Name: KEY

NOTES
Hydrology, Weathering, Erosion & Deposition

OBJECTIVES

Correctly define: abrasion, capillarity, deposition, discharge, erosion, evapotranspiration, hydrology, impermeable, infiltration, meander, permeable, porosity, water table, weathering, zone of aeration, zone of saturation

HYDROLOGY:

- Explain what the hydrologic cycle is and correctly label a diagram of the hydrologic cycle.
- Explain the difference between permeability, porosity, and capillarity.
- Explain the relationship between particle size and each of the following: permeability, porosity, and capillarity.
- Describe how slope, particle size, and the state of soil (frozen or unfrozen) affect the rate of infiltration
- Describe the factors that affect runoff and stream discharge.

WEATHERING:

- Identify the two types of weathering---physical and chemical.
- Give two examples of both physical and chemical weathering.
- Describe the environment in which chemical weathering would be the greatest.
- Explain surface area and composition affect the rate of weathering.
- Explain the normal progression of soil profile development.

EROSION:

- Identify the greatest force and agents of erosion.
- Describe the difference in the shape of valleys carved out by streams and those carved out by glaciers.
- Describe the relationship between the rate of erosion and each of the following factors: stream discharge, slope, and location on a meander.
- Calculate the minimum of velocity required to move a specific size of sediment.

DEPOSITION:

- Describe the relationship between the rate of deposition and each of the following factors: stream velocity, slope, location on a meander, size, density, and shape.
- Describe the pattern of deposition for each of the following: streams, wind, glaciers, mass movement.

Vocabulary

Abrasion: _____

Capillarity: _____

_____

Deposition: _____

_____

Discharge: _____

_____

Erosion: _____

_____

Evapotranspiration: _____

_____

Hydrology: _____

_____

Impermeable: _____

_____

Infiltration: _____

_____

Meander: _____

Permeable: _____

Porosity: _____

_____

Water Table: _____

_____

Weathering: _____

_____

Zone of Aeration: _____

_____

Zone of Saturation: _____

_____

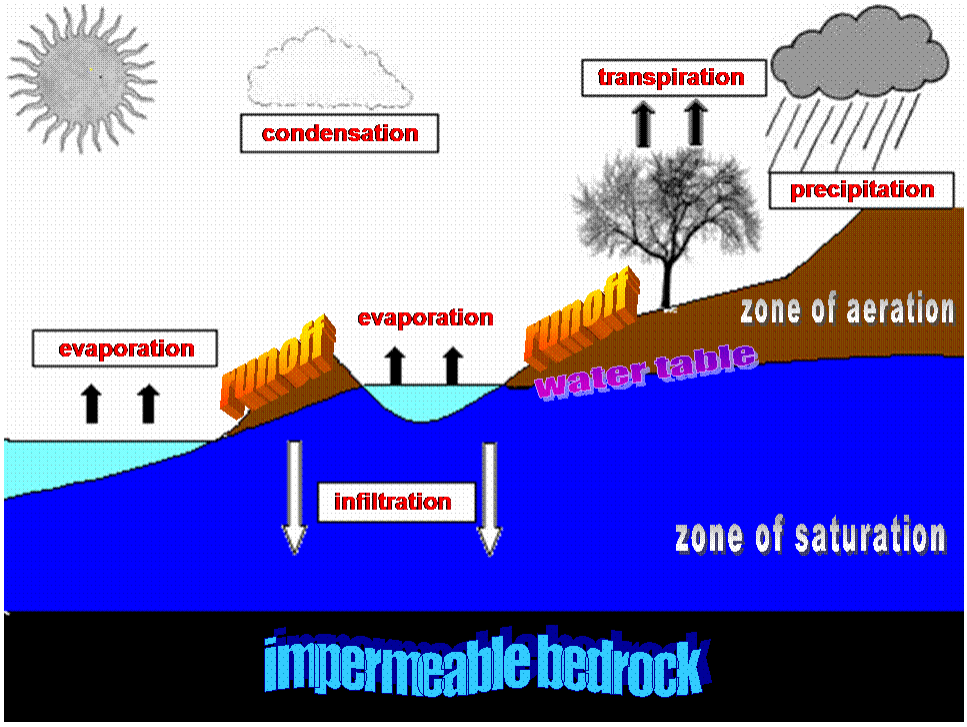
Hydrology

The water cycle is also called the _____**hydrological**_____ cycle.

Water that is stored in the oceans and lakes can _____**evaporate**_____ and become a gas. As the water rises through the atmosphere, it cools, condenses and becomes ___**clouds**_____. When the water gets heavy enough it can fall to the ground in the form of different types of ___**precipitation**_____. If the lithosphere (ground) is saturated, the water that has fallen can become ___**runoff**_____ and flow directly into streams, rivers, or lakes. If the lithosphere is not saturated, the water will ____**infiltrate**_____ the lithosphere and move into the zone of ____**aeration**_____ or the zone of _____**saturation**__. The interface (boundary) between these two zones is called the ____**water table**_____. The roots of plants can reach into the zone of ___**saturation**_____, soak up the water, and the water can then re-enter the atmosphere through the process of ____**transpiration**_____.

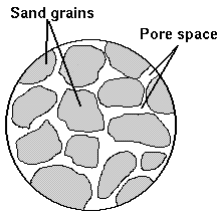
In the diagram below, place the following words in their correct locations:

condensation	**evaporation**	**impermeable bedrock**	**infiltration**	**precipitation**
runoff	**transpiration**	**water table**	**zone of aeration**	**zone of saturation**



Porosity

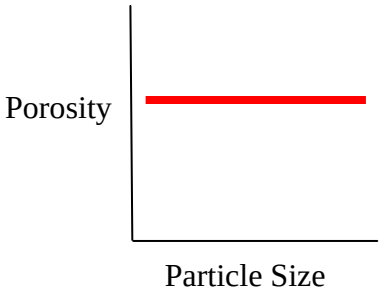
Total volume of empty space ÷ total volume of soil = porosity



What materials would you need to calculate the porosity of a sample of soil? **graduated cylinder, water**

Particle size alone does not determine porosity

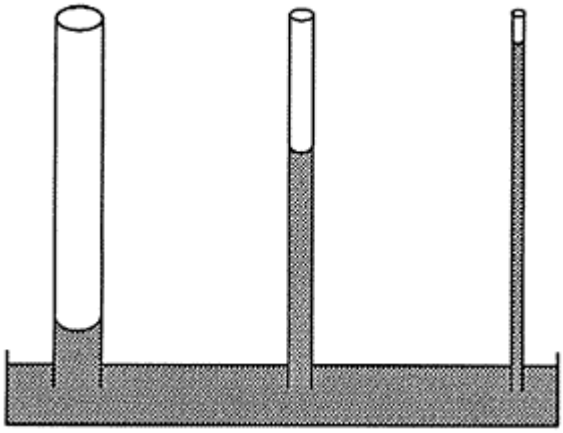
Identically shaped samples of increasing particles size will have the same porosity



Which is more porous, a container of:

a. round particles	**or**	**angular particles**
b. tightly packed particles	**or**	**loosely packed particles**
c. well-sorted particles	**or**	**unsorted particles**
d. large beads	**or**	**small beads**

Capillarity

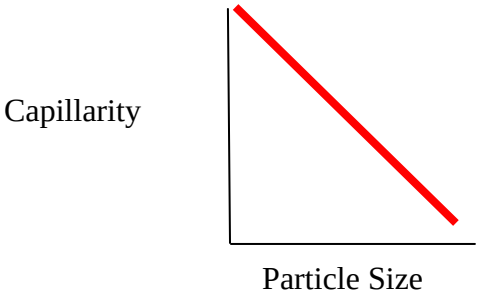


The diagram to the left shows three tubes of with different diameters. Water is placed in the tray at the bottom.

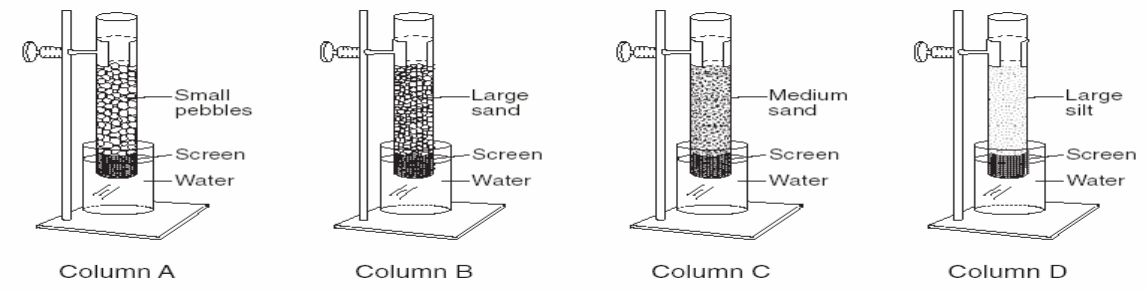
Capillary action draws the water up higher in the smaller tube.

Soils with smaller sized particles can draw water from the zone of saturation higher than those with larger sized particles.

Therefore, a __**indirect**___ relationship exists between particle size and capillarity.

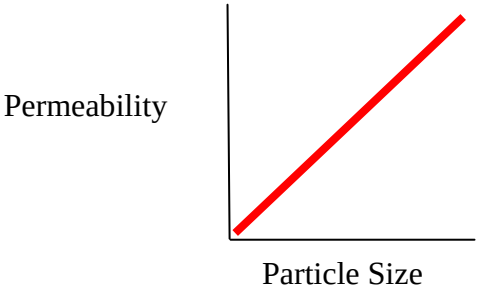


Permeability



Which column would allow water to flow through fastest? **A** Why? **the particles are largest**

If the sediment in column A and column D were combined in a fifth column, would the new column's permeability be greater, less, or the same as that of A? **less** Why? **the small particles fill in the spaces in between**



Which is more permeable?

a. small particles or large particles

b. frozen ground or unfrozen ground

FACTORS AFFECTING RUNOFF AND STREAM DISCHARGE

Which will result in greater runoff and stream discharge?

a. an area that is vegetated or an area that is barren

b. an area that has a steep slope or an area that is flat

c. ground that is frozen or ground that is unfrozen

d. ground that is saturated or ground that unsaturated

Weathering

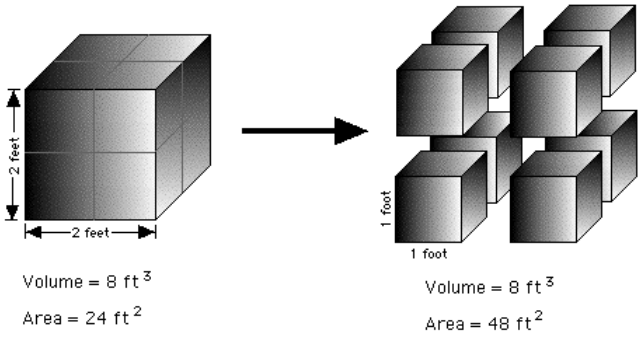
Physical (Mechanical) Weathering

- **abrasion**
- **freeze/thaw**

Chemical Weathering

- **oxidation**
- **hydration**
- **Chemical Weathering occurs fastest in this type of environment: warm and moist**

Surface Area and Weathering

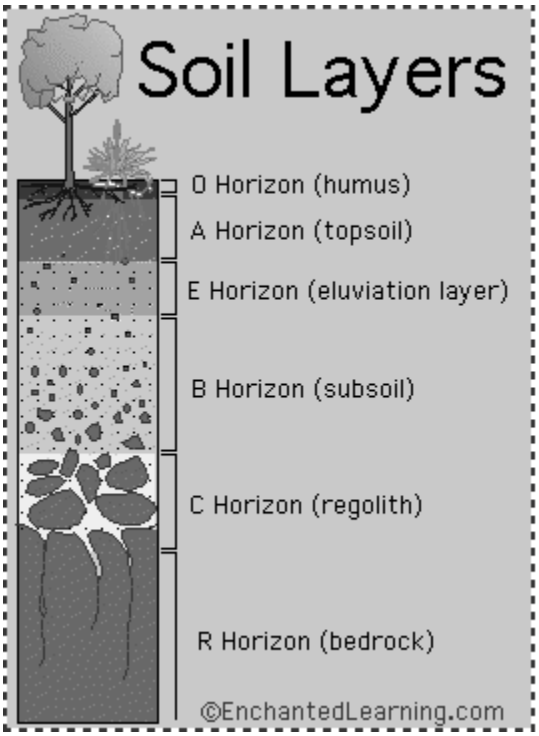


Why will smaller particles weather faster? **they have greater surface area**

Which will weather faster and why? Pebbles Sand Silt Clay

they are smaller and have greater surface area

Soil



When the bedrock weathers, soil is created. Scientists separate this soil into **horizons.** Water can only infiltrate through horizon C as the R Horizon is solid rock.

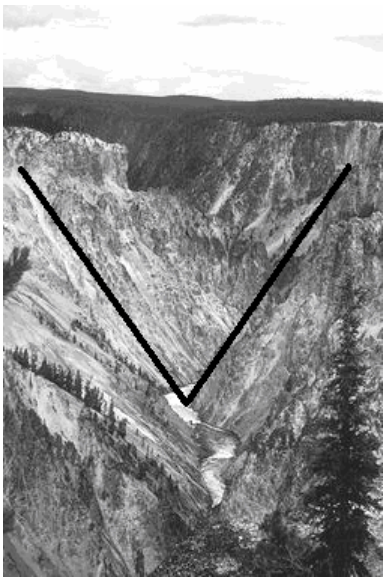
Erosion

Greatest **FORCE** of Erosion

gravity

Greatest **AGENT** of Erosion

running water



What agent of erosion is responsible for carving out V-SHAPED valleys such as the above?

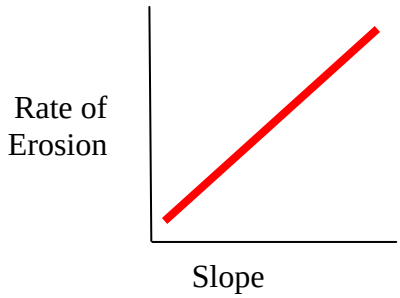
running water

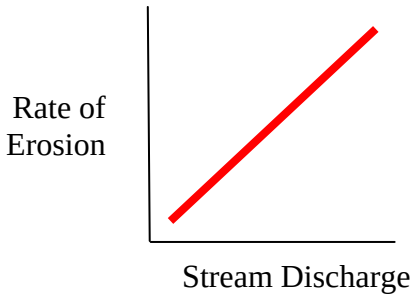
What agent of erosion is responsible for carving out U-SHAPED valleys such as the one above?

glaciers

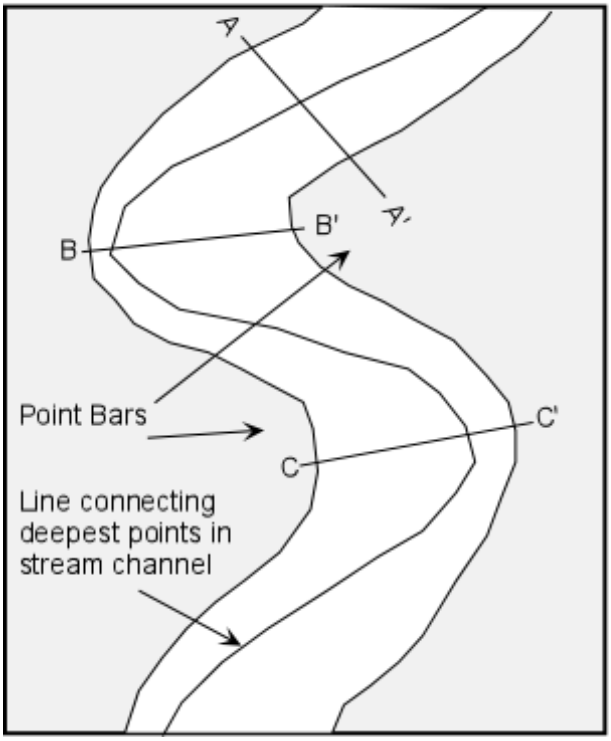
Rate of Erosion

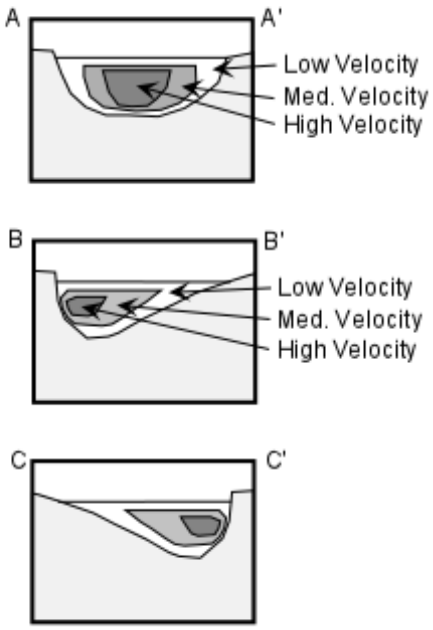
For each of the factors below, draw the relationship between that factor and the rate of erosion.





Meandering Channels





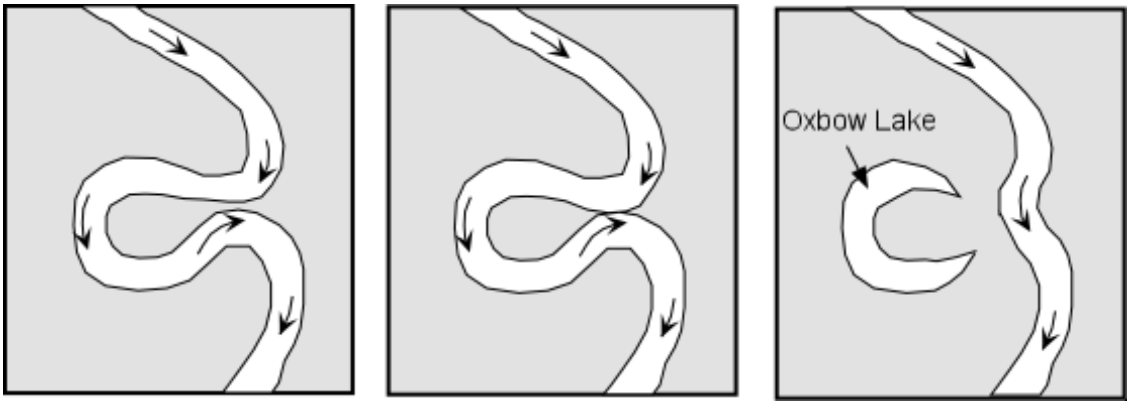
Where is erosion greatest?

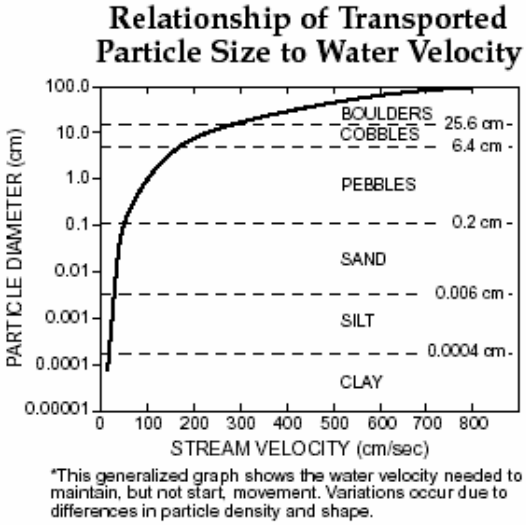
Outside of Curve
Inside of Curve

Where does the river flow fastest?

center down from the surface

Oxbow Lakes



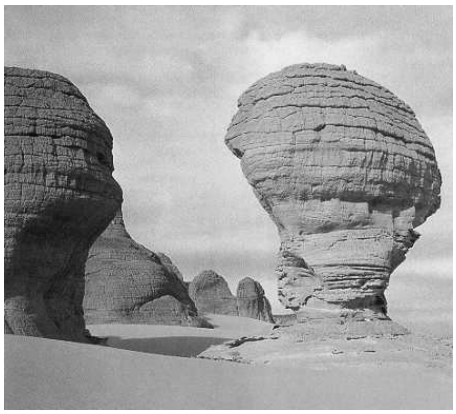


What page can this graph be found in the ESRTS? ____**6**_____

What's the minimum speed water need to be moving in order to transport sand? **~50cm/sec**

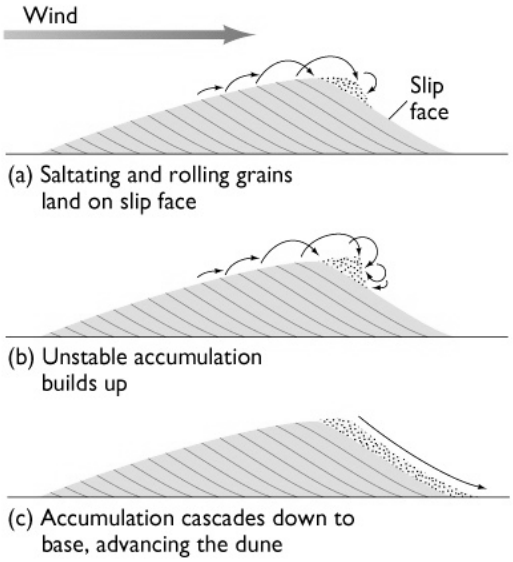
In order to move a particle that is 7.0 cm, a stream's velocity would need to be at least **200 cm/sec.**

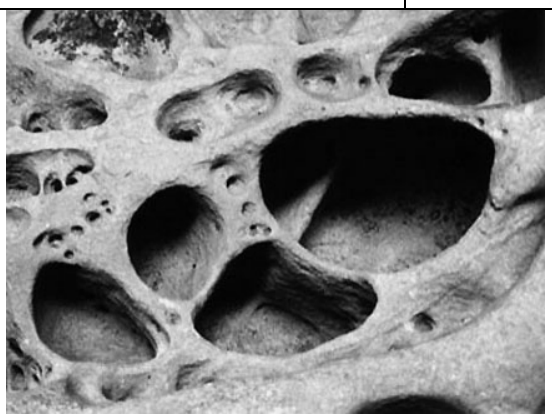
Wind Erosion



desert wind erosion

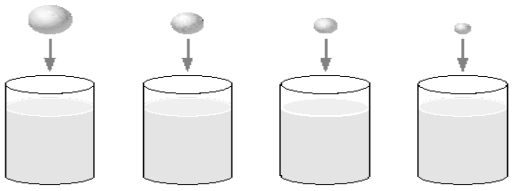
How sand dunes form



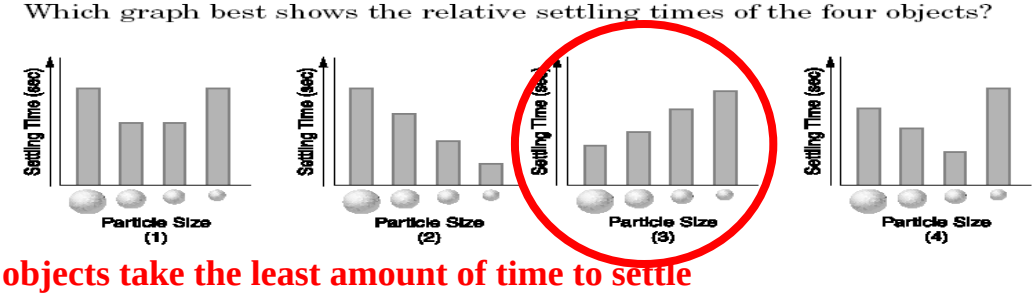


pitted

Deposition



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



big objects take the least amount of time to settle

The table below shows the density of four mineral samples.

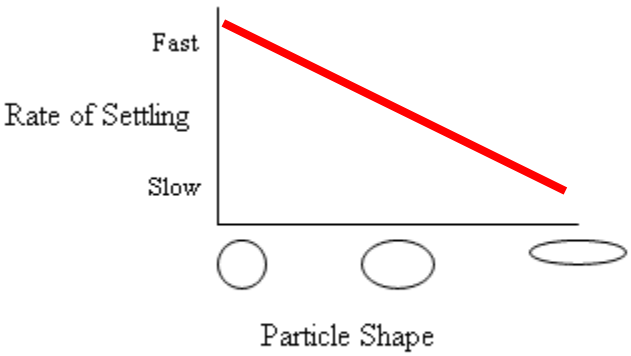
Mineral	Density (g/cm^3)
Cinnabar	8.2
Magnetite	5.2
Quartz	2.7
Siderite	3.9

What must you know in order to get this question correct?

denser particles settle first

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

(1) cinnabar
(2) magnetite
(3) quartz
(4) siderite

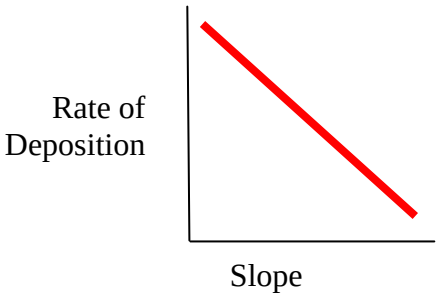


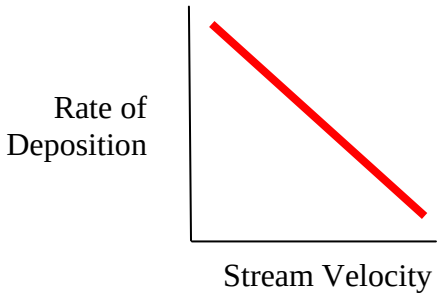
Which object will settle the fastest in water? **round**

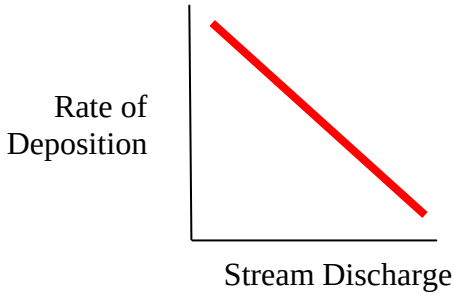
Why? **less surface area**

Draw the relationship between shape and the rate of settling.

For each of the factors below, draw the relationship between that factor and the rate of deposition.







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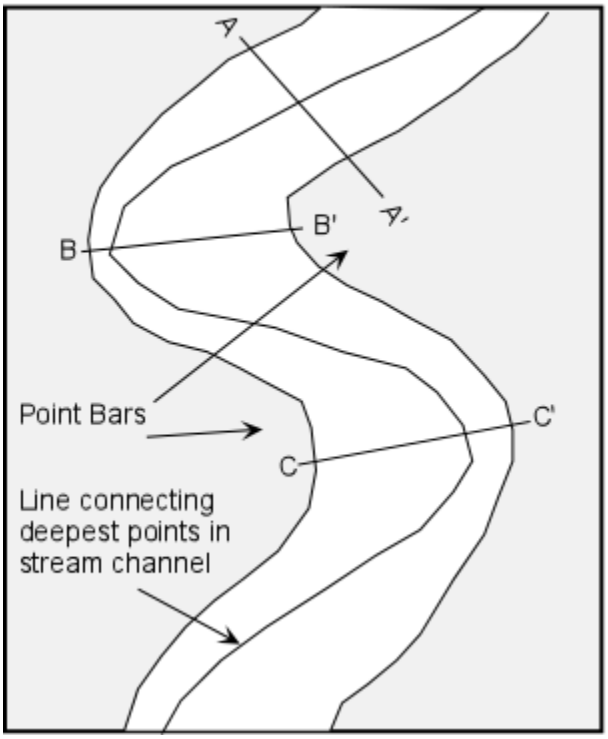
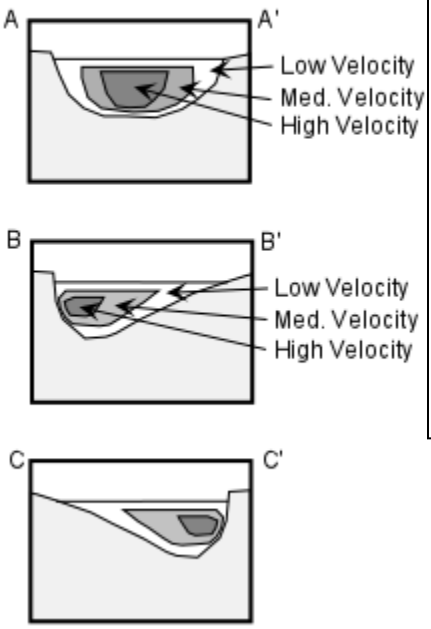


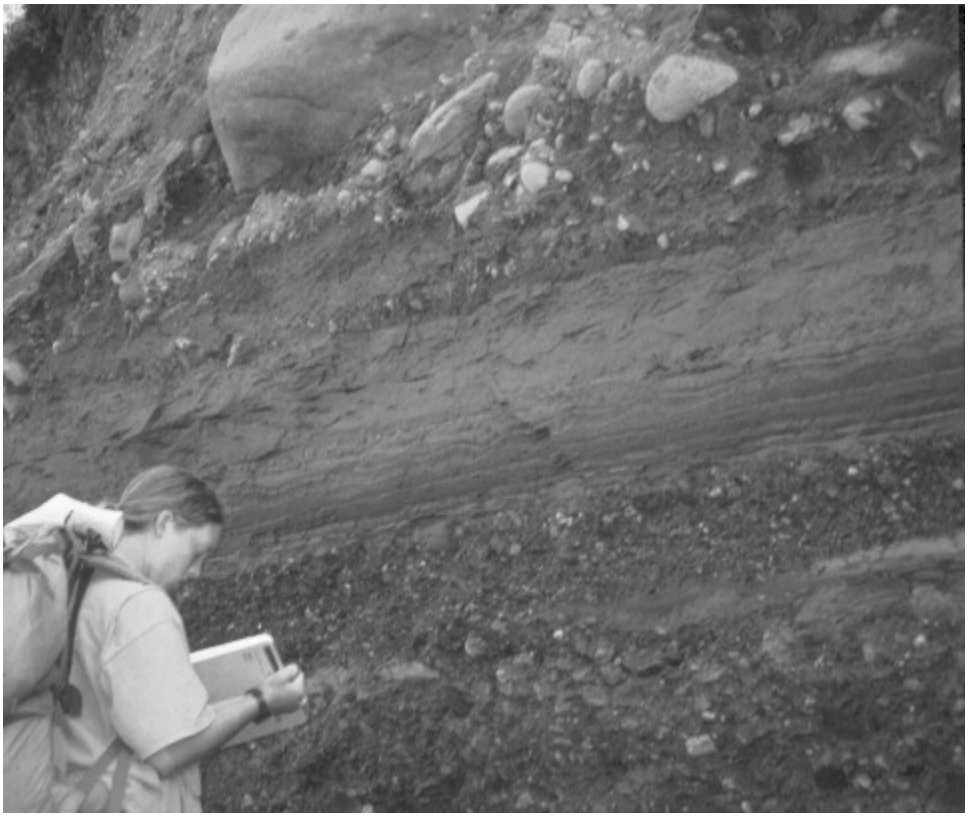


Where is deposition greatest?

Outside of Curve
Inside of Curve

Source of River
Mouth of River

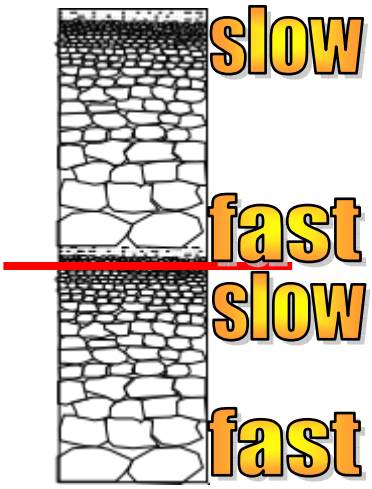
Why?
lowest velocity



What agent of deposition was probably responsible for depositing these unsorted layers of sediment?

glaciers

Deposition by Streams: Graded Bedding



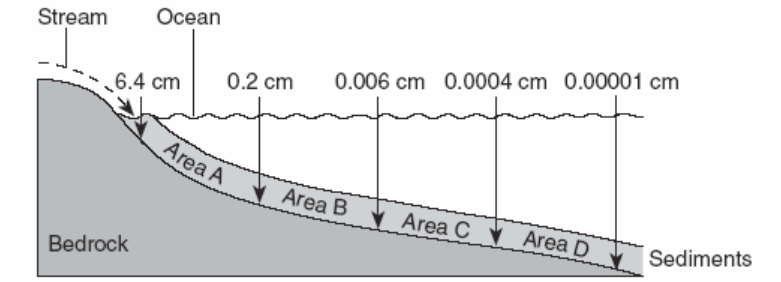
Draw a line on the diagram to the left to show where the stream velocity changed.

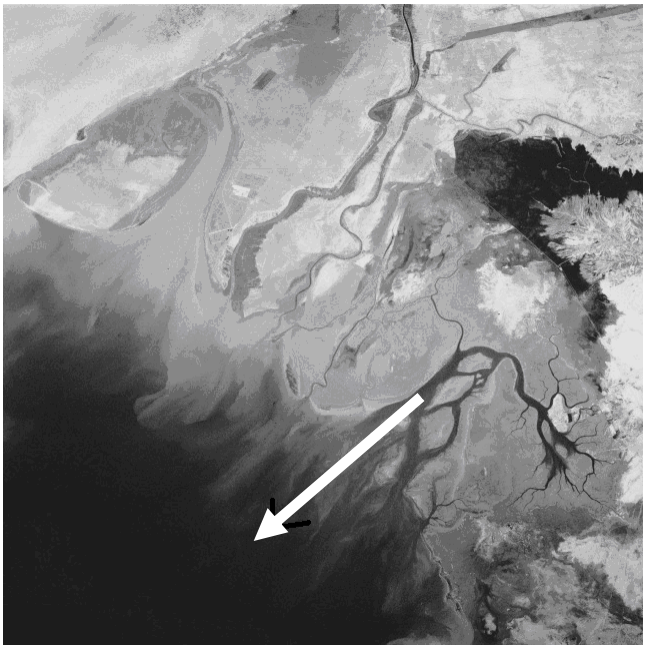
Write “fastest” on the side of the diagram where the stream would have been flowing the fastest.

Write “slowest” on the side of the diagram where the stream would have been flowing the slowest.

Based on the diagram below, what happens to the size of particles deposited in the ocean as distance from the mouth of a stream increases? **they get smaller**

Why? **the stream velocity decreases**





What is this type of river deposit called?

delta

Where would the largest sized particles be found?

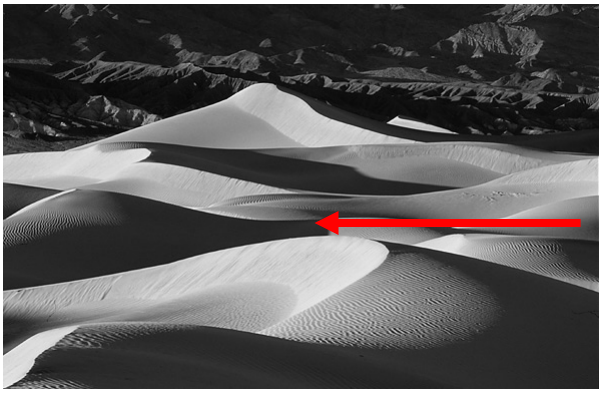
near shore

Where would the smallest sized particles be found?

farthest from shore

Along the arrow that is drawn, would the sediment size that is deposited decrease, increase or remain the same?

decrease



What agent of deposition would have created the image to the left?

wind

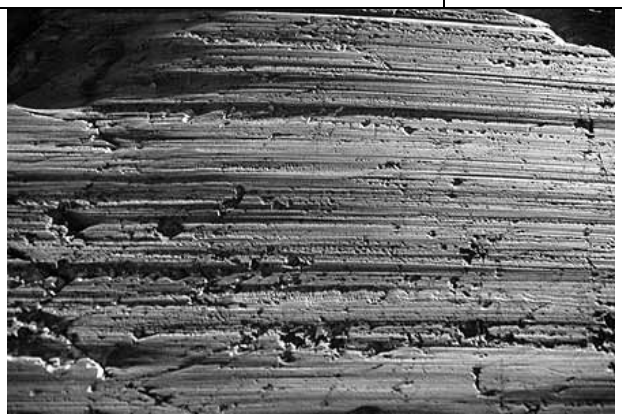
What direction was this agent moving?

to the left

Glacial Deposits:

till

erratics



striations

Glacial Landforms: