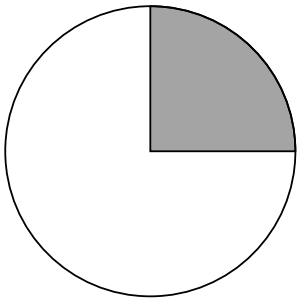
Compared to the climate at location *A*, the climate at location *B* generally is

(1) cooler with more precipitation
(2) cooler with less precipitation
(3) warmer with more precipitation
(4) warmer with less precipitation

28 Which pie graph correctly shows the percentage of original radioactive ^{40}K remaining in an igneous rock sample after 2.6×10^9 years?



(1)



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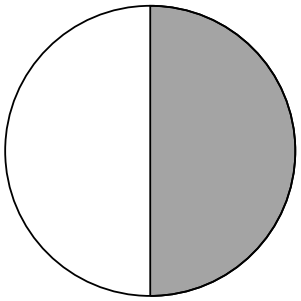

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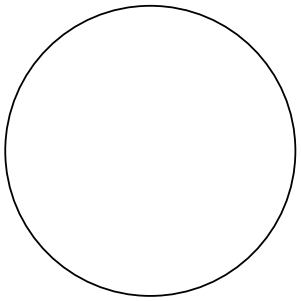

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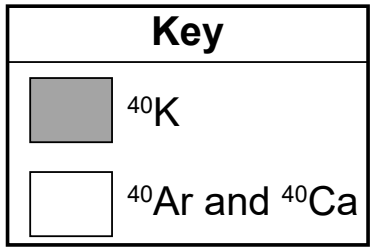
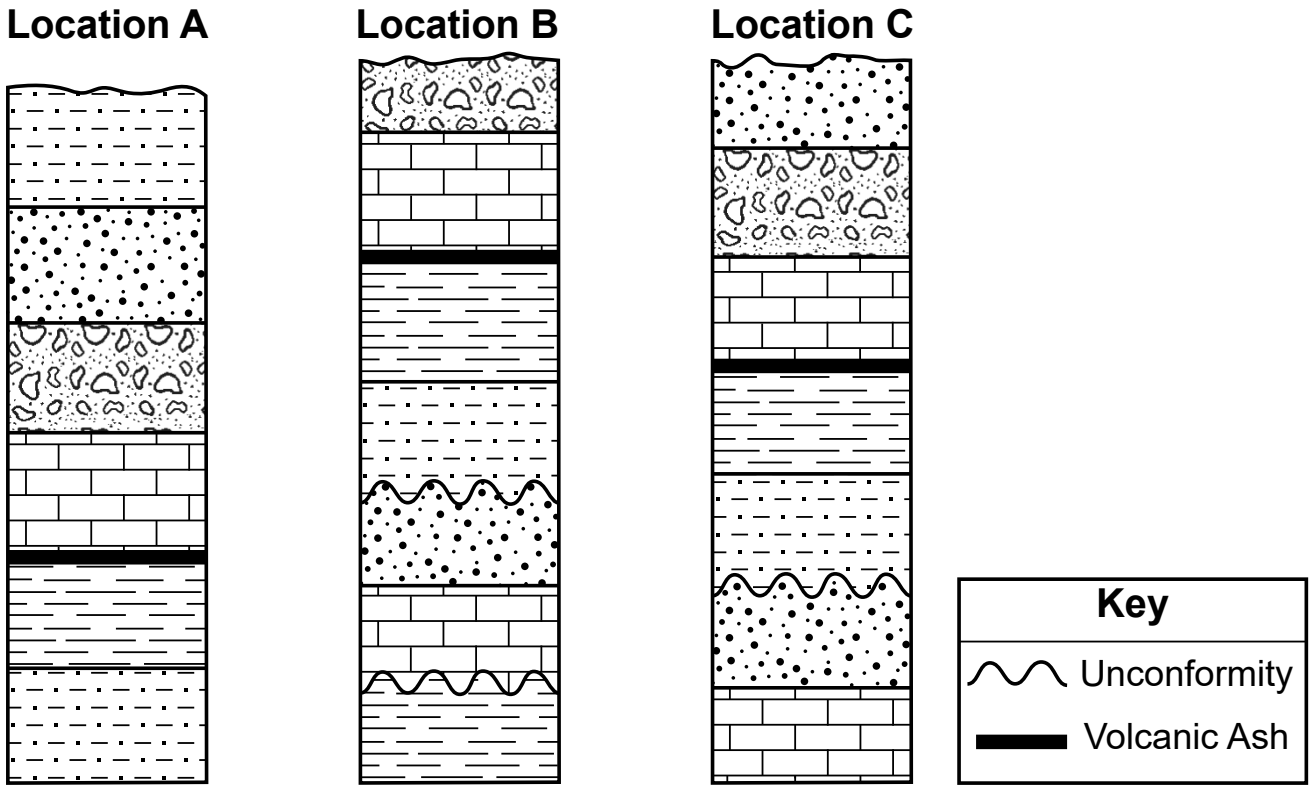


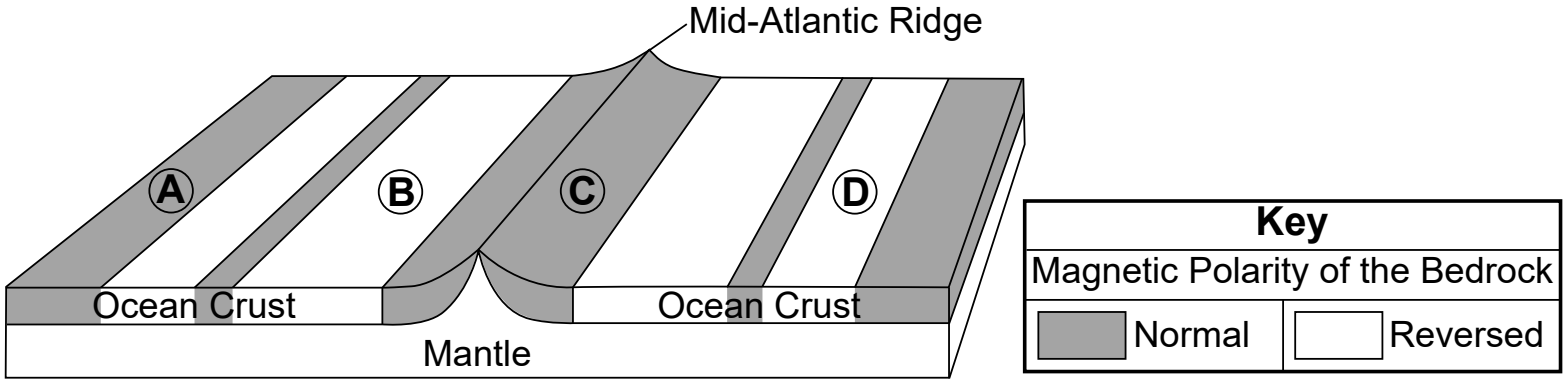
29 The diagram below represents three rock outcrops at locations *A*, *B*, and *C*. No overturning of rock layers has occurred.



Which rock unit shown in the three outcrops is the oldest?

(1) siltstone layer at the top of location *A*
(2) shale layer at the bottom of location *B*
(3) conglomerate layer at the top of location *B*
(4) limestone layer at the bottom of location *C*

30 The diagram below represents the magnetic polarity preserved by minerals within the bedrock of the oceanic crust near the Mid-Atlantic Ridge. Letters *A*, *B*, *C*, and *D* represent locations on the ocean-floor bedrock.



The oldest bedrock is found at location

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

31 Oswego and Old Forge, located at similar latitudes in New York State, have very different landscapes. Which two factors are primarily responsible for these landscape differences?

(1) soil characteristics and bedrock composition
(2) soil characteristics and bedrock age
(3) bedrock structure and bedrock composition
(4) bedrock structure and bedrock age

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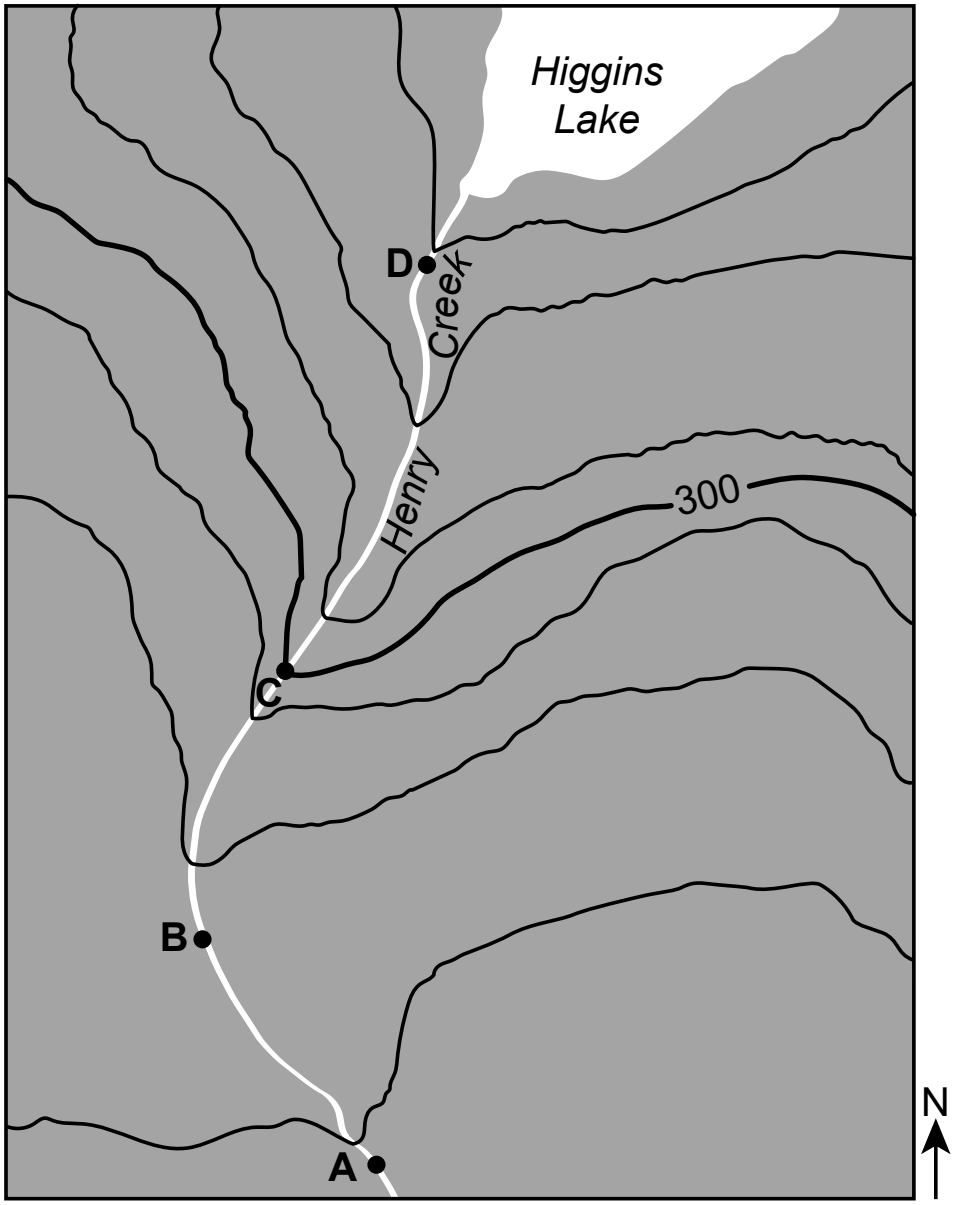
32 The topographic map below shows the location of Henry Creek. Points *A*, *B*, *C*, and *D* represent locations on Earth's surface.



Contour Interval = 10 feet

Question 32 is continued on the next page

Question 32 continued

At which location would the water in Henry Creek be flowing at the greatest rate?

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

33 A metamorphic rock with banding is described as having a

(1) clastic texture
(2) non-clastic texture
(3) foliated texture
(4) non-foliated texture

34 The hardness of a mineral is primarily a result of the mineral's

(1) mass
(2) nonmetallic shape
(3) pattern of breakage
(4) internal arrangement of atoms

35 Two sedimentary rocks formed from organic sediments are

(1) bituminous coal and limestone
(2) bituminous coal and anthracite coal
(3) rock gypsum and limestone
(4) rock gypsum and anthracite coal

Part B–1

Answer all questions in this part.

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

Base your answers to questions 36 through 38 on the passage below and on your knowledge of Earth science.

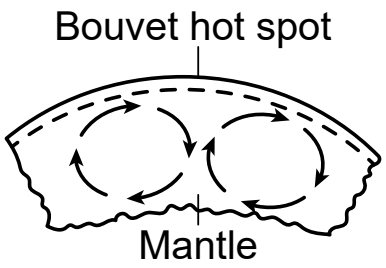
Bouvet Island

Bouvet Island is the most remote uninhabited island in the world. It is located above a geologic hot spot on the Southwest Indian Ridge. The closest landmass to the island is Antarctica, which is 1700 km away. Most of this volcanic island is currently covered by glaciers. Scientists inferred from drill core samples that the last massive lava flow that occurred on Bouvet Island was approximately 2000 years ago.

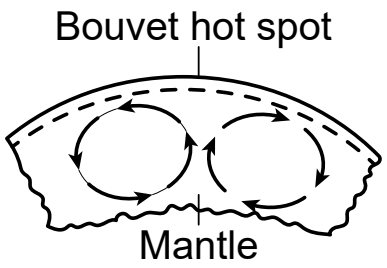
36 The distance between Bouvet Island and Antarctica is approximately equal to the distance from Earth's surface to the

(1) top of the asthenosphere
(2) middle of the stiffer mantle
(3) bottom of the outer core
(4) center of Earth

37 Which cross section best represents the mantle convection currents formed beneath the Bouvet hot spot?



(1)



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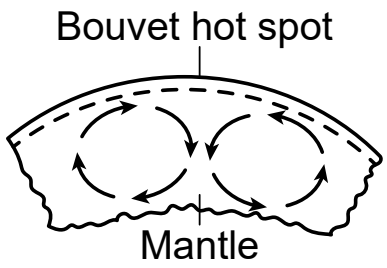

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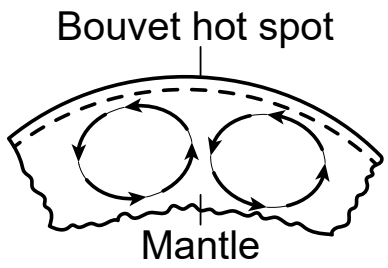
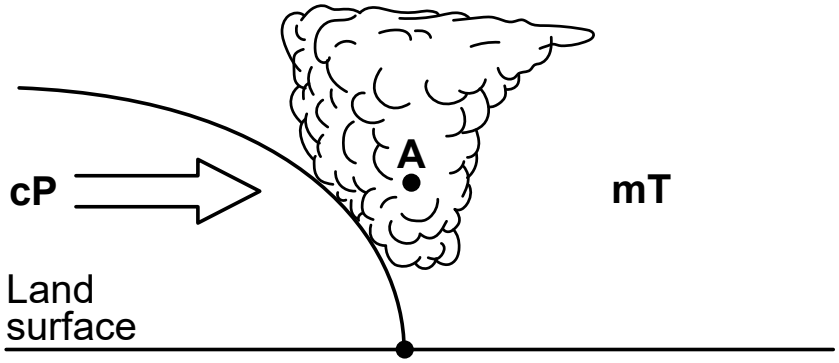


(4)

38 Which ocean current would most likely influence the climate of Bouvet Island?

(1) Antarctic Circumpolar Current
(2) Brazil Current
(3) Falkland Current
(4) South Equatorial Current

Base your answers to questions 39 through 41 on the cross section below and on your knowledge of Earth science. The cross section represents a weather front over New York State. A continental polar (cP) air mass is moving into the region now occupied by a maritime tropical (mT) air mass. The arrow shows the direction the cP air mass is moving. Point *A* is located within the cloud.



39 Which type of frontal boundary is represented?

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

40 The relative humidity within the cloud at point *A* is most likely

(1) 0%
(2) 33%
(3) 50%
(4) 100%

41 Which statement best describes why clouds are forming along the frontal boundary?

(1) The mT air pushes the cP air up, causing it to compress and warm.
(2) The mT air pushes the cP air up, causing it to expand and cool.
(3) The cP air pushes the mT air up, causing it to compress and warm.
(4) The cP air pushes the mT air up, causing it to expand and cool.

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Base your answers to questions 42 through 44 on the diagram on the next page and on your knowledge of Earth science. The diagram represents five maps, labeled *A*, *B*, *C*, *D*, and *E*, and the inferred position and shape of the continents on Earth during five periods of geologic time.

42 Between 251 million years ago and 1.8 million years ago, India generally moved

(1) north and east
(2) north and west
(3) south and east
(4) south and west

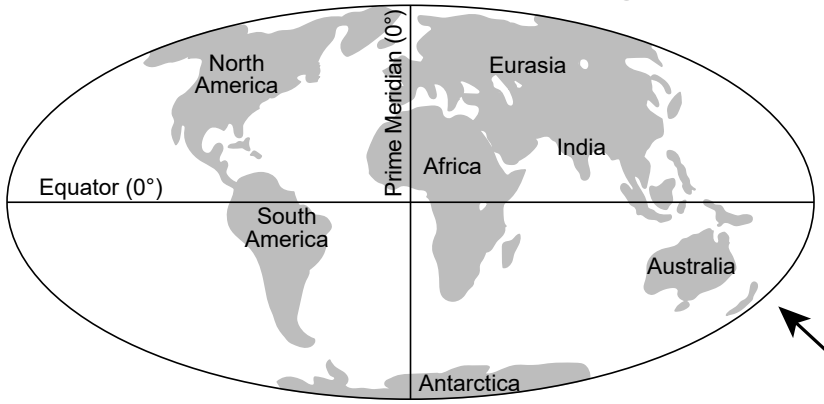
43 Pangaea is represented on map

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

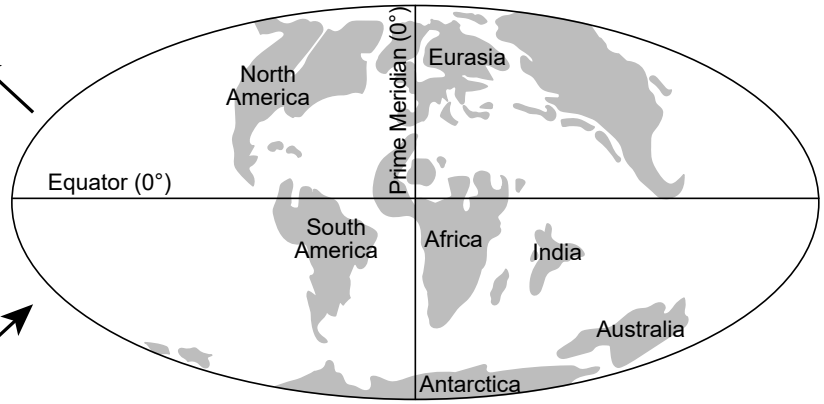
44 Which group of organisms became extinct during the time represented on map *A*?

(1) placoderm fish
(2) dinosaurs
(3) trilobites
(4) graptolites

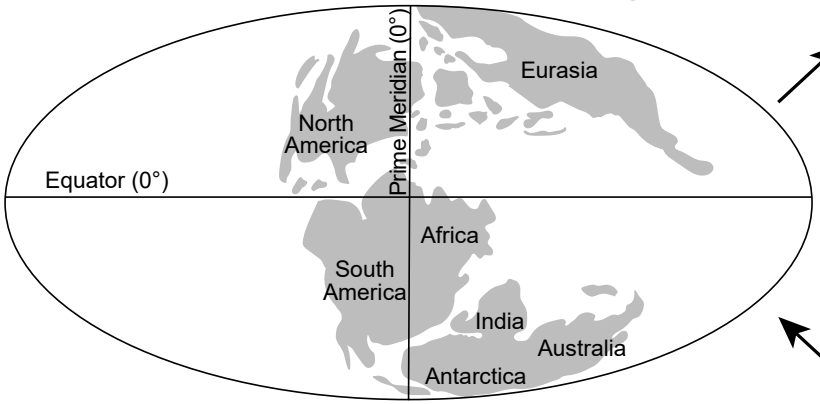
E 1.8 Million Years Ago



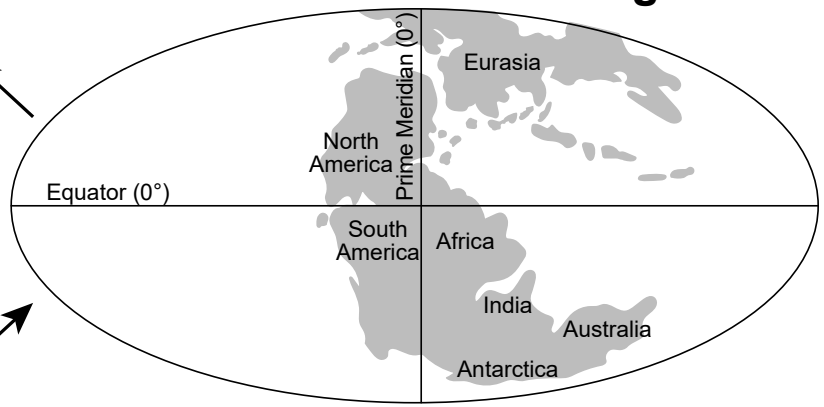
D 65.5 Million Years Ago



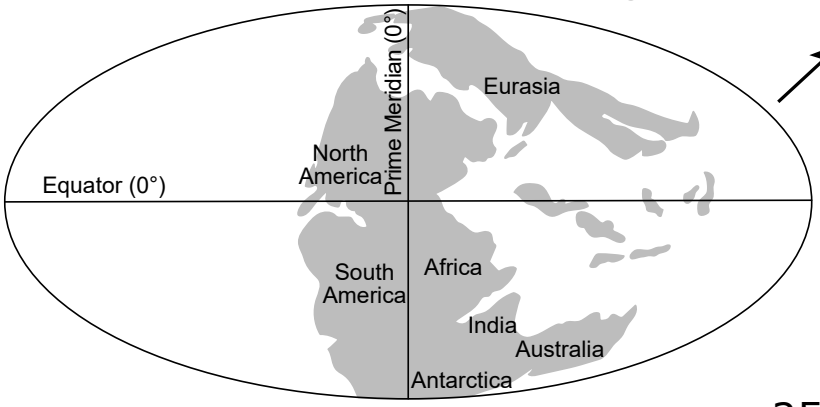
C 146 Million Years Ago



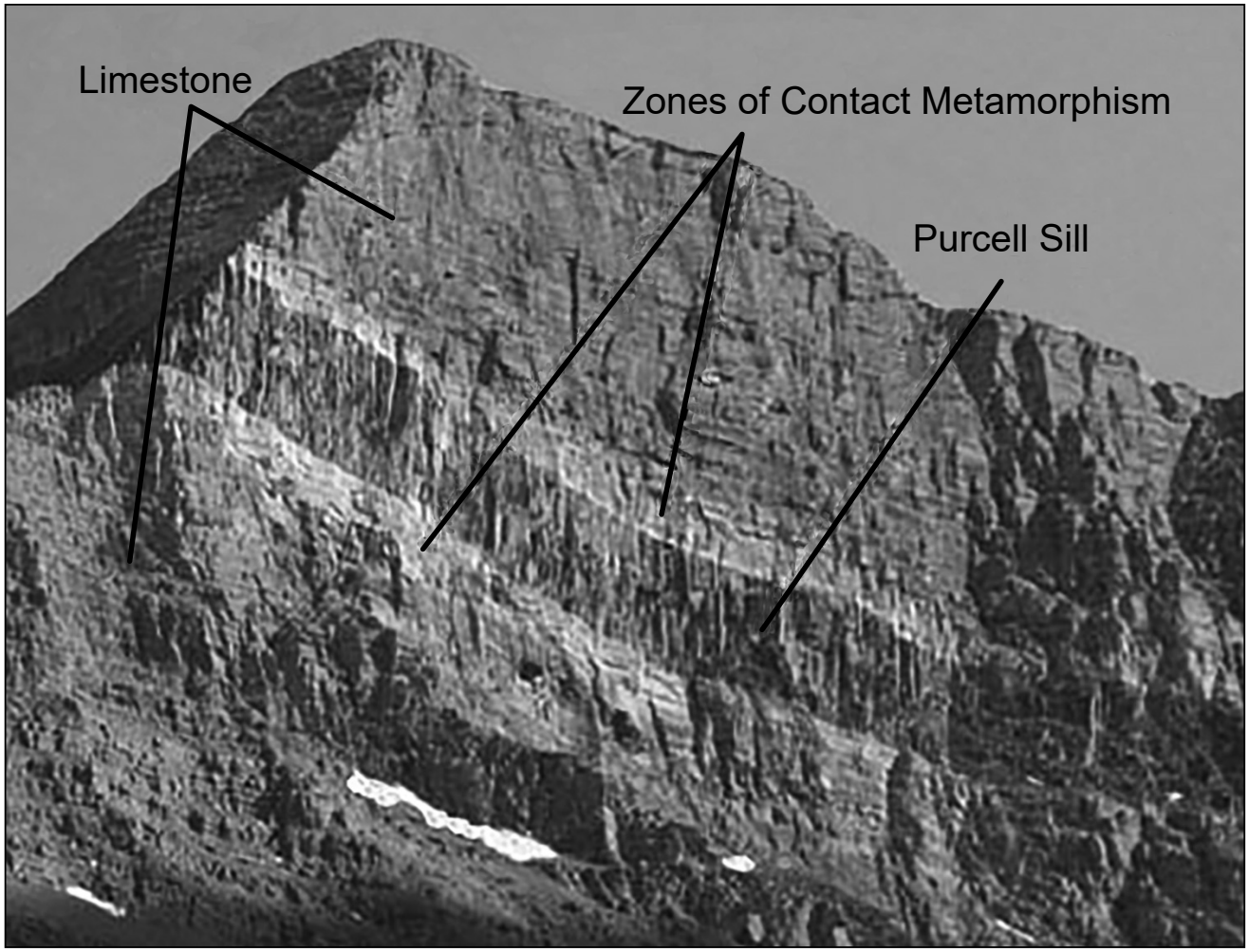
B 200 Million Years Ago



A 251 Million Years Ago



Base your answers to questions 45 through 47 on the photograph below and on your knowledge of Earth science. The photograph shows the Purcell Sill, located in Glacier National Park in Montana. The Purcell Sill is composed of the igneous rock diorite and cuts through Precambrian-age limestone bedrock. Zones of contact metamorphism are indicated.



Source: https://gotbooks.miracosta.edu/earth_science/chapter11.html

45 The rock that formed in the zones of contact metamorphism in the limestone is

(1) quartzite
(2) marble
(3) schist
(4) gneiss

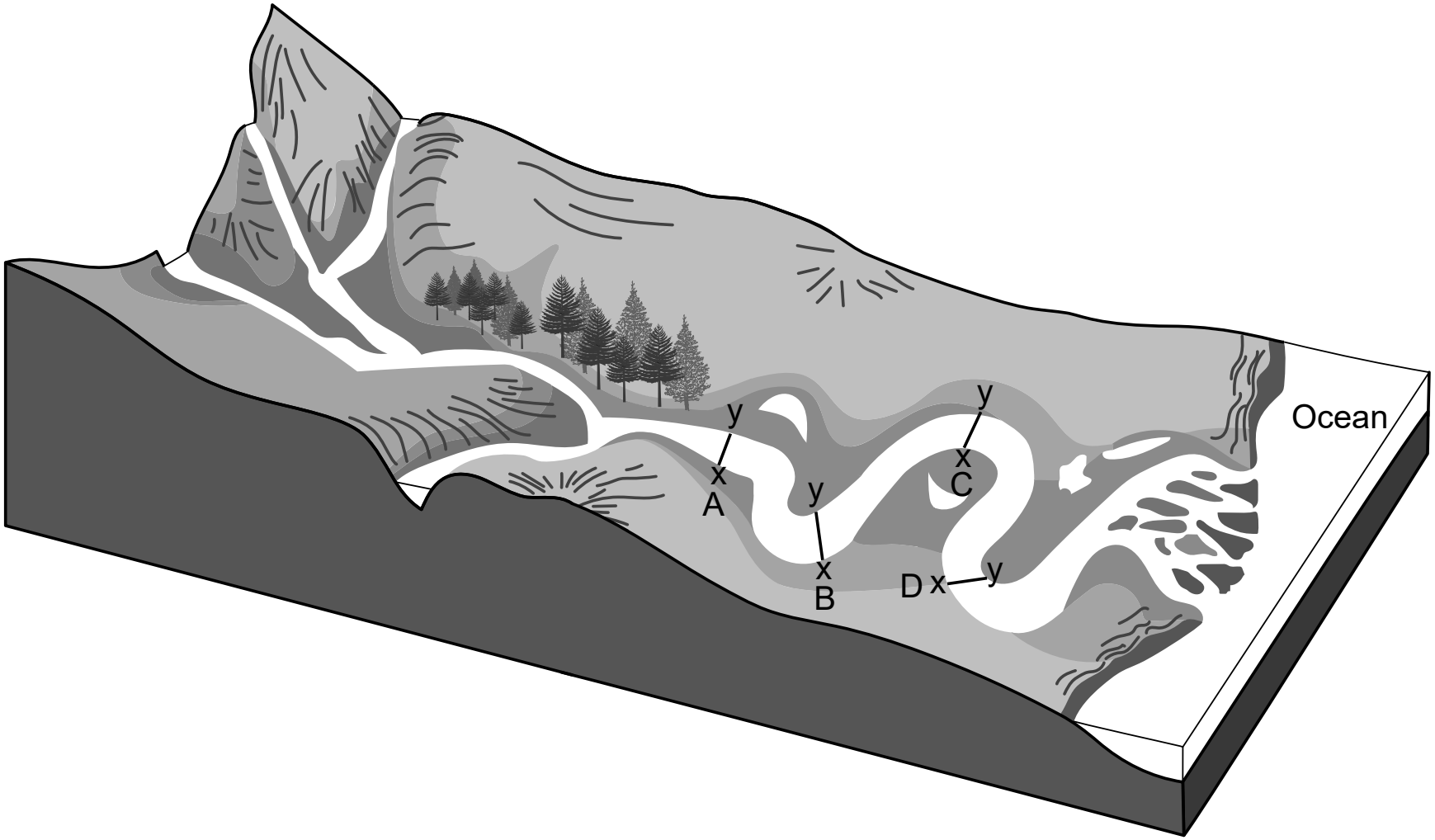
46 Which minerals are most likely found together in a sample of diorite taken from Purcell Sill?

(1) quartz, plagioclase feldspar, and pyroxene
(2) plagioclase feldspar, pyroxene, and olivine
(3) plagioclase feldspar, biotite, and amphibole
(4) potassium feldspar, quartz, and biotite

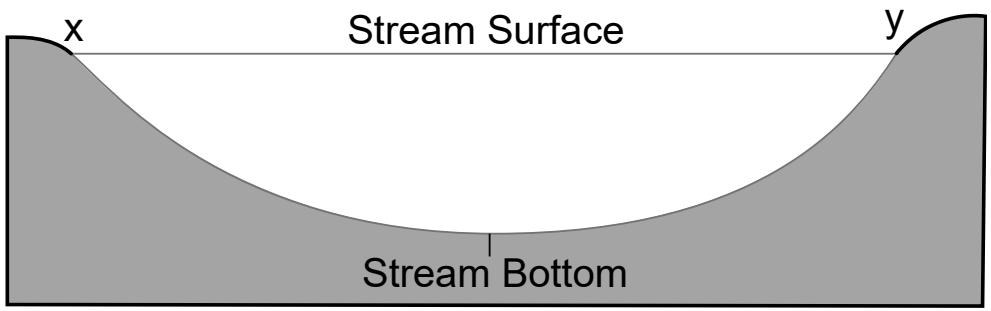
47 The texture of the diorite found in the sill is best described as

(1) fine-grained and non-vesicular
(2) coarse-grained and non-vesicular
(3) fine-grained and vesicular
(4) glassy and vesicular

Base your answers to questions 48 through 50 on the map below and on your knowledge of Earth science. The map shows a meandering stream entering the ocean. Four locations, labeled *A*, *B*, *C*, and *D*, are indicated on the map. Each location has a cross-section line labeled *x*-*y*.



48 The cross section below represents the shape of the stream channel between x and y at one location along the stream.



Which location is best represented by this cross section?

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

49 The velocity at a certain location in this stream was measured to be 100 centimeters per second. What size sediment particles will be transported at this location?

(1) clay, only
(2) pebbles, only
(3) clay, silt, and some sand, only
(4) clay, silt, sand, and some pebbles, only

50 What is the name of the depositional feature located at the end of the stream where it enters the ocean?

(1) floodplain
(2) watershed
(3) tributary
(4) delta

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.

Evolution of Stars

A star forms from a huge dust and gas cloud called a nebula. Gravitational forces cause the cloud to contract. As matter in the cloud draws closer together, temperature and pressure increase, causing hydrogen to combine, forming helium in a nuclear process. The energy released by this process is eventually radiated into space in the form of electromagnetic energy, some of which can be seen by humans. A star about the size of our Sun takes about 10 billion years to go through its life cycle. It begins with the formation of a main sequence star, and then goes through a giant star stage. Finally, in its late stage of existence, it becomes a white dwarf. Stars much more massive than our Sun undergo explosions called supernovas.

51 Identify the nuclear process that produces energy in stars. [1]

52 Identify *one* star that was formerly a Sun-sized star, but is now in its late stage of existence. [1]

53 Barnard's Star and Betelgeuse are stars having similar color and surface temperature. Explain why Betelgeuse will most likely undergo a supernova but Barnard's Star will not. [1]

Base your answers to questions 54 through 56 on the passage below and on your knowledge of Earth science. The passage describes the formation of the Albany Pine Bush.

The Albany Pine Bush

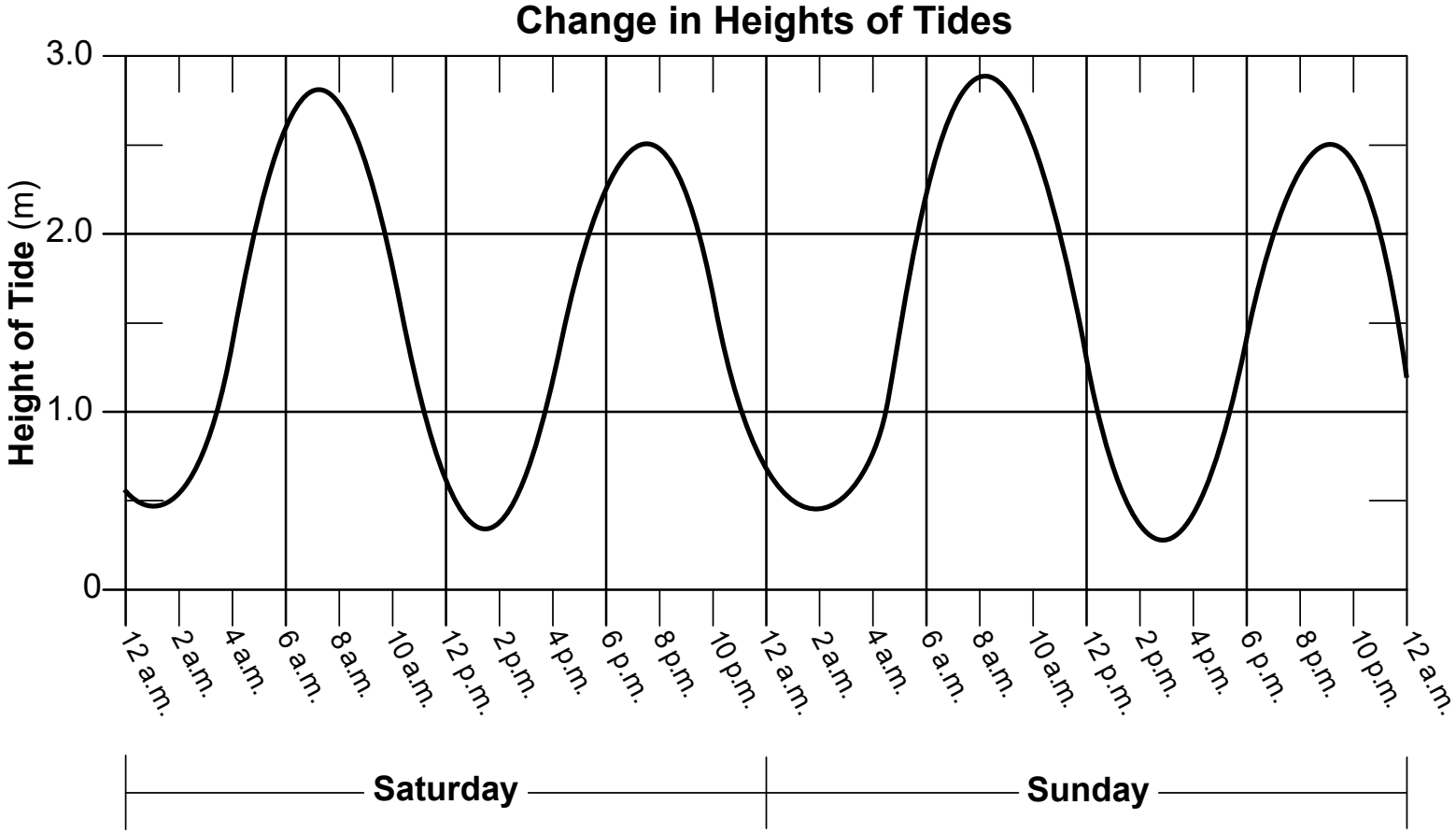
Approximately 6,000 acres near Albany, New York, is known as the Albany Pine Bush. Its history began about 15,000 years ago, when a one-mile-thick glacier melted at the end of the last ice age, forming a giant lake that was over 190 miles long. Scientists call this lake Glacial Lake Albany. The lake eventually drained and the sandy deposits on the lake floor were blown into sand dunes. The sandy dunes were gradually covered by plants.

54 Identify the geologic period when Glacial Lake Albany was first formed. [1]

55 Identify the entire range of sand sizes covering the lake floor when Glacial Lake Albany drained. [1]

56 Identify the agent of erosion that formed the sand dunes from the sediments left on the lake floor after Glacial Lake Albany drained. [1]

Base your answers to questions 57 through 59 on the graph below and on your knowledge of Earth science. The graph shows the change in the heights of tides at a coastal location for two days.



57 Determine the height of the tide at 5 p.m. on Saturday. [1]

58 Predict the time of the next high tide on Monday. Include a.m. or p.m. in your answer. [1]

59 Identify the force that causes tides. [1]

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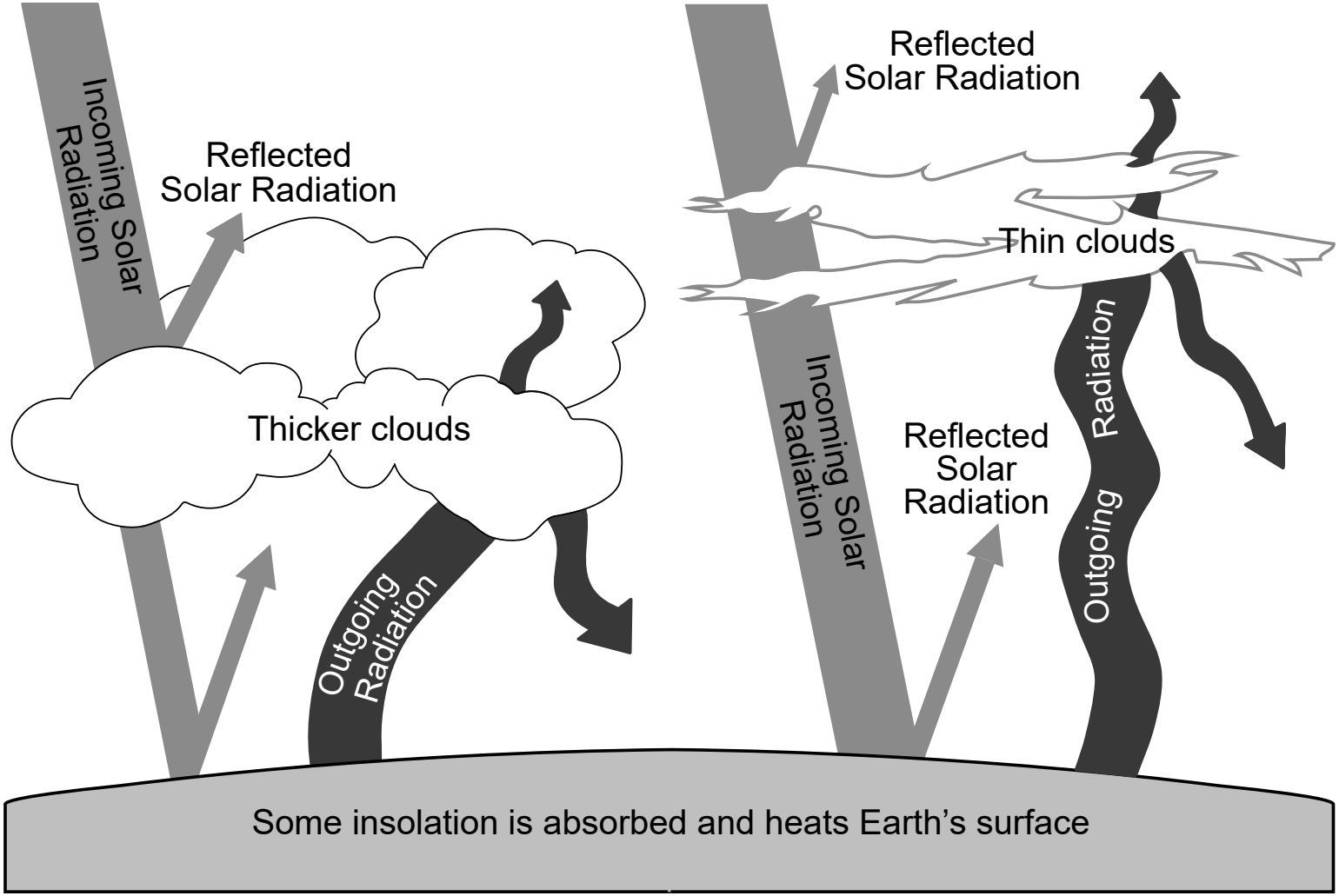
Base your answers to questions 60 and 61 on the diagram below and on your knowledge of Earth science. The diagram represents the effect that cloud thickness has on incoming solar radiation reaching Earth and outgoing radiation. Thickness of arrows represents relative amount of radiation.



60 Describe how the thickness of cloud cover at a particular location affects the relative amount of solar radiation reaching Earth's surface. [1]

61 State the name of the temperature zone of Earth's atmosphere where most clouds form. [1]

Base your answers to questions 62 through 65 on the diagram in your answer booklet and on your knowledge of Earth science. The diagram represents a view of Earth as seen from space on the first day of a certain season. Some latitudes have been labeled.

62 On the diagram in *your answer booklet*, shade the portion of Earth that represents nighttime. [1]

63 Identify the season that is beginning in the northern hemisphere when Earth is in this position. [1]

64 State the number of daylight hours that an observer at the equator would experience on this day. [1]

65 Compared to current summer and winter temperatures in New York State, describe how New York State's summer and winter temperatures would change if Earth's rotational axis were tilted at 33.5° instead of 23.5°. [1]

Part C

Answer all questions in this part.

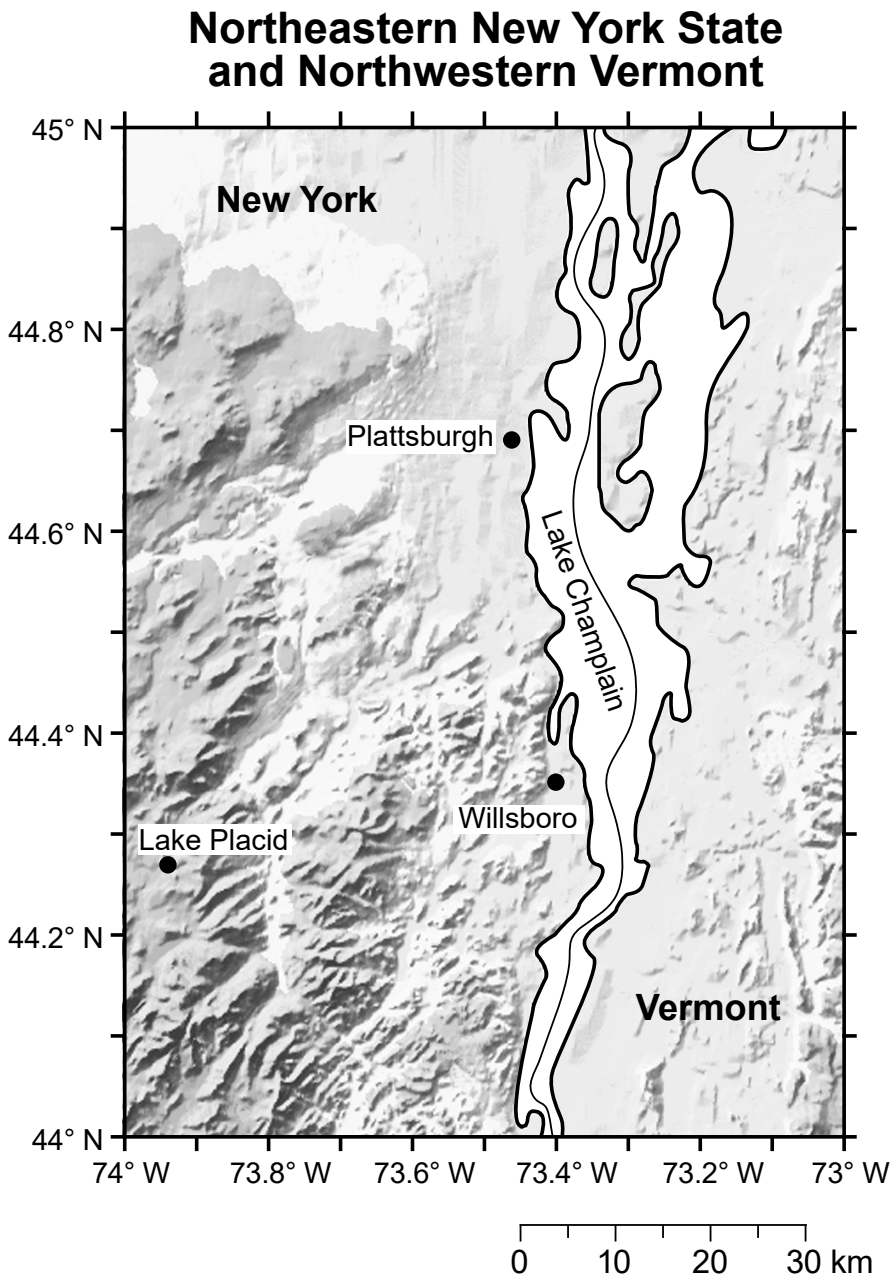
Directions (66–85): Record your answers in the spaces provided in your answer booklet. Some questions may require the use of the *2011 Edition Reference Tables for Physical Setting/Earth Science*.

Base your answers to questions 66 through 68 on the passage below, the map on the next page, and on your knowledge of Earth science. The map shows a portion of northeastern New York State and northwestern Vermont.

Wollastonite — A Versatile Industrial Mineral

Wollastonite is a mineral composed of calcium, silicon, and oxygen ($CaSiO_3$). The formation of wollastonite can occur when a large area of silica-rich rock and limestone is deeply buried and recrystallized at temperatures from 400°C to 450°C.

The Lewis Deposit, located in Willsboro, New York, contains approximately 60% wollastonite. Since the early 1980s wollastonite has been used as a replacement for asbestos in products such as insulating boards and panels, roofing tiles, and brakes. Wollastonite is also used in ceramic glaze mixes.



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66 Identify the process that recrystallizes silica-rich rock and limestone into wollastonite using heat and pressure. [1]

67 Identify *one* mineral, other than wollastonite, that is used in ceramics. [1]

68 Identify the New York State landscape region in which Plattsburgh, New York, is located. [1]

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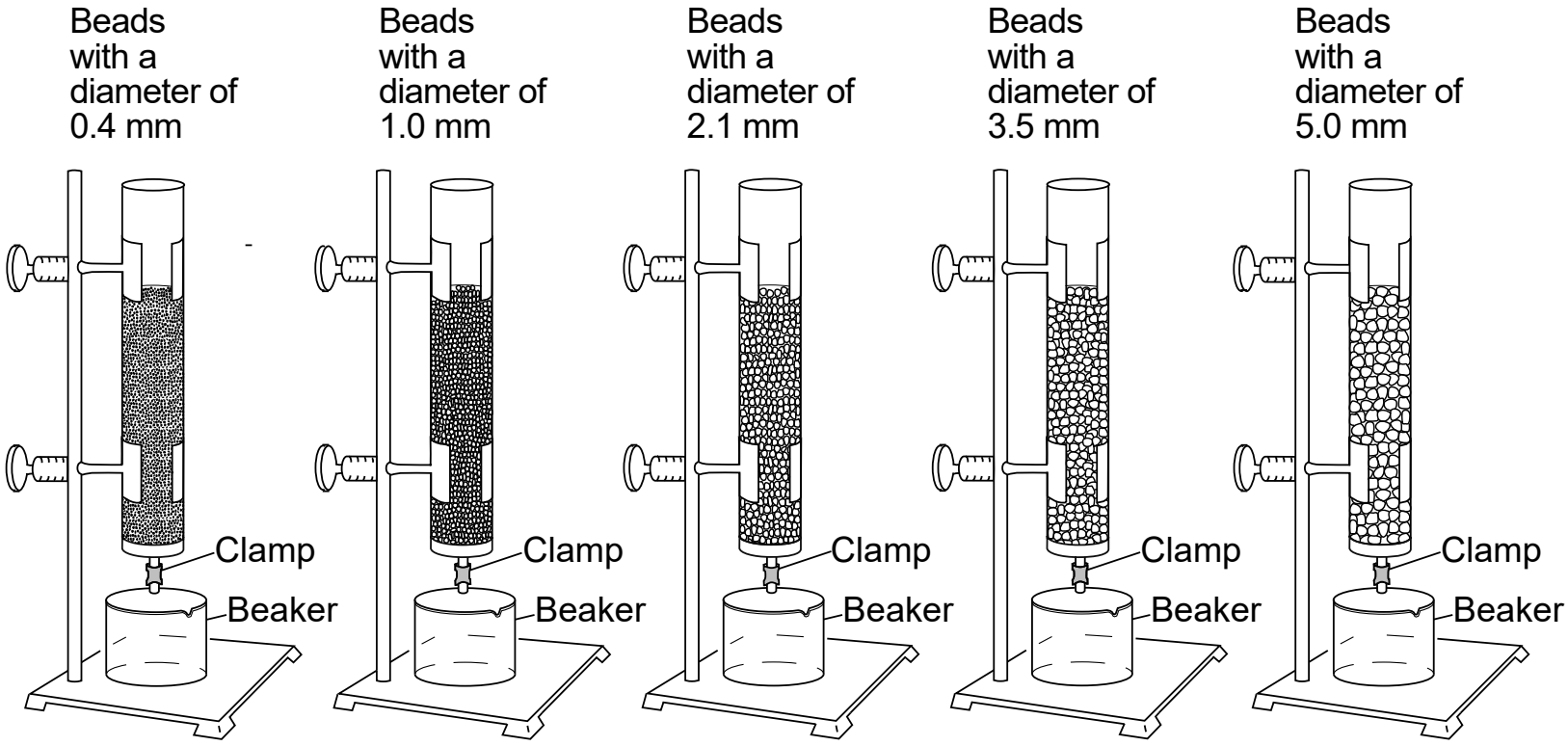
Base your answers to questions 69 and 70 on the diagram below, the table on the next page, and on your knowledge of Earth science. The diagram represents the laboratory materials used for investigations of how bead diameter affects infiltration, porosity, and water retention. Each column was filled to the same level with uniform-sized, dry, spherical beads. Water was added to fill each column to the top of the beads. The clamps were then opened toallow the water to drain into the beakers beneath each column. The time it took the water to drain and the amount of water left in each column was calculated. The table shows the results of the investigation.



(Not drawn to scale)

Effects of Bead Diameter

Bead Diameter (mm)	Infiltration Rate (mm/s)	Porosity (%)	Retention (ml)
0.4	18	40	22
1.0	25	40	16
2.1	31	40	11
3.5	34	40	9
5.0	36	40	5

69 On the grid in *your answer booklet*, construct a line graph by plotting the infiltration rates for the *five* bead diameters listed in the table. Connect the five plots with a line. [1]

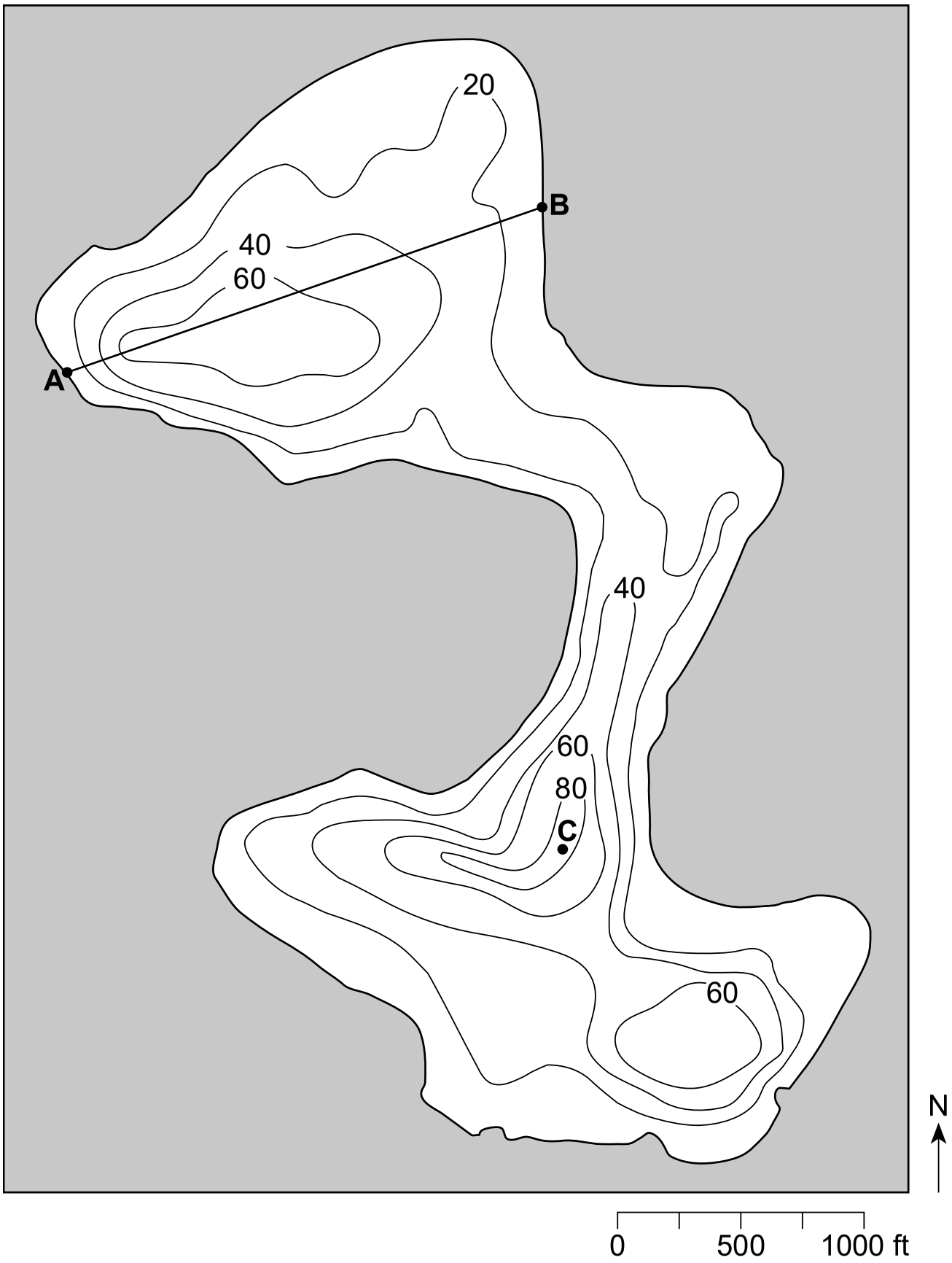
70 State the relationship between increasing bead size and the amount of water retention in the column. [1]

Base your answers to questions 71 and 72 on the bathymetric map on the next page and on your knowledge of Earth science. The map shows the depth of White Lake located in Sullivan County, New York. Isoline values indicate water depth in feet. The surface of White Lake is 1323 feet above sea level. Points *A* and *B* represent locations on the shoreline of White Lake. Point *C* represents a location on the bottom of the lake.

71 On the grid in *your answer booklet*, construct a profile of the depth of White Lake from point *A* to point *B*. Plot each point where an isoline showing depth is crossed by line *AB*. Points *A* and *B* have been plotted on the graph. Connect the plots with a line, starting at *A* and ending at *B*, to complete the profile. [1]

72 State *one* possible water depth at point *C*. [1]

Map of White Lake, New York



Base your answers to questions 73 through 75 on the data table below and on your knowledge of Earth science. The data table lists the distance from Earth to the Moon and the percentage of the lighted portion of the Moon visible from Earth each day for a 9-day period.

Day	**Approximate Earth-Moon Distance** (km)	**Lighted portion of Moon Visible** (%)
1	393,300	84
2	397,600	76
3	400,900	67
4	403,200	58
5	404,300	49
6	404,000	39
7	402,500	30
8	399,800	22
9	396,300	14

73 On the diagram in *your answer booklet*, place an **X** on the Moon's orbit to show the approximate position of the Moon on day 5. [1]

74 State the number of days (d) it takes the Moon to complete one cycle of phases from one full moon to the next full moon. [1]

75 Explain how the data provide evidence that the Moon has an elliptical orbit around Earth. [1]

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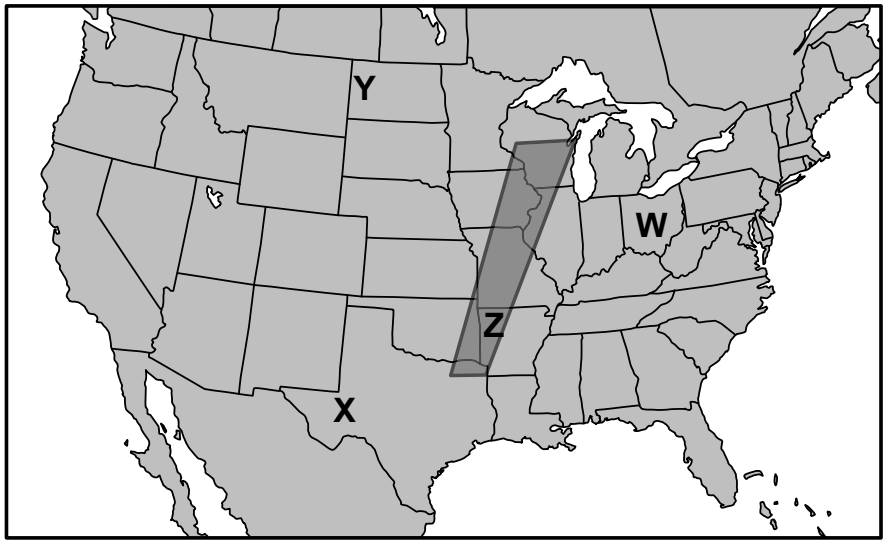
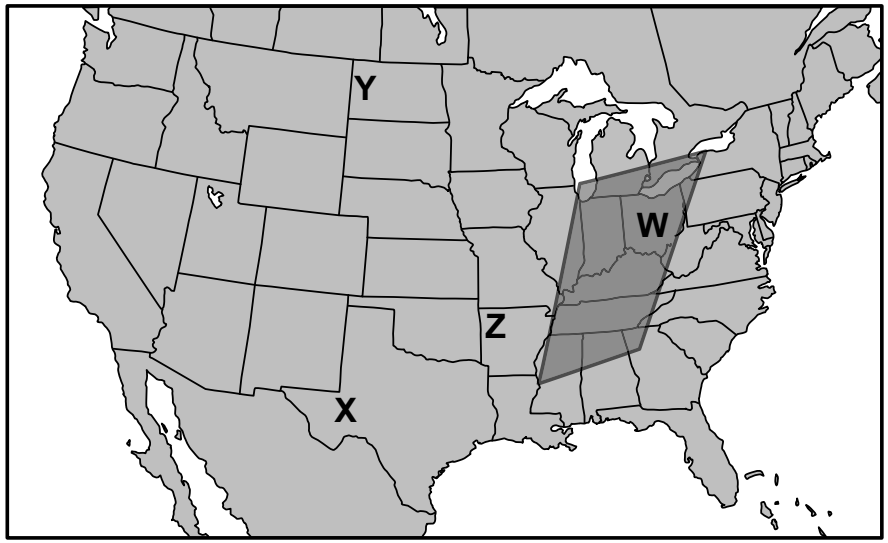
Base your answers to questions 76 through 79 on the Surface Air Temperature map in your answer booklet, the two Extreme Storms and Winds maps below, and on your knowledge of Earth science. The Surface Air Temperature map shows the surface air temperatures, recorded in degrees Fahrenheit (°F), across the United States at 6 p.m. on October 25, 2010. The 40°F isotherm is drawn. The shaded portions on the two Extreme Storms and Winds maps show the areas where extreme storms and winds (including tornadoes) were forecasted on October 25, 2010 and October 26, 2010. Letters *W*, *X*, *Y*, and *Z* represent the same surface locations on all maps.

Extreme Storms and Winds
October 25, 2010



Extreme Storms and Winds
October 26, 2010



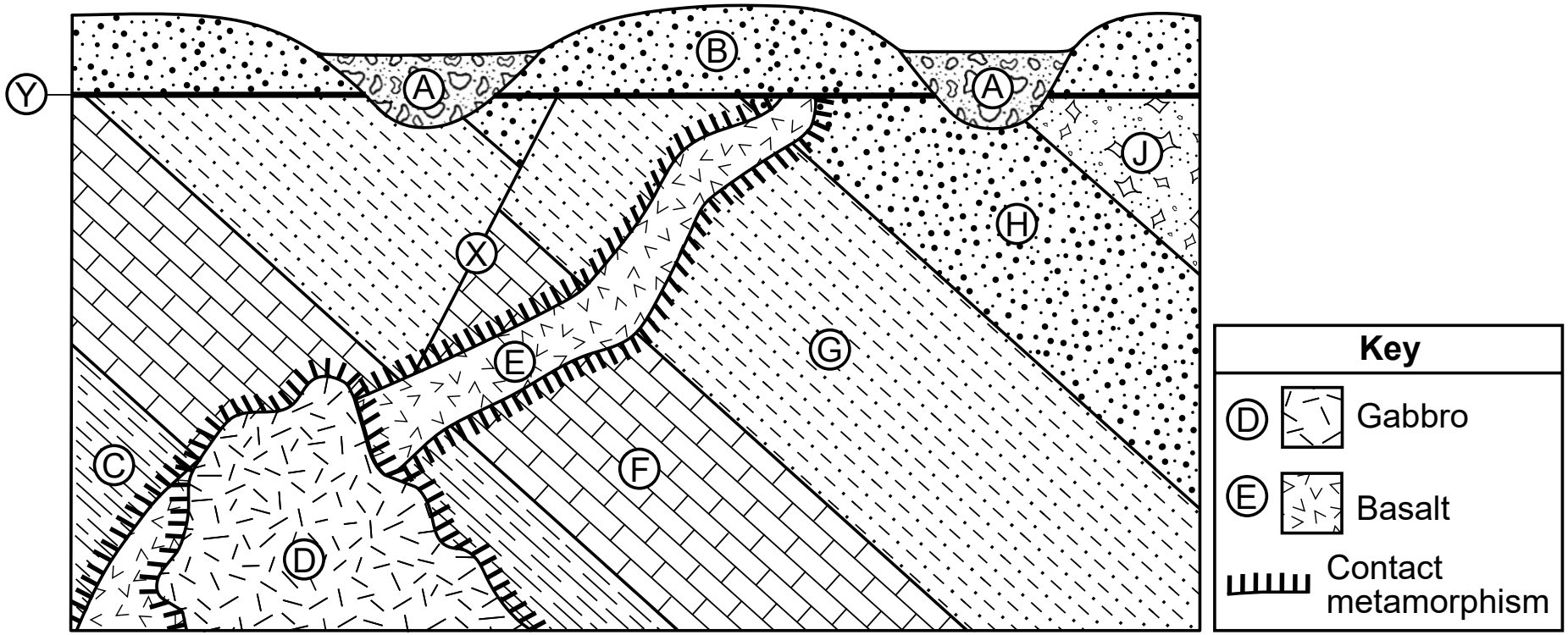
76 On the map in *your answer booklet*, draw the 70°F isotherm. Extend the line to the edges of the United States. [1]

77 The lowest temperatures on the Surface Air Temperature map are inside the 40°F isotherm. This region is part of the Rocky Mountains. Identify the climate factor that accounts for the low surface air temperatures in this mountain region. [1]

78 Identify the evidence on the October 25 Extreme Storms and Winds map that indicates location Z has a dewpoint that is close to the air temperature. [1]

79 Other than stocking up on food and water, describe *two* emergency actions that should be taken in order to prevent loss of life and property in the regions where damaging storms and possible tornadoes were forecast on October 25 and 26. [1]

Base your answers to questions 80 through 82 on the cross section below and on your knowledge of Earth science. Letters *A* through *J* represent different rock units. Letter *X* represents a fault line, and letter *Y* represents an unconformity. The rock units have not been overturned.



80 Describe *one* piece of evidence shown in the diagram that leads to the inference that crustal movement occurred in this region. [1]

81 Place the letters of the following rock units and the fault in order from oldest to youngest. [1]

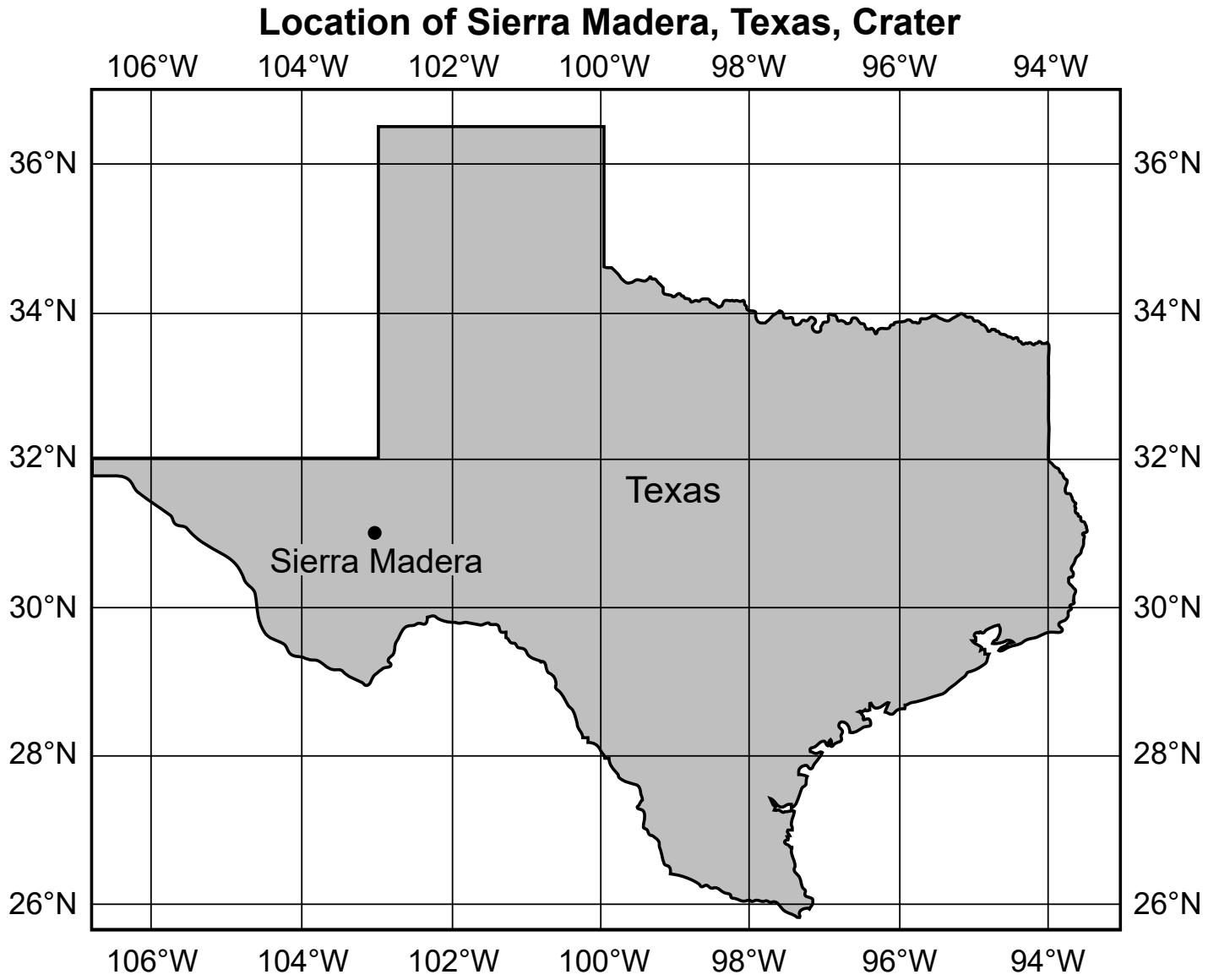
C
D
E
Fault *X*

82 Rock unit *G* formed during the late Cambrian period, and Rock unit *J* formed during the early Ordovician period. Identify the name of *one* New York State index fossil that could possibly be found in Rock unit *H*. [1]

_____

Base your answers to questions 83 through 85 on the data table below, the map on the next page, and on your knowledge of Earth science. The data table shows the location, diameter, and age of some impact craters on Earth. The latitude and longitude of the Sierra Madera, Texas, crater has been left blank. The location of the Sierra Madera crater is indicated on the map of Texas.

Crater	**Latitude**	**Longitude**	**Diameter** (km)	**Age** (yrs.)
Meteor Crater	35° N	111° W	1.2	50,000
Chicxulub	23° N	90° W	180	65.5 million
Sierra Madera			13	100 million
Red Wing Creek	48° N	104° W	9	200 million
Wells Creek	36° N	88° W	14	200 million
Clearwater Lakes	56° N	74° W	22	290 million
Pilot Lake	60° N	111° W	6	440 million



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83 Determine the latitude and longitude, to the nearest whole degree, of the Sierra Madera crater. Include units and compass directions in your answer. [1]

84 State the name of the crater that has a diameter approximately equal to the straight line distance, in kilometers, between Ithaca, New York and Slide Mountain, New York. [1]

85 Identify *one* type of solar system object that could have impacted Earth's surface to create any of these craters. [1]

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