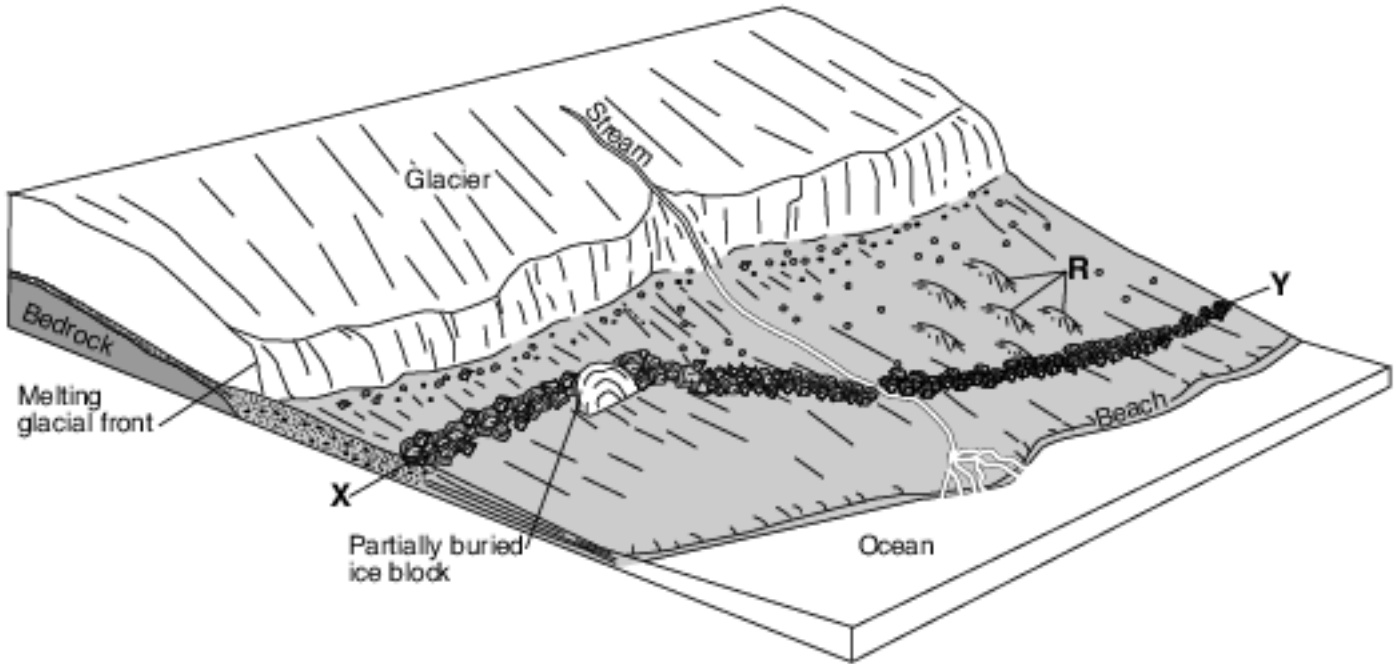


## Patterns Of Deposition And Formation Of Sedimentary Rocks

Base your answers to questions 1 on the diagram below, which 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.



1 The ridge of sediments from X to Y can best be described as

- |                                       |   |
|---------------------------------------|---|
| (1) sorted and deposited by ice       | (3) unsorted and deposited by ice       |
| (2) sorted and deposited by meltwater | (4) unsorted and deposited by meltwater |

- 2 The satellite photograph below shows the Mississippi River entering into the Gulf of Mexico. Arrows show the direction of river flow.



This depositional feature in the Gulf of Mexico is best identified as

- (1) a delta
- (2) a sandbar
- (3) a barrier island
- (4) an outwash plain

Base your answers to questions 3 on the reading passage below and on your knowledge of Earth science.

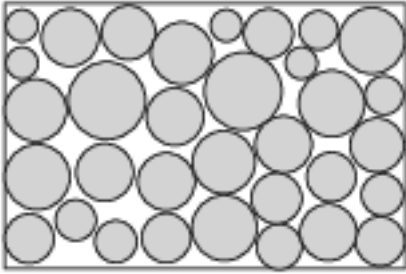
### Roche Moutonnée

A roche moutonnée is a glacial landscape feature produced as an advancing glacier slides over a hill of surface bedrock. As the glacier advances up the side of the hill, the surface bedrock is abraded and smoothed by rock fragments carried within the base of the glacial ice, creating a more gentle hillslope. As the glacier advances down the opposite side of the hill, chunks of bedrock are broken off and removed by the ice, a process called glacial quarrying (plucking), making this side of the hill steeper. The resulting hill resembles a drumlin, except it is often smaller and is composed of solid bedrock.

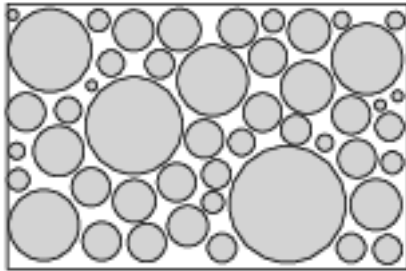
- 3 A drumlin differs from a roche moutonnée because a drumlin is
- (1) formed by glaciers
  - (2) dome shaped
  - (3) deposited by glacial meltwater
  - (4) composed of loose sediments

4 Which diagram best represents sediments with the greatest degree of sorting by size?

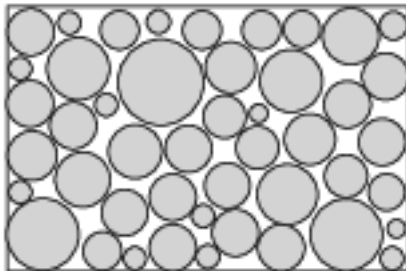
(1)



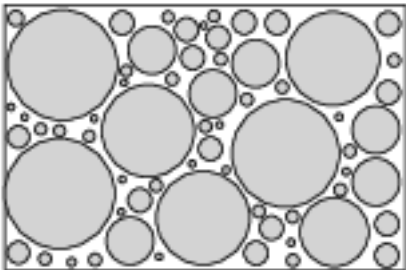
(2)



(3)



(4)



- 5 The photograph below shows a depositional feature located near the shore of Texas. Letter X represents a location on this feature.



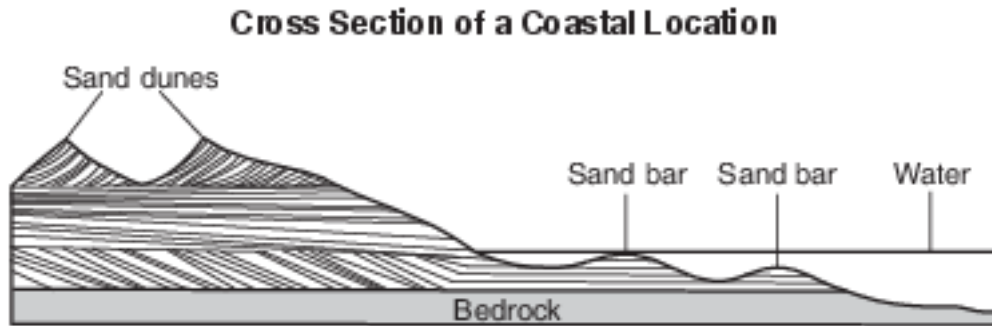
www.texasbeyondhistory.net

On which depositional feature is location X found?

- |                      |                  |
|----------------------|------------------|
| (1) an island arc    | (3) a drumlin    |
| (2) a barrier island | (4) a floodplain |
- 6 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
- |                          |                          |
|--------------------------|--------------------------|
| (1) rounded and sorted   | (3) angular and sorted   |
| (2) rounded and unsorted | (4) angular and unsorted |
- 7 An elongated hill that is composed of unsorted sediments deposited by a glacier is called
- |               |                      |
|---------------|----------------------|
| (1) a delta   | (3) a sand dune      |
| (2) a drumlin | (4) an outwash plain |

- 8 When wind and running water gradually decrease in velocity, the transported sediments are deposited
- (1) all at once, and are unsorted
  - (2) all at once, and are sorted by size and density
  - (3) over a period of time, and are unsorted
  - (4) over a period of time, and are sorted by size and density

9 The cross section below represents two types of sorted-sand depositional features found at a coastal location.



Which table correctly pairs these depositional features with the agents of erosion that formed them?

(1)

| Depositional Feature | Agent of Erosion |
|----------------------|------------------|
| sand dune            | mass movement    |
| sand bar             | wind             |

(3)

| Depositional Feature | Agent of Erosion |
|----------------------|------------------|
| sand dune            | mass movement    |
| sand bar             | glaciers         |

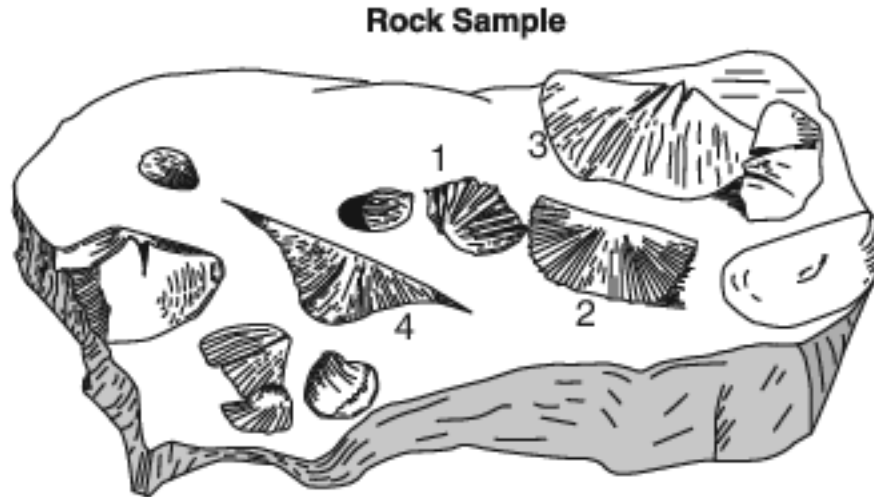
(2)

| Depositional Feature | Agent of Erosion |
|----------------------|------------------|
| sand dune            | glaciers         |
| sand bar             | waves            |

(4)

| Depositional Feature | Agent of Erosion |
|----------------------|------------------|
| sand dune            | wind             |
| sand bar             | waves            |

Base your answers to questions 10 on the diagram and tables below. The diagram shows a rock sample containing fossils from a location in New York State at 42° N 78° 15' W. Fossils 1, 2, 3, and 4 are labeled. Table A lists the names and rock types of the New York State rock units from the Middle and Late Devonian in this area. The presence of fossil 1, 2, 3, or 4 in a rock unit is indicated by an X in the fossils column in the table. Table B identifies typical rocks formed within different marine (ocean) environments.



**Table A: New York State Rock Units in Area Where the Rock Sample was Found**

| Geologic Age:<br>Devonian | Name of Rock Unit | Type of Rock Found in Unit            | Fossils |   |   |   |
|---------------------------|-------------------|---------------------------------------|---------|---|---|---|
|                           |                   |                                       | 1       | 2 | 3 | 4 |
| Late                      | Conewango         | shales and sandstones                 | X       | X |   | X |
| Late                      | Conneaut          | shales and sandstones                 | X       | X |   | X |
| Late                      | Canadaway         | shales and sandstones                 | X       | X | X | X |
| Late                      | West Falls        | shales and sandstones                 | X       | X | X |   |
| Late                      | Sonyea            | shale                                 | X       | X | X |   |
| Late/Middle               | Genesee           | shale                                 | X       | X |   |   |
| Middle                    | Tully             | limestone                             | X       | X |   |   |
| Middle                    | Hamilton          | limestone                             | X       | X |   |   |
| Middle                    | Onondaga          | limestone (includes volcanic ash bed) |         | X |   |   |

**Table B: Sedimentary Rock Types Formed in Different Marine Environments**

| Sedimentary Rocks                           | Marine Environment       |
|---|--------------------------|
| limestones                                  | clear, shallow water     |
| gray shales                                 | muddy, oxygen rich       |
| black shales                                | muddy, oxygen poor       |
| siltstones and sandstones                   | silty to sandy bottom    |
| evaporites                                  | very salty, shallow seas |
| coarse-grained sandstones and conglomerates | tidal shores and deltas  |

- 10 On the map in the image provided, place an X at the location where this rock sample was collected. [1]



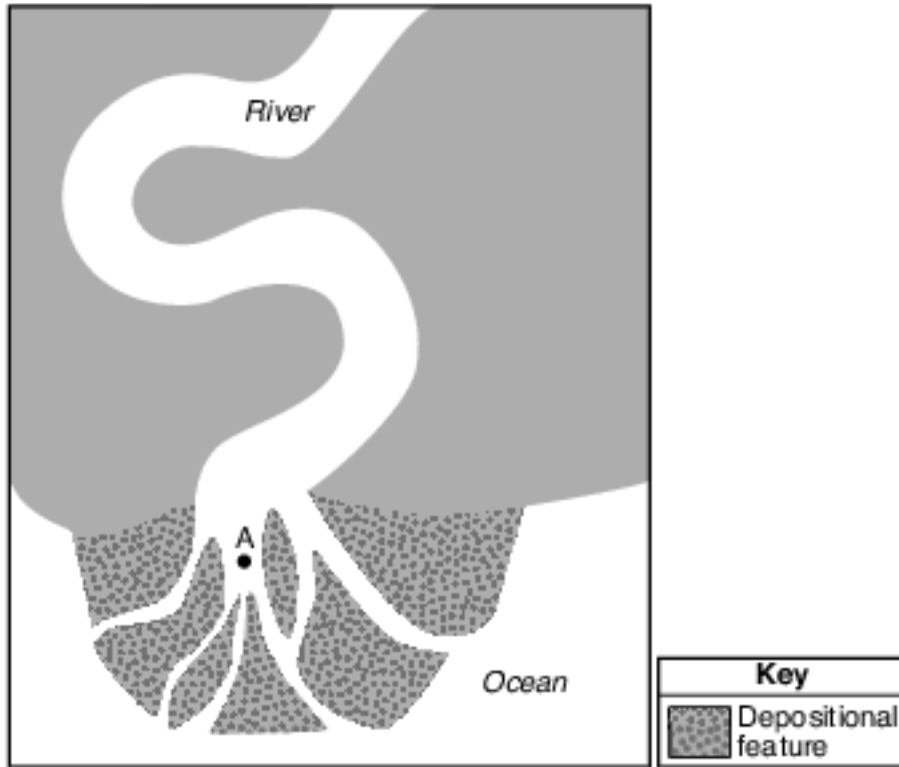
Base your answers to questions 11 on the photograph below and on your knowledge of Earth science. The photograph shows a glacier located in the Chugach Mountains of Alaska. Letter A indicates a moraine. The glacier previously flowed down the entire valley. The lower portion of this valley is now occupied by a stream. Letter B represents a location within the stream.



11 Describe the arrangement of sediments found within the moraine indicated by letter A. [1]

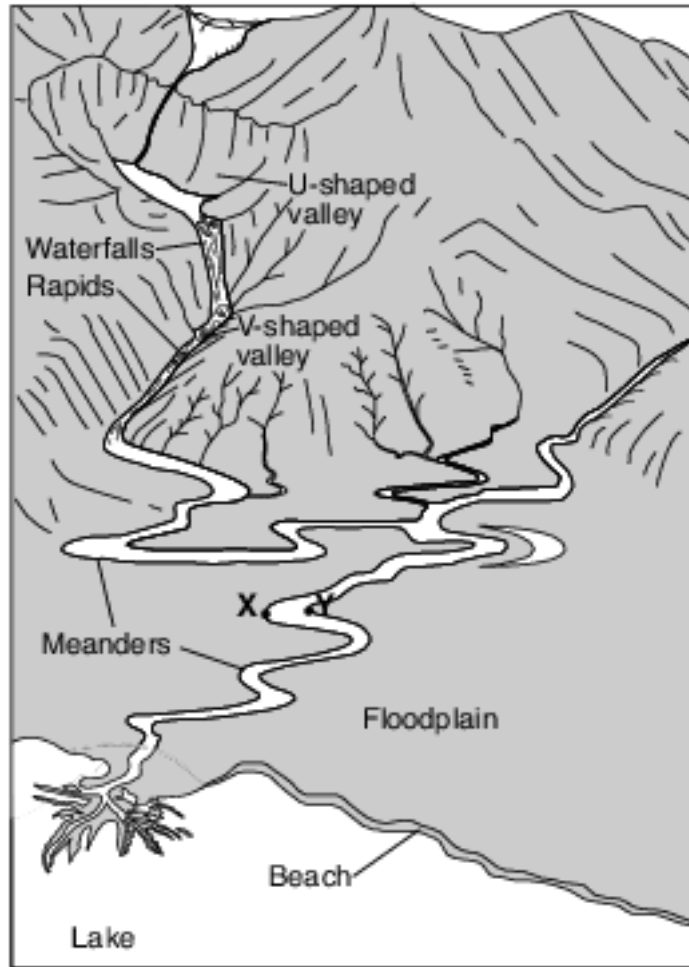


Base your answers to questions 12 on the map below and on your knowledge of Earth science. The map shows a river and a depositional feature at an ocean shoreline. Point A indicates a location on Earth's surface.



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

Base your answers to questions 13 on the diagram below, which shows several different landscape features. Points X and Y indicate locations on the streambank.



13 Identify which point, X or Y, has more stream erosion and explain why the amounts of erosion are different. [1]

Point:

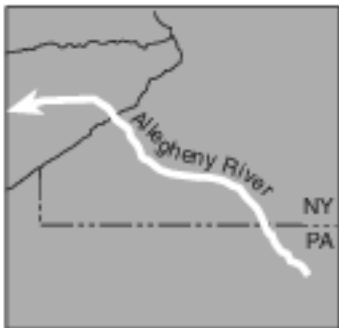
Explanation:

Base your answers to questions 14 on the maps below. The southwest corner of the New York State map below is enlarged in maps I, II, and III. Arrows on maps I, II, and III show the location and direction of flow for part of the Allegheny River at different times during the Cenozoic Era. The present boundaries of New York State and Lake Erie are shown on each map. Point A on map III represents a location in New York State.

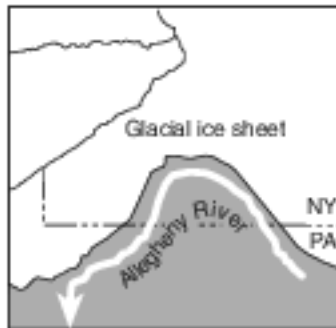


**Course of the Allegheny River**

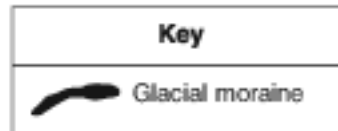
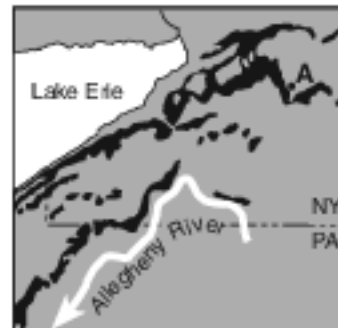
**Map I**  
During the Neogene Period



**Map II**  
22,000 Years Ago

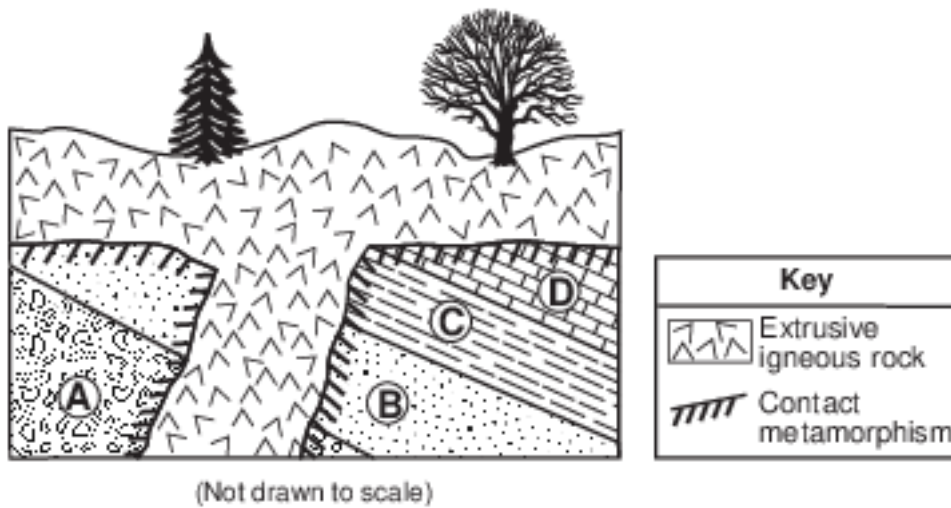


**Map III**  
Present Day



- 14 Identify the present-day feature that prevents the Allegheny River from returning to its earlier (Neogene) direction of flow to the northwest. [1]

Base your answers to questions 15 on the cross section below and on your knowledge of Earth science. The cross section represents a portion of Earth's crust. Letters A, B, C, and D indicate sedimentary rock layers that were originally formed from deposits in a sea. The rock layers have not been overturned.



- 15 Describe one piece of evidence that suggests that rock layer C formed in a deeper sea environment than did rock layer A. [1]

**Answer Keys**

- 1 3
- 2 1
- 3 4
- 4 1
- 5 2
- 6 4
- 7 2
- 8 4
- 9 4

- 10 Allow 1 credit if the center of an X is placed within the circled area shown on the map below.
- Note: It is recommended that an overlay of the same scale as the student answer booklet be used
  - to ensure reliability in rating.
  -



- 11 Allow 1 credit. Acceptable responses include, but are not limited to:
- — unsorted
  - — unlayered
  - — mixed
- 12 Allow 1 credit for delta or river delta.

- 13 Allow 1 credit for X and a correct explanation. Acceptable explanations include, but are not limited to:
- — Point X is on the outside of a meander curve.
  - — Stream velocity is greater at point X.
  - — More deposition occurs at Y.
- 14 Allow 1 credit. Acceptable responses include, but are not limited to:
- — glacial deposits
  - — moraines
  - — ridges of glacial sediments
- 15 Allow 1 credit. Acceptable responses include, but are not limited to:
- — The grain size of rock layer C is smaller.
  - — Smaller sediment is deposited in deeper water.
  - — Shale is made of clay-sized particles/clay.
  - — Rock layer A contains larger sediments.