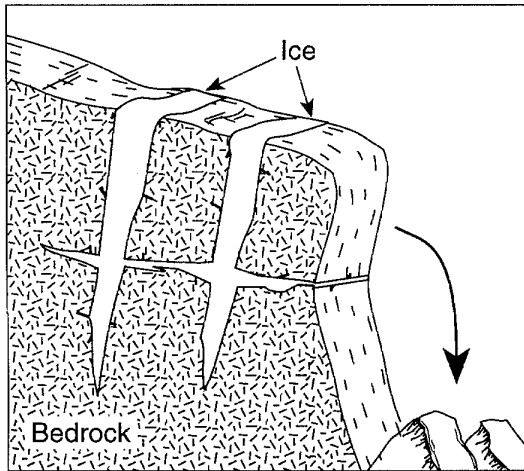


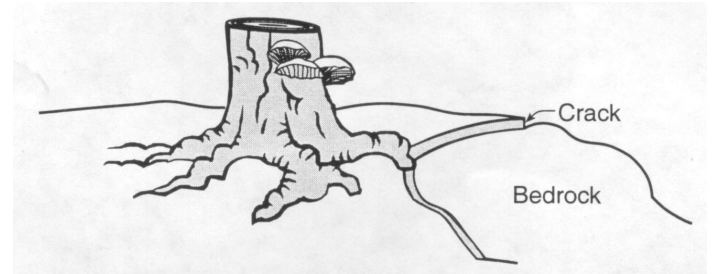
1. The diagram below shows a process called frost wedging.



Frost wedging is an example of

- A) **physical weathering**
 - B) chemical weathering
 - C) metamorphism
 - D) deposition
2. Which property of water makes frost action a common and effective form of weathering?
- A) Water dissolves many earth materials.
 - B) **Water expands when it freezes.**
 - C) Water cools the surroundings when it evaporates.
 - D) Water loses 334 Joules of heat per gram when it freezes.
3. Which type of climate has the greatest amount of rock weathering caused by frost action?
- A) a wet climate in which temperatures remain below freezing
 - B) **a wet climate in which temperatures alternate from below freezing to above freezing**
 - C) a dry climate in which temperatures remain below freezing
 - D) a dry climate in which temperatures alternate from below freezing to above freezing

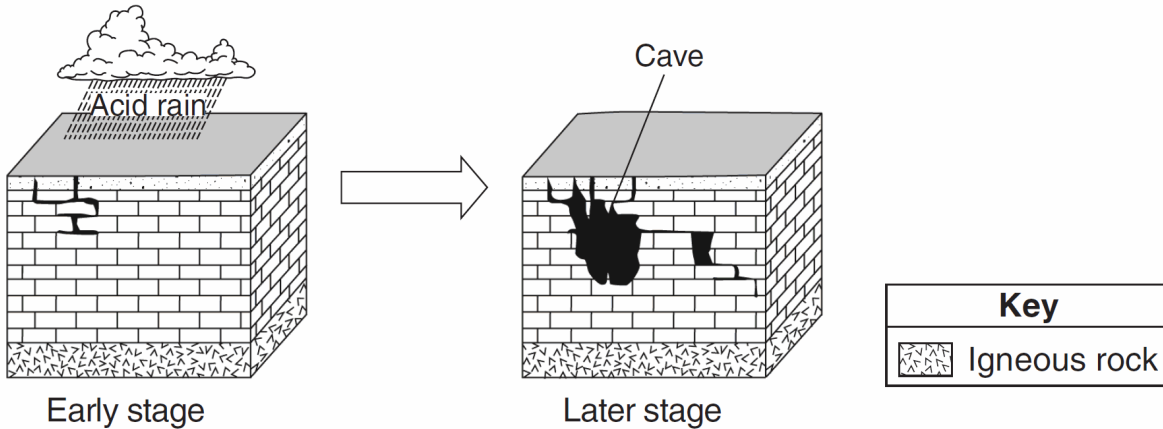
4. The diagram below shows the stump of a tree whose root grew into a small crack in bedrock and split the rock apart.



The action of the root splitting the bedrock is an example of

- A) chemical weathering
- B) deposition
- C) erosion
- D) **physical weathering**

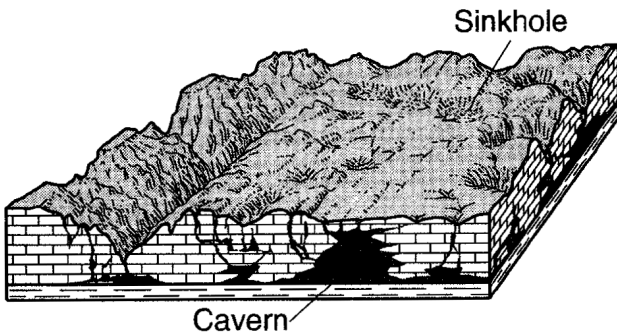
5. The two block diagrams below represent the formation of caves.



Which types of weathering and erosion are primarily responsible for the formation of caves?

- A) **chemical weathering and groundwater flow**
- B) chemical weathering and runoff
- C) physical weathering and groundwater flow
- D) physical weathering and runoff

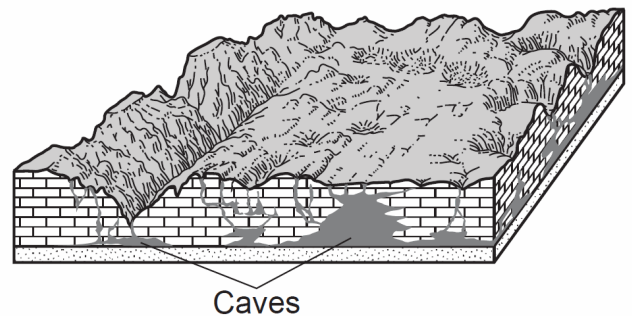
6. The block diagram below represents a landscape where caverns and sinkholes have gradually developed over a long period of time.



Why did these caverns and sinkholes form?

- A) **The bedrock chemically reacted with acidic groundwater.**
- B) This type of bedrock contained large amounts of oxygen and silicon.
- C) Glacial deposits altered the shape of the bedrock.
- D) Crustal uplift formed gaps in the bedrock.

7. The block diagram below represents caves that developed in a region over time.



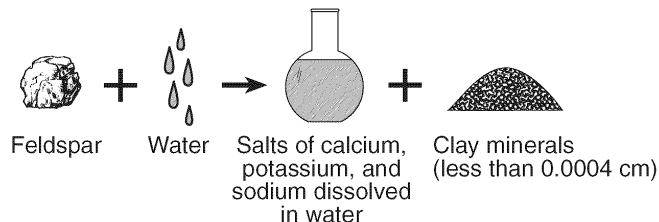
Which type of weathering was primarily responsible for the development of these caves?

- A) physical weathering of sandstone
 - B) physical weathering of limestone
 - C) chemical weathering of sandstone
 - D) **chemical weathering of limestone**
8. Which rock weathers most rapidly when exposed to acid rain?
- A) quartzite
 - B) granite
 - C) basalt
 - D) **limestone**

9. Landscapes will undergo the most chemical weathering if the climate is

- A) cool and dry
- B) cool and wet
- C) warm and dry
- D) warm and wet**

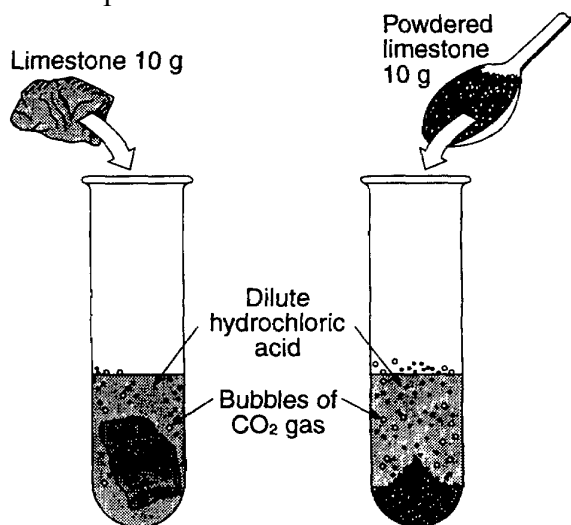
10. The diagram below represents a naturally occurring geologic process.



Which process is best illustrated by the diagram?

- A) physical weathering
- B) erosion
- C) metamorphism
- D) chemical weathering**

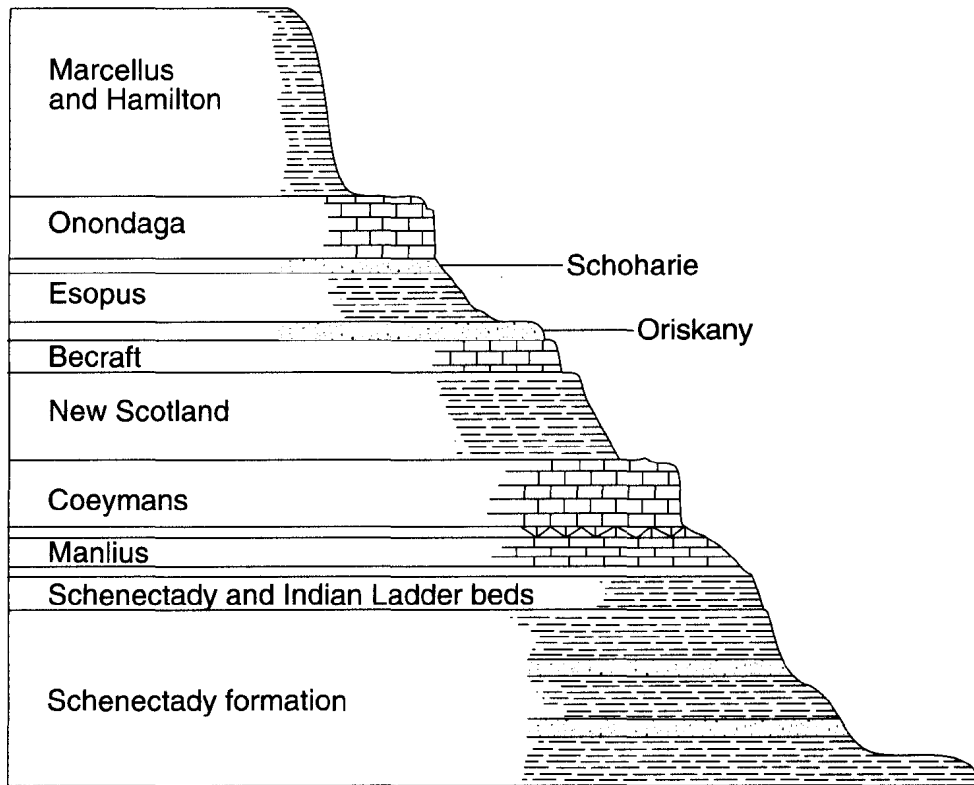
11. The demonstration shown in the diagram below indicates that powdered limestone reacts faster than a single large piece of limestone of equal mass when both are placed in acid.



The most likely reason powdered limestone reacts faster is that it has

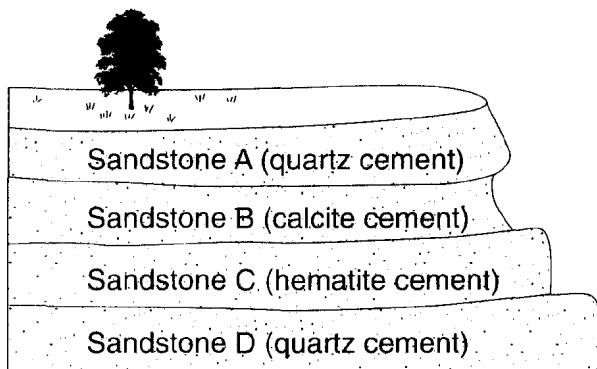
- A) less total volume
- B) more chemical bonds
- C) more total surface area**
- D) lower density

12. Base your answer to the following question on the cross section below, which shows the bedrock of a portion of the Helderberg Escarpment, located in Thacher State Park near Albany, New York. The rock formations are identified by name.



What is the main factor that causes the bedrock to weather at different rates?

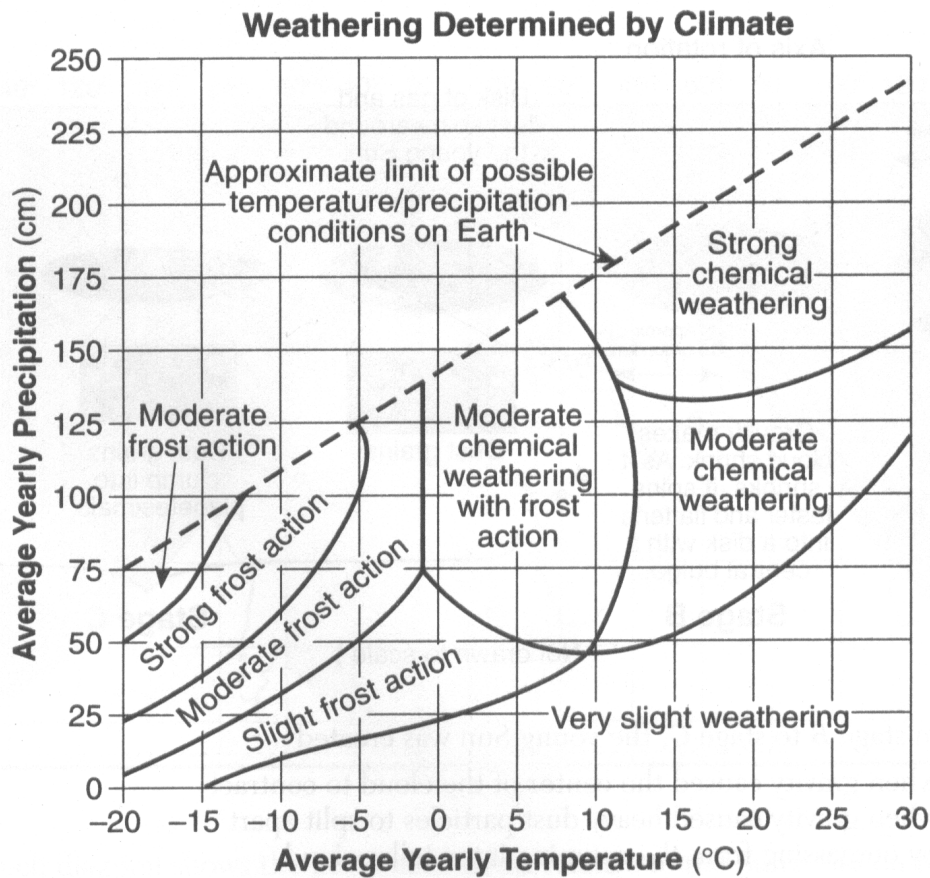
- A) elevation above sea level
B) **mineral composition**
C) age of rock layers
D) environment of formation
13. The diagram below shows an outcrop of different layers of sandstone in a region receiving heavy rainfall.



Which sandstone layer appears to be the *least* resistant to weathering?

- A) *A* **B) *B*** C) *C* D) *D*

14. Base your answer to the following question on the graph below, which shows the effect that average yearly precipitation and temperature have on the type of weathering that will occur in a particular region.



The amount of chemical weathering will increase if

- A) air temperature decreases and precipitation decreases
 - B) air temperature decreases and precipitation increases
 - C) air temperature increases and precipitation decreases
 - D) air temperature increases and precipitation increases**
-
15. In the diagram below, sample *X* and sample *Y* represent equal masses of earth material which are weathering under the same conditions. The samples have the same mineral composition.



Sample *X*

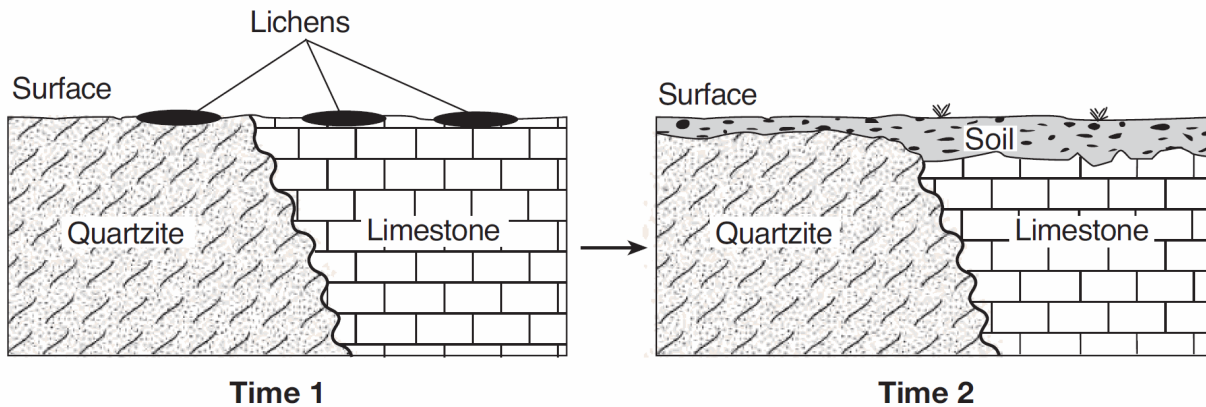


Sample *Y*

The weathering rate for sample *Y* will most likely be

- A) less than *X*
- B) greater than *X***
- C) the same as *X*

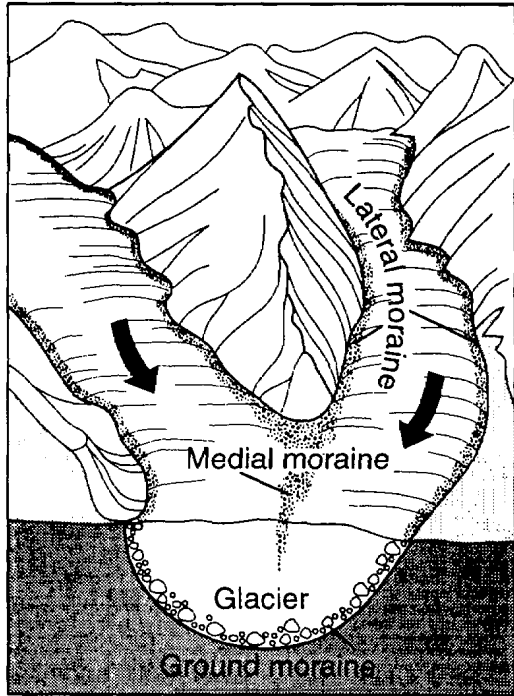
16. Lichens are usually the first organisms that appear in barren, rocky areas. They use rootlike structures to split bedrock into small fragments. Lichens also secrete acidic solutions that help break down rock. The cross sections below represent an area when lichens first appeared (time 1) and that same area hundreds of years later, after it was changed by lichens and exposed to air and water (time 2).



The soil shown in time 2 was formed mainly by

- A) compaction and cementing
 - B) weathering and biological activity**
 - C) faulting and tilting of rock strata
 - D) mass movement and deposition of particles
17. Humus, which is formed by the decay of plant and animal matter, is important for the formation of most
- A) soils**
 - B) minerals
 - C) sediment
 - D) surface bedrock
18. Solid bedrock is changed to soil primarily by the process of
- A) erosion
 - B) weathering**
 - C) infiltration
 - D) transpiration
19. Which factors most directly control the development of soils?
- A) soil particle sizes and method of deposition
 - B) bedrock composition and climate characteristics**
 - C) direction of prevailing winds and storm tracks
 - D) earthquake intensity and volcanic activity
20. A landslide is an example of
- A) river deposition
 - B) glacial scouring
 - C) mass movement**
 - D) chemical weathering
21. Which quartz sample has probably undergone abrasion in a stream for the longest period of time?
- A)
 - B)
 - C)
 - D)

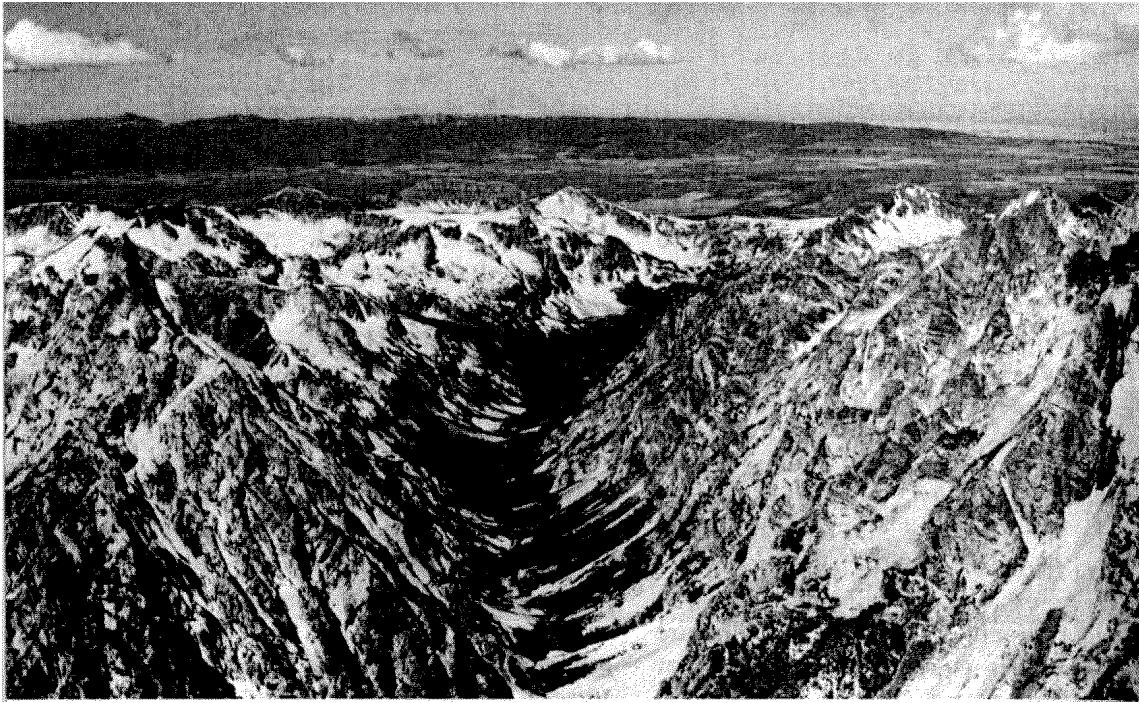
22. The diagram below shows rock material being transported by a mountain glacier.



The moraine deposits left when this glacier melts will generally be

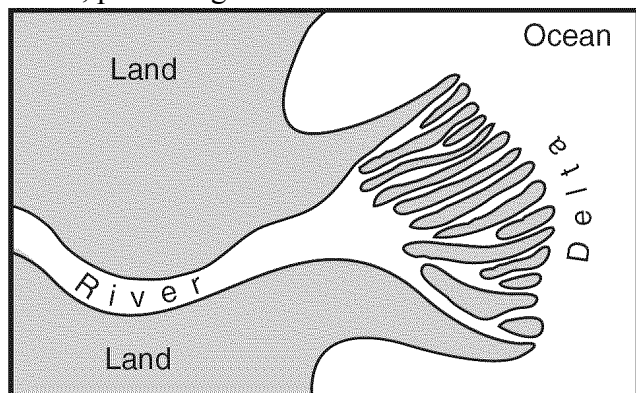
- A) sorted by size and layered
- B) sorted by size and unlayered
- C) unsorted by size and layered
- D) unsorted by size and unlayered**

-
23. Base your answer to the following question on the photograph below, which shows a mountainous region cut by a large valley in its center.

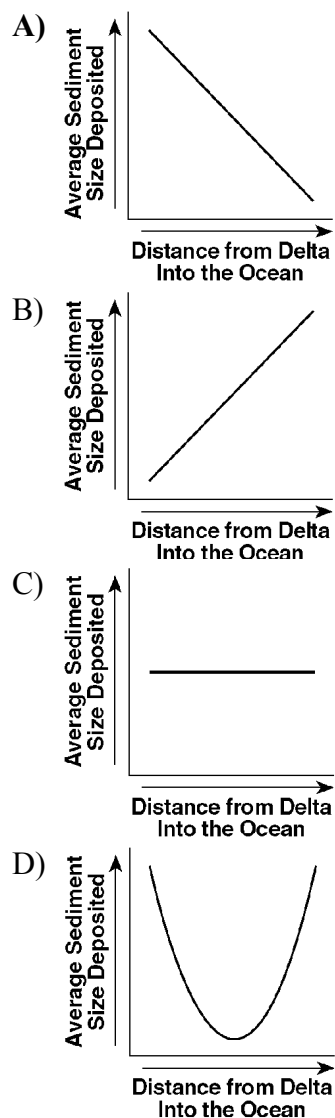


Describe additional geologic evidence that might be found on the valley floor that would support the idea that glacial ice formed this valley.

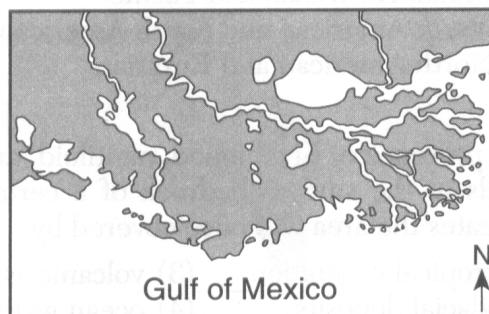
24. The map below shows a river emptying into an ocean, producing a delta.



Which graph best represents the relationship between the distance from the river delta into the ocean and the average size of sediments deposited on the ocean floor?



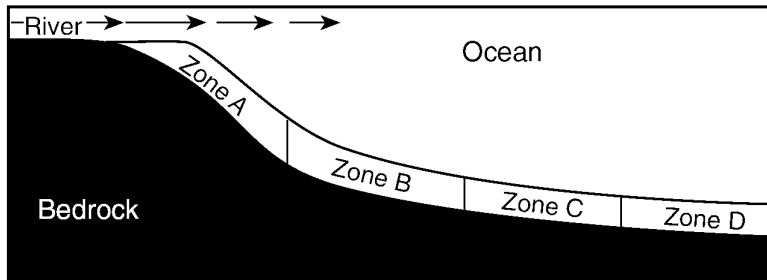
25. The map below shows the large delta that formed as the Mississippi River emptied into the Gulf of Mexico.



Which process was primarily responsible for the formation of the delta?

- A) glacial erosion
 B) cementation of sediment
C) deposition of sediment
 D) mass movement
26. Sediment is deposited in a river delta because the
- A) **velocity of the river decreases**
 B) force of gravity decreases
 C) volume of the river increases
 D) gradient of the river increases

27. Base your answer to the following question on the cross section and data table shown below. The cross section shows a sediment-laden river flowing into the ocean. The arrows show the direction of river flow. Different zones of sorted sediments, A, B, C, and D, have been labeled. Sediments have been taken from these zones and measured. The data table shows the range of sediment sizes in each zone.



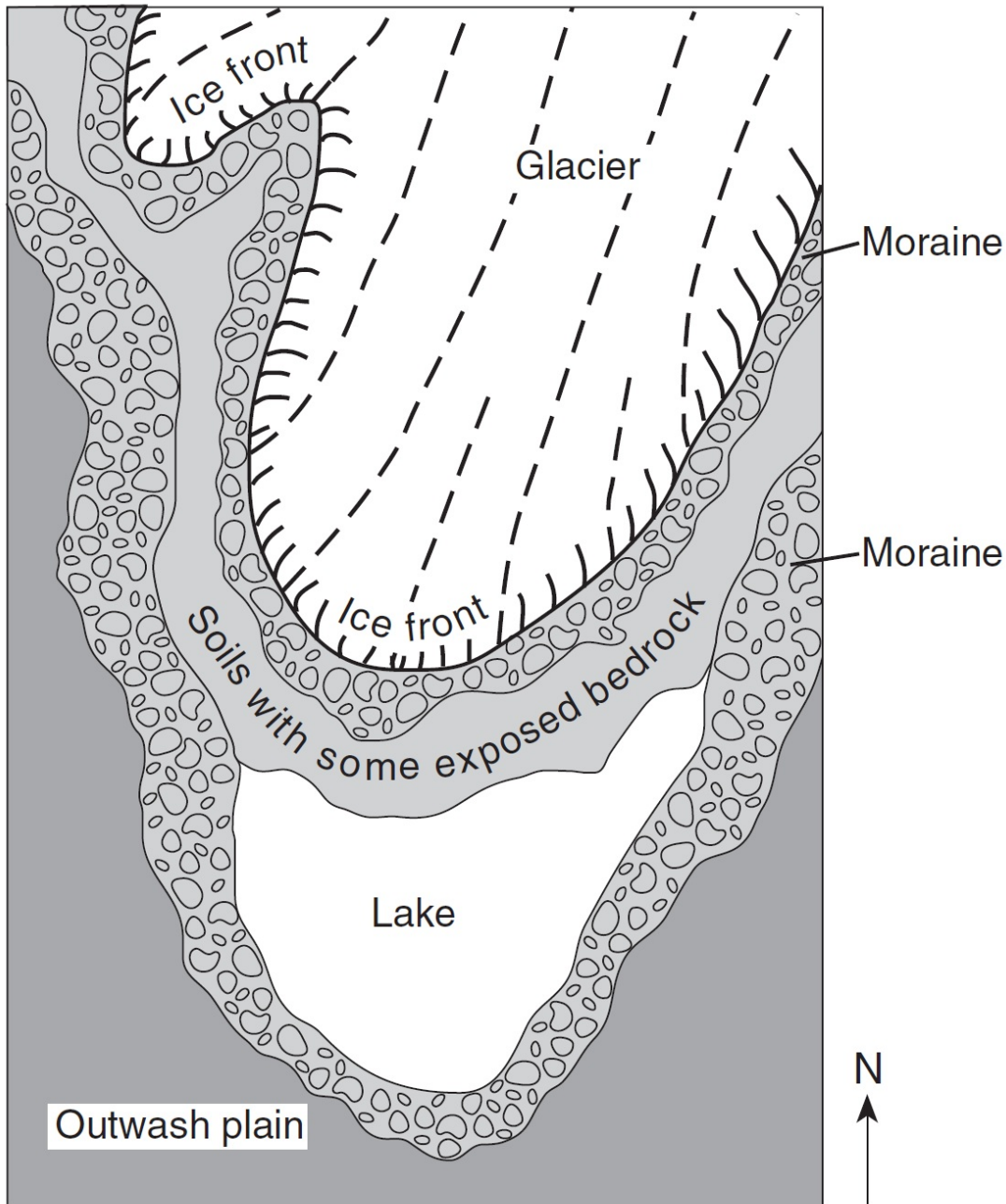
Data Table

Zone	Major Sediment Sizes
A	0.04 cm to 6 cm
B	0.006 cm to 0.1 cm
C	0.0004 cm to 0.006 cm
D	Less than 0.0004 cm

How is this pattern of horizontal sorting produced?

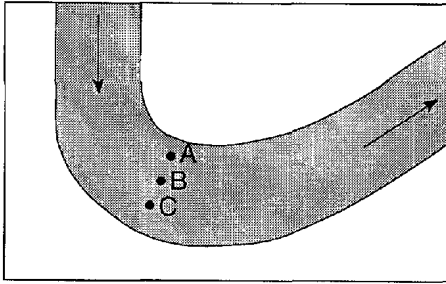
- A) High-density materials generally settle more slowly.
 - B) Rounded sediments generally settle more slowly.
 - C) Dissolved minerals are generally deposited first.
 - D) Bigger particles are generally deposited first.**
28. Which evidence best indicates that a landscape has been eroded primarily by streams?
- A) parallel sets of U-shaped valleys
 - B) sand dunes
 - C) thick residual soil
 - D) sorted layers of cobbles and sand**

29. Base your answer to the following question on the map below and on your knowledge of Earth science. The map shows a retreating valley glacier and the features that have formed because of the advance and retreat of the glacier.

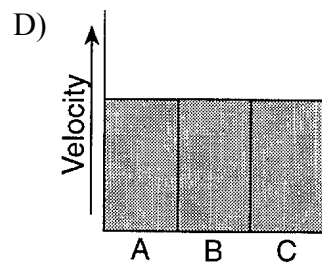
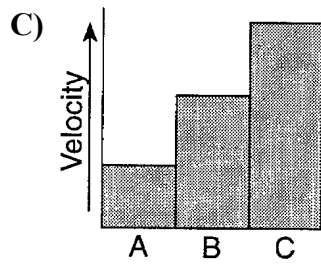
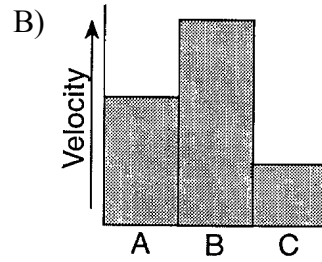
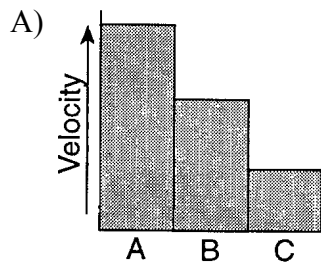


Describe *one* difference between the arrangement of sediment in the moraines and the arrangement of sediment in the outwash plain.

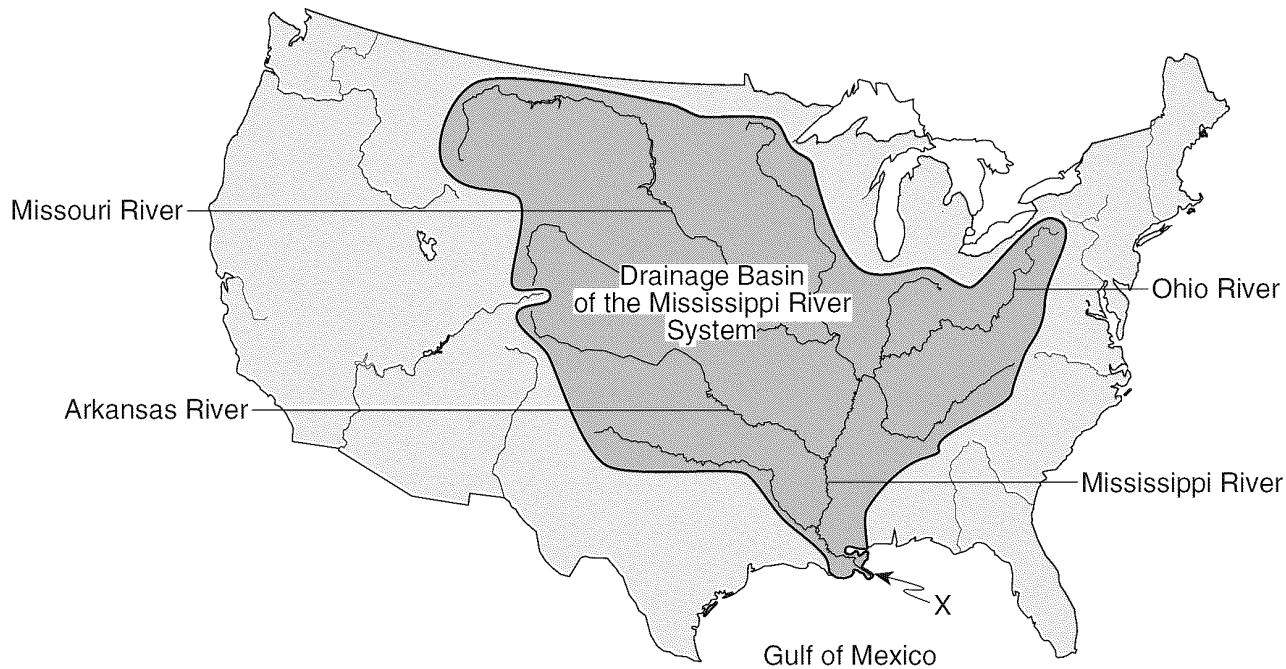
30. The map below represents a large stream meander (bend). The arrows show the direction of stream flow. Stream velocity was measured at surface locations *A*, *B*, and *C*.



Which graph best represents the relative velocities of the stream at locations *A*, *B*, and *C*?

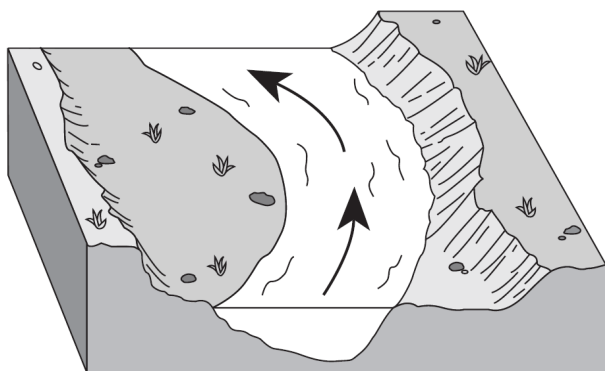


Base your answers to questions **31** and **32** on the map below, which shows the drainage basin of the Mississippi River system. Several rivers that flow into the Mississippi River are labeled. The arrow at location *X* shows where the Mississippi River enters the Gulf of Mexico.



31. The structure formed by the deposition of sediments at location *X* is best described as a
A) moraine B) tributary **C) delta** D) drumlin
32. The entire land area drained by the Mississippi River system is referred to as a
A) levee **B) watershed** C) meander belt D) floodplain

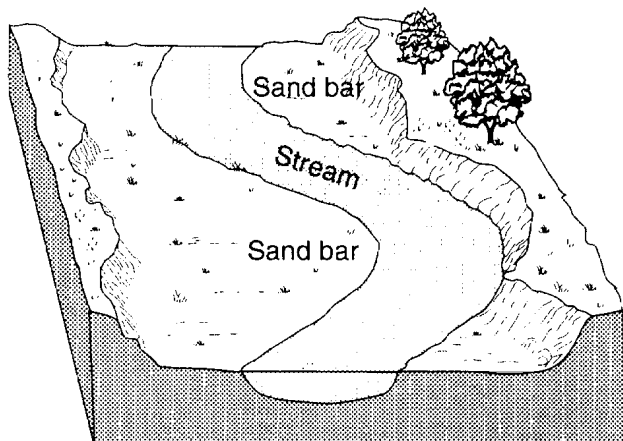
33. The diagram below shows a section of a meander in a stream. The arrows show the direction of stream flow.



The streambank on the outside of this meander is steeper than the streambank on the inside of this meander because the water on the outside of this meander is moving

- A) slower, causing deposition
- B) faster, causing deposition
- C) slower, causing erosion
- D) faster, causing erosion**

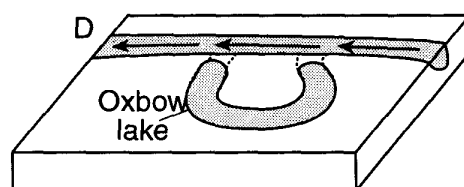
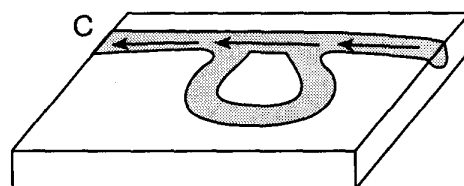
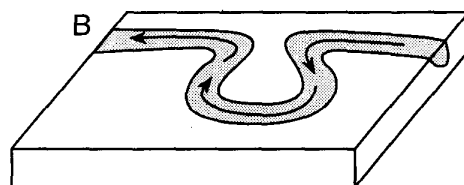
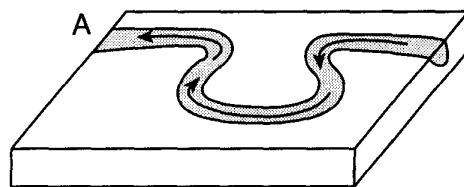
34. The diagram below shows a portion of a stream.



The sand bars formed as a direct result of

- A) erosion due to a decrease in stream velocity
- B) erosion due to an increase in stream velocity
- C) deposition due to a decrease in stream velocity**
- D) deposition due to an increase in stream velocity

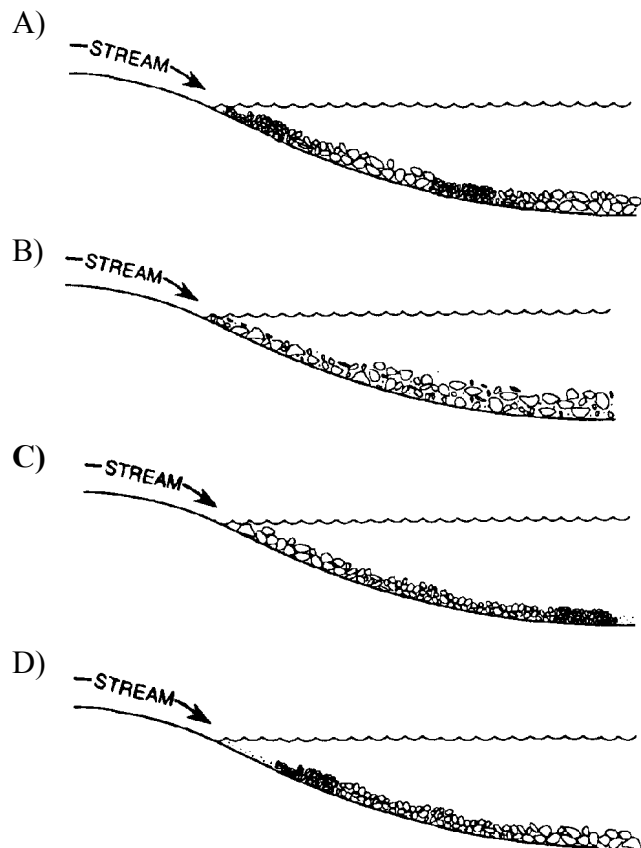
35. The diagrams below show the stages, A through D, in the formation of an oxbow lake over a period of time. [The arrows indicate the direction of streamflow.]



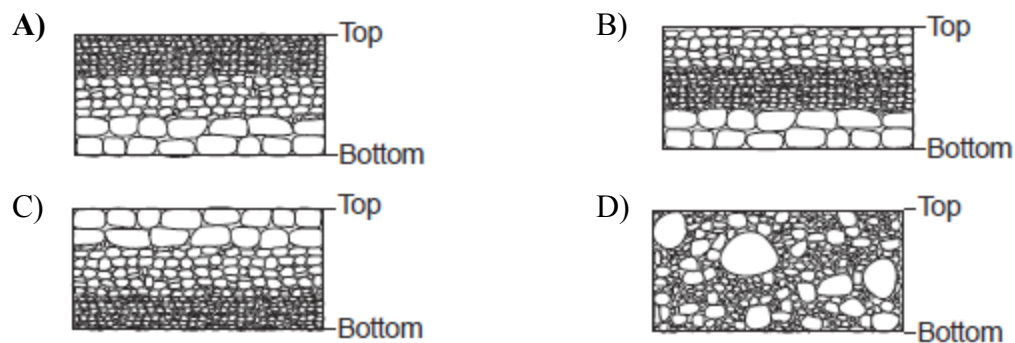
Oxbow lakes are generally formed by

- A) erosion, resulting in a sudden increase in the stream's gradient
- B) deposition, resulting in a sudden increase in the stream's gradient
- C) erosion along the outside banks of the curve in a meandering stream**
- D) deposition along the outside banks of the curve in a meandering stream

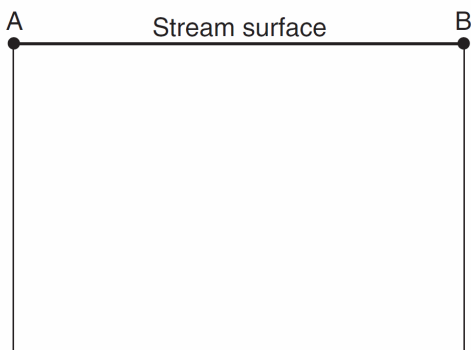
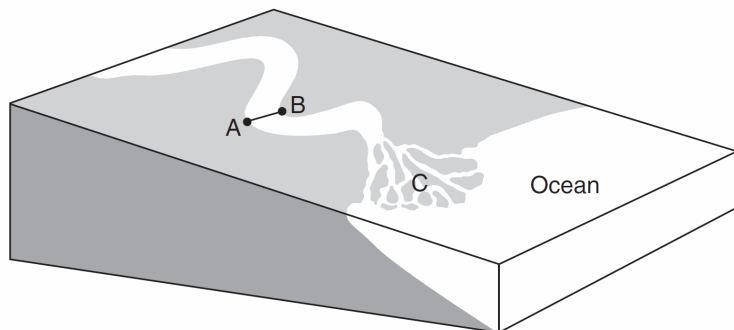
36. A stream is entering the calm waters of a large lake.
Which diagram best illustrates the pattern of
sediments being deposited in the lake from the
stream flow?



37. 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?

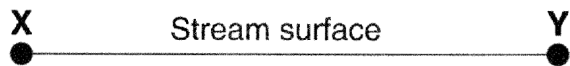
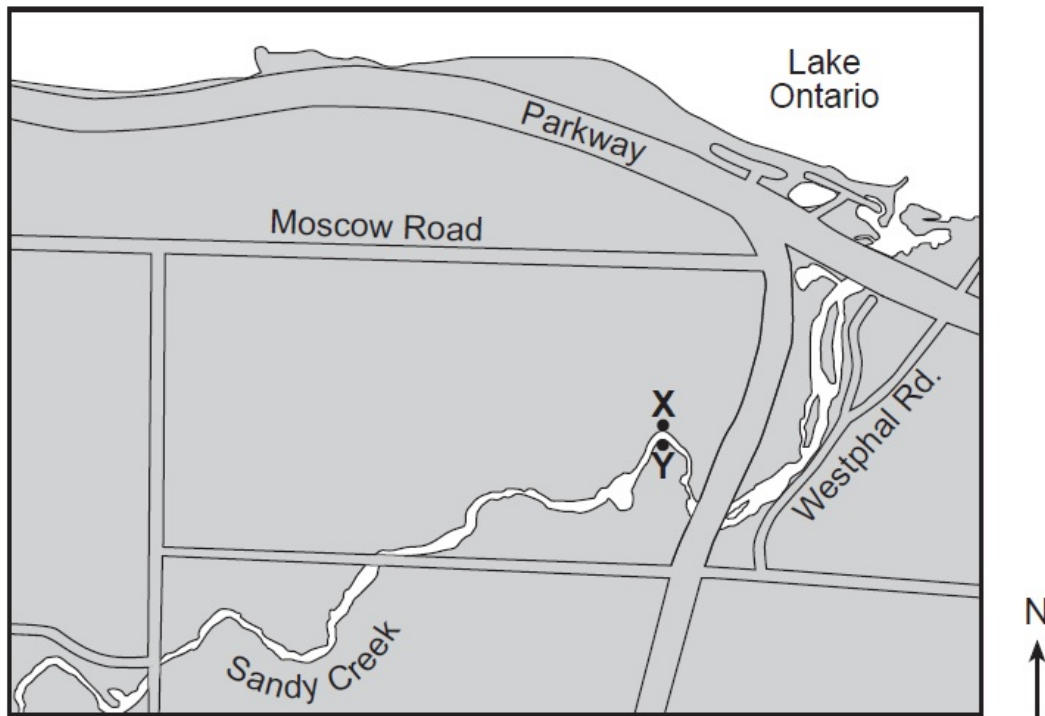


Base your answers to questions **38** through **41** on the block diagram below and on your knowledge of Earth science. The diagram represents a meandering stream flowing into the ocean. Points *A* and *B* represent locations along the streambanks. Letter *C* indicates a triangular-shaped depositional feature where the stream enters the ocean.



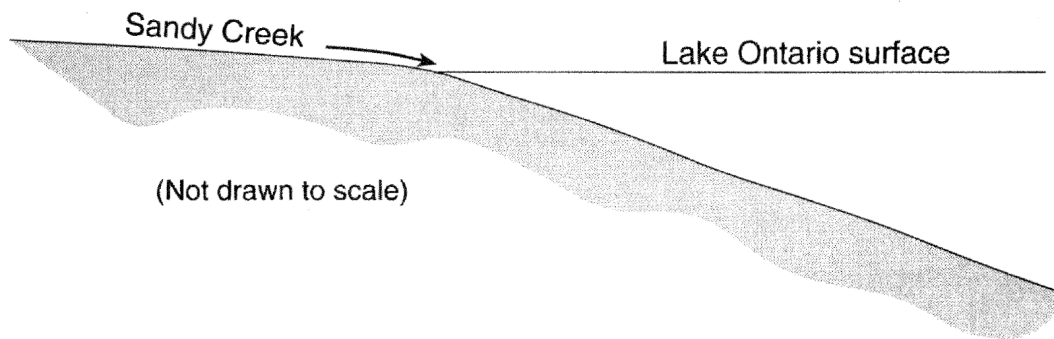
38. Identify *two* factors that determine the rate of stream erosion.
39. Identify the triangular-shaped depositional feature indicated by letter *C*.
40. Explain how sediments eroded by the water in this stream become smoother and rounder in shape.
41. The top of the box represents the stream surface between points *A* and *B*. In the box, draw a line from point *A* to point *B* to represent a cross-sectional view of the shape of the bottom of the stream channel.

Base your answers to questions **42** and **43** on the map below and on your knowledge of Earth Science. The map shows the location of Sandy Creek, west of Rochester, New York. *X* and *Y* represent points on the banks of the stream.



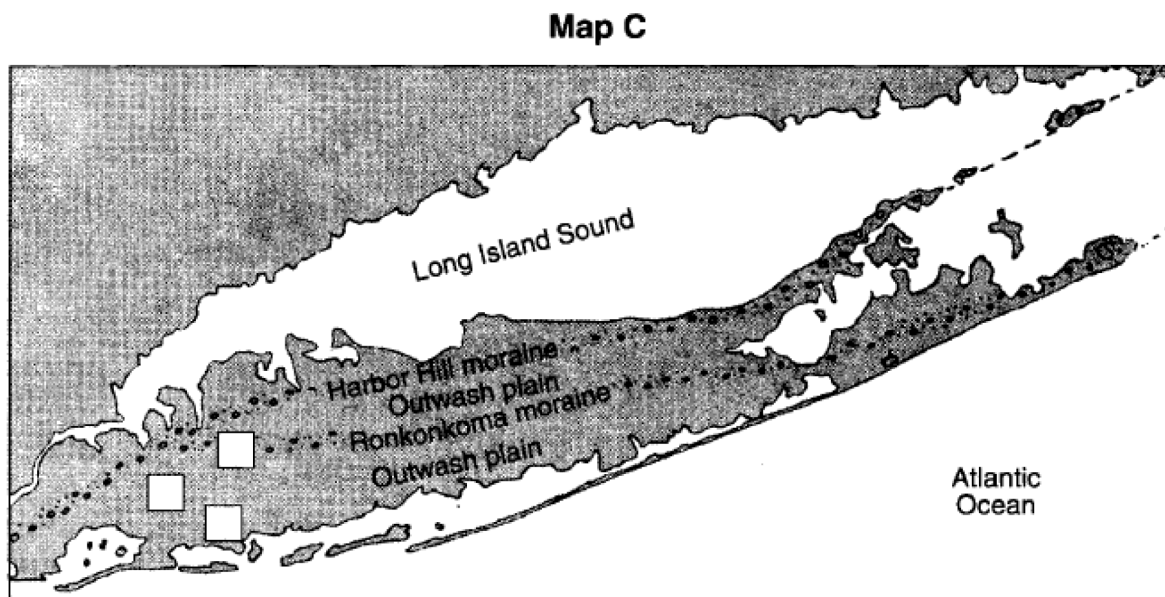
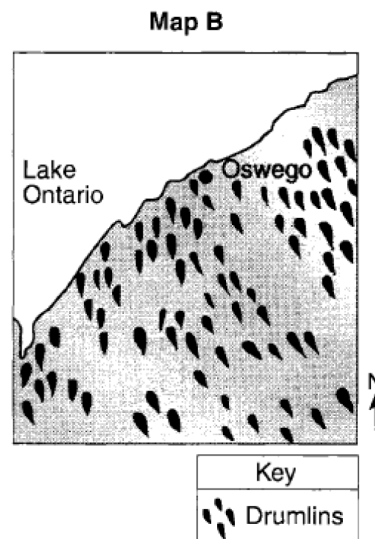
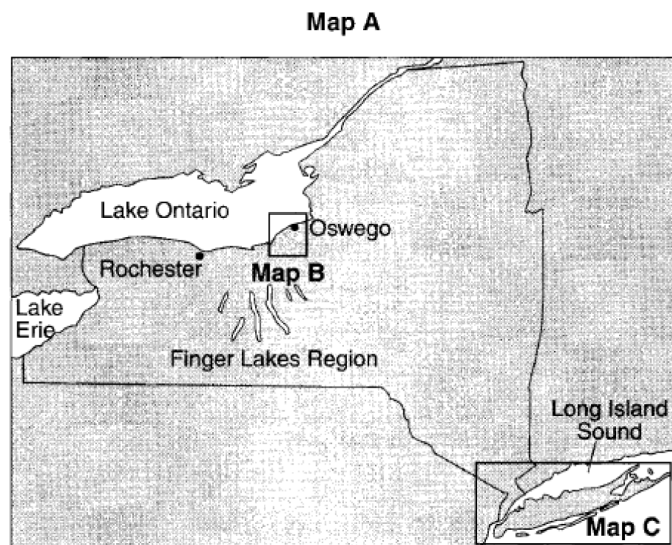
42. The symbols representing four sediment particles are shown in the key below. These particles are being transported by Sandy Creek into Lake Ontario. On the cross section below, draw the symbols on the bottom of Lake Ontario to show the relative position where *each* sediment particle is most likely deposited.

Key	
□	Small pebble
△	Sand
○	Silt
×	Clay

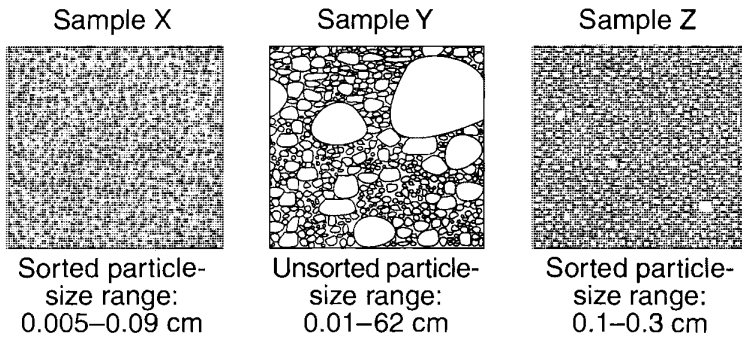


43. Explain why sediments are deposited when Sandy Creek enters Lake Ontario.

44. Base your answer to the following question on map *A* and map *B*, and map *C* below, which show evidence that much of New York State was once covered by a glacial ice sheet. Map *A* shows the location of the Finger Lakes Region in New York State. The boxed areas on map *A* were enlarged to create maps *B* and *C*. Map *B* shows a portion of a drumlin field near Oswego, New York. Map *C*, shows the locations of glacial moraines and outwash plains on Long Island, New York.



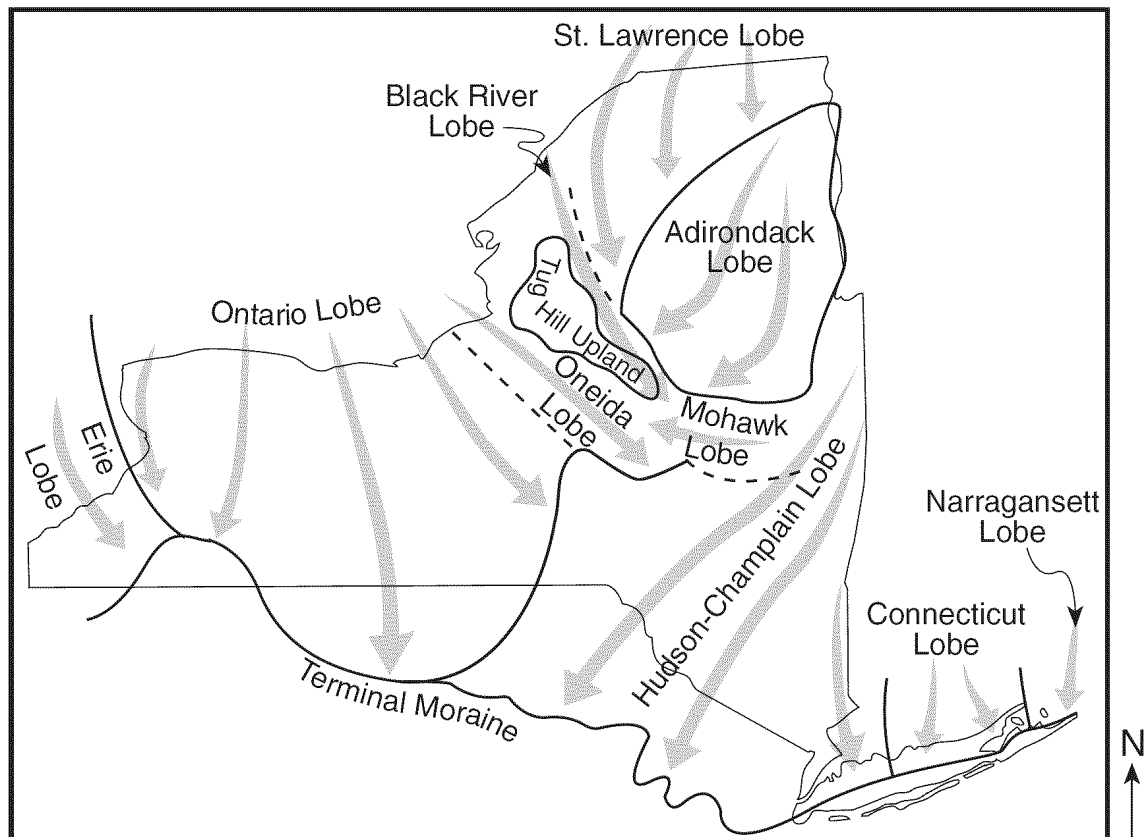
The diagrams below represent three sediment samples labeled X, Y, and Z. These samples were collected from three locations marked with empty boxes on map C in your answer booklet.



(Not drawn to scale)

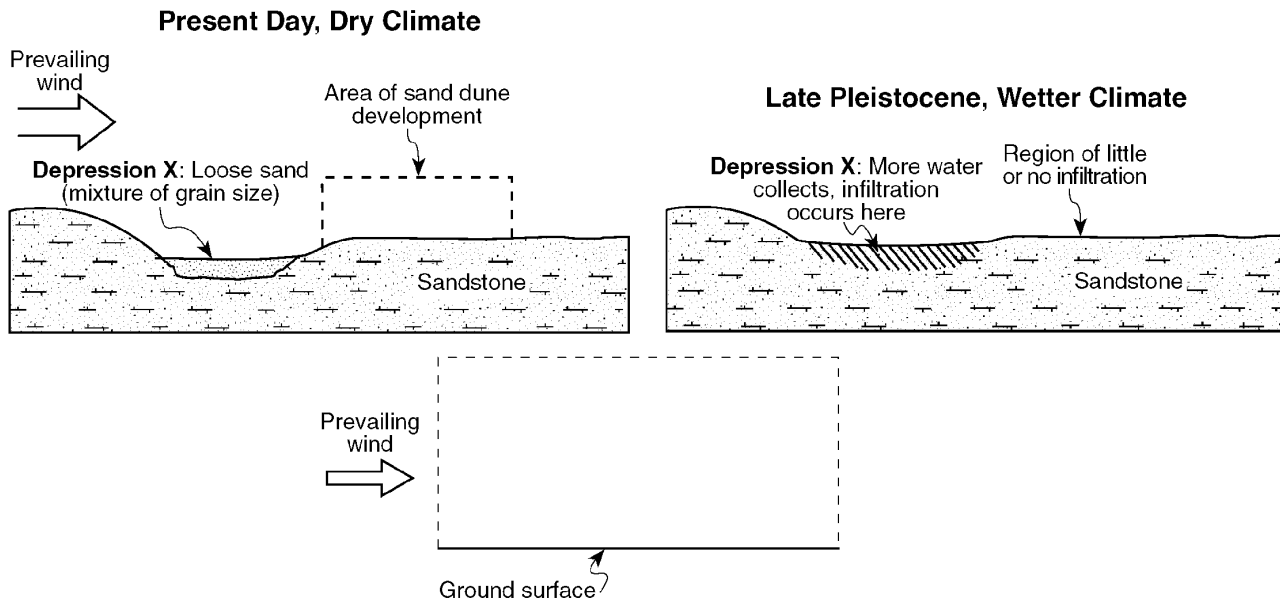
Write the letter of each sample in the correct box on map C to indicate the location from which each sample was most likely collected

45. Base your answer to the following question on the map below, which shows the different lobes (sections) of the Laurentide Ice Sheet, the last continental ice sheet that covered most of New York State. The arrows show the direction that the ice lobes flowed. The terminal moraine shows the maximum advance of this ice sheet.



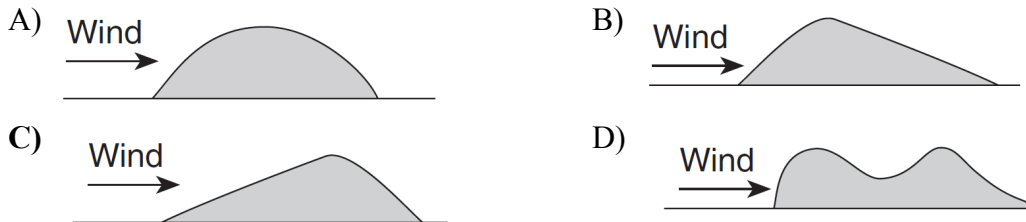
What evidence might be found on surface bedrock of the Catskills that would indicate the direction of ice flow in this region?

46. Base your answer to the following question on the cross section below, which represents a part of Texas where weakly cemented sandstone is exposed at the surface. The mineral cement holding the sandstone grains together is calcite. Area *X* is a circular depression of loose sand that has been partially removed by prevailing winds. Sand dunes have developed downwind from depression *X*.



On the diagram of the area of sand dune development provided above, draw a sketch showing the general sideview of a sand dune formed by a wind blowing in the direction indicated. Your sketch should clearly show any variations in the slope of the sides of the dune.

47. Which diagram represents a side view of a sand dune most commonly formed as a result of the prevailing wind direction shown?



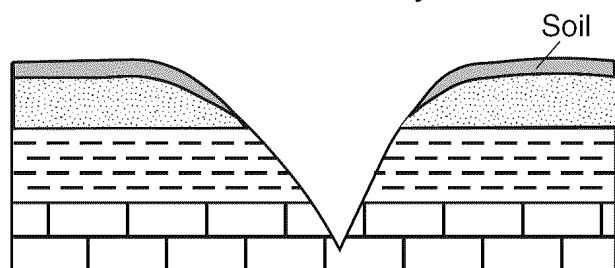
48. The photograph below shows scratched and grooved bedrock with boulders on its surface.



Source: www.nr.gov.nl.ca

The scratches and grooves were most likely created when

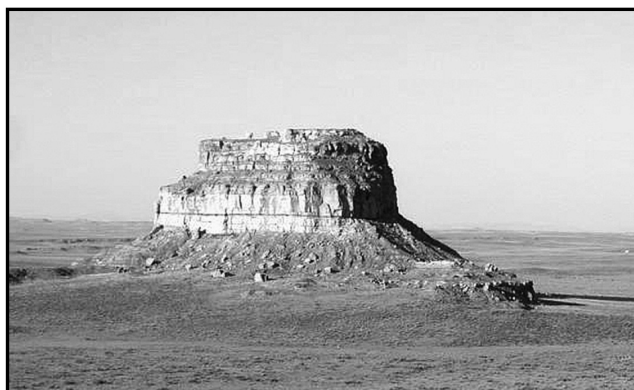
- A) alternating thawing and freezing of water cracked the bedrock
 - B) flooding from a nearby lake covered the bedrock
 - C) **a glacier dragged rocks over the bedrock**
 - D) rocks from a landslide slid along the bedrock
49. The cross section below shows a V-shaped valley and the bedrock beneath the valley.



Which agent of erosion is responsible for cutting most V-shaped valleys into bedrock?

- A) surface winds
- B) **running water**
- C) glacial ice
- D) ocean waves

50. The photograph below shows a sandstone butte in an arid region.



Which agents of erosion are currently changing the appearance of this butte?

- A) glaciers and mass movement
 - B) wave action and running water
 - C) **wind and mass movement**
 - D) running water and glacier
51. The photograph below shows a valley.



Which agent of erosion most likely produced this valley's shape?

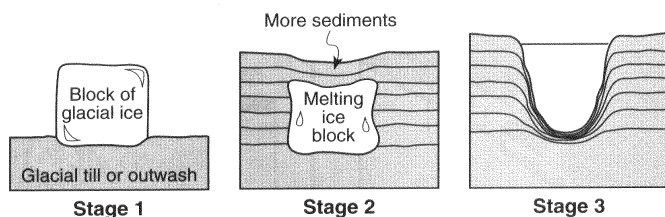
- A) blowing wind
- B) ocean waves
- C) **moving ice**
- D) running water

52. The photograph below shows a large boulder of metamorphic rock in a field in the Allegheny Plateau region of New York State.



The boulder was most likely moved to this location by

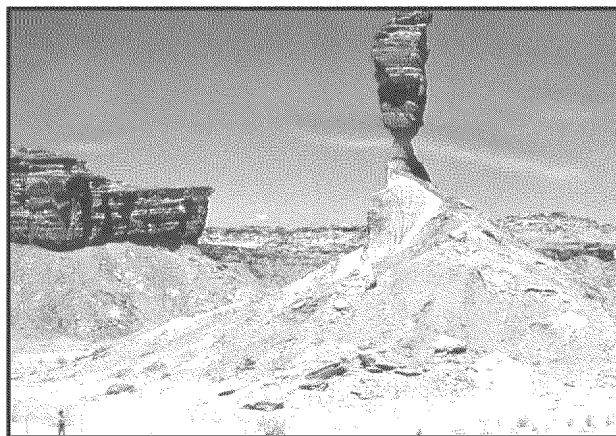
- A) **glacial ice** B) prevailing wind
C) streamflow D) volcanic action
53. The cross sections below show a three-stage sequence in the development of a glacial feature.



Which glacial feature has formed by the end of stage 3?

- A) **kettle lake** B) finger lake
C) drumlin D) parallel scratches

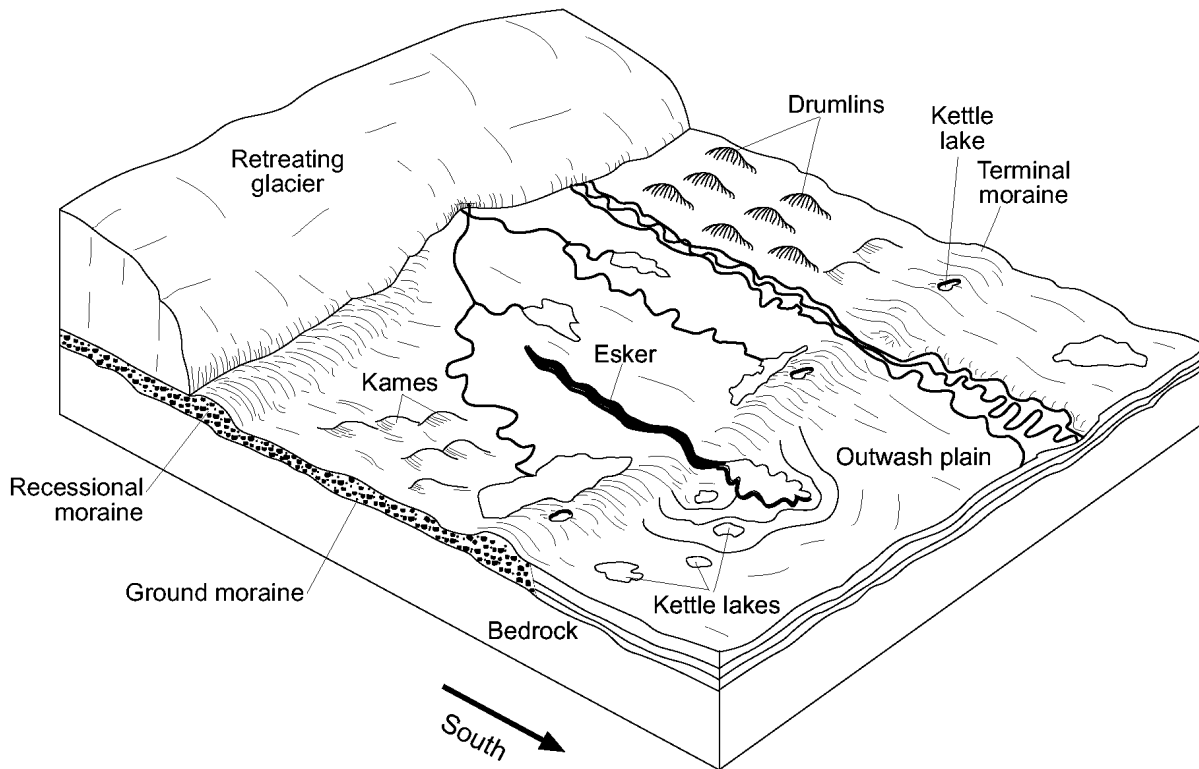
54. The picture below shows a geological feature in the Kalahari Desert of southwestern Africa.



Which process most likely produced the present appearance of this feature?

- A) **wind erosion**
B) volcanic eruption
C) earthquake vibrations
D) plate tectonics

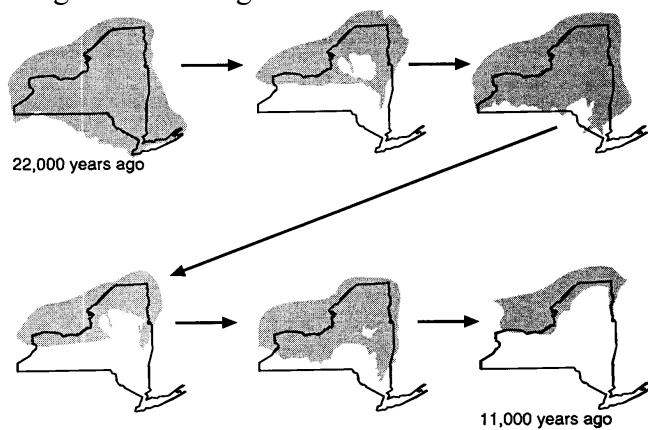
55. Base your answer to the following question on the block diagram below, which shows some of the landscape features formed as the most recent continental glacier melted and retreated across western New York State.



The shape of elongated hills labeled drumlins is most useful in determining the

- A) age of the glacier
- B) **direction of glacial movement**
- C) thickness of the glacial ice
- D) rate of glacial movement

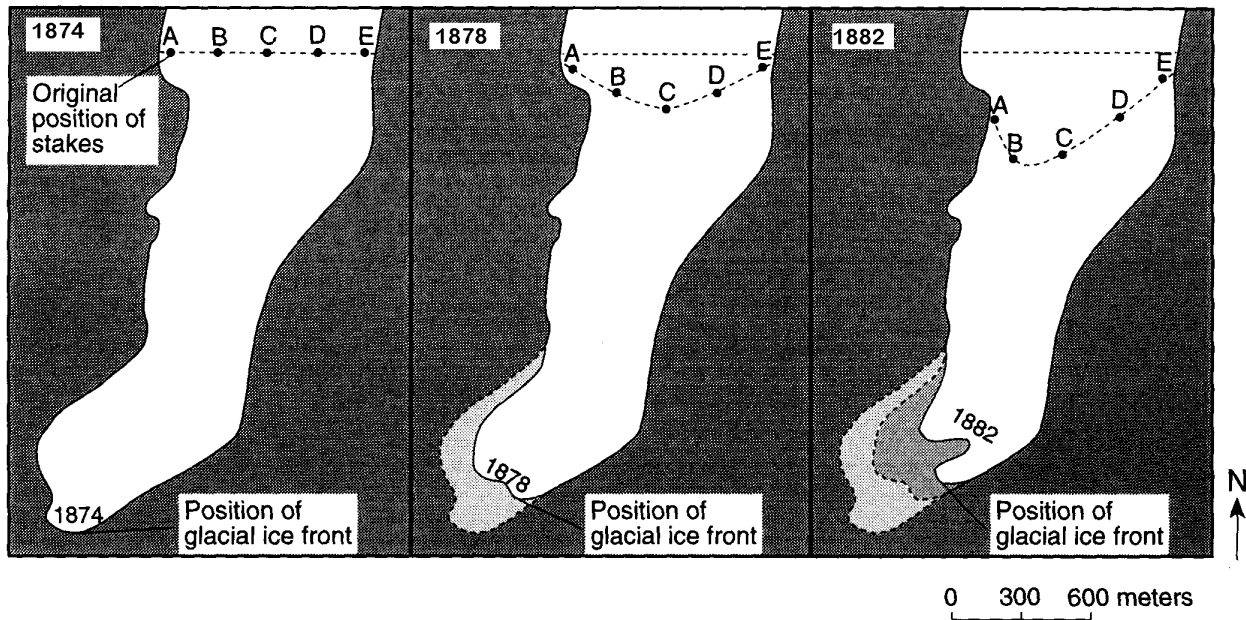
56. Shaded areas on the diagrams below show the part of New York State that was covered by glacial ice during the last ice age.



The best inference that can be made from these diagrams is that this glacial ice

- A) was about 1 mile thick at New York City
- B) advanced and retreated more than once**
- C) moved more slowly than the glaciers of earlier ice ages
- D) changed the shape of Lake Ontario

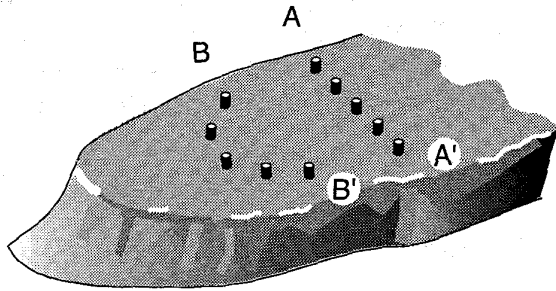
57. Base your answer to the following question on the three maps below, which show the ice movement and changes at the ice front of an alpine glacier from the years 1874 to 1882. Points A, B, C, D, and E represent the positions of large markers placed on the glacial ice and left there for a period of eight years.



Which statement best describes the changes happening to this glacier between 1874 and 1882?

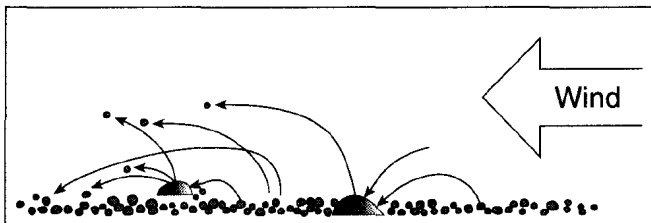
- A) The ice front was advancing, and the ice within the glacier was advancing.
- B) The ice front was advancing, and the ice within the glacier was retreating.
- C) The ice front was retreating, and the ice within the glacier was advancing.**
- D) The ice front was retreating, and the ice within the glacier was retreating.

58. Wooden stakes were placed on a glacier in a straight line as represented by $A-A'$ in the diagram below. The same stakes were observed later in the positions represented by $B-B'$.



The pattern of movement of the stakes provides evidence that

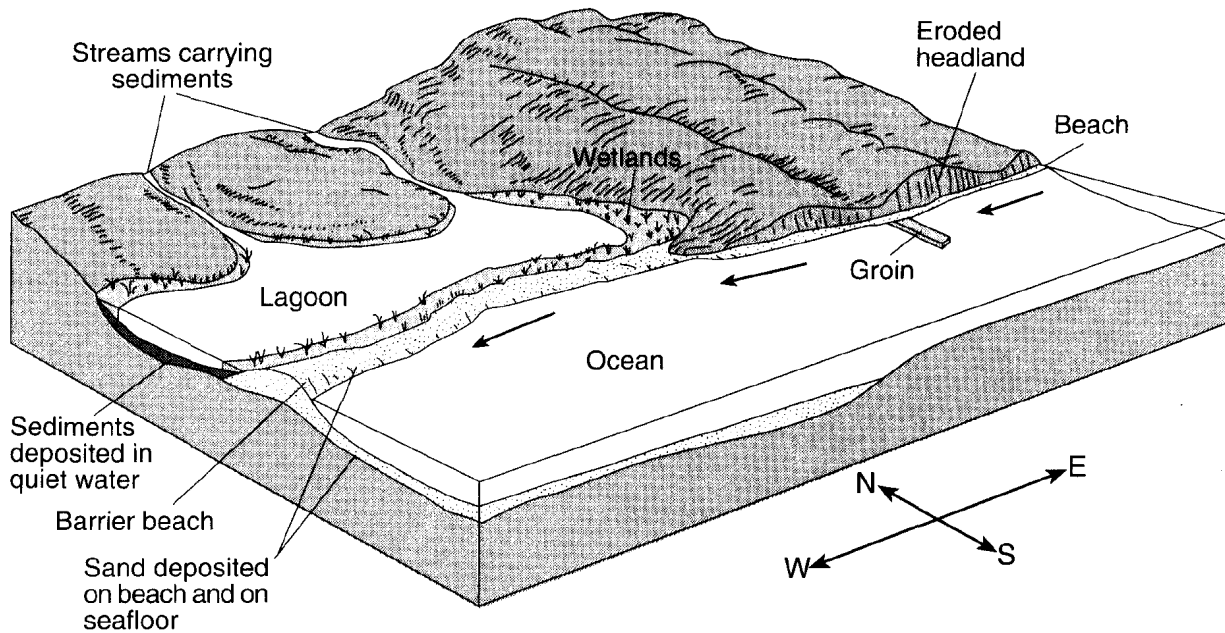
- A) glacial ice does not move
 - B) glacial ice is melting faster than it accumulates
 - C) the glacier is moving faster in the center than on the sides**
 - D) friction is less along the sides of the glacier than in the center
59. The diagram below shows sand particles being moved by wind.



At which Earth surface locations is this process usually the most dominant type of erosion?

- A) deserts and beaches**
 - B) deltas and floodplains
 - C) glaciers and moraines
 - D) mountain peaks and escarpments
60. Which natural agent of erosion is mainly responsible for the formation of the barrier islands along the southern coast of Long Island, New York?
- A) mass movement
 - B) running water
 - C) prevailing winds
 - D) ocean waves**

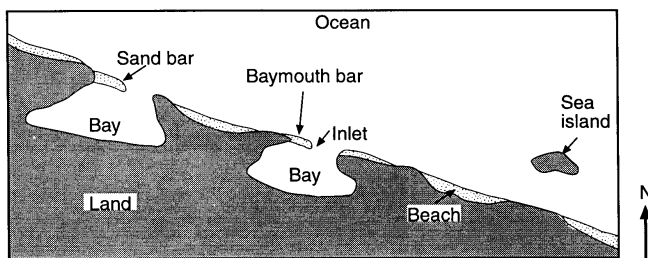
61. Base your answer to the following question on the diagram below. The arrows show the direction in which sediment is being transported along the shoreline. A barrier beach has formed, creating a lagoon (a shallow body of water in which sediments are being deposited). The eroded headlands are composed of diorite bedrock. A groin has recently been constructed. Groins are wall-like structures built into the water perpendicular to the shoreline to trap beach sand.



The groin structure will change the pattern of deposition along the shoreline, initially causing the beach to become

- A) wider on the western side of the groin **B) wider on the eastern side of the groin**
 C) narrower on both sides of the groin D) wider on both sides of the groin

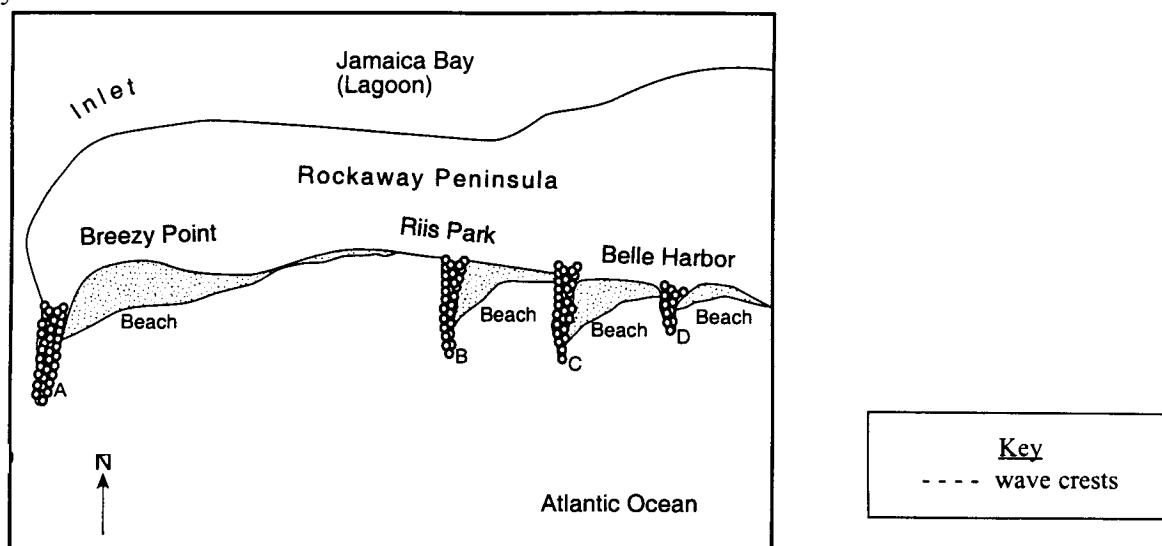
62. The map below shows some features along an ocean shoreline.



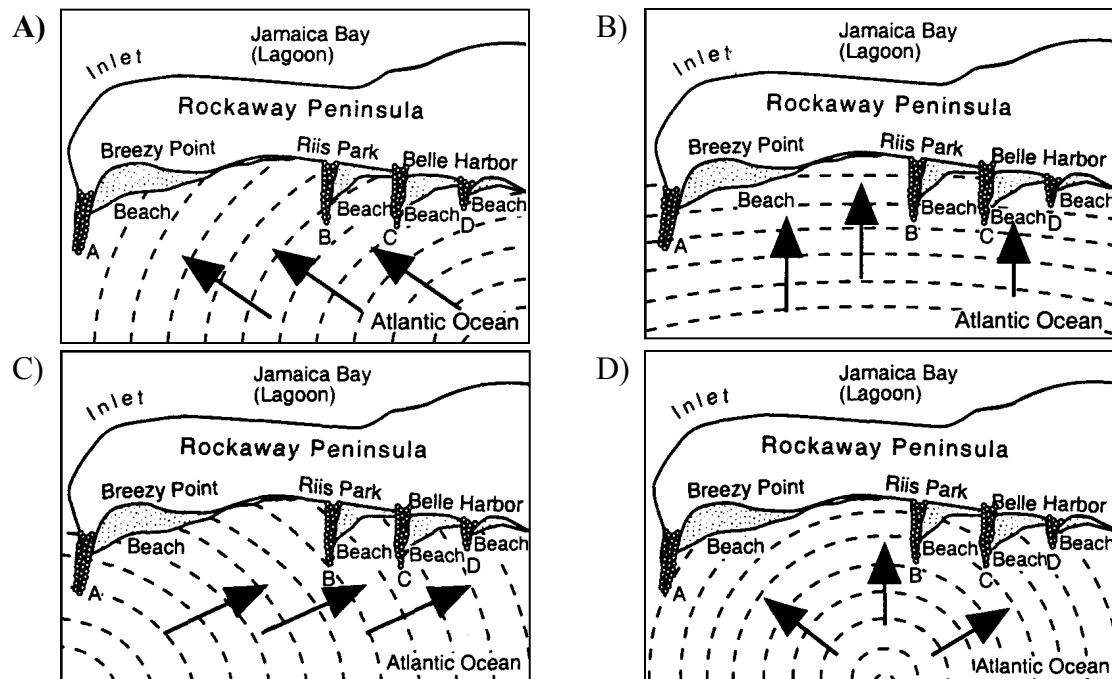
In which general direction is the sand being moved along this shoreline by ocean (long-shore) currents?

- A) northeast **B) southeast**
 C) northwest D) southwest

63. The map below shows Rockaway Peninsula, part of Long Island's south shore, and the location of several stone barriers, *A*, *B*, *C*, and *D*, that were built to trap sand being transported along the coast by wave action.



On which map do the arrows best show the direction of wave movement that created the beaches in this area?



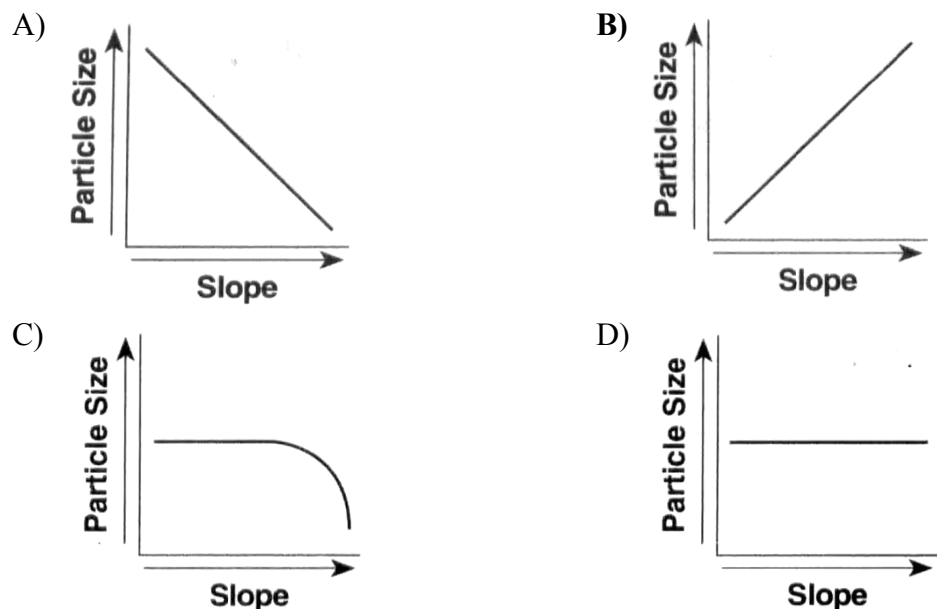
64. What is the approximate minimum stream velocity needed to keep a 6.4-cm-diameter particle in motion?

- A) 10 cm/s
B) 50 cm/s
C) 100 cm/s
D) 200 cm/s

65. A stream's velocity decreases from 100 cm/s to 5 cm/s. Which size sediment particles will still be transported by the stream?

- A) pebbles, sand, silt, and clay
B) sand, silt, and clay, only
C) silt and clay, only
D) clay, only

66. Which graph best represents the relationship between the slope of a river and the particle size that can be transported by that river?



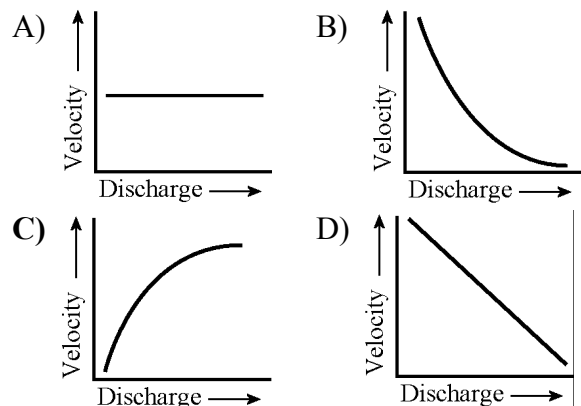
67. Two streams, *A* and *B*, carry the same volume of water, but stream *A* has a greater velocity. The most likely cause of this greater velocity would be that stream *A*

- A) has more tributaries
- B) has a wider streambed
- C) flows down a steeper slope**
- D) travels over less resistant bedrock

68. What is the lowest stream velocity that would keep a cobble-sized particle moving downstream?

- A) 100 cm/sec
- B) 180 cm/sec**
- C) 220 cm/sec
- D) 290 cm/sec

69. Stream velocity and stream discharge were recorded continuously at the same location in a stream channel. Which graph best shows the relationship between stream velocity and stream discharge at this location?



Answer Key

Weathering and Erosion Regents Review

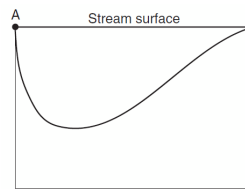
1. A
2. B
3. B
4. D
5. A
6. A
7. D
8. D
9. D
10. D
11. C
12. B
13. B
14. D
15. B
16. B
17. A
18. B
19. B
20. C
21. A
22. D
23.
 - Piles of unsorted sediments deposited across the valley floor (moraines)
 - Parallel scratches and/or grooves in the bedrock (striations)
24. A
25. C
26. A
27. D
28. D

29. Moraines: –unsorted sediments/mixed particles –unlayered
Outwash plain: –sorted deposits –layered sediments
30. C
31. C
32. B
33. D
34. C
35. C
36. C
37. A
38. — stream velocity/speed — gradient/slope of the stream — location within a meander/stream channel — volume/amount of stream discharge — shape of stream channel (straight vs. meandering) — water depth — material found in the stream or along the streambed (vegetation, trees, sediments) — type of bedrock — particle size/shape/density

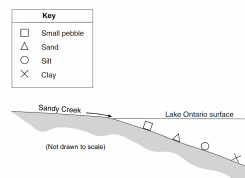
39. delta

40. — The particles were weathered by abrading with other particles. — Rolling and bouncing along the streambed breaks off corners and polishes rocks. — The sediments scrape against the streambed. — They rub against one another. — abrasion — weathering due to collision of particles

- 41.

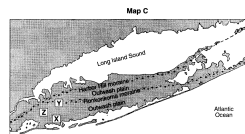


- 42.



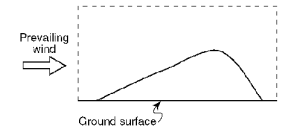
43. –Water velocity decreases, causing some sediment to be dropped. –The stream slows down as it enters the lake.

- 44.



45. Responses include, but are not limited to: parallel scratches, grooves or striations; orientation of glacial features, such as drumlins and lateral moraines.

- 46.



47. C
48. C
49. B
50. C
51. C
52. A
53. A
54. A
55. B
56. B
57. C
58. C
59. A
60. D
61. B
62. B
63. A
64. D
65. B
66. B
67. C
68. B
69. C