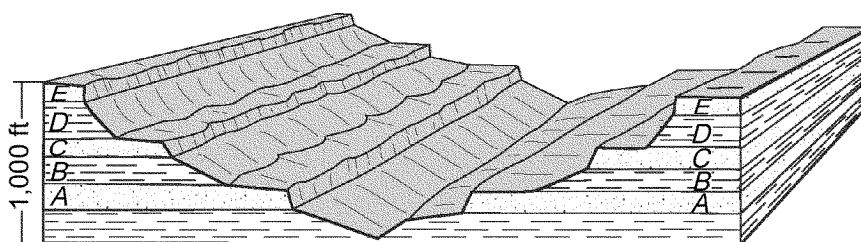


Name: _____

- 1) The formation of soil is primarily the result of
 - A) stream deposition and runoff
 - B) precipitation and wind erosion
 - C) stream erosion and mass movement
 - D) weathering and biological activity
- 2) Which mineral would most likely become rounded at the *fastest* rate when tumbled along a stream bottom?
 - A) garnet
 - B) plagioclase feldspar
 - C) selenite gypsum
 - D) pyroxene
- 3) The block diagram below shows a cross section of a landscape. Letters A, B, C, D, and E represent different rock layers.



Which rock layers appear to be *most* resistant to weathering?

- A) A, C, and E
 - B) B and D
 - C) A and B
 - D) C, D, and E
- 4) Which rock weathers most rapidly when exposed to acid rain?
- A) basalt
 - B) quartzite
 - C) granite
 - D) limestone

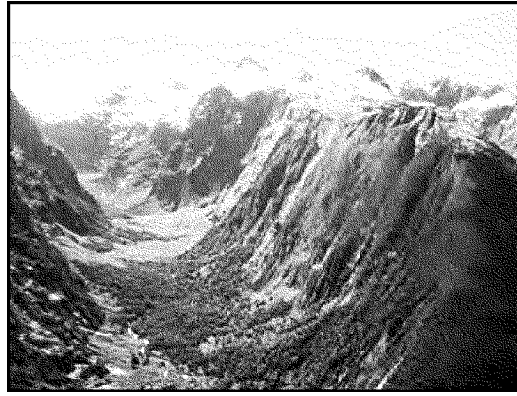
Questions 5 through 8 refer to the following:

The weathering of four different rock samples with different masses was studied. Each rock sample was placed in a separate beaker containing 500 milliliters of a dilute acid for 10 minutes. Bubbling was observed in some of the beakers. The data table below shows the mass of each sample, in grams, before placement in the acid and after removal from the acid.

DATA TABLE:

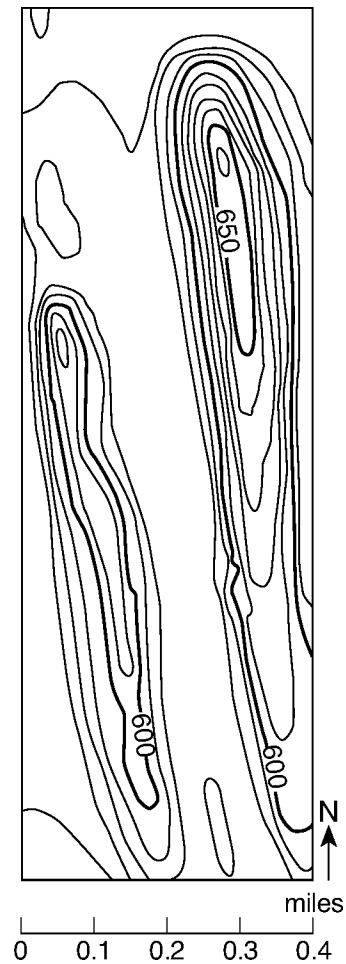
Rock	Mass Before (g)	Mass After (g)
limestone	19.72	19.64
granite	20.77	20.77
gneiss	26.83	26.83
marble	20.81	20.73

- 12) The photograph below shows a valley.



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

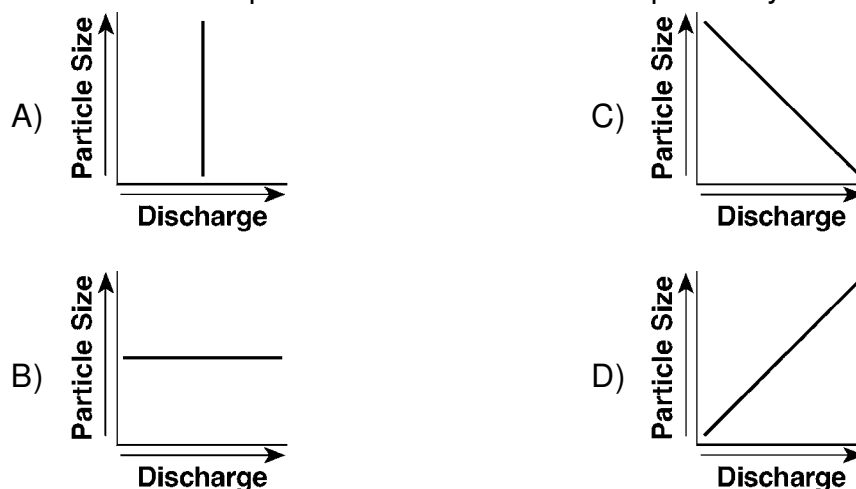
- A) moving ice
 B) blowing wind
 C) ocean waves
 D) running water
- 13) The topographic map below shows two hills located in upstate New York.



Which agent of erosion is *most* responsible for the shape of these hills?

- A) gravity
 B) glaciers
 C) wind
 D) waves

- 14) Which graph *best* represents the correct relationship between the discharge of a river and the particle size that can be transported by that river?

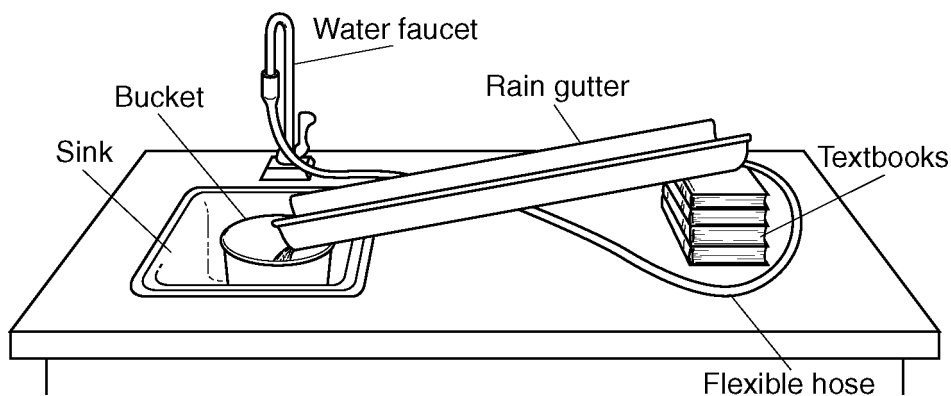


- 15) What is the approximate minimum stream velocity needed to keep a 6.4-cm-diameter particle in motion?

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

Questions 16 and 17 refer to the following:

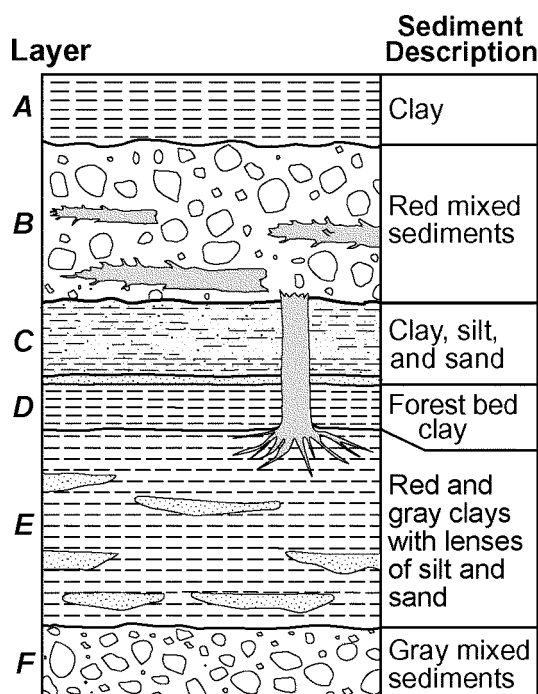
The diagram below show the equipment used to determine the factors affecting the rate of erosion in a stream. The data table shows the time it took a 10-gram sample of quartz sand to move 100 centimeters down the rain gutter under various conditions.



DATA TABLE:

Rain Gutter Slope	Water Velocity	Erosion Time (s)	
		Fine Sand	Coarse Sand
5°	slow	20	60
	fast	15	40
10°	slow	15	40
	fast	10	30
20°	slow	10	30
	fast	5	15

- 16) In the given experiment, the water velocity could be increased by
- increasing the amount of water from the faucet
 - decreasing the slope of the rain gutter
 - lowering the flexible hose
 - widening the rain gutter
- 17) What is the relationship between the water velocity and the rate of erosion in the given experiment?
- If the water velocity decreases, the rate of erosion increases.
 - If the water velocity remains constant, the rate of erosion decreases.
 - If the water velocity increases, the rate of erosion increases.
 - If the water velocity remains constant, the rate of erosion increases.
- 18) Pieces of bedrock material that are broken from a cliff and deposited by a landslide at the base of the cliff are best described as
- rounded and sorted
 - angular and sorted
 - rounded and unsorted
 - angular and unsorted
- 19) The cross section below shows layers of sediments deposited in a region of Wisconsin that has experienced several periods of glaciation. Descriptions of the sediments in layers A through F are included.



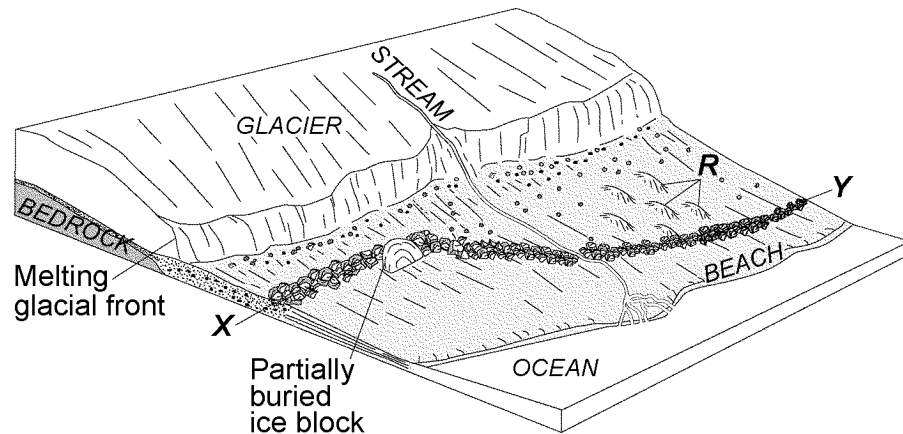
SOURCE: A.N. Strahler, *The Earth Sciences*, 2nd Edition, 1971 (adapted)

Which two layers of sediments were probably deposited directly by glaciers?

- B and F
 - D and E
 - C and E
 - A and D
- 20) Sediments found in glacial moraines are *best* described as
- sorted and not layered
 - unsorted and not layered
 - sorted and layered
 - unsorted and layered

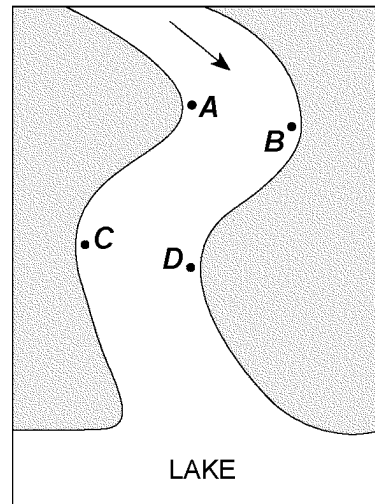
Questions 21 through 23 refer to the following:

The diagram below shows the edge of a continental glacier that is receding. *R* indicates elongated hills. The ridge of sediments from *X* to *Y* represents a landscape feature.



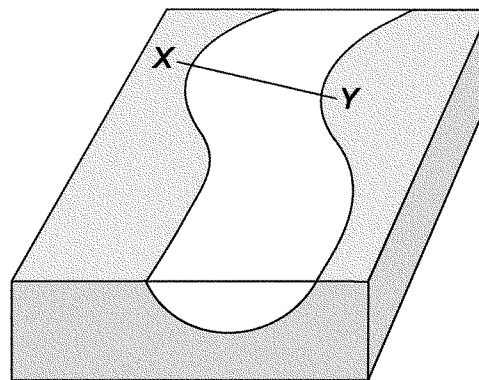
- 21) The ridge of sediments from *X* to *Y* on the given diagram can *best* be described as
- sorted and deposited by ice
 - sorted and deposited by meltwater
 - unsorted and deposited by ice
 - unsorted and deposited by meltwater
- 22) The elongated hills labeled *R* on the given diagram are *most* useful in determining the
- thickness of the glacier
 - rate at which the glacier is melting
 - age of the glacier
 - direction the glacier has moved
- 23) Which feature will most likely form when the partially buried ice block on the given diagram melts?
- | | |
|----------------|----------------|
| A) finger lake | C) kettle lake |
| B) moraine | D) drumlin |
- 24) Sandstone, limestone, and conglomerate cobbles are found in a streambed in New York State where the surrounding bedrock is composed of shales and siltstones. The most likely explanation for the presence of these cobbles is that they were
- transported to this area from another region
 - weathered from the surrounding bedrock
 - metamorphosed from shale and siltstone
 - formed when shale and siltstone bedrock were eroded
- 25) What is the approximate minimum stream velocity needed to keep a particle in motion that has a diameter of 10 centimeters?
- | | |
|-------------|-------------|
| A) 110 cm/s | C) 190 cm/s |
| B) 425 cm/s | D) 325 cm/s |

- 26) The map below shows a meandering stream as it enters a lake. The arrow shows the direction of stream flow. Points *A* through *D* represent locations on the surface of the stream.



The greatest stream velocities are found *closest* to points

- | | |
|--------------------------|--------------------------|
| A) <i>D</i> and <i>A</i> | C) <i>A</i> and <i>B</i> |
| B) <i>B</i> and <i>C</i> | D) <i>C</i> and <i>D</i> |
- 27) The block diagram below shows part of a meandering stream. Line *XY* shows the location of a stream cross section.



Which cross section *best* represents the shape of the stream channel at line *XY*?

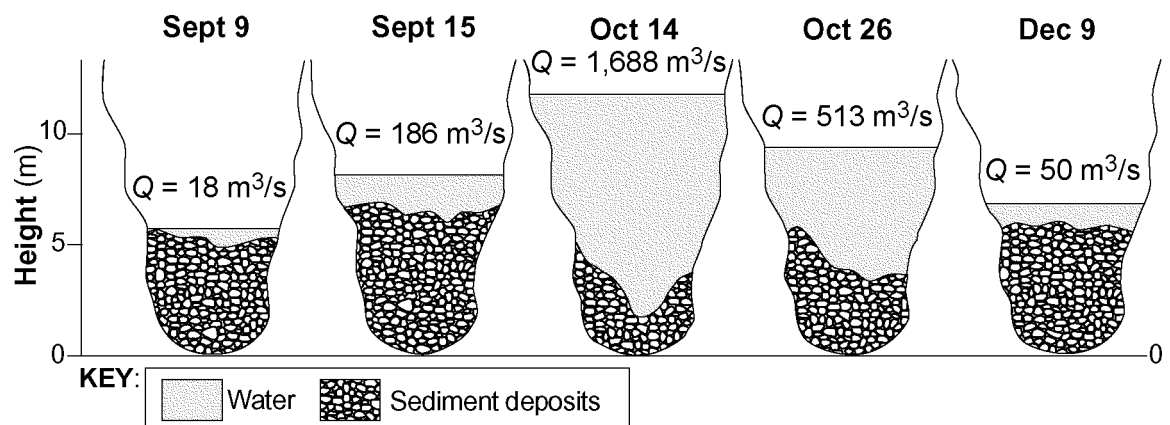
- | | |
|----|----|
| A) | C) |
| B) | D) |

- 28) Trees growing on the edge of a river's meander are most likely to fall into the river due to
- erosion on the inside of the meander
 - deposition on the inside of the meander
 - erosion on the outside of the meander
 - deposition on the outside of the meander
- 29) Each of the rock particles below has the same density and volume. Which particle will most likely settle at the *fastest* rate in moving water?



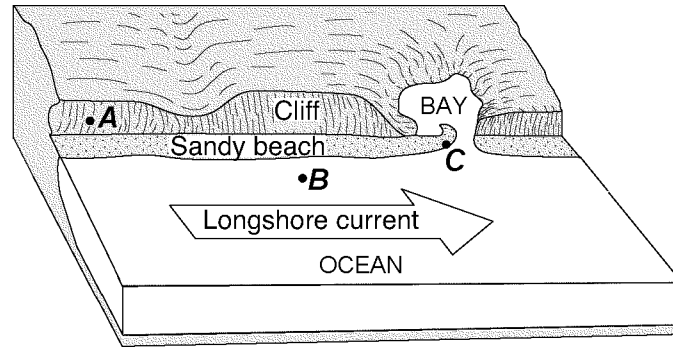
Questions 30 through 32 refer to the following:

The cross sections below represent a particular location of the channel of the San Juan River in Utah. Changes in river discharge (Q), in cubic meters per second, and sediment deposits before, during, and after a flood are shown.



- 30) During the time from September 9 to October 14 shown on the given diagram, the thickness of the sediment deposits at the bottom of the San Juan River channel
- decreased and then increased
 - increased and then decreased
 - increased, only
 - decreased, only
- 31) On October 14, during the flood, the discharge of the San Juan River changed dramatically. The change in the river's discharge at this location was related to an increase in the river's
- channel length
 - sediment deposits
 - velocity
 - gradient

- 38) The block diagram below shows a part of the eastern coastline of North America. Points *A*, *B*, and *C* are reference points along the coast.

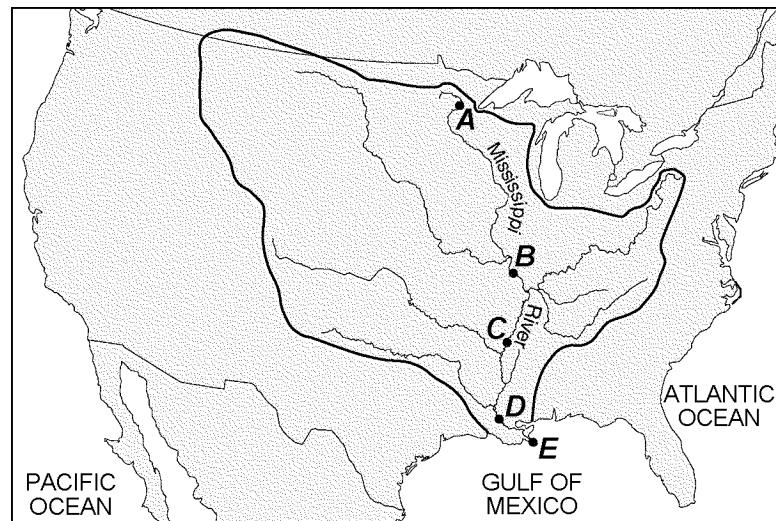


Which list *best* represents the primary processes occurring along the coastline at points *A*, *B*, and *C*?

- A) *A* ⇄ precipitation; *B* ⇄ infiltration; *C* ⇄ evaporation
 B) *A* ⇄ folding; *B* ⇄ subduction; *C* ⇄ crosscutting
 C) *A* ⇄ weathering; *B* ⇄ erosion; *C* ⇄ deposition
 D) *A* ⇄ faulting; *B* ⇄ conduction; *C* ⇄ mass movement

Questions 39 through 41 refer to the following:

The map below shows a portion of the continent of North America and outlines the Mississippi River watershed. Points *A*, *B*, *C*, *D*, and *E* represent locations on Earth's surface.



KEY:

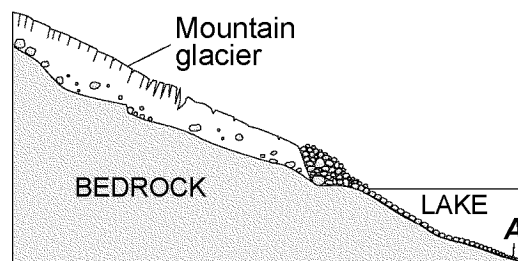
— Mississippi watershed boundary

- 39) At which location on the map would the Mississippi River's discharge most likely be the *greatest*?
- A) *A* B) *B* C) *C* D) *D*
- 40) Sediments deposited by the river at location *B* on the map are *best* described as
- A) unsorted and not layered C) unsorted and layered
 B) sorted and not layered D) sorted and layered

- 41) Which landform is produced at location *E* on the map where the Mississippi River enters the Gulf of Mexico?
- A) an escarpment
 B) a drumlin
 C) a delta
 D) an outwash plain
- 42) After a glacier melts, what evidence might be found on the surface of the bedrock indicating that the glacier had passed over the surface?

Questions 43 and 44 refer to the following:

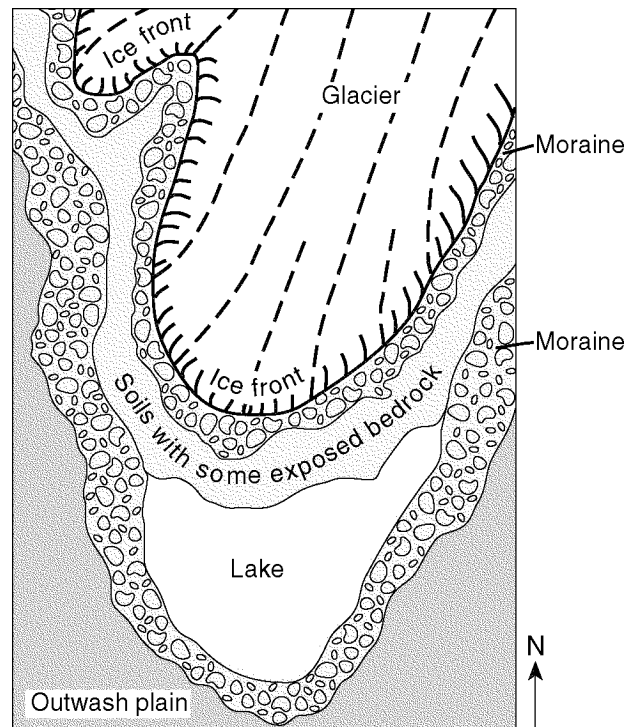
The cross section below represents a glacier moving down a mountain valley. The water from the melting glacier is flowing into a lake. Letter *A* represents a location on the bottom of the lake.



- 43) Describe the most likely shape of a cross section of the glacial valley as viewed from the lake shown in the diagram.
- 44) Sediments found at location *A* in the given diagram range in diameter from 0.0004 to 0.006 centimeter. What name is given to this size sediment?

Questions 45 through 48 refer to the following:

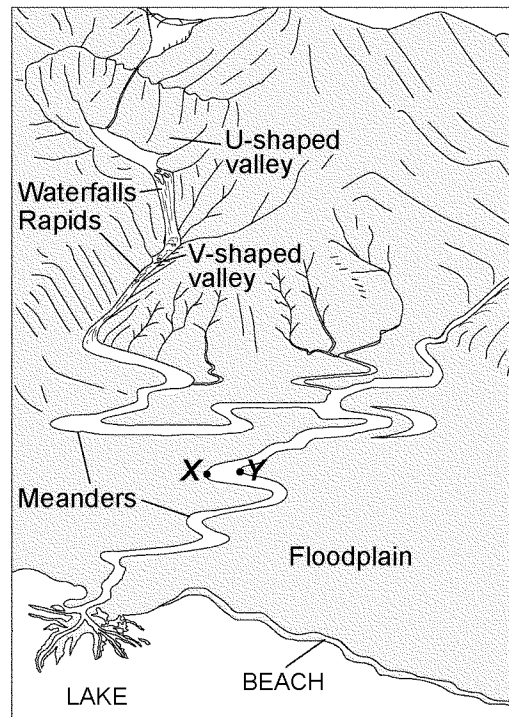
The map below shows a retreating valley glacier and the features that have formed because of the advance and retreat of the glacier.



- 45) Describe *one* piece of evidence likely to be found on the exposed bedrock surfaces that could indicate the direction the glacier shown in the map moved.
- 46) Describe *one* difference between the arrangement of sediment in the moraines and the arrangement of sediment in the outwash plain shown in the given map.
- 47) Describe the most likely shape of the valley being formed due to erosion by the glacier shown in the map.
- 48) Explain why the glacial ice absorbs less solar radiation than the surrounding exposed bedrock and soil.

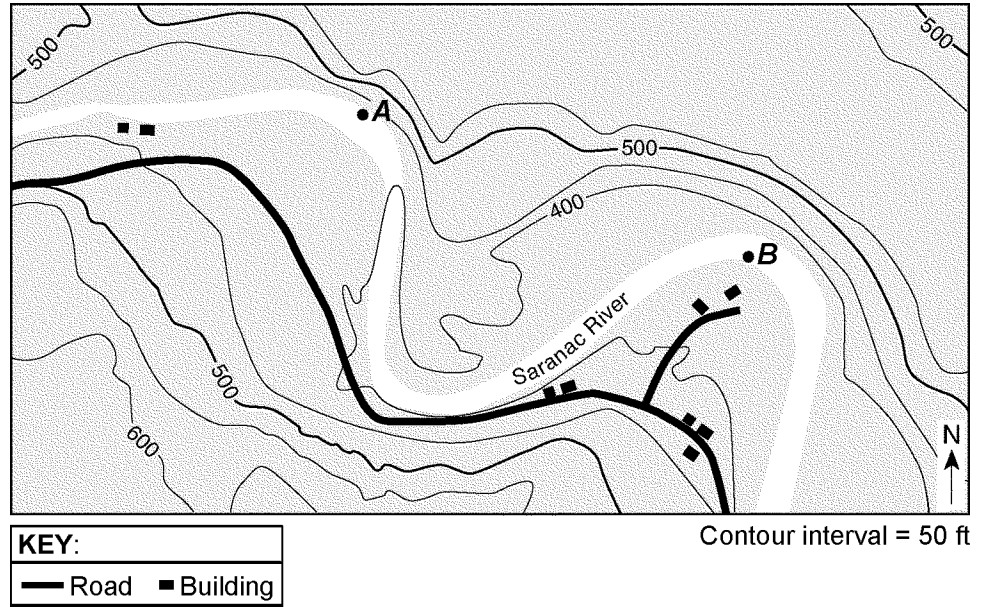
Questions 49 through 52 refer to the following:

The diagram below shows several different landscape features. Points X and Y indicate locations on the streambank.



- 49) Explain why the upper valley in the mountains is U-shaped and the lower valley is V-shaped.
- 50) Identify which point in the given diagram, X or Y, has more stream erosion and explain why the amounts of erosion are different.
- 51) Explain why the stream shown in the diagram meanders on the floodplain, but *not* in the mountains.
- 52) The given beach consists of particles with diameters from 0.01 cm to 0.1 cm. Identify the sedimentary rock that will form when burial and cementation of these sediments occur.

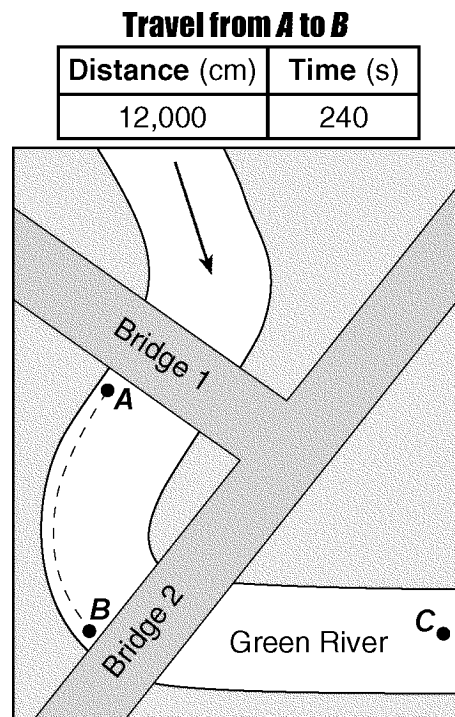
- 53) The topographic map below shows an area of the Saranac River just west of Plattsburgh, New York. Points *A* and *B* are locations in the river.



Why is erosion of the stream bank more likely at point *A* on the given map than at point *B*?

Questions 54 through 56 refer to the following:

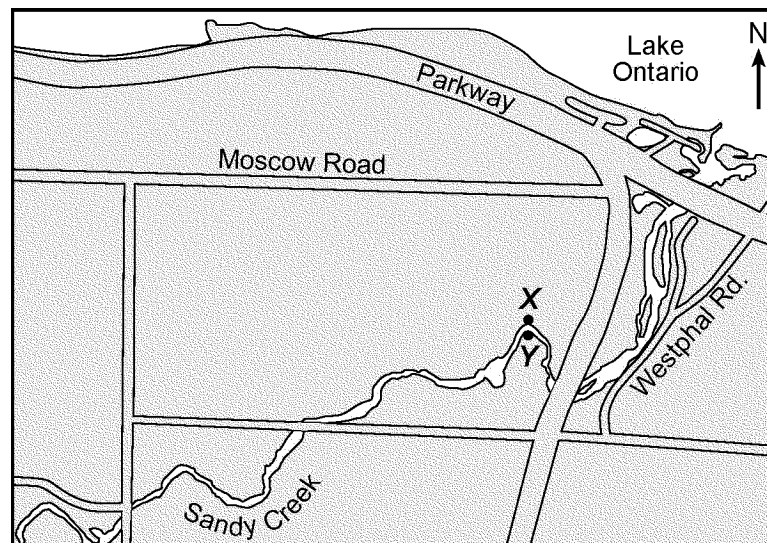
The map below represents two bridges that cross the Green River. Letters *A*, *B*, and *C* represent locations in the river. A ball was dropped from bridge 1 at location *A* and the distance and travel time to location *B* were recorded. The results are shown in the data table below.



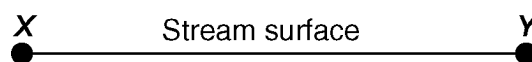
- 54) On the map provided, place an **X** at the location between the bridges where the *greatest* amount of deposition is most likely occurring.
- 55) Based on the given information, determine the rate at which the ball traveled, in centimeters per second, from location *A* to location *B*.
- 56) After a thunderstorm, the velocity of the river at location *C* on the given map was 100 centimeters per second. What was the *largest* type of sediment transported by the river at this location?

Questions 57 through 60 refer to the following:

The map below shows the location of Sandy Creek, west of Rochester, New York. *X* and *Y* represent points on the banks of the stream.



- 57) On the diagram below, draw a line to represent the shape of the stream bottom from point *X* to point *Y* in the given map.



- 58) Explain why sediments are deposited when Sandy Creek enters Lake Ontario.

- 59) Record the minimum velocity a stream needs to transport a 2.0-cm-diameter particle.
- 60) 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 provided, draw the symbols on the bottom of Lake Ontario to show the relative position where *each* sediment particle is most likely deposited.

