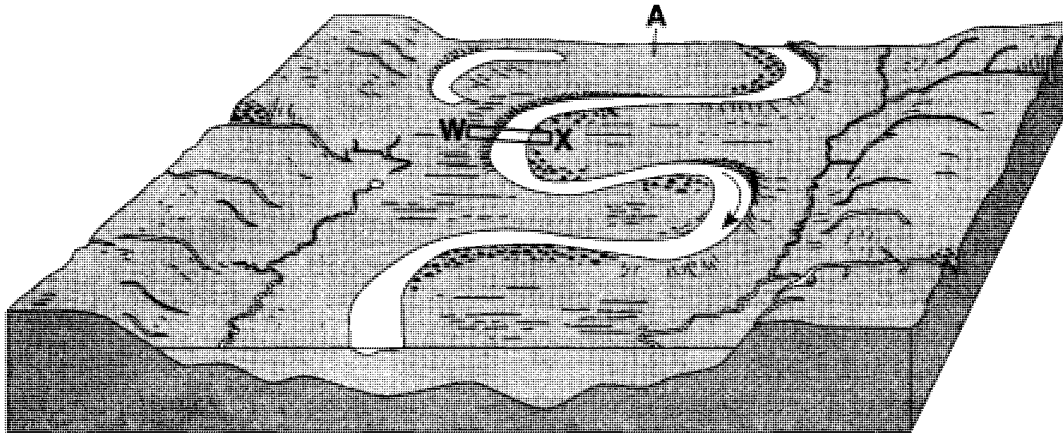
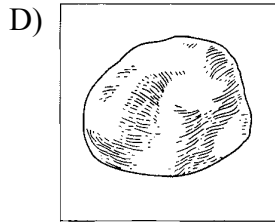
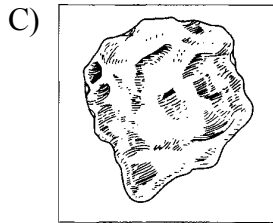
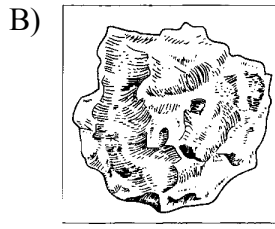
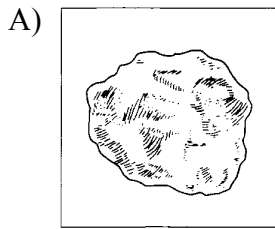


-
1. Base your answer to the following question on the block diagram below, which represents the landscape features associated with a meandering stream. *WX* is the location of a cross section. Location *A* indicates a landscape feature.



(Not drawn to scale)

Which particle of quartz shows evidence of being transported the farthest distance by the stream?



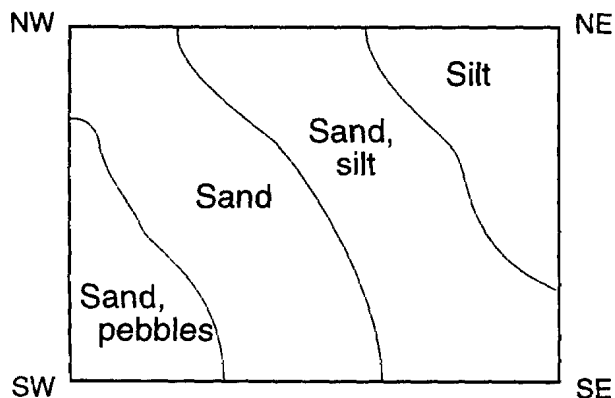
2. Four samples of aluminum, *A*, *B*, *C*, and *D*, have identical volumes and densities, but different shapes. Each piece is dropped into a long tube filled with water. The time each sample takes to settle to the bottom of the tube is shown in the table below.

Sample	Time to Settle (sec)
<i>A</i>	2.5
<i>B</i>	3.7
<i>C</i>	4.0
<i>D</i>	5.2

Which diagram most likely represents the shape of sample *A*?

- A)  B) 
 C)  D) 

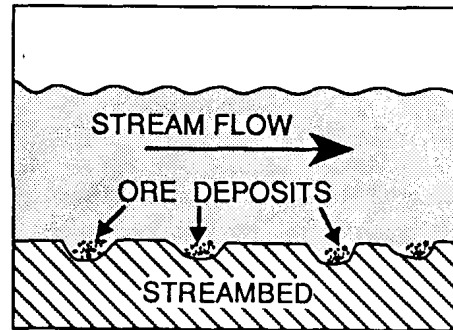
3. A stream entering a lake deposits sediments on the lake bottom in the pattern shown on the map below.



Which corner of the map is nearest to the point where the stream flows into the lake?

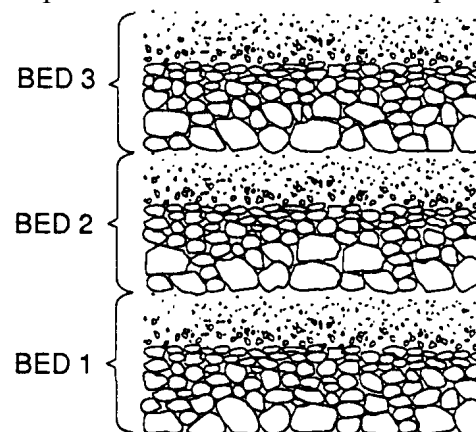
- A) northeast (NE) B) northwest (NW)
 C) southeast (SE) D) southwest (SW)

4. The diagram below shows mineral ore sediments deposited in depressions on the bottom of a stream.



These deposits accumulated because the

- A) stream velocity increased
 B) stream volume increased
 C) ore particles are smaller than other sediments
 D) ore particles are more dense than other sediments
5. The diagram below shows three beds of sediment deposited at different times in a quiet body of water.

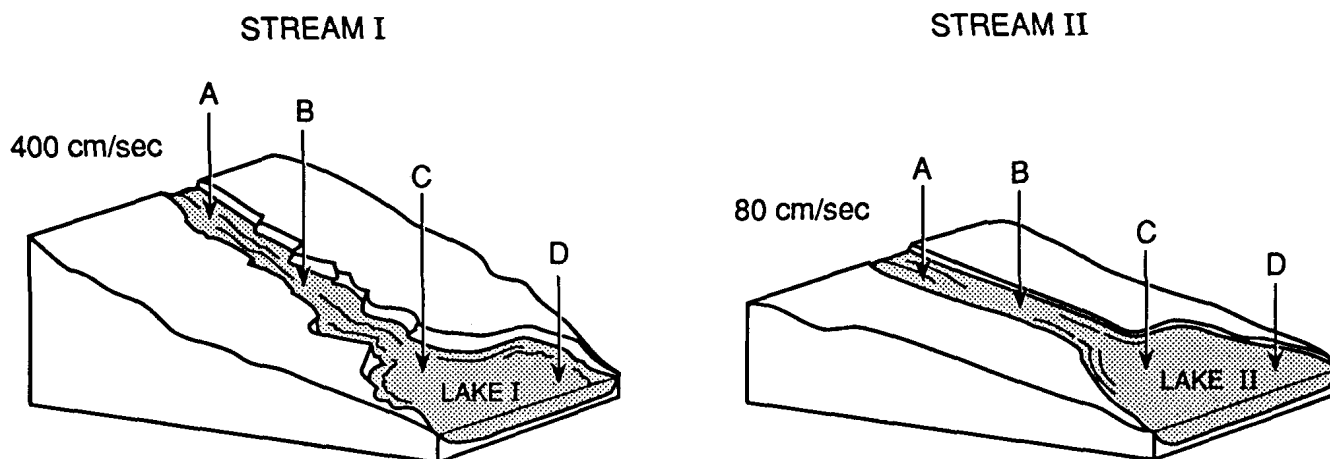


The sediment deposited in each bed is best described as

- A) sorted mainly according to particle size
 B) sorted mainly according to particle shape
 C) a mixture of sorted and unsorted particles
 D) showing no evidence of sorting

6. Base your answer to the following question on the information and diagrams below.

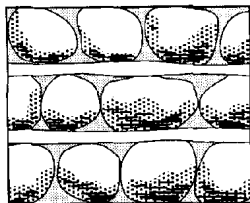
A mixture of colloids, clay, silt, sand, pebbles, and cobbles is put into stream I at point *A*. The water velocity at point *A* is 400 centimeters per second. A similar mixture of particles is put into stream II at point *A*. The water velocity in stream II at point *A* is 80 centimeters per second.



What will most likely occur when the transported sediment reaches lake II?

- A) Clay particles will settle first.
- B) The largest particles will be carried farthest into the lake.
- C) The sediment will become more angular because of abrasion.
- D) The particles will be deposited in sorted layers.

7. The diagram below shows cobbles used in the construction of the walls of a cobblestone building.

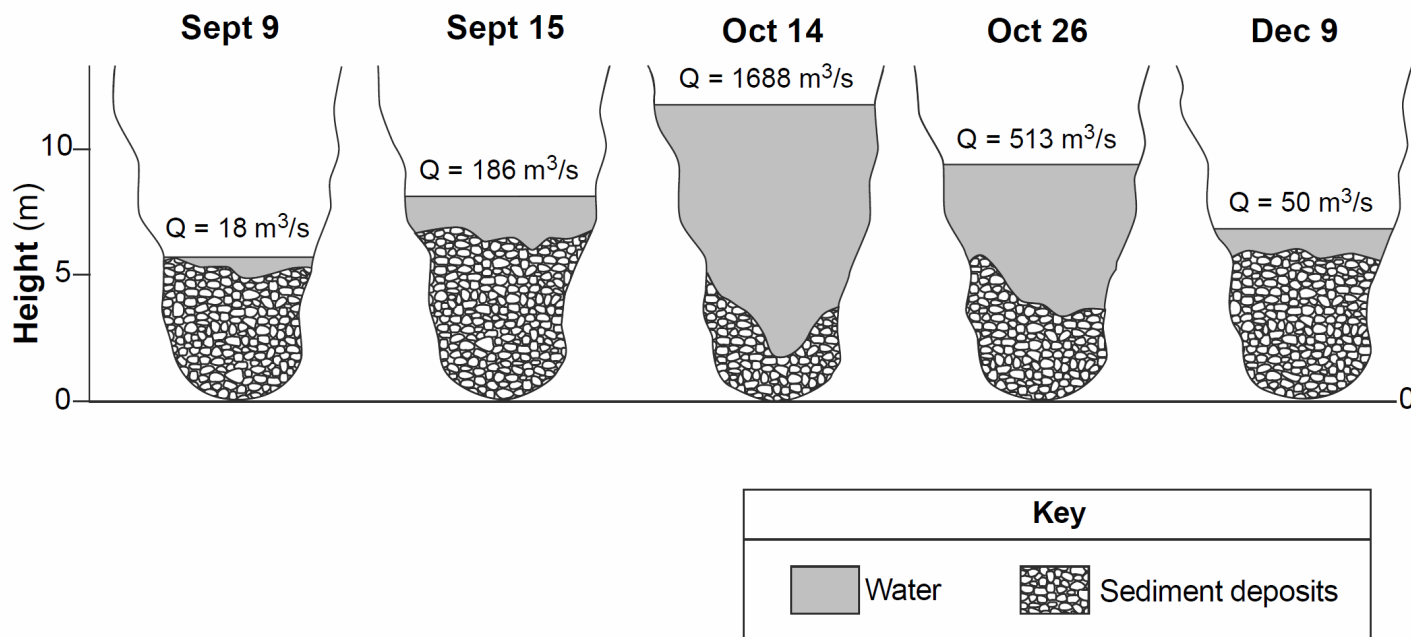


(Not actual size)

The shape and size of the cobbles suggest that they were collected from

- A) the channel of a fast-flowing stream
- B) volcanic ash deposits
- C) a desert sand dune
- D) the base of a cliff from which they had weathered

Base your answers to questions 8 and 9 on the cross sections below, which 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.



8. If the greatest velocity of the San Juan River on December 9 was 10 centimeters per second, what was the approximate diameter of the largest particles that the river could have carried?
- A) 1.0 cm B) 2.0 cm C) 10.0 cm D) 0.2 cm
9. During the time from September 9 to October 14, the thickness of the sediment deposits at the bottom of the San Juan River's channel
- A) decreased, only B) increased, only
 C) decreased and then increased D) increased and then decreased

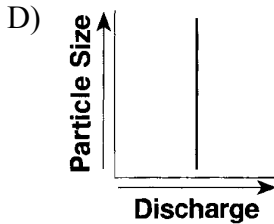
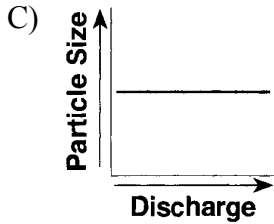
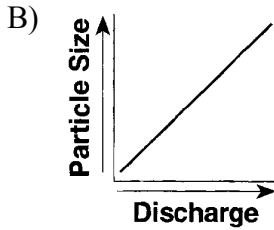
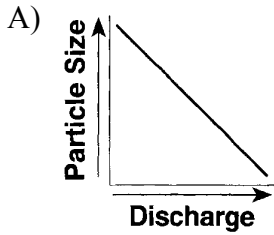
10. The table below shows the density of four mineral samples.

Mineral	Density (g/cm^3)
Cinnabar	8.2
Magnetite	5.2
Quartz	2.7
Siderite	3.9

If the shape and size of the four mineral samples are the same, which mineral will settle most *slowly* in water?

- A) cinnabar B) magnetite
 C) quartz D) siderite

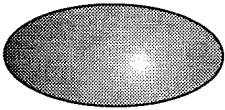
11. Which graph best represents the correct relationship between the discharge of a river and the particle size that can be transported by that river?



12. The two pebbles shown below are dropped into a tank of water 1 meter deep.

Hematite

Density = 6.5 g/cm^3



Quartz

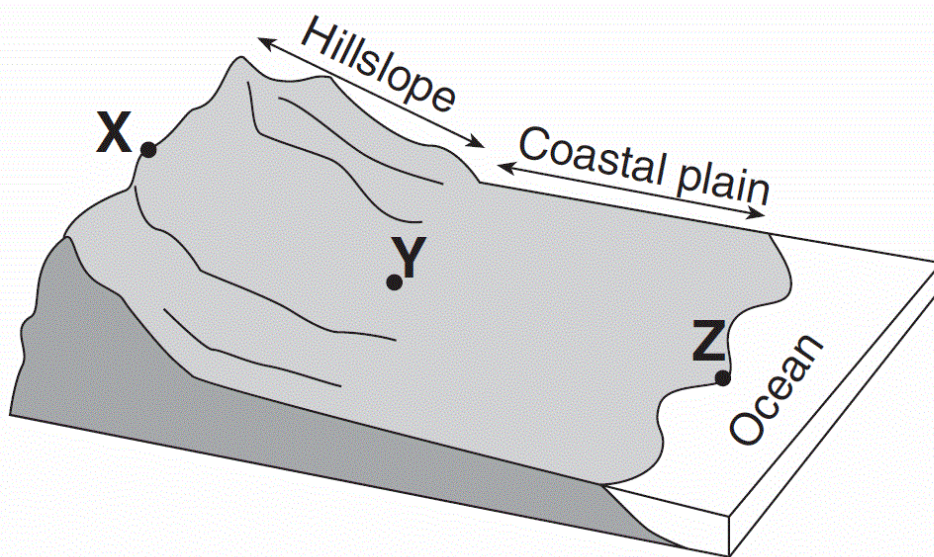
Density = 2.6 g/cm^3



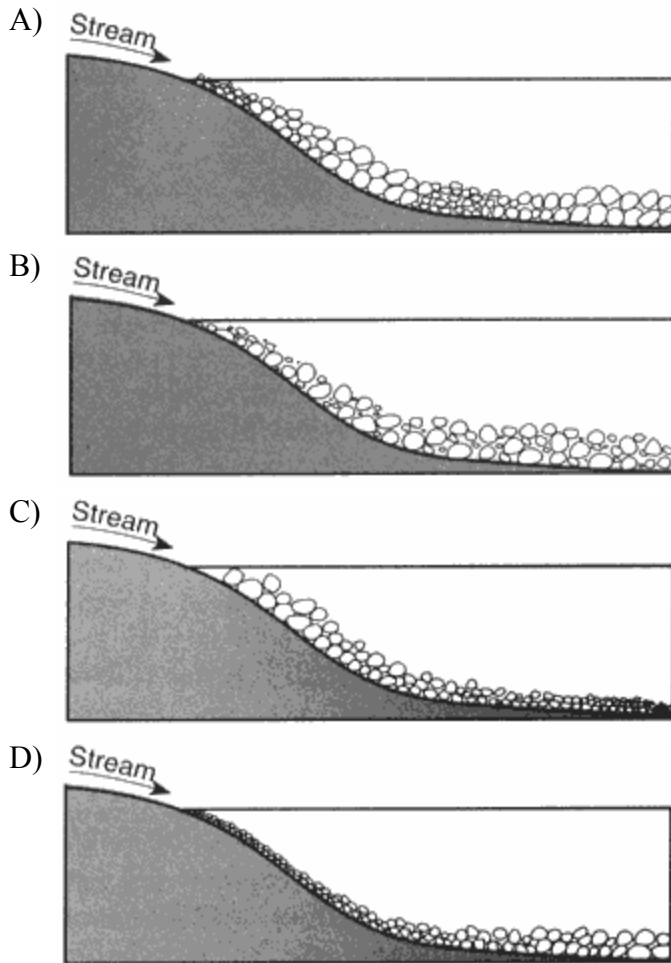
Why does the hematite pebble settle faster than the quartz pebble?

- A) Smaller objects settle faster than larger objects.
- B) Flat objects settle faster than round objects.
- C) Spherical objects have less gravitational attraction than flat objects.
- D) Objects with higher density settle faster than objects with lower density.

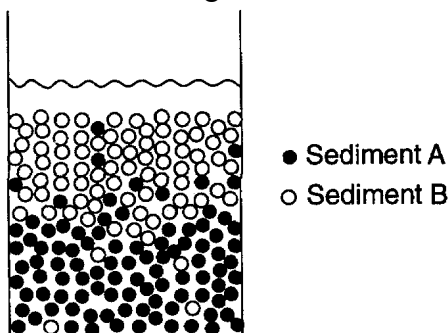
-
13. Base your answer to the following question on the diagram below, which shows a coastal region in which the land slopes toward the ocean. Point *X* is near the top of the hill, point *Y* is at the base of the hill, and point *Z* is a location at sea level. The same type of surface bedrock underlies this entire region. A stream flows from point *X* through point *Y* to point *Z*. This stream is not shown in the diagram.



Which cross section best shows the pattern of sediments deposited by the stream as it enters the ocean near point Z?



14. Particles of sediment A and sediment B were mixed in a container of water. They settled in the pattern shown in the diagram below.



The pattern indicates that, compared to particles of sediment B, particles of sediment A have a

- A) smaller volume B) greater density
C) smaller volume D) rougher texture

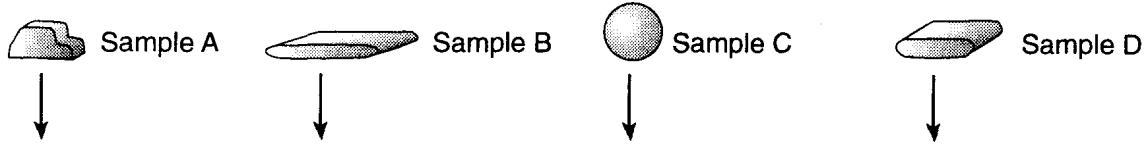
15. How are dissolved materials carried in a river?

- A) in solution
B) in suspension
C) by precipitation
D) by bouncing and rolling

16. A sedimentary particle is dropped into a cylinder of water. The particle will take the longest time to settle if the particle has

- A) low density, small size, and spherical shape
B) low density, small size, and flattened shape
C) high density, large size, and spherical shape
D) high density, large size, and flattened shape

17. Four differently shaped samples of equal mass and density are dropped into still water. The diagrams below indicate the position of each sample as it settles.



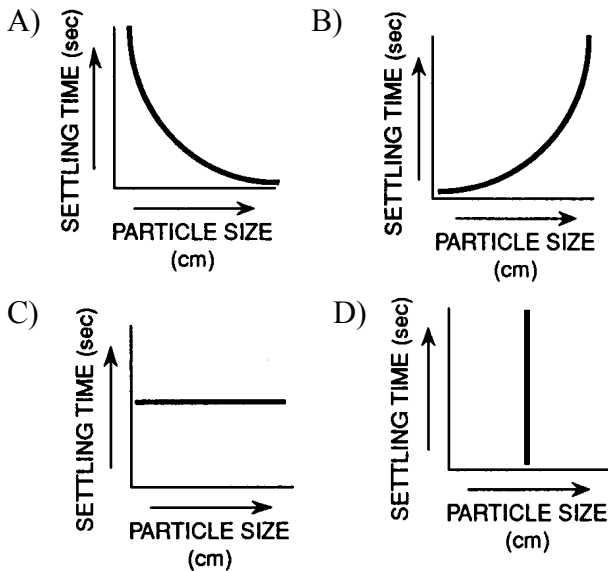
Which graph best shows the relationship of the settling time of the four samples?



18. Which cross-sectional diagram best shows how a mixture of sediment particles of equal density would settle in a still lake?



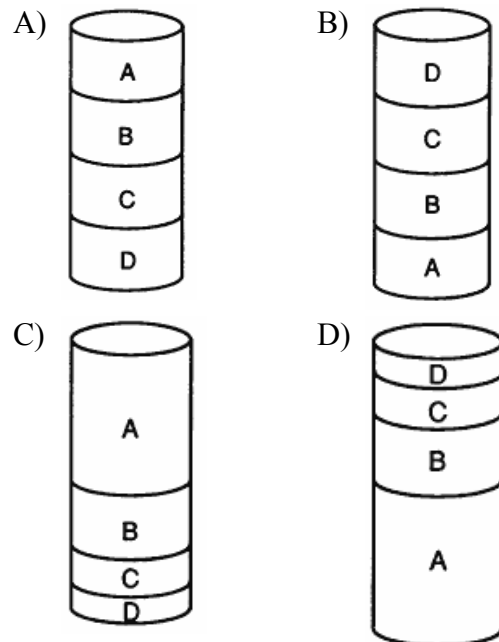
19. A sample of rounded quartz sediments of different particle sizes is dropped into a container of water. Which graph best shows the settling time for these particles?



20. Four different kinds of particles (*A*, *B*, *C*, and *D*) with the same shape and diameter were mixed and poured into a column of water. The mass, volume, and density of the particles are shown below.

Particle	Mass (g)	Volume (cm ³)	Density (g/cm ³)
A	100	67	1.5
B	100	33	3.0
C	100	22	4.5
D	100	17	6.0

Which diagram best shows how the particle beds would be arranged in the column of water after settling?



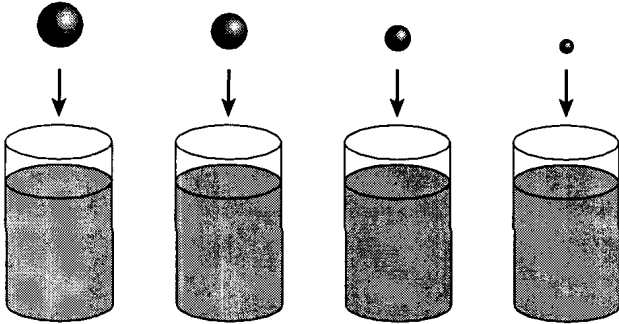
21. When particles of uniform shape and density are dropped into a calm lake, silt will settle faster than

- A) sand
- B) clay
- C) cobbles
- D) pebbles

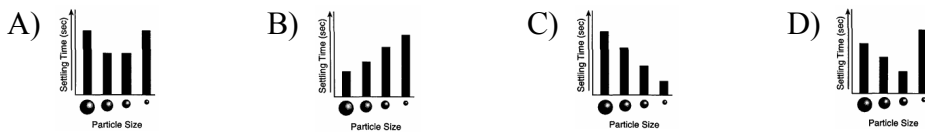
22. Which size particle will remain suspended longest as a river enters the ocean?

- A) pebble B) sand
C) silt D) clay

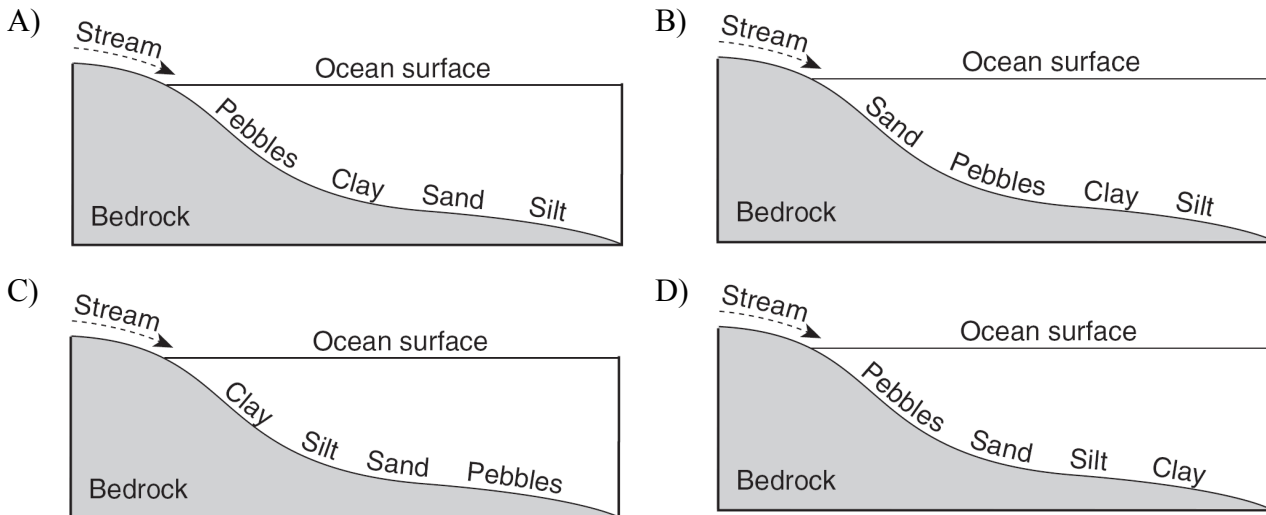
23. The diagram below shows four identical columns containing the same amount of water. Four different-sized spherical particles, made of the same uniform material, are dropped into the columns and settle to the bottom.



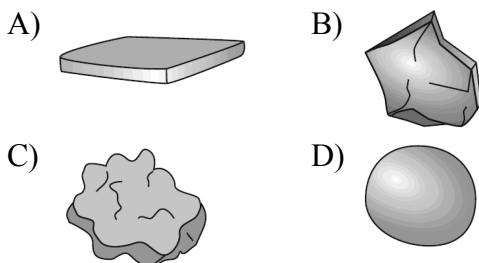
Which graph best shows the relative settling times of the four particles?



24. Which profile best shows the general depositional pattern that occurs when water from a stream enters the ocean?



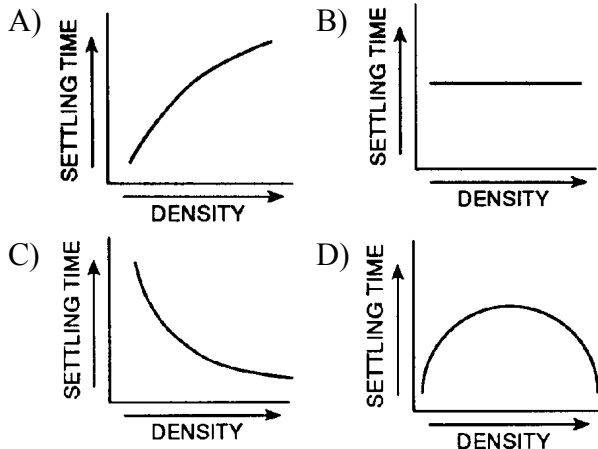
25. Each of the rock particles below has the same density and volume. Which particle will most likely settle at the fastest rate in moving water?



26. When small particles settle through water faster than large particles, the small particles are probably

- A) lighter B) flatter
C) better sorted D) more dense

27. Which graph shows the relationship between the density of particles and their settling time in still water? [Assume that the particles have the same size and shape.]



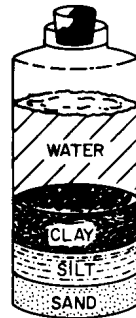
28. Sediment samples *A* through *D* below have the same volume and packing, but contain different percentages of various particle sizes.

- Sample *A*: 75% clay and 25% silt
- Sample *B*: 25% clay and 75% sand
- Sample *C*: 50% pebbles and 50% sand
- Sample *D*: 50% pebbles and 50% cobbles

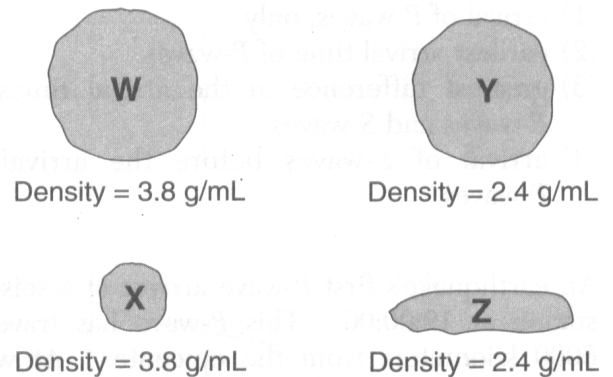
Which sample most likely has the greatest permeability?

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

29. Clay, silt, and sand are added to a jar of water. The jar is shaken and then allowed to stand quietly for a number of hours. The result of this demonstration could be best used as a model to show that



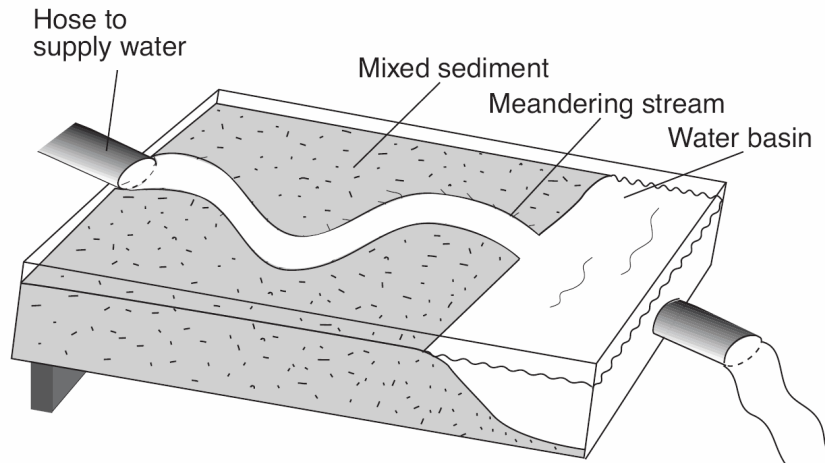
- A) particles with the lowest density settle the fastest
 - B) particles with the largest diameter settle the fastest
 - C) water has a higher specific gravity than clay, silt, and sand
 - D) the bottom layer of a series of sediments is the youngest
30. What is the largest sediment that can be transported by a stream that has a velocity of 125 cm/sec?
- A) cobbles B) pebbles
 - C) sand D) clay
31. A stream is transporting the particles *W*, *X*, *Y*, and *Z*, shown below.



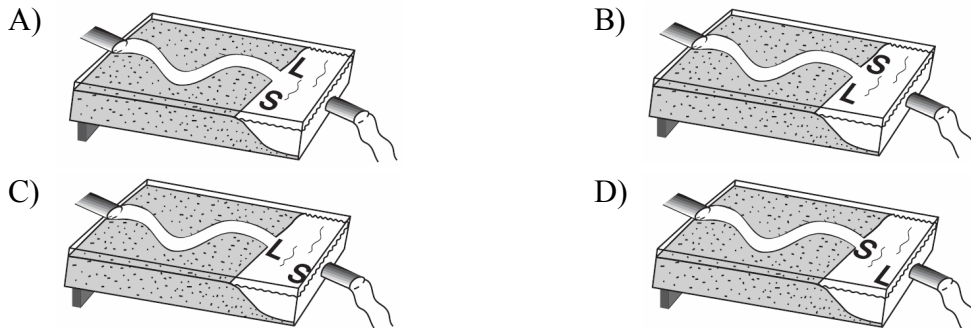
Which particle will most likely settle to the bottom first as the velocity of this stream decreases?

- A) *W* B) *X* C) *Y* D) *Z*

32. Base your answer to the following question on the diagram below, which shows a model used to investigate the erosional-depositional system of a stream. The model was tilted to create a gentle slope, and a hose supplied water to form the meandering stream shown.



Which diagram best represents the arrangement of large, *L*, and small, *S*, sediment deposited as the stream enters the water basin?



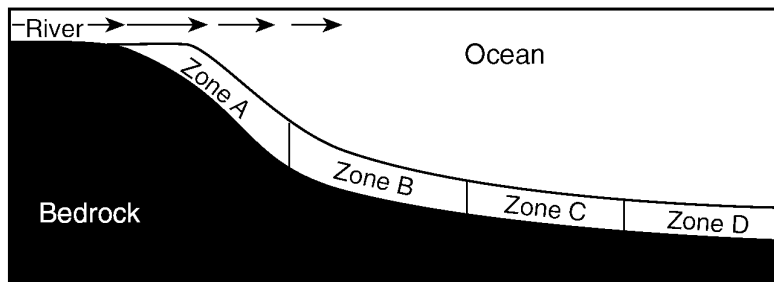
33. When wind and running water gradually decrease in velocity, the transported sediments are deposited

- A) all at once, and are unsorted
- B) all at once, and are sorted by size and density
- C) over a period of time, and are unsorted
- D) over a period of time, and are sorted by size and density.

34. Which characteristics of a particle would usually result in the longest settling time for the particle in calm water?

- A) low density and round shape
- B) low density and flat shape
- C) high density and round shape
- D) high density and flat shape

Base your answers to questions 35 and 36 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

35. 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.

36. The sedimentary rock, siltstone, will most likely form from sediments deposited in zone

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

37. Which statement best describes sediments deposited by glaciers and rivers?

- A) Glacial deposits and river deposits are both sorted.
- B) Glacial deposits are sorted, and river deposits are unsorted.
- C) Glacial deposits are unsorted, and river deposits are sorted.
- D) Glacial deposits and river deposits are both unsorted.

38. Which property would best distinguish sediment deposited by a river from sediment deposited by a glacier?

- A) mineral composition of the sediment
- B) amount of sediment sorting
- C) thickness of sediment layers
- D) age of fossils found in the sediment

39. Compared to a low-density spherical particle, a high-density spherical particle of the same size will sink through water

- A) more slowly
- B) more rapidly
- C) at the same rate

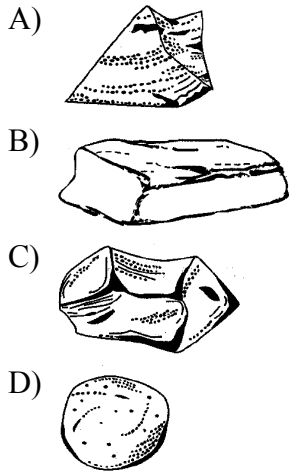
40. The graph below shows the relationship between particle shape and settling rate.



Which statement best describes the relationship shown?

- A) Flatter particles settle more slowly than rounder particles.
- B) Flatter particles settle faster than rounder particles.
- C) All particles settle at the same speed.
- D) Particle shape does not affect settling rate.

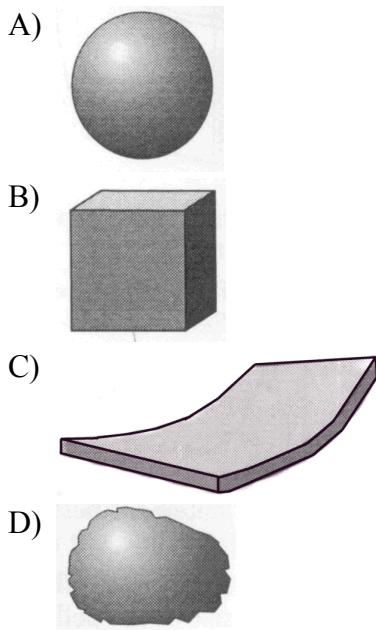
41. Four quartz samples of equal size and shape were placed in a stream. Which of the four quartz samples below has most likely been transported farthest in the stream?



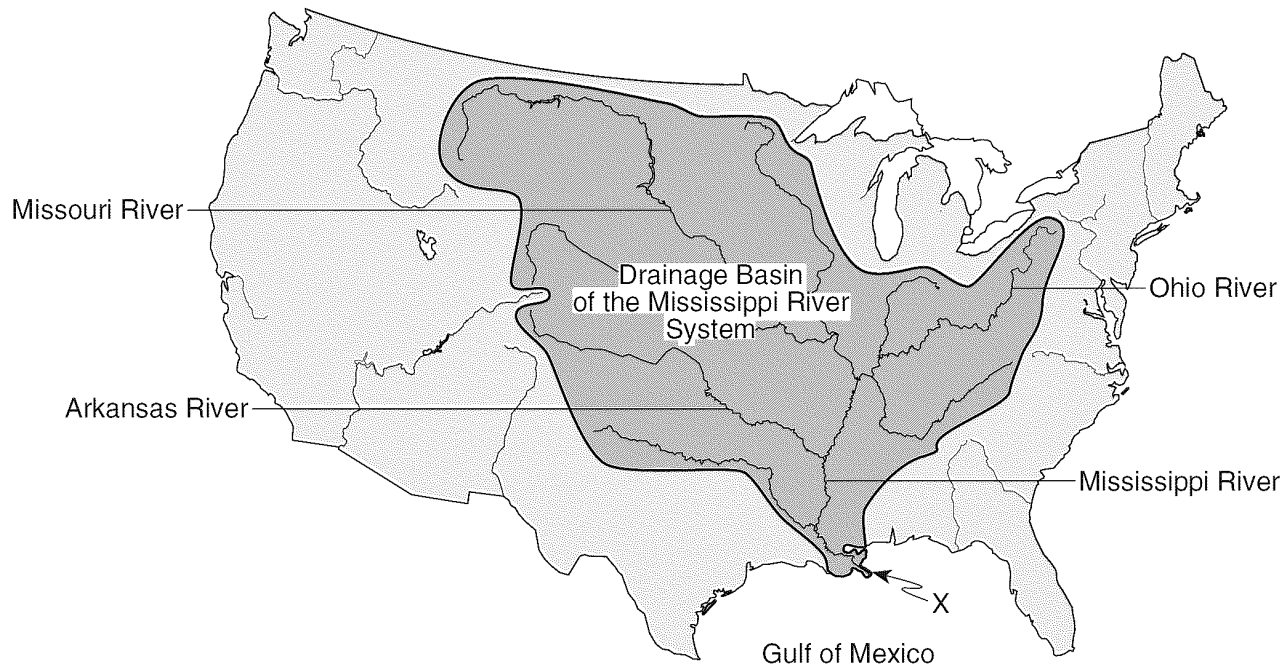
42. Which rock particles will remain suspended in water for the longest time?

- A) pebbles B) sand
C) silt D) clay

43. The four objects below are made of the same material and have the same mass. Which object will settle fastest in calm water?



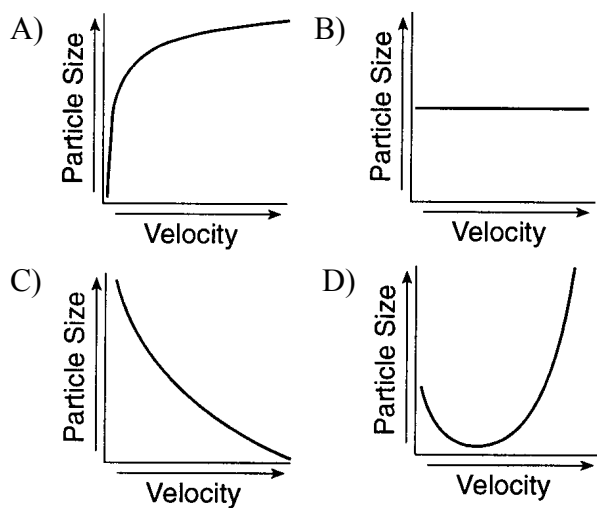
44. Base your answer to the following question on the map below, which shows the drainage basin of the Mississippi River system. Several rivers that flow into the Mississippi River are labeled. The arrow at location *X* shows where the Mississippi River enters the Gulf of Mexico.



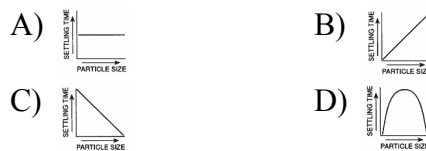
Sediments deposited at location *X* by the Mississippi River most likely have which characteristics?

- A) angular fragments arranged as mixtures
- B) rock particles arranged in sorted beds
- C) rocks with parallel scratches and grooves
- D) high-density minerals with hexagonal crystals

45. Which graph best shows the general relationship between stream velocity and the diameter of particles transported by a stream?



46. In a soil sample, the particles have the same shape but different sizes. Which graph best represents the relationship between particle size and settling time when these particles are deposited in a quiet body of water?

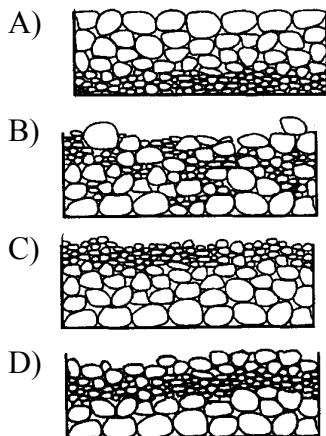


47. The four particles shown in the table below are of equal volume and are dropped into a column filled with water.

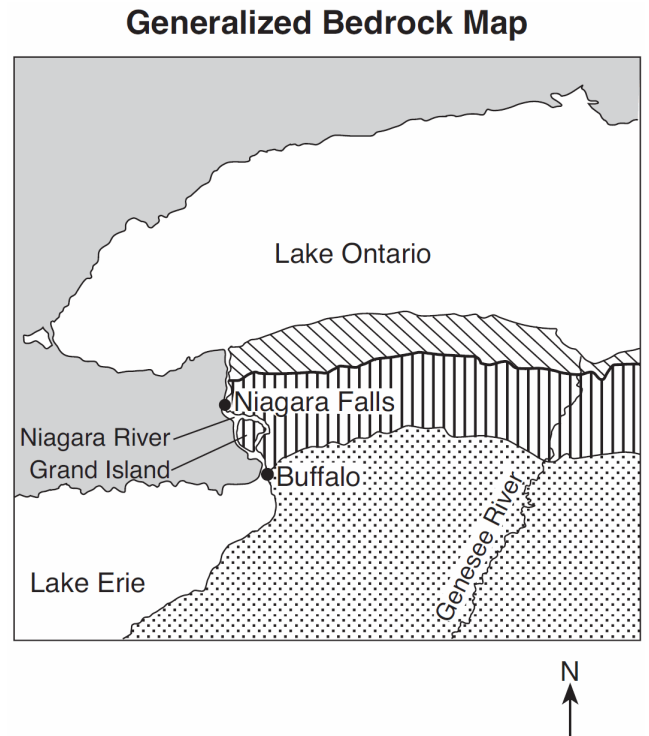
Particle	Shape	Density
A	flat	2.5 g/cm ³
B	flat	3.0 g/cm ³
C	round	2.5 g/cm ³
D	round	3.0 g/cm ³

Which particle would usually settle most rapidly?

- A) A B) B C) C D) D
48. Quartz particles of varying sizes are dropped at the same time into deep, calm water. Which cross section best represents the settling pattern of these particles?



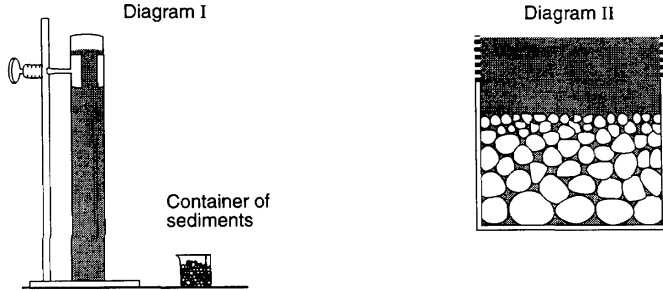
49. Base your answer to the following question on the map below, which shows the generalized bedrock of a part of western New York State.



Sediments that are transported by the Genesee river generally become

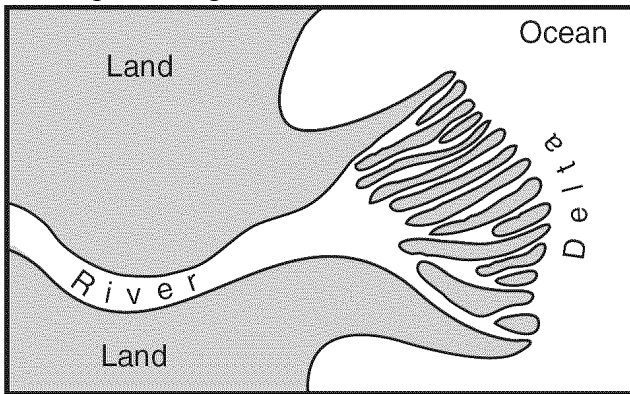
- A) smaller and rounder
 B) smaller and more angular
 C) larger and rounder
 D) larger and more angular

50. Diagram I below shows a laboratory setup for observing the settling pattern in water of sediments composed of the same mineral. When the sediments in the container were poured into the tube of water, they settled to the bottom in the pattern shown in diagram II below. [Diagram II is enlarged to show the sedimentary particles.]

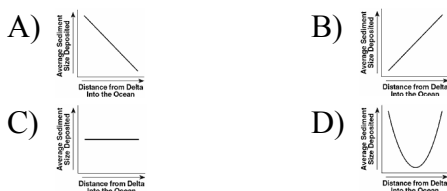


Which characteristic of the sedimentary particles most likely caused the pattern of deposition shown in diagram II?

- A) particle shape
 B) particle size
 C) particle composition
 D) particle density
51. The map below shows a river emptying into an ocean, producing a delta.



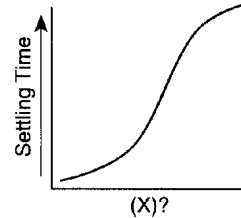
Which graph best represents the relationship between the distance from the river delta into the ocean and the average size of sediments deposited on the ocean floor?



52. The velocity of a stream is decreasing. As the velocity approaches zero, which size particle will most likely remain in suspension?

- A) clay
 B) pebble
 C) sand
 D) boulder

53. The graph below is incomplete because it does not identify the sediment characteristic (X) that would produce the line plotted on the graph.

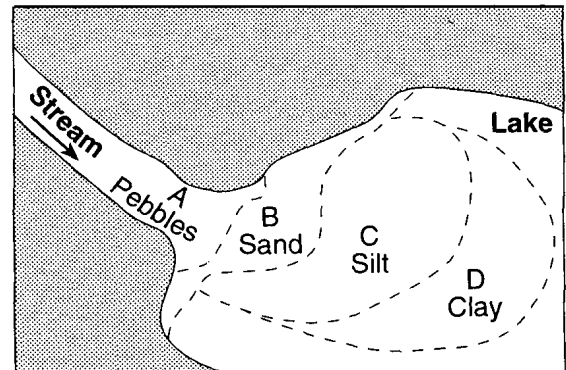


Which label should be placed on the horizontal axis to accurately complete the graph?

- A) Low → High Particle Density
 B) Small → Large Particle Size
 C) Light → Heavy Particle Mass
 D) Round → Flat Particle Shape

54. The map below shows the sizes of sediments deposited in different locations within a stream and lake. A sample of sediments taken from one location consists mostly of particles that are approximately 0.4 centimeter in diameter.

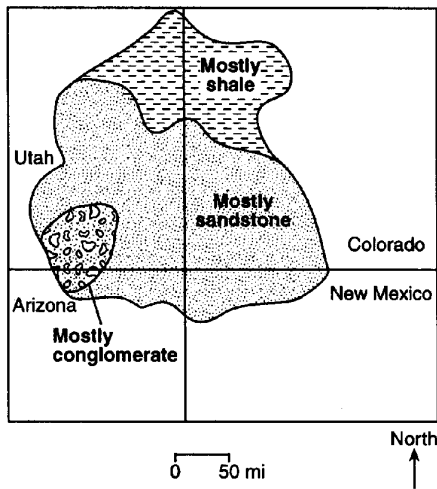
From which location was the sample most likely collected?



From which location was the sample most likely collected?

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

55. The map below shows the surface bedrock in an area of the southwestern United States that formed from sediments deposited in a shallow sea that formerly existed in that area. These sediments were transported by a river that flowed into the sea.



In which diagram does the arrow best show the direction of flow of the river that deposited these sediments and the point at which the river emptied into the sea?

