

Name: _____

Date: _____ Period: _____

Surface Processes

Regents: Earth Science

Class Notes: Surface Processes

In this unit we will investigate surface processes and the mechanisms that help shape our planet Earth. We will also focus on agents of erosion and be able to identify their different geologic features. Moreover, this unit will revisit sedimentary rocks and see how the sediments produced during weathering factor into the formation of the different rocks.

I. Weathering, Erosion, and Deposition

- Weathering - _____

- Sediments - _____

- Weathering occurs when rocks are exposed to:
 - _____
 - _____
 - _____
- Chemical Weathering - _____

 - The rate of chemical weathering increases in _____ and _____ climates
- Oxidation - _____

- Effects of Water on Rock
 - Sometimes called the _____, because given enough time water can dissolve nearly everything
 - Water can combine with _____ to form carbonic acid
 - Carbonic acid can dissolve most rock --- especially _____
- Physical Weathering - _____

• Abrasion - _____

• Characteristics: _____

• Occurs as sediment are moved by ice, running water, gravity, or air

• Frost Action - _____

• Water _____ cracks in the bed rock and when it freezes it expands _____ causing the rock to split apart

• Infiltration - _____

• Plant Root Growth - _____

• Abrupt Temperature Changes - _____

• After rocks are broken up from weathering they need to be moved

• Erosion - _____

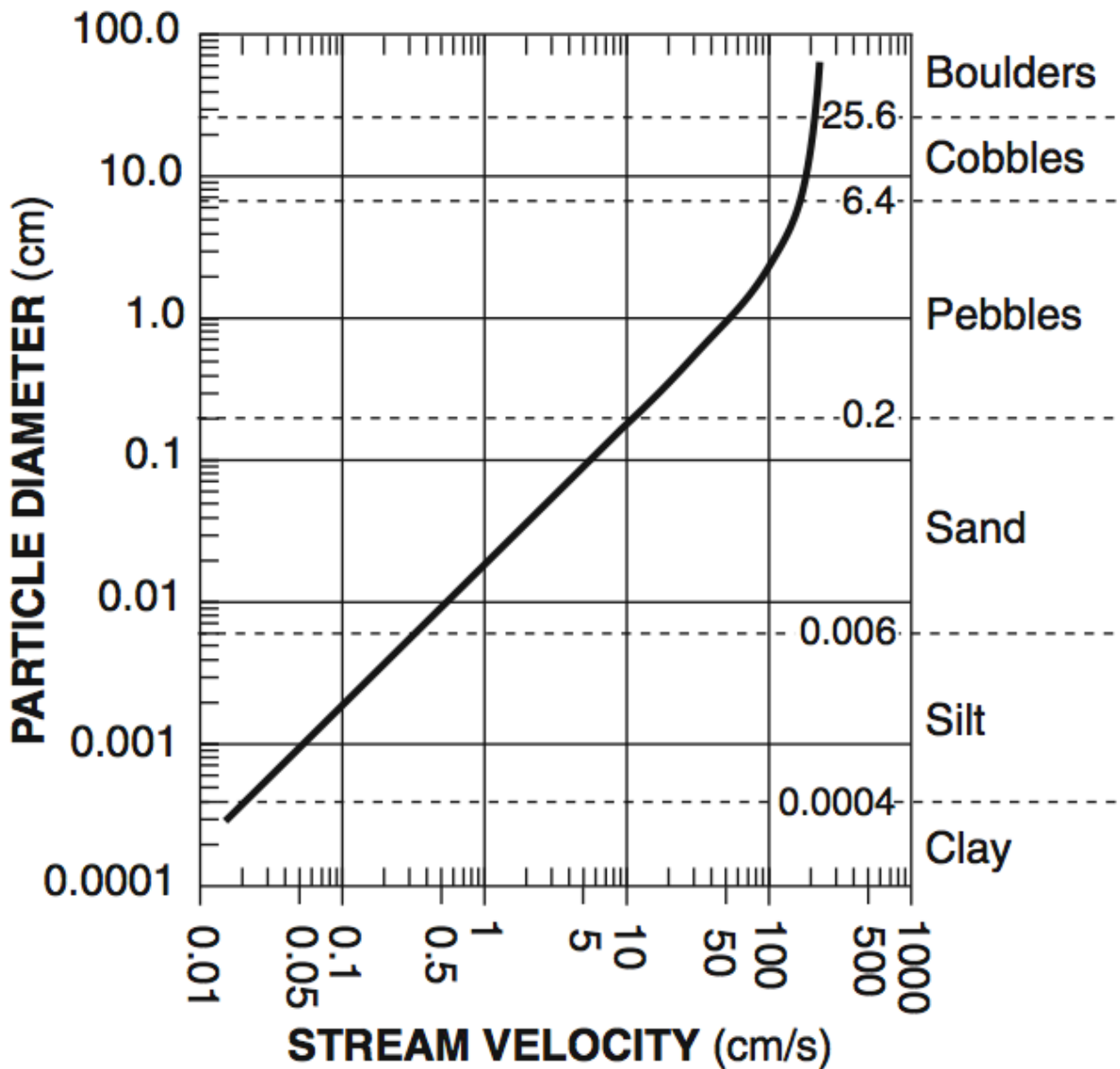
• Over time erosion helps _____ and _____ all surface features

• Agents of Erosion - _____

• Examples of Agents of Erosion:

- _____
- _____
- _____
- _____
- _____

- Gravity --- _____
 - Force behind most agents of erosion
 - Causes rivers to flow, ice to move, and rocks to slide
- The Sun --- _____
 - Drives the water cycle which produces rain and ice
 - Fuels winds and drives ocean currents



- Deposition - _____

- Sediments are deposited in locations where they form layers of sedimentary rock
- The sediment determines how fast they are deposited
 - Size - _____

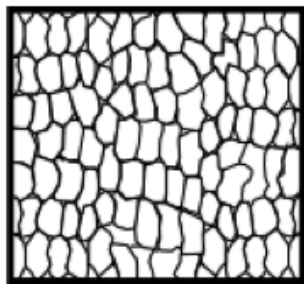
 - Shape - _____

 - Density - _____

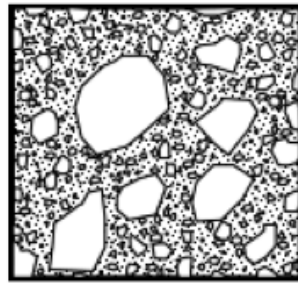
- Sorted Sediment - _____

- Example: deposition from a stream
- Unsorted Sediment - _____

- Example: deposition from a glacier

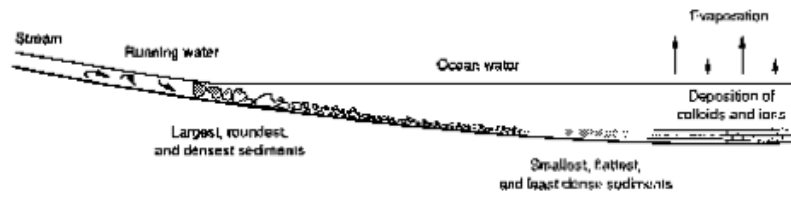


Sorted Sediment



Unsorted Sediment

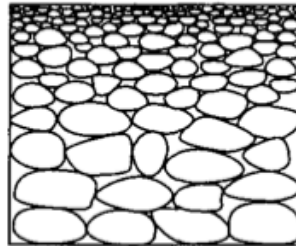
• Horizontal Sorting - _____



- Size, roundness, and density gradually _____ as water velocity decreases when you move farther out

• Vertical Sorting - _____

- Example: as a stream slows down throughout the year it can no longer transport larger material and begins to deposit the sediments according to size order



II. Running Water

- Running water is the most common agent of erosion
- Stream - _____

- Tributary - _____

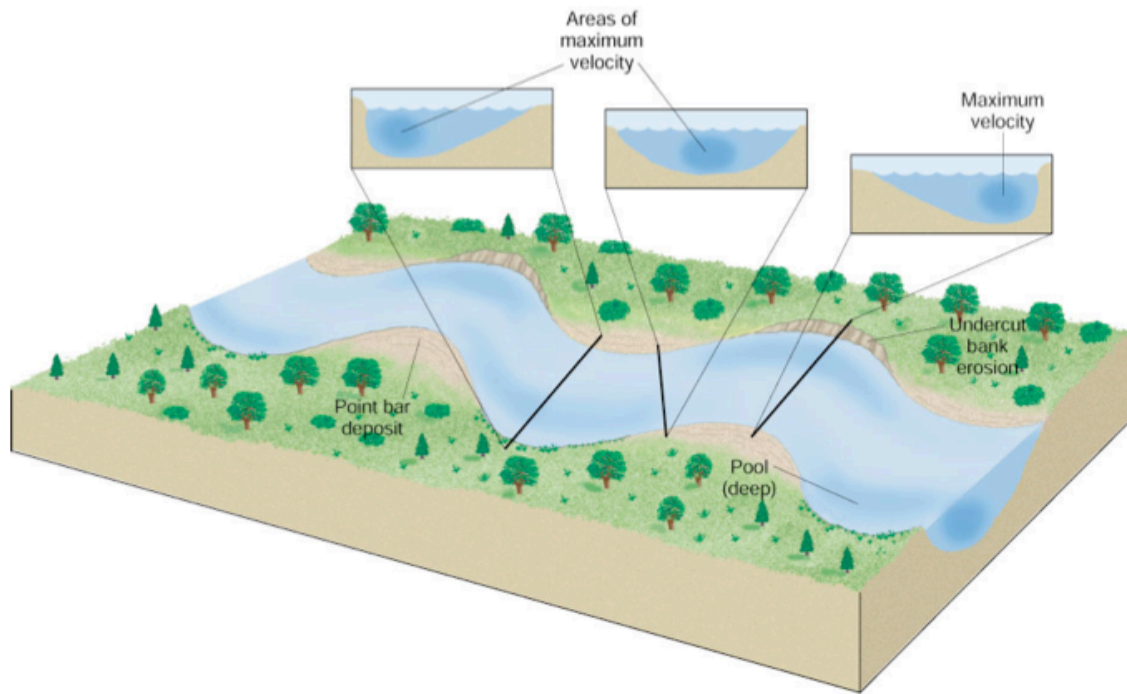
- Flood Plain - _____

- Levee - _____

- Stream carry sediment in various ways:
 - _____
 - _____
 - Larger particles are usually carried by _____, _____
_____ along the stream bottom
- Stream Velocity - _____
 - Gradient - _____
 - Discharge - _____

 - Channel Shape - _____

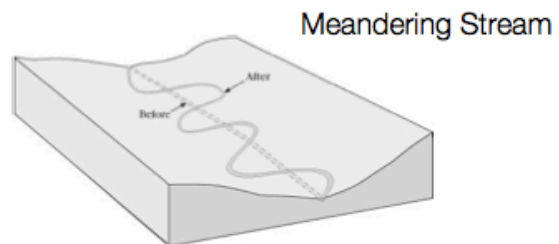
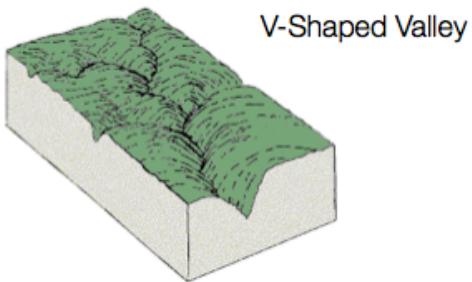
- Variations in Stream Velocity:
 - When a stream channel is straight the greatest velocity is in the _____
 - When a stream channel curves the greatest velocity is on the _____
of the curve



• Stream Characteristics:

- V-Shaped Valley - _____

- Meanders - _____



III. Glaciers

- Glacier - _____

- Glacier Movement:
 - As snow and ice _____ the glacier moves _____
under its own mass and the pull of gravity
 - Sometimes called a " _____ " glaciers act like fluids
and flow in a _____ motion
- Types of Glaciers:
 - Continental Glacier - _____

 - Valley Glacier - _____

- Glacial Features:
 - U-Shaped Valleys - _____

 - Erratics - _____

 - Drumlins - _____

 - Eskers - _____

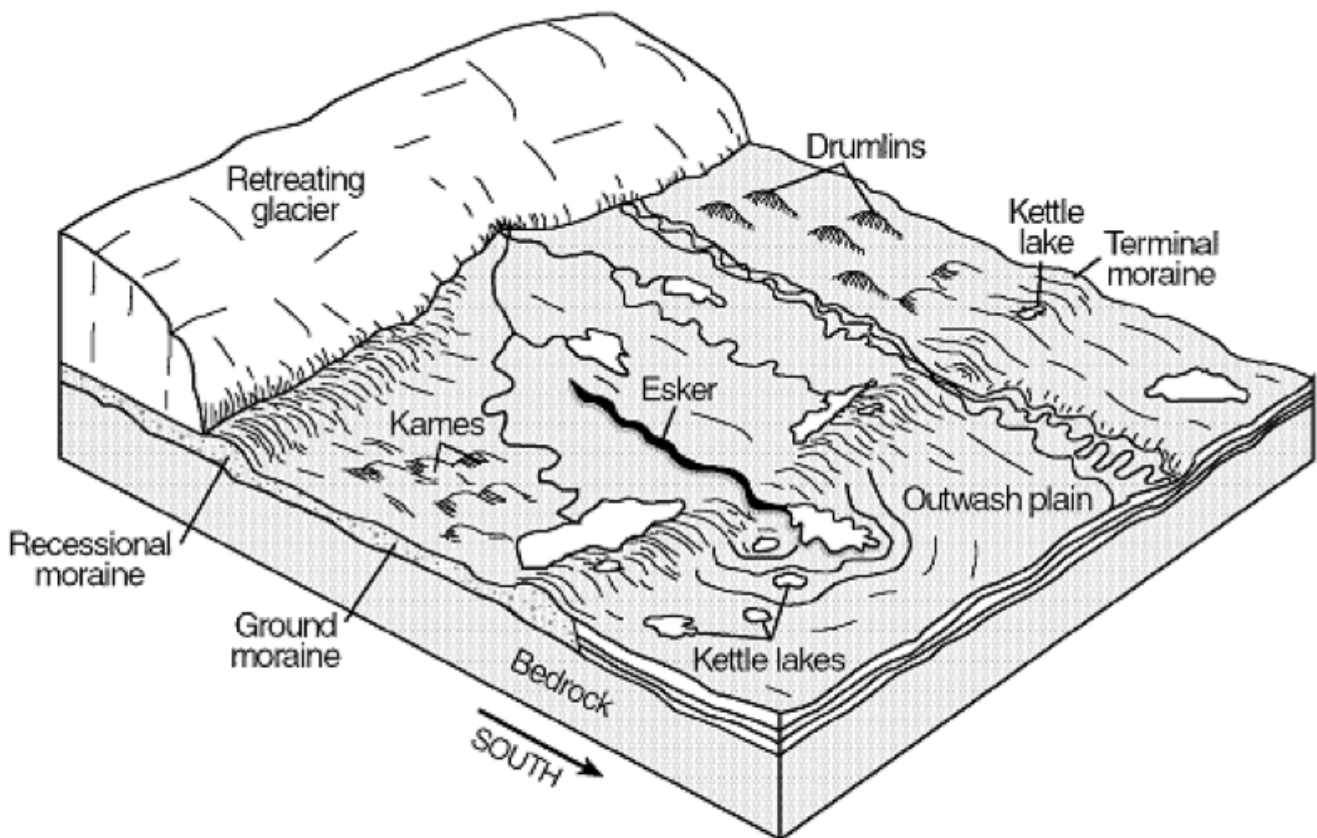
 - Terminal Moraines - _____

- Glacial Grooves - _____

 - The grooves indicate the direction the glacier has traveled
- Kettle Lake - _____

 - Example: Lake Ronkonkoma
- Outwash Plain - _____

 - Example: Southern Long Island



IV. Mass Movement, Waves, & Wind

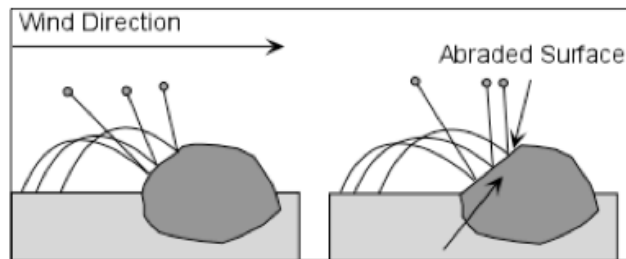
- Mass Movement - _____

 - Characteristics: unsorted sediment
 - Mass Movement Examples:
 - _____
 - _____
 - _____
- The sediment determines how fast they are deposited
 - Gravity - _____

 - Friction - _____

- When rain weakens the force of friction gravity then pulls rock and sediment down a slope
- Wind - _____

 - Wind picks up loose sediment such as sand and silts and carries them to a new location
- Deflation - _____

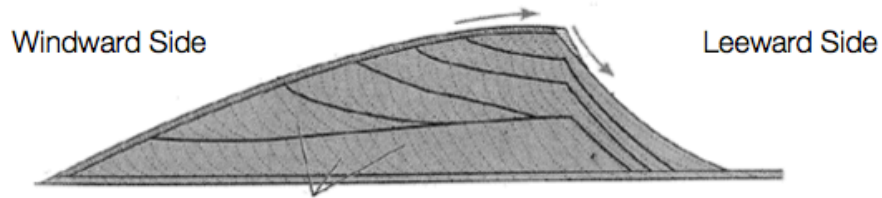


• Abrasion - _____

• Sand Dune - _____

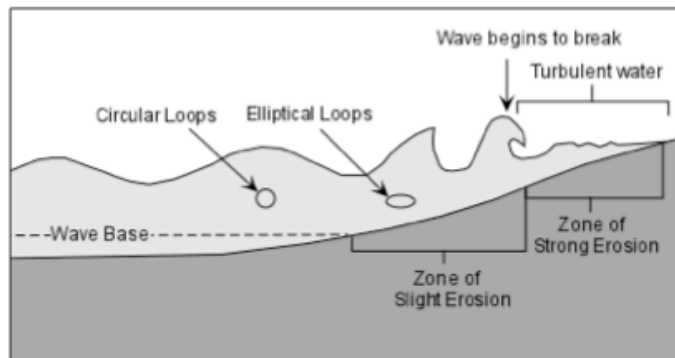
• Windward Side: _____

• Leeward Side: _____



Waves - _____

- As _____ pushes a wave toward the shore, it drags along the bottom of the ocean floor
- The dragging slows the bottom of the wave, but the top continues at the same speed
- Eventually the wave becomes unstable and “_____”



- Waves approach the shore at an angle, but retreat parallel to the shore, creating a zigzag pattern
- Long Shore Current - _____

V. NYS Landscapes

- New York State contains many different landscape regions characterized by different elevation and rock types
 - High Elevations: _____
 - Medium Elevations: _____
 - Low Elevations: _____

- Atlantic Coastal Plain - landscape region formed during the Cretaceous and Pleistocene
 - Composition: _____
 - Elevation: _____

- Manhattan Prong - landscape region formed during the Cambrian and Ordovician
 - Composition: _____
 - Elevation: _____

- Hudson Highlands / Taconic Mountains - landscape region formed during the middle of the Proterozoic
 - Composition: _____
 - Elevation: _____

- Hudson / Mohawk Lowlands - landscape region formed during the Ordovician
 - Composition: _____
 - Elevation: _____

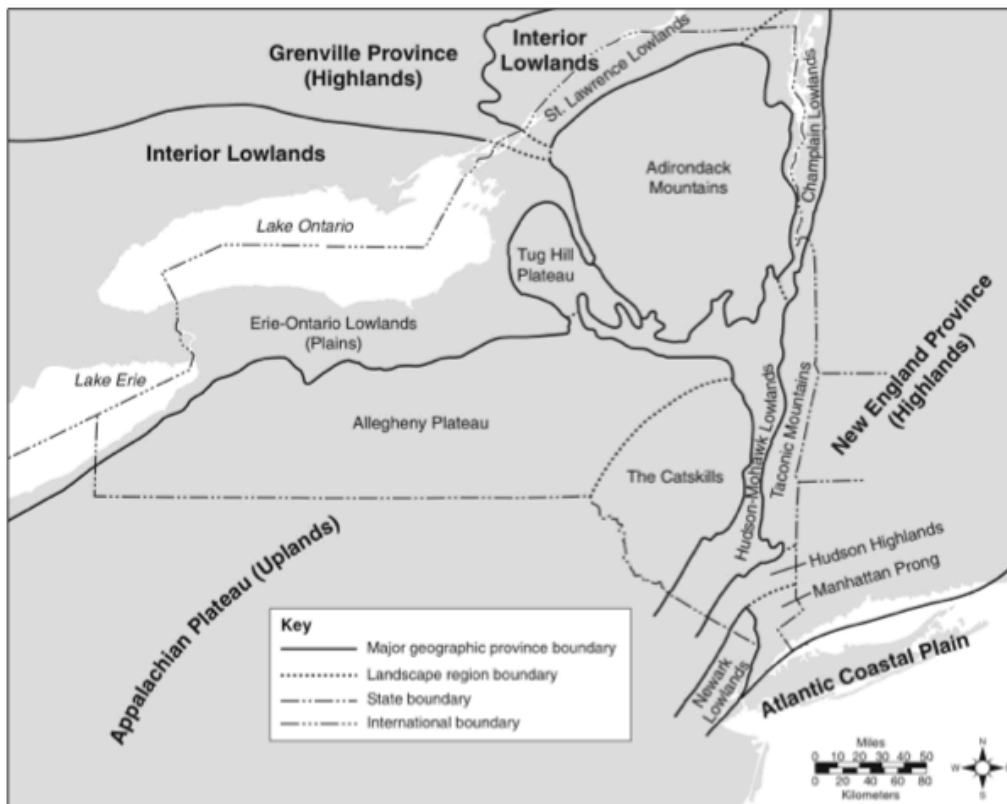
- Adirondack Mountains - landscape region formed during the middle of the Proterozoic Cambrian
 - Composition: _____
 - Elevation: _____

- Tug Hill Plateau - landscape region formed during the Ordovician
 - Composition: _____
 - Elevation: _____

- Erie-Ontario Lowlands - landscape region formed during the Silurian
 - Composition: _____
 - Elevation: _____

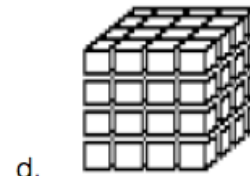
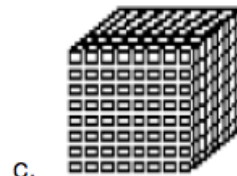
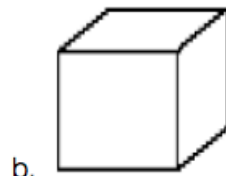
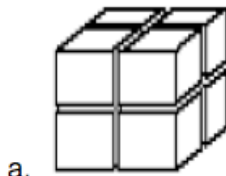
- St. Lawrence Lowlands - landscape region formed during the Ordovician and Cambrian
 - Composition: _____
 - Elevation: _____

- Allegheny Plateau / Catskills - landscape region formed during the Devonian
 - Composition: _____
 - Elevation: _____



Worksheet: Weathering, Erosion, and Deposition

- Which is the best example of physical weathering?
 - the cracking of rock caused by the freezing and thawing of water
 - the transportation of sediment in a stream
 - the reaction of limestone with acid rainwater
 - the formation of a sandbar along the side of a stream
- A large rock is broken into several smaller pieces. Compared to the rate of weathering of the large rock, the rate of weathering of the smaller pieces is
 - the same
 - less
 - greater
- Which change in the climate of New York State would most likely cause the greatest increase in chemical weathering of local bedrock?
 - lower humidity in winter
 - greater precipitation in summer
 - lower temperature in winter
 - higher atmospheric pressure in summer
- Four samples of the same material with identical composition and mass were cut as shown in the diagrams below. When subjected to the same chemical weathering, which sample will weather at the fastest rate?



- Which is the best evidence that erosion has occurred?
 - a large number of fossils embedded in limestone
 - a soil rich in lime on top of a limestone bedrock
 - sediments found in a sandbar of a river
 - a layer of basalt found on the floor of the ocean
- For which movement of earth materials is gravity not the main force?
 - snow tumbling in an avalanche
 - moisture evaporating from an ocean
 - boulders carried by a glacier
 - sediments flowing in a river

7. Which sediment is the largest that could be carried by a stream flowing at a velocity of 100 cm/sec?
 - a. sand
 - b. cobbles
 - c. silt
 - d. pebbles

8. What can a stream flowing at a velocity of 100 cm/sec can transport?
 - a. silt, sand, and pebbles, but not cobbles
 - b. silt, but not sand, pebbles, or cobbles
 - c. silt, sand, pebbles, and cobbles
 - d. silt and sand, but not pebbles or cobbles

9. As the gradient of a stream increases, the stream's ability to carry sediment
 - a. decreases
 - b. increases
 - c. remains the same

10. A glass sphere and a lead sphere have the same volume. Each sphere is dropped into a container of water. Which statement best explains why the lead sphere settles faster?
 - a. The lead sphere has a higher density.
 - b. The lead sphere takes up less space.
 - c. The glass sphere has more surface area.
 - d. The glass sphere has a smoother surface.

11. The sediment deposited in each bed is best described as
 - a. sorted mainly according to particle shape
 - b. a mixture of sorted and unsorted particles
 - c. sorted mainly according to particle size
 - d. showing no evidence of sorting

12. Which rock particles will remain suspended in water for the longest time?
 - a. pebbles
 - b. silt
 - c. clay
 - d. sand

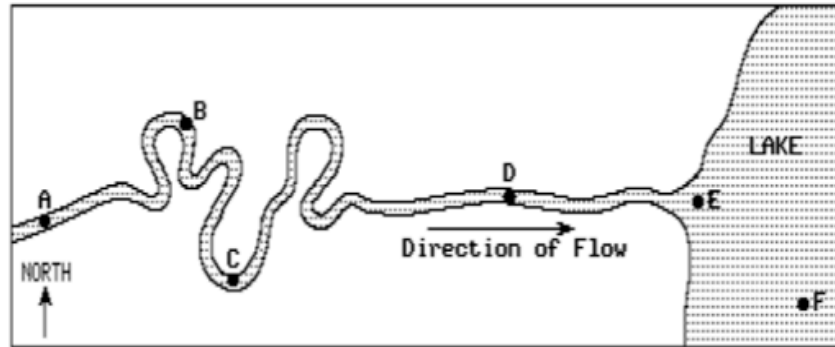
13. Compared to a low-density spherical particle, a high-density spherical particle of the same size will sink through water
 - a. more rapidly
 - b. more slowly
 - c. at the same rate

14. Which is not an example of chemical weathering?
 - a. The oxidation of a nail left outside for an extended about of time.
 - b. A tombstone that has had the letters washed away by acid rain.
 - c. The enlarging of a pothole from cycles of freezing and thawing.
 - d. An underground cave created from carbonic acid.

Worksheet: Running Water

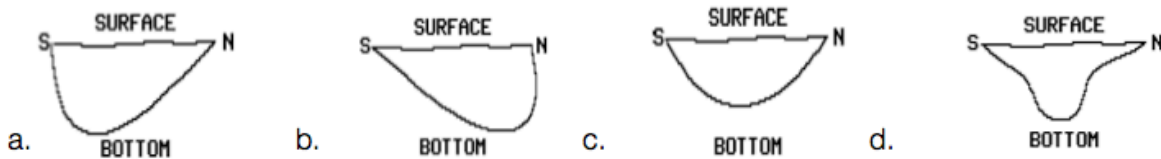
Questions 1 through 2 refer to the following:

The map below shows a stream flowing into a lake. Letters A through F represent locations in the stream and lake.



1. The velocity of this stream at point B depends on the stream's
 - a. discharge, only
 - b. slope and discharge, only
 - c. slope, discharge, and channel shape
 - d. slope, only

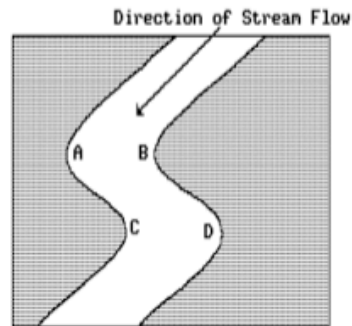
2. Which diagram best represents the cross section of the stream at location C.? [Note that letters N and S represent the north and south sides of the stream.]



3. Stream A has a steeper slope than stream B. However, the average water velocity of stream B is greater than that of stream A. Which is the most reasonable explanation for this?
 - a. Stream B has a curved stream bed.
 - b. Stream B has more friction to overcome along its banks.
 - c. Stream B has a greater volume of water.
 - d. Stream B has a higher average temperature.

4. According to the Earth Science Reference Tables, a stream flowing at a velocity of 100 centimeters per second can transport
 - a. silt, sand, and pebbles, but not cobbles
 - b. silt, but not sand, pebbles, or cobbles
 - c. silt, sand, pebbles, and cobbles
 - d. silt and sand, but not pebbles or cobbles

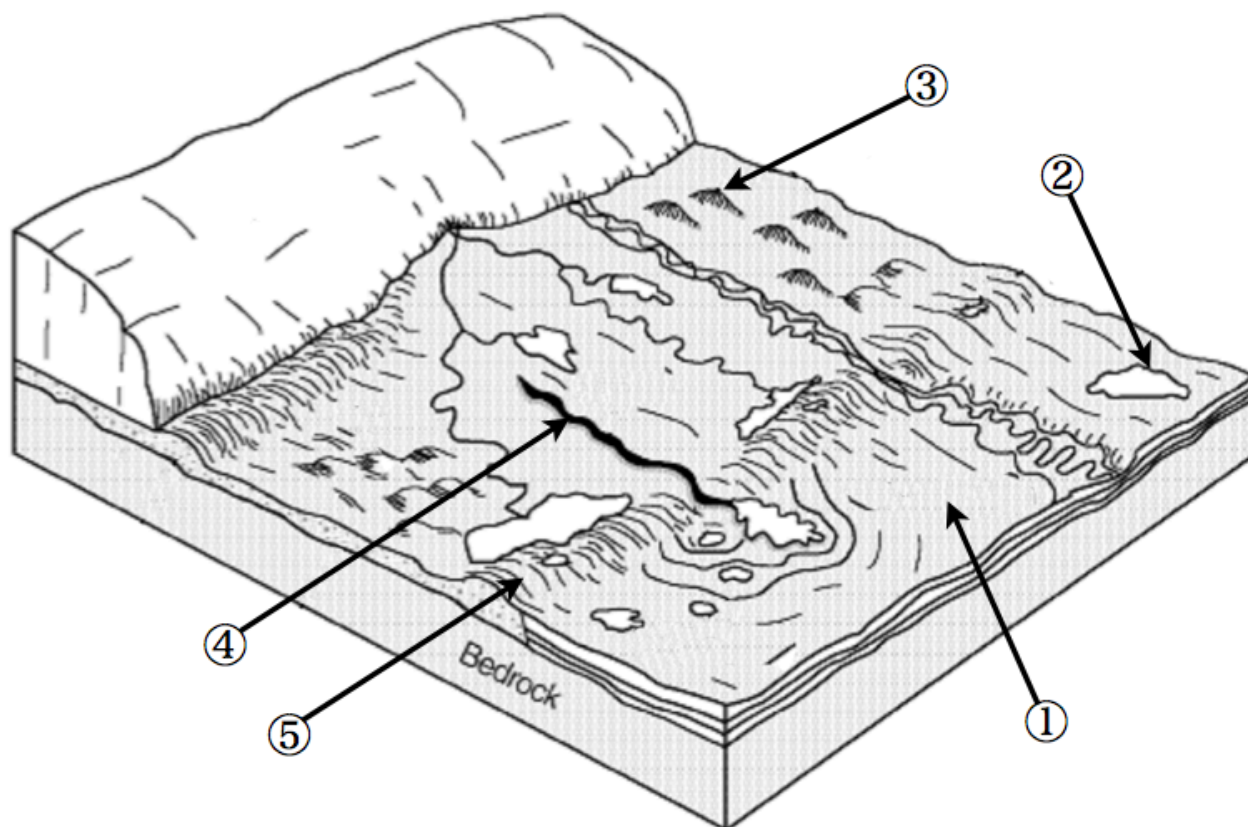
5. The map below represents a view of a flowing stream. The letters identify locations in the stream near the interface between land and water. At which two locations is erosion due to flowing water likely to be greatest?



- a. A and D
 - b. A and B
 - c. B and D
 - d. B and C
6. The rate at which particles are deposited by a stream is least affected by the
- a. size and shape of the particles
 - b. velocity of the stream
 - c. stream's elevation above sea level
 - d. density of the particles
7. Why do the particles carried by a river settle to the bottom as the river enters the ocean?
- a. The velocity of the river water decreases as it enters the ocean.
 - b. The kinetic energy of the particles increases as the particles enter the ocean.
 - c. The density of the ocean water is greater than the density of the river water.
 - d. The large particles have a greater surface area than the small particles.
8. A river transports material by suspension, rolling, and
- a. transpiration
 - b. solution
 - c. sublimation
 - d. evaporation
9. Stream A has a steeper slope than stream B. However, the average water velocity of stream B is greater than that of stream A. Which is the most reasonable explanation for this?
- a. Stream B has a curved stream bed.
 - b. Stream B has more friction to overcome along its banks.
 - c. Stream B has a greater volume of water.
 - d. Stream B has a higher average temperature.
10. Which erosional force acts alone to produce avalanches and landslides?
- a. sea waves
 - b. winds
 - c. running water
 - d. gravity

Supplemental: Glaciers

Directions: Fill in the chart below with the proper depositional feature left behind from the retreating glacier and define what each term means.

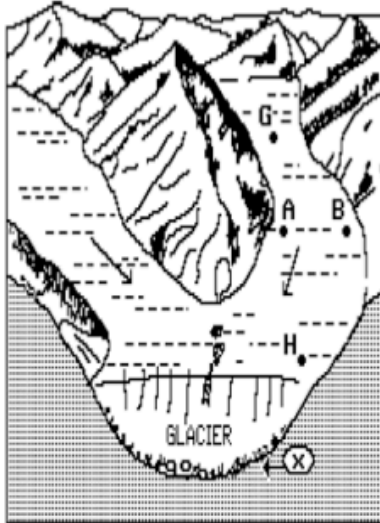


Number	Feature Name	Definition
①		
②		
③		
④		
⑤		

Worksheet: Glaciers

Questions 1 through 2 refer to the following:

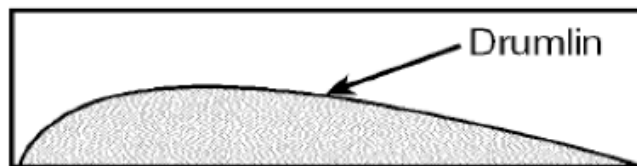
The diagram below represents two branches of a valley glacier. Points A, B, G, and H are located on the surface of the glacier. Point X is located at the interface between the ice and the bedrock. The arrows indicate the general direction of ice movement.



1. Which type of weathering most likely is dominant in the area represented by the diagram?
 - a. acid reactions
 - b. chemical reactions
 - c. biologic activity
 - d. frost action
2. Which force is primarily responsible for the movement of the glacier?
 - a. gravity
 - b. running water
 - c. ground water
 - d. wind
3. For which movement of earth materials is gravity not the main force?
 - a. snow tumbling in an avalanche
 - b. moisture evaporating from an ocean
 - c. boulders carried by a glacier
 - d. sediments flowing in a river
4. Which characteristic of a transported rock would be most helpful in determining its agent of erosion?
 - a. age
 - b. physical appearance
 - c. density
 - d. composition

5. Which geologic evidence would best support the inference that a continental ice sheet once covered a given location?
- a. polished and smooth pebbles; meandering rivers; V-shaped valleys
 - b. scratched and polished bedrock; unsorted gravel deposits; transported boulders
 - c. sand and silt beaches; giant swamps; marine fossils found on mountaintops
 - d. basaltic bedrock; folded, faulted, and tilted rock structures; lava flows
6. Which erosional agent typically deposits hills of unsorted sediments?
- a. ocean waves
 - b. glaciers
 - c. winds
 - d. streams
7. A large, scratched boulder is found in a mixture of unsorted, smaller sediments forming a hill in central New York State. Which agent of erosion most likely transported and then deposited this boulder?
- a. ocean waves
 - b. running water
 - c. a glacier
 - d. wind
8. The direction of movement of a glacier is best indicated by the
- a. elevation of erratics
 - b. alignment of grooves in bedrock
 - c. size of kettle lakes
 - d. amount of deposited sediments

The diagram below represents a side view of a hill (drumlin) that was deposited by a glacier in central New York.



9. This hill is most likely composed of
- a. cemented sediments
 - b. unsorted sediments
 - c. horizontally layered sediments
 - d. vertically layered sediments
10. A low hill is composed of unsorted sediments that have mixed grain sizes. This hill was probably deposited by
- a. the wind
 - b. wave action
 - c. running water
 - d. a glacier

Worksheet: Mass Movement, Wind, and Waves

1. The particles in a sand dune deposit are small and very well-sorted and have surface pits that give them a frosted appearance. This deposit most likely was transported by
 - a. ocean currents
 - b. glacial ice
 - c. gravity
 - d. wind

2. The long, sandy islands along the south shore of Long Island are composed mostly of sand and rounded pebbles arranged in sorted layers. The agent of erosion that most likely shaped and sorted the sand and pebbles while transporting them to their island location was
 - a. glaciers
 - b. landslides
 - c. wind
 - d. oceans

3. Waves that erode the shore of Lake Ontario are caused primarily by
 - a. the rotation of the Earth
 - b. differences in temperature of lake water along the shore
 - c. winds blowing over the lake surface
 - d. density variations within the lake

4. 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

5. For which movement of earth materials is gravity not the main force?
 - a. sediment flowing in a river
 - b. boulders carried by a glacier
 - c. snow tumbling in an avalanche
 - d. moisture evaporating from an ocean

6. Wind erosion is most active in regions that have
 - a. a hot climate
 - b. much loose sediment
 - c. weak or non-resistant bedrock
 - d. bedrock exposed to the atmosphere

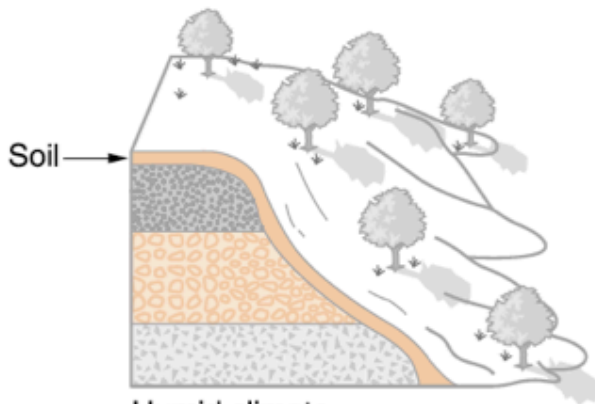
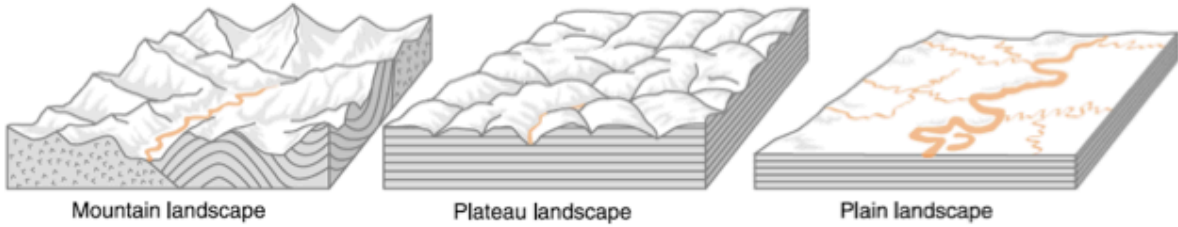
Worksheet: NYS Landscapes

1. According to the Earth Science Reference Tables, the Catskills are part of which landscape region?
 - a. plateau
 - b. coastal lowland
 - c. mountain
 - d. plain
2. The major landscape regions of the United States are identified chiefly on the basis of
 - a. similar surface characteristics
 - b. similar climatic conditions
 - c. nearness to continental boundaries
 - d. nearness to major mountain regions
3. Which New York State landscape region has been most extensively changed by ocean wave erosion during the last 200 years?
 - a. Atlantic Coastal Plains
 - b. St. Lawrence Lowlands
 - c. Hudson-Mohawk Lowlands
 - d. Triassic Lowlands
4. The boundaries between landscape regions are usually indicated by sharp changes in
 - a. stream discharge rate and direction of flow
 - b. weathering rate and method of deposition
 - c. soil associations and geologic age
 - d. bedrock structure and elevation
5. Landscape regions are generally determined by
 - a. amount of yearly precipitation
 - b. method of surface sediment deposition
 - c. underlying rock structure and elevation
 - d. amount of stream discharge and direction of flow
6. The approximate latitude of Utica, New York is
 - a. $43^{\circ}05'$ N
 - b. $43^{\circ}05'$ S
 - c. $75^{\circ}15'$ E
 - d. $75^{\circ}15'$ W
7. Which major landscape region covers the greatest surface area in New York State?
 - a. Atlantic Coastal Plains
 - b. St. Lawrence Lowlands
 - c. Adirondack Mountains
 - d. Tug Hill Plateau

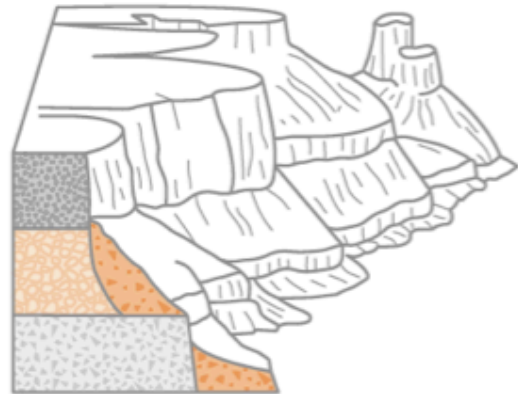
8. According to the Earth Science Reference Tables, which New York State landscape region has the lowest elevation
 - a. Atlantic Coastal Plain
 - b. Adirondack Mountains
 - c. Allegheny Plateau
 - d. Tug Hill Plateau

9. According to the Earth Science Reference Tables, which landscape region separates the Adirondack Mountains from the Catskills?
 - a. Champlain Lowlands
 - b. Hudson-Mohawk Lowlands
 - c. Taconic Mountains
 - d. Tug Hill Plateau

10. The Adirondack Mountains landscape region was formed primarily by
 - a. changes in the water levels of the Great Lakes
 - b. mountain building and erosion
 - c. wind erosion in an arid climate
 - d. erosion by the Hudson and Mohawk Rivers



Humid climate



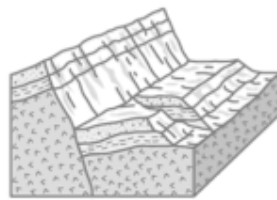
Arid climate



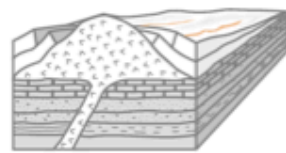
Dendritic



Radial



Rectangular

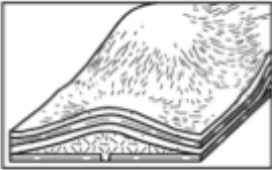
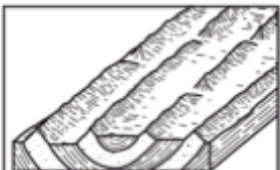
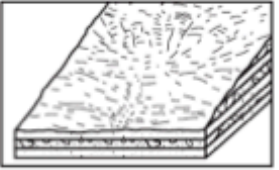
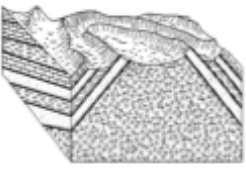
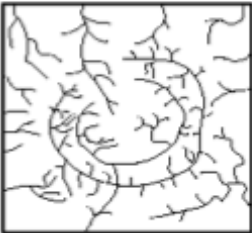
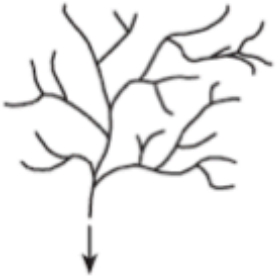
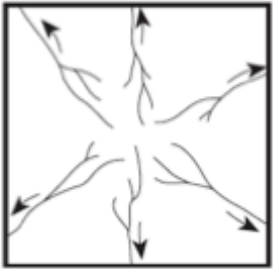



Annular

Fill in the following chart using the Generalized Landscape and Generalized Bedrock Maps of NYS on Pages 2 and 3 in your ESRT.

Landscape Name	Mountain, Plain or Plateau	Bedrock Type (Met, Ign, Sed)	Age of Bedrock (Time Period)	City Found In Landscape (if any)
Allegheny Plateau				
The Catskills				
Atlantic Coastal Plain				
Adirondack Mountains				
Erie-Ontario Lowlands				
Newark Lowlands				
Major Rivers				

Match the following landscapes with their respective drainage patterns:

1. What direction does the Genesee River flow? _____
2. How can you tell the direction? _____
3. As you travel from the Erie-Ontario Lowlands to the Tug Hill Plateau to the Adirondack Mountains...what happens to the elevation change?

4. What happens to the bedrock type? _____
5. What happens to the atmospheric temperature? _____
6. What type of drainage pattern would the Adirondack Mountains have?

7. What type of drainage pattern would the St. Lawrence Lowlands have?

8. What type of drainage pattern would the Catskill Mountains have?

9. What type of rock makes up the Catskill Mountains?

10. What type of rock makes up the Adirondack Mountains?

11. What is the difference between the two landscapes?

12. Name a tributary river of the Hudson River? _____
13. Name a rock that makes up the Tug Hill Plateau? _____
14. Name a city and a river that are found in the Allegheny Plateau?

15. As you travel from NYC to Old Forge, what happens to the elevation?

16. Why do you think that southern NY has such a complicated bedrock structure? _____
17. The landscapes of NY...are they altered by a humid climate or arid climate?

18. What landscape region is Niagara Falls located? _____
19. What landscape region is Mt. Marcy located? _____
20. What type of rock is the most abundant in NY? _____

Oceans and Coastal Processes: QUESTIONS

1. What are the two primary sources of sediment for beaches?

2. What are ocean waves caused by? What effects how large they are?

3. Explain what a longshore current is.

4. Briefly define the following terms:

sandbar: _____

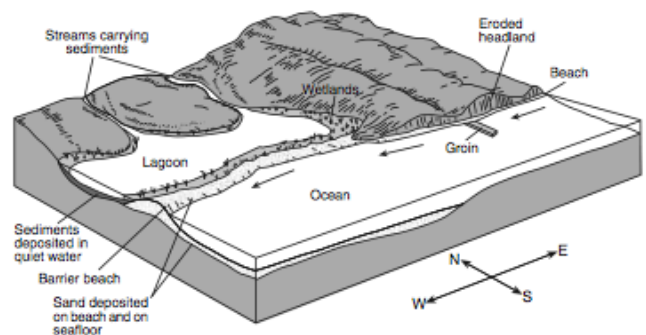
spit: _____

bay-mouth bar: _____

lagoon: _____

groin/pier: _____

Base your answers to questions 5 through 7 on the diagram to the right. 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.



5. 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
- C. narrower on both sides of the groin
- D. wider on the eastern side of the groin
- E. wider on both sides of the groin

6. Which event will most likely occur during a heavy rainfall?

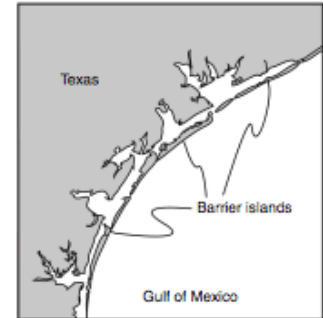
- A. Less sediment will be carried by the streams.
- C. An increase in sea level will cause more sediments to be deposited along the shoreline.
- D. The shoreline will experience a greater range in tides.
- E. The discharge from the streams into the lagoon will increase.

7. The sediments that have been deposited by streams flowing into the lagoon are most likely

- A. sorted and layered
- C. unsorted and layered
- D. sorted and not layered
- E. unsorted and not layered

8. 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
 - C. running water
 - D. ocean waves
 - E. prevailing winds

9. The map on the right shows barrier islands in the ocean along the coast of Texas.
- A. mass movement
 - C. wave action
 - D. streams
 - E. glaciers

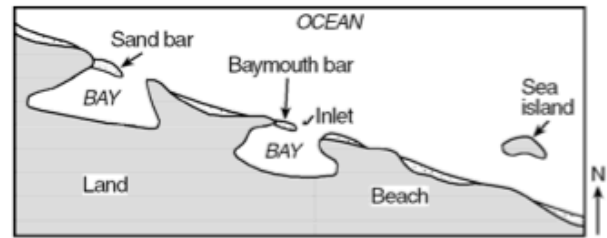


9. Why do the particles carried by a river settle to the bottom as the river enters the ocean?
- A. The velocity of the river water decreases as it enters the ocean.
 - C. The large particles have a greater surface area than the small particles.
 - D. The density of the ocean water is greater than the density of the river water.
 - E. The kinetic energy of the particles increases as the particles enter the ocean.

10. The map on the right shows some features along an ocean shoreline.

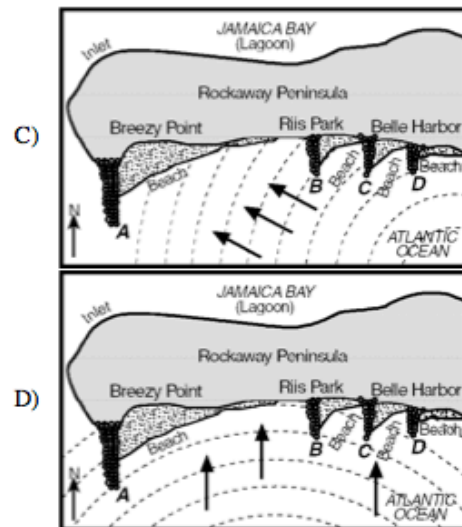
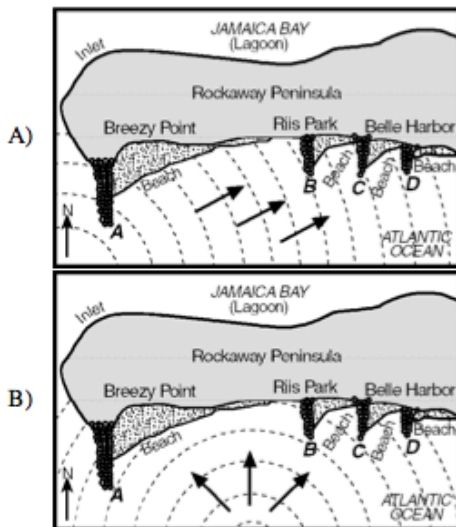
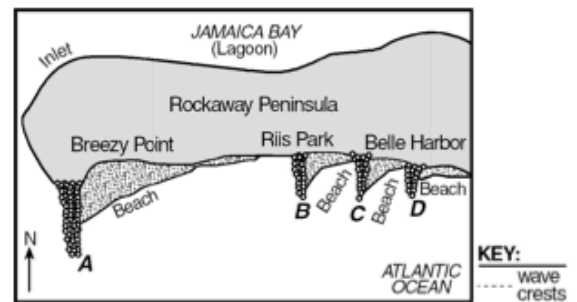
In which general direction is the sand being moved along this shoreline by ocean (long-shore) currents?

- A. NE
- C. SW
- D. NW
- E. SE



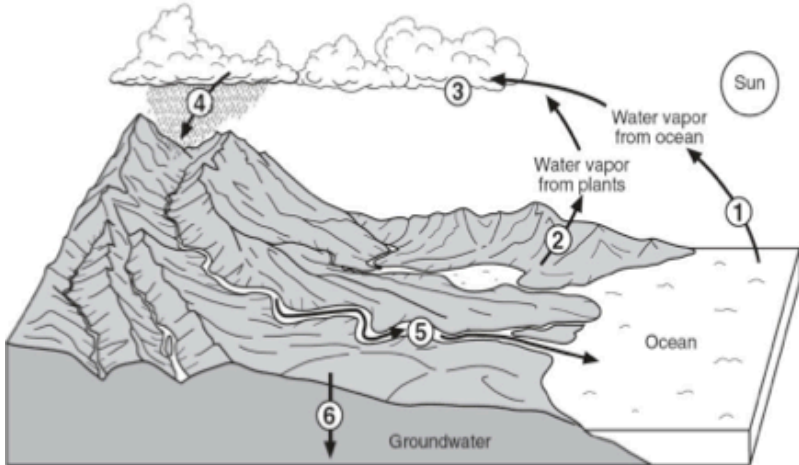
10. The map below shows Rockaway Peninsula, part of Long Island's south shore, and the location of several stone barriers, A, B, C, and D, that were built to trap sand being transported along the coast by wave action.

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



Surface Processes

THE HYDROLOGIC CYCLE

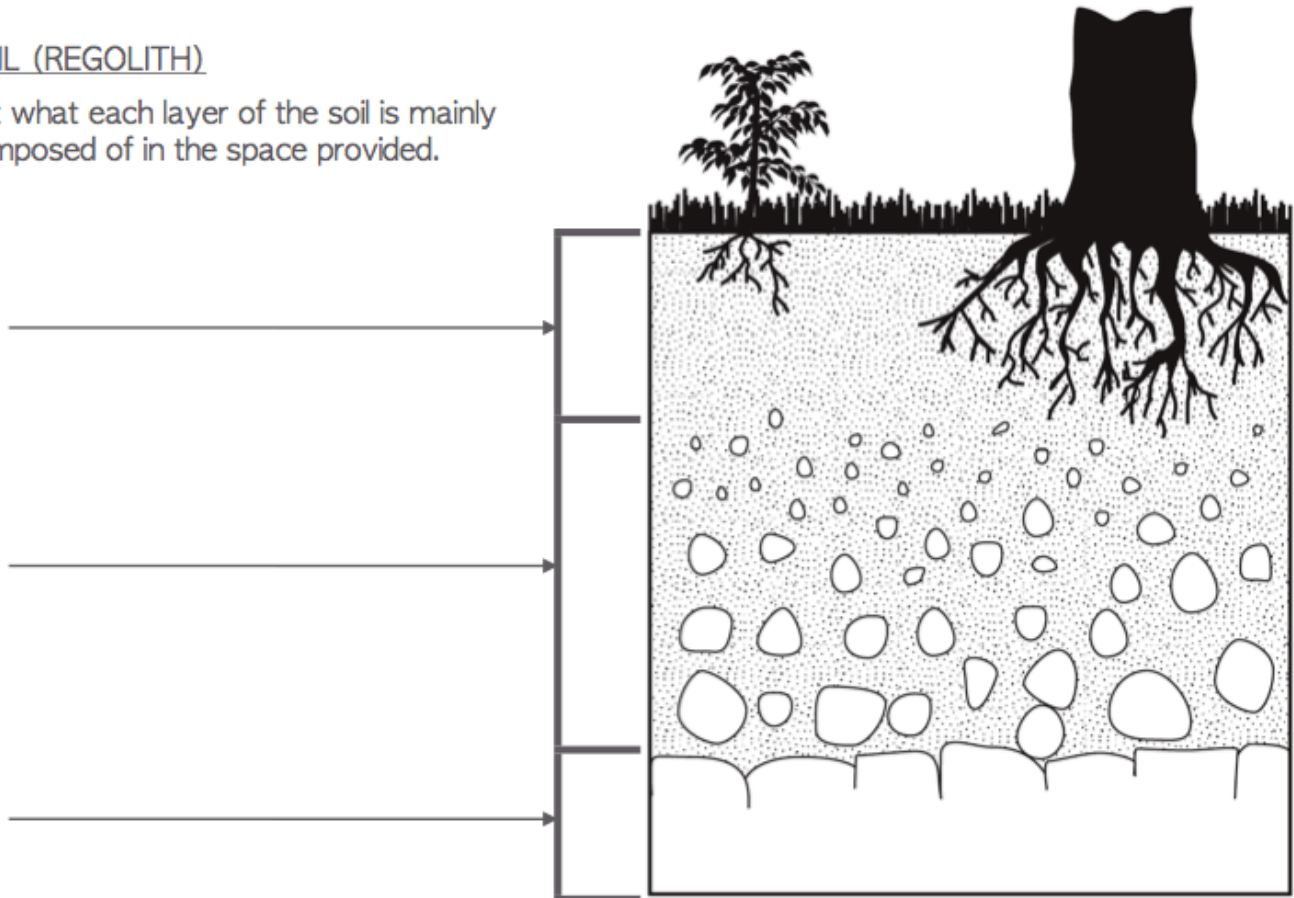


List the processes shown in the diagram.

1. _____
2. _____
3. _____
4. _____
5. _____
6. _____

SOIL (REGOLITH)

List what each layer of the soil is mainly composed of in the space provided.

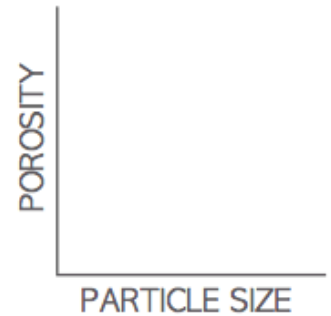


INFILTRATION OR RUNOFF?

- ▶ Steep Slope: _____
- ▶ Frozen Ground: _____
- ▶ Saturated Soil: _____
- ▶ Gradual Slope: _____
- ▶ Thawed Ground: _____
- ▶ Unsaturated Soil: _____

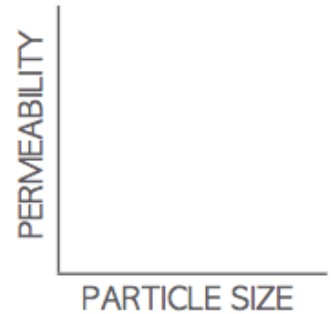
POROSITY

- ▶ Definition: _____
- ▶ Relationship with particle size: _____



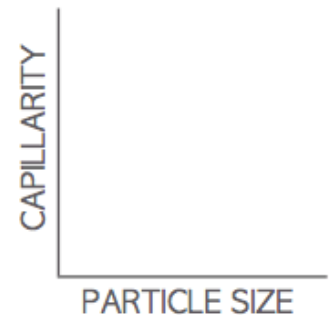
PERMEABILITY

- ▶ Definition: _____
- ▶ Relationship with particle size: _____



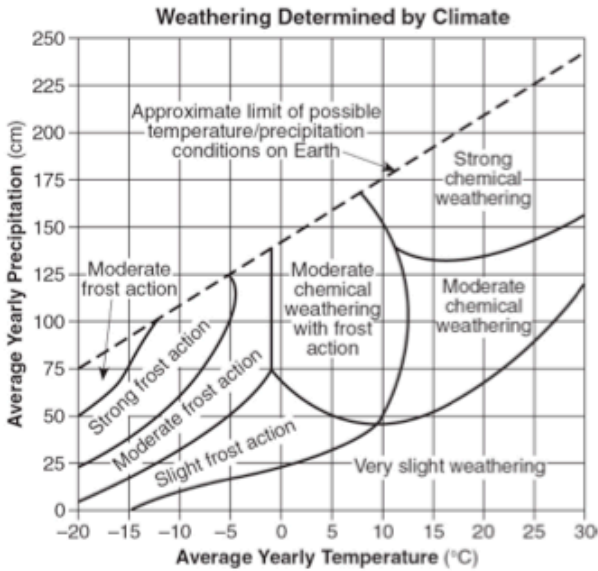
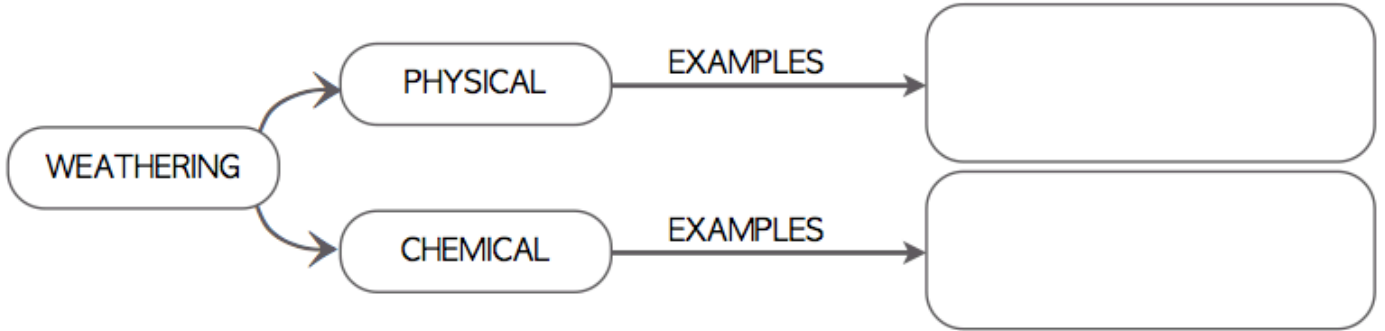
CAPILLARITY

- ▶ Definition: _____
- ▶ Relationship with particle size: _____



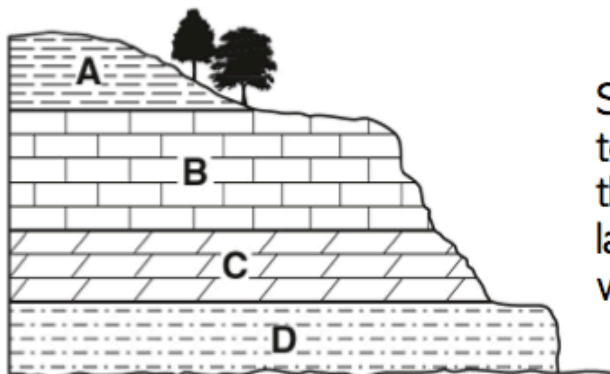
WEATHERING

Definition: _____



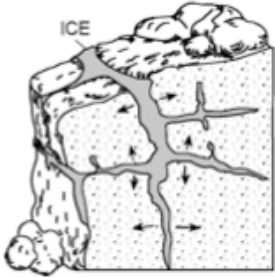
Climate is the most important factor that determines the amount and type of weathering that will occur in a location

The more exposed surface area of a substance, the faster it will weather.



Some rocks and minerals are resistance to weathering and will wear away slower than other layers of rock. In this diagram, layer D is the most resistant to weathering.

Complete the tables with the information pertaining to the images.



Name	Type (Physical/Chemical)	Description
Ice Wedging or Frost Action		



Name	Type (Physical/Chemical)	Description
Wind Abrasion		



Name	Type (Physical/Chemical)	Description
Carbonation of limestone		



Name	Type (Physical/Chemical)	Description
Stream Abrasion		



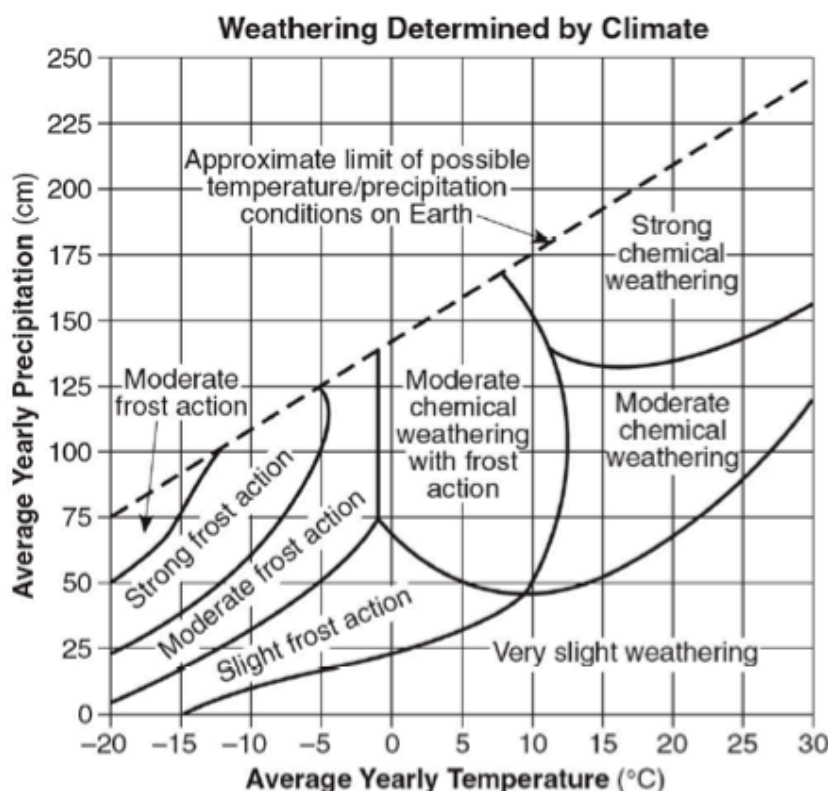
Name	Type (Physical/Chemical)	Description
Root Wedging		



Name	Type (Physical/Chemical)	Description
Exfoliation		

Weathering and Climate

The type of weathering that dominates in an area depends on the climate in that area. Specifically, the major factors that control climate, and thus weathering, are precipitation and temperature. The graph below indicates the general relationship between precipitation, temperature and the type and rate of weathering.



1. What is the range of temperatures shown on this graph? _____

2. What is the range of yearly precipitation? _____

3. Weathering rates are described as:

- 1.
- 2.
- 3.
- 4.

4. Determine the major type of weathering that occurs in Washington, D.C. if the average yearly temperature (AYT) is 15° C and the average yearly precipitation (AYP) is 111 cm.

5. The AYT in Albany, N.Y. is 9° C and the AYP is 98 cm. What is the major type of weathering that occurs in Albany?

6. What is the major difference, in terms of weathering type, between Washington, D.C. and Albany, N.Y.? What might explain this difference?

7. Phoenix, Arizona has an AYT of 20° C and an AYP of 22 cm. How would the climate of Phoenix have to change for moderate chemical weathering to become dominant?

8. According to the graph, no frost action occurs at an AYT above 13° C. What is a possible reason for this?

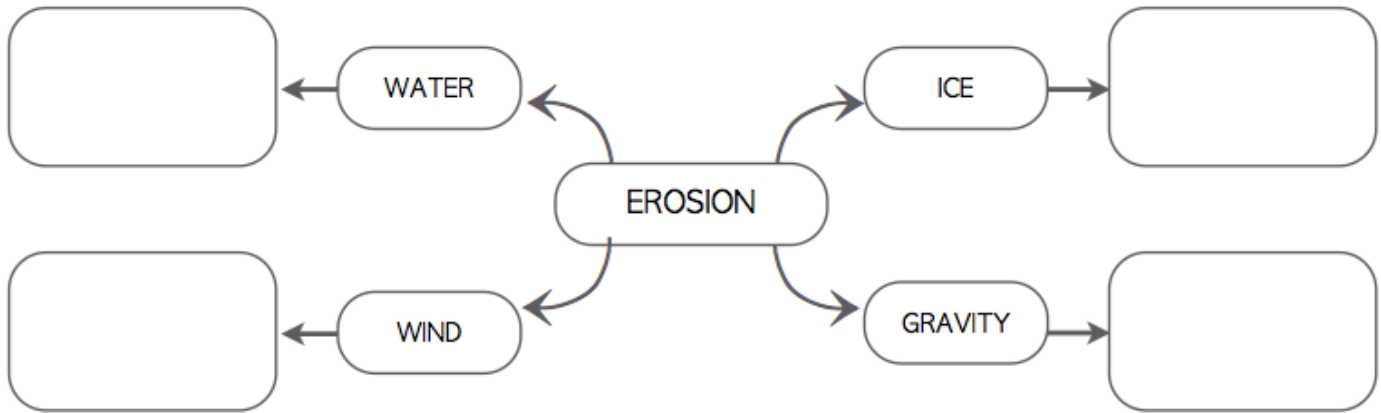
9. In general, what region of the country most likely experiences the greatest chemical weathering?

10. In general, what region of the county most likely experiences the greatest mechanical weathering?

11. In terms of climate, how does a region that experiences strong chemical weathering differ from a region that experiences strong mechanical weathering?

EROSION

▶ Definition: _____



▶ Transported Sediments: _____

▶ Residual Sediments: _____

Erosion by Gravity

▶ Known as a _____

▶ Examples include...

▶ _____

▶ _____

▶ _____

Erosion by Running Water

▶ Stream Features include...

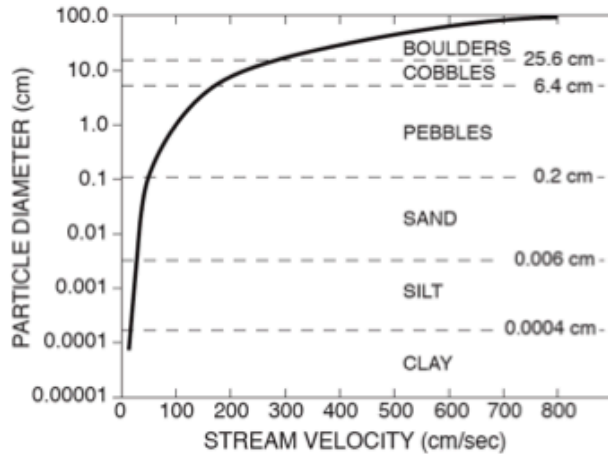
▶ Deltas: _____

▶ Valters: _____

▶ Flood Plains: _____

▶ Meanders: _____

Relationship of Transported Particle Size to Water Velocity



- 1) Name the particles (sediments) that will be carried by water at the following velocities:
 - 500 cm/sec _____
 - 100 cm/sec _____
 - 200 cm/sec _____
 - 50 cm/sec _____

- 2) Name the particle(s) that will be deposited if a stream moving at 700 cm/sec suddenly decreases in velocity to 225 cm/sec?

- 3) State the water velocity necessary to maintain the transport of the following sized particles.
 - 0.1 cm particle diameter: _____
 - 25.6 cm particle diameter: _____
 - 0.001 cm particle diameter: _____
 - 10 cm particle diameter: _____

- 4) Why do you think particle size diameters appear on BOTH the left and right sides of the chart?

- 5) As soon as water velocity decreases even slightly, what occurs?

- 6) Name the particle(s) that cannot be transported by a stream moving at 150 cm/sec.

- 7) State the range of particle sizes for a "cobble". _____

- 8) At approximately what speed will the stream no longer be able to transport pebbles. _____

Do Now(s): Two Minutes – Complete the KW table below.

Date:

K	W
What I Know about - _____	What I Want to Find Out about _____
1.	1.
2.	2.
3.	3.

Date:

K	W
What I Know about - _____	What I Want to Find Out about _____
1.	1.
2.	2.
3.	3.

Date:

K	W
What I Know about - _____	What I Want to Find Out about _____
1.	1.
2.	2.
3.	3.

Date:

K	W
What I Know about - _____	What I Want to Find Out about _____
1.	1.
2.	2.
3.	3.

Date:

K	W
What I Know about - _____	What I Want to Find Out about _____
1.	1.
2.	2.
3.	3.