

Date: Friday, 01 May 2020

Title: Fluvial Processes - Erosion, Transportation and Deposition

Knowledge Recall: Key word crossword

Without looking at last lessons notes, try and complete the key word crossword

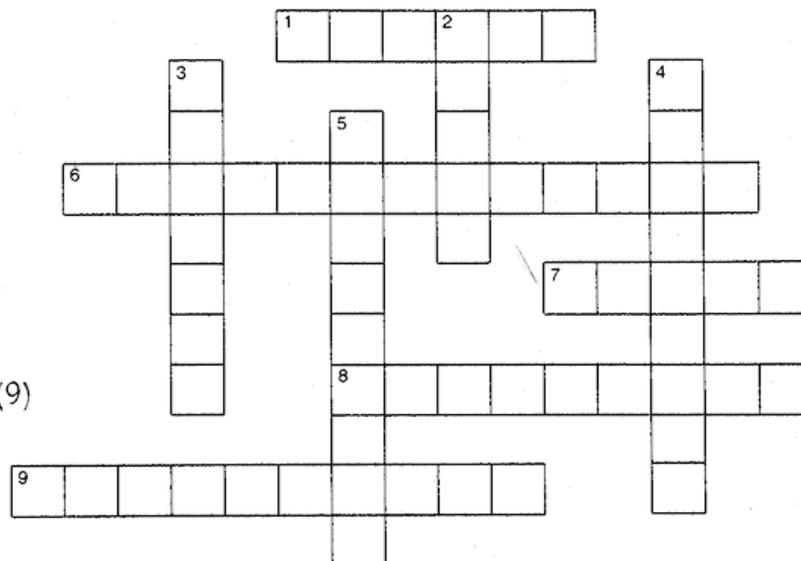
Solve the crossword using the clues below.

Across

- 1 Where a river starts (6)
- 6 An area drained by a river (8, 5)
- 7 The end of a river (5)
- 8 Where rivers flow into (3, 2, 4)
- 9 Where a small river joins a larger one (10)

Down

- 2 A large stream (5)
- 3 A river flows in this (7)
- 4 A stream or small river that flows into a bigger one (9)
- 5 The boundary between two river basins (9)



LO: To explore how rivers erode, transport and deposit material.

SUCCESS CRITERIA:

I can **describe** the fluvial processes.

I can **explain** how a river erodes, transports and deposits material.

I can **suggest** how velocity affects the processes of erosion, transportation and deposition.

There are three main river processes

Erosion



Transportation



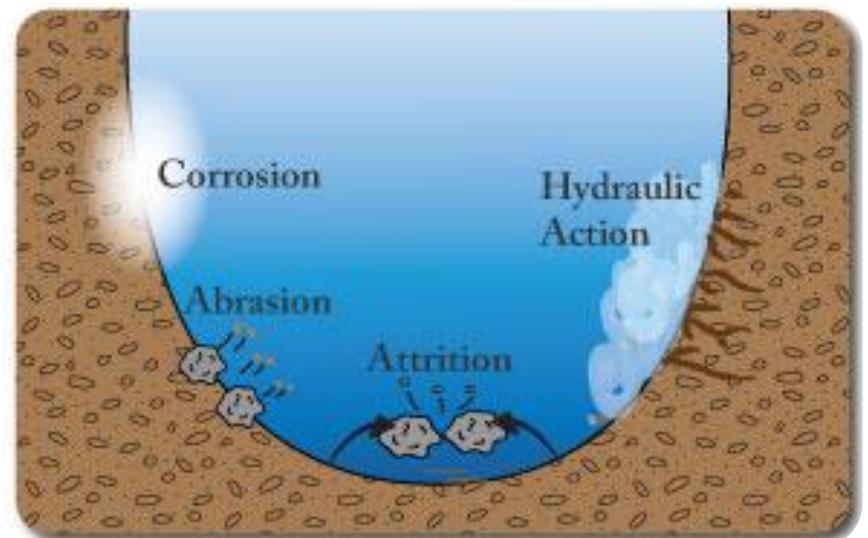
Deposition



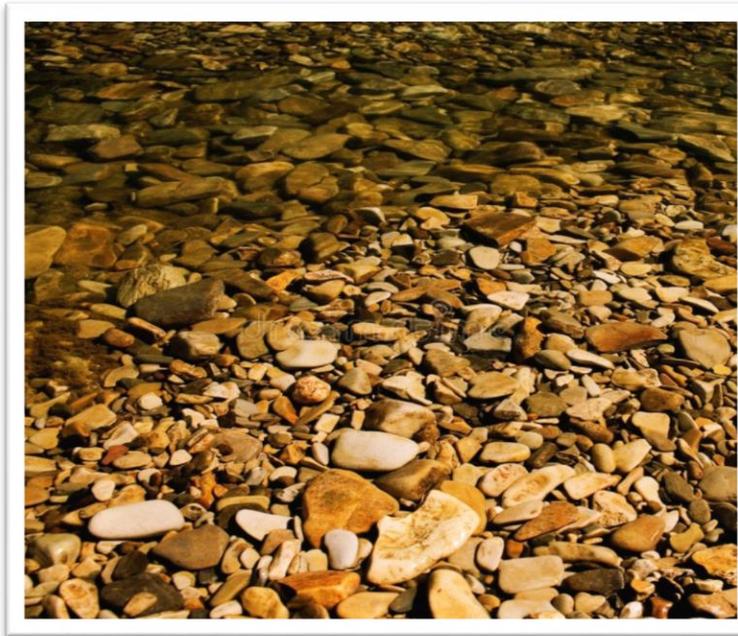
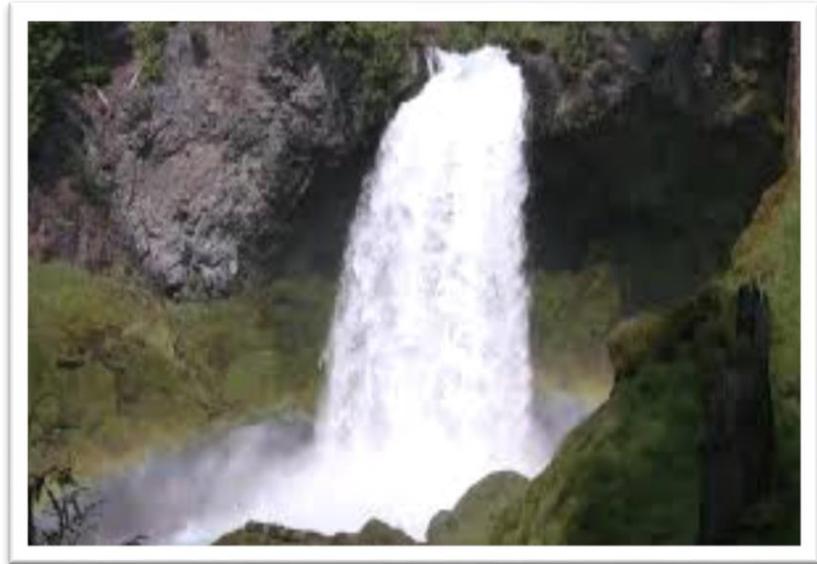
Erosion

The ability of a river to erode depends on its velocity. So, the faster a river is flowing, the more erosion takes place.

EROSION IS THE WEARING AWAY OF ROCKS, RIVER BED AND BANKS



**Hydraulic
action**
= sheer force
of the water



Attrition
= rocks hit
against each
other and
become smaller

Abrasion
= rocks in the
river scrape and
scour the river
bank

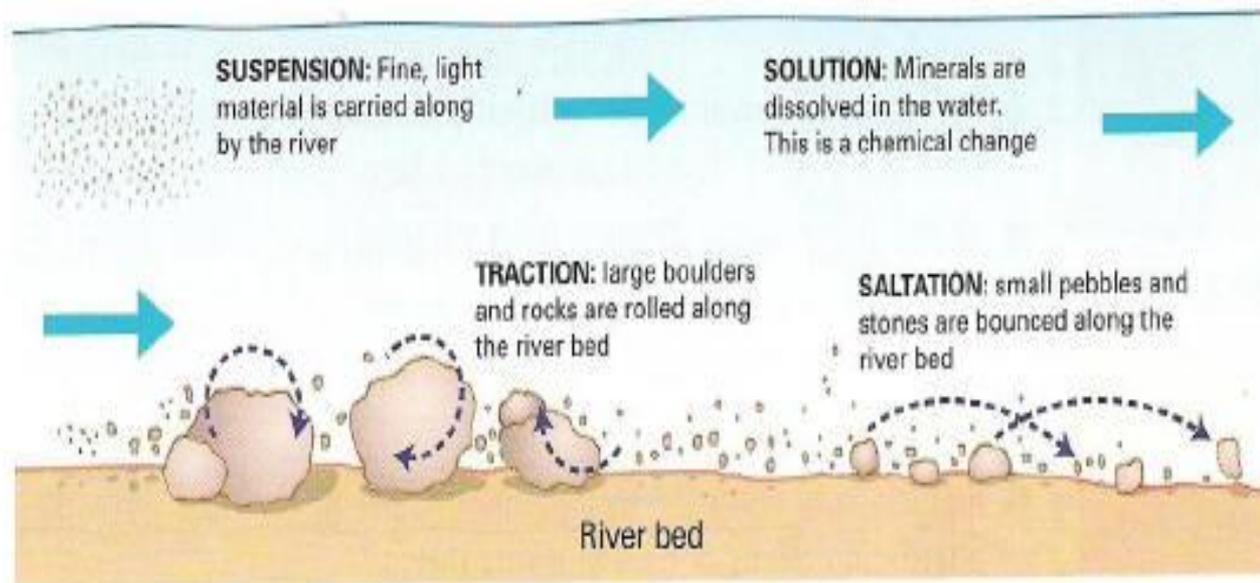


Solution
= rocks dissolve
into the water

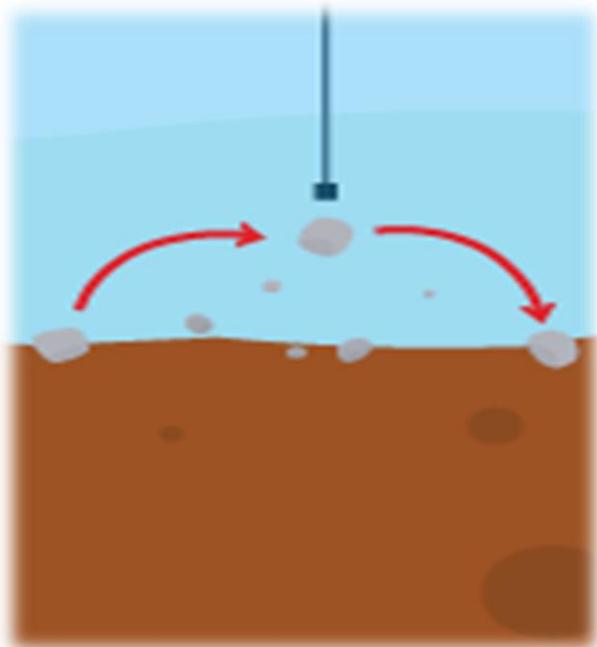
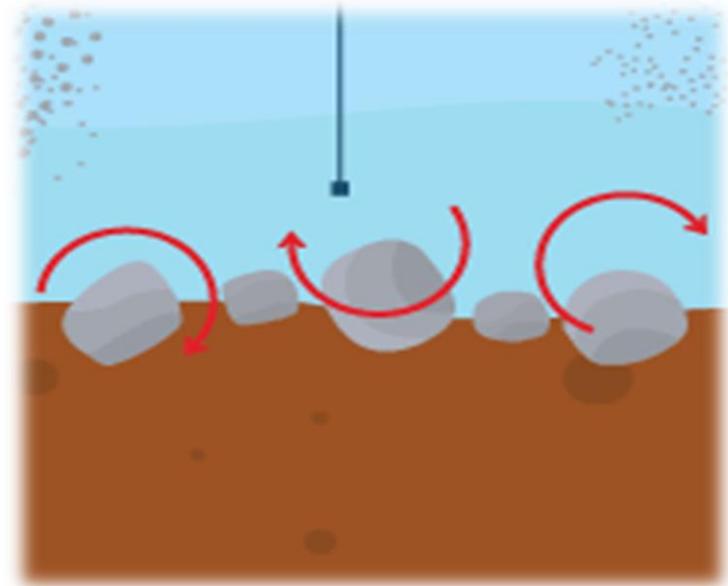
Transportation

TRANSPORTATION IS WHEN THE ERODED MATERIAL IS CARRIED AWAY

Transportation depends on velocity but also particle size. If a river is flowing fast, it is more able to transport larger material.

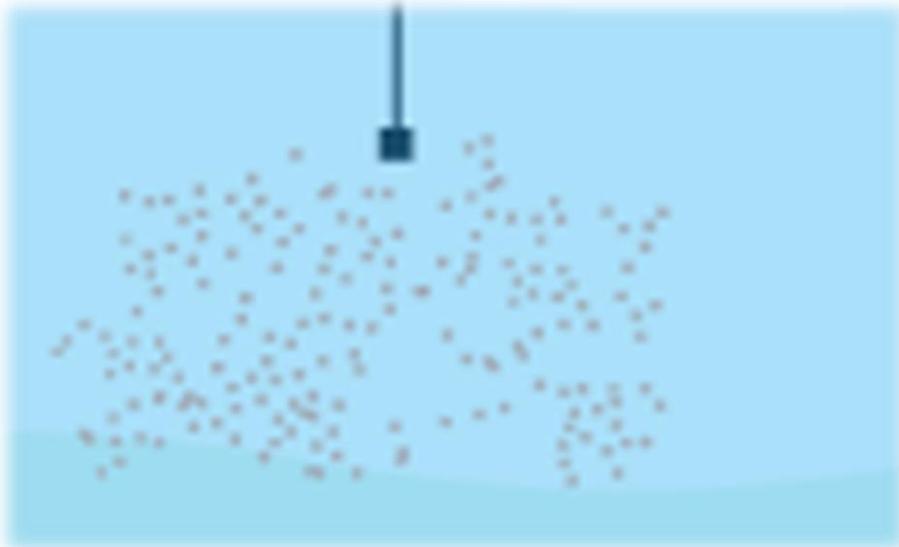
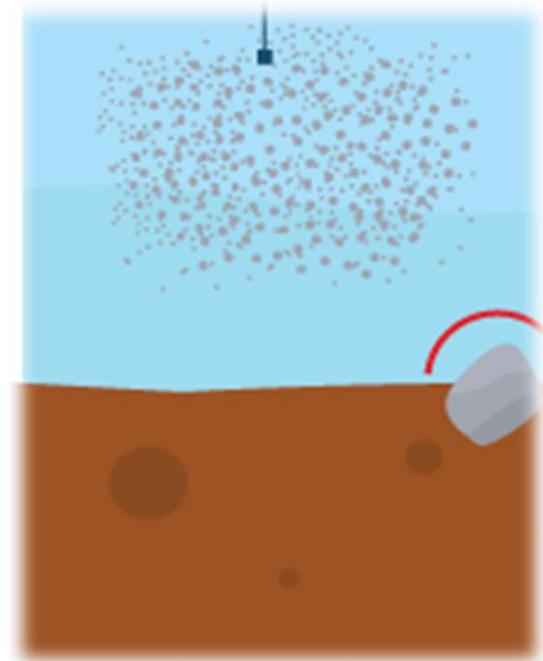


Traction
= where large pebbles are rolled along the river bed



Saltation
= pebbles are bounced along the river bed

Suspension
= where smaller
particles are carried
suspended in the
load



Solution
= where
dissolved
particles are
carried invisibly

Deposition

3. DEPOSITION



Rivers deposit material when they lose velocity (slow down). The bigger the load particle, the greater the velocity needed to keep it moving. That's why large particles (like boulders) are deposited first and small, fine particles (like silt) are deposited last.

There are a few reasons why rivers slow down and deposit material:

- The volume of water in the river decreases
- The amount of eroded material in the water
- The water is shallower
- The river reaches its mouth



TASK 1: Erosion of the river bed and banks

Use the diagrams and text boxes to identify, describe and explain the fluvial processes that occur along the course of a river.

Cut them out and glue them in your books (Get them checked first!)

Here's an example of what your connections should look like.



ACTIVATE Cut out the boxes and glue them in your book to describe and explain the fluvial processes along the course of a river. Some are already in the correct order.

Erosion, Transportation and Deposition along the course of a River.

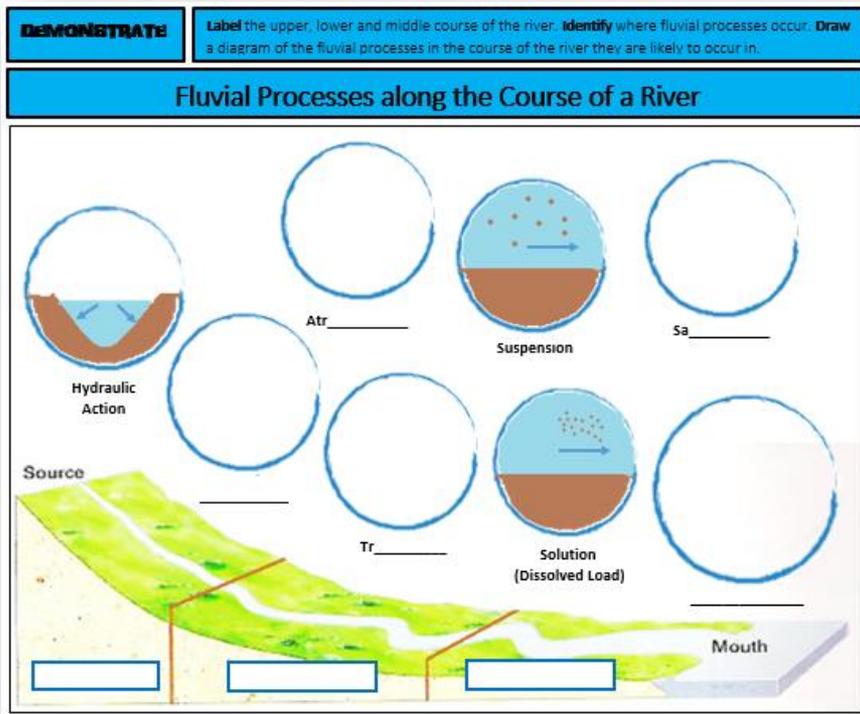
Hydraulic Action	This is when the sheer force of fast-flowing water hits the river banks and river beds and forces water into the cracks.	This compresses air in the cracks. Repeated changes in air pressure weaken the channel. Hydraulic action is responsible for vertical erosion in the upper course of a river. In the lower course of the river it contributes to lateral erosion of the banks, especially when fast flowing water hits the outside bend of a meander.
Abrasion	Abrasion affects a river's bed. When stones first enter a river they are jagged and angular. As they are transported downstream, stones collide with each other and also with the river banks and bed.	Stones will be worn flatter into the channel quite rapidly. They will be angular and have sharp, jagged edges. These are particularly effective tools of abrasion. Chipping also responsible for both vertical and lateral erosion of a meander.
Attrition	This gradually breaks the stones, jagged edges so they become smooth and more rounded. Some collisions may cause stones to be smashed into several smaller stones. These smaller stones will be further smoothed and rounded on their journey to the sea.	This is also called 'load' and 'load' is the material that is carried in the river. It is made up of rocks and stones of various sizes and shapes that are carried in the river.
Solution	The fluvial process is also known as corrosion. Solution refers to the dissolving of rocks such as chalk and limestone.	The load is alternately lifted then dropped in the velocity of the river and falls in the velocity of the river. Particles are too large to be suspended but large enough to be dragged along the river bed.
Traction	This transportation process is what happens to fine material (silt).	These fine particles such as silt and clay are carried in this way in the river.
Saltation	Rivers travelling over these types of rocks will erode them this way by causing a chemical reaction which causes the rocks to dissolve, and therefore be eroded.	The material is too large to be carried by the current of the river, therefore it is rolled along the river bed. The load that is carried in this way is called the bed load.
Suspension	This transportation process moves large boulders and rocks along the river bed.	The material is too large to be carried by the current of the river, therefore it is rolled along the river bed. The load that is carried in this way is called the bed load.
Solution	The fluvial process is also known as corrosion. Solution refers to the dissolving of rocks such as chalk and limestone.	This is a chemical change in which rocks such as limestone and chalk are dissolved. The dissolved material is carried in the river.
Deposition	Deposition is the process by which a river drops its load. Material deposited by a river is called sediment.	The bigger the load particle, the greater the velocity it needs to be deposited. The finest particles are deposited first. Along its course a river carries a load of sediment. This could be at the base of the river, or where the river enters the sea or lake.

Hydraulic Action

This is when the sheer force of fast-flowing water hits the river banks and river beds and forces water into the cracks.

This compresses air in the cracks. Repeated changes in air pressure weaken the channel. Hydraulic action is responsible for vertical erosion in the upper course of a river. In the lower course of the river it contributes to lateral erosion of the banks, especially when fast flowing water hits the outside bend of a meander.

TASK 2: Fluvial Processes along the Course of a River



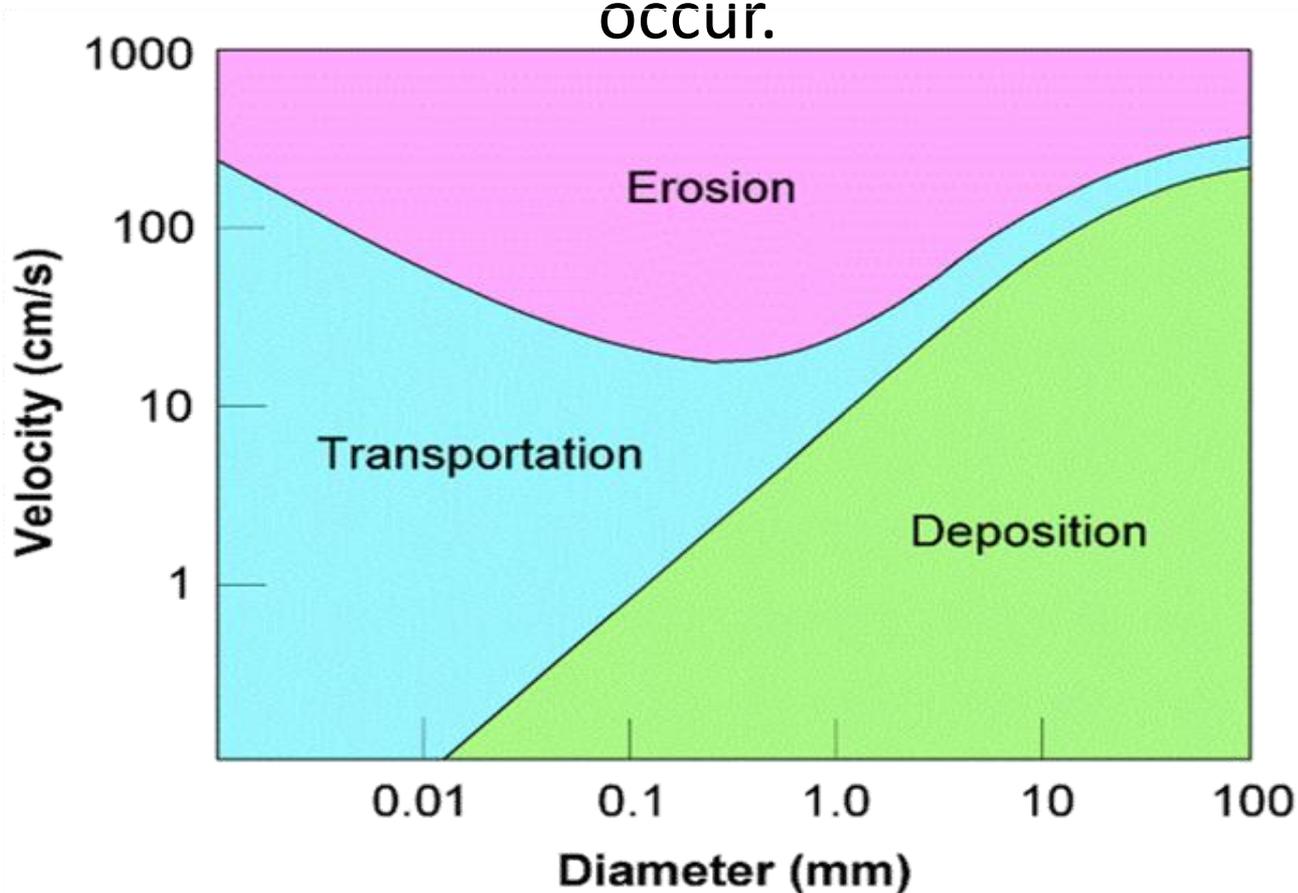
Label the upper, lower and middle course of the river.

Identify the fluvial processes.

Draw a diagram of the fluvial processes in the course of the river they are likely to occur in.

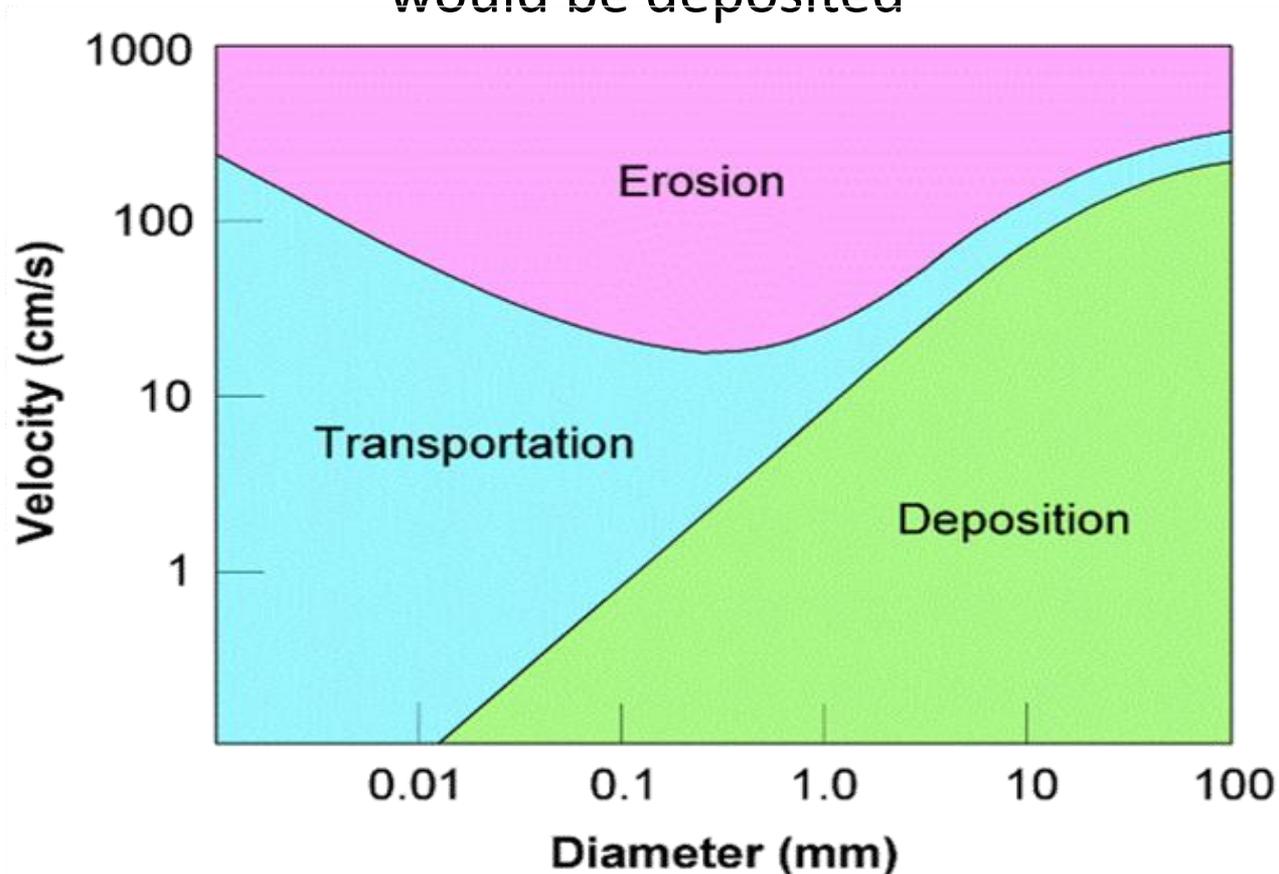
Hjulstrom Curve

The Hjulstrom Curve (below) shows the different critical velocities at which erosion, transportation and deposition occur.

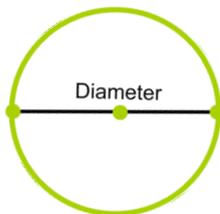
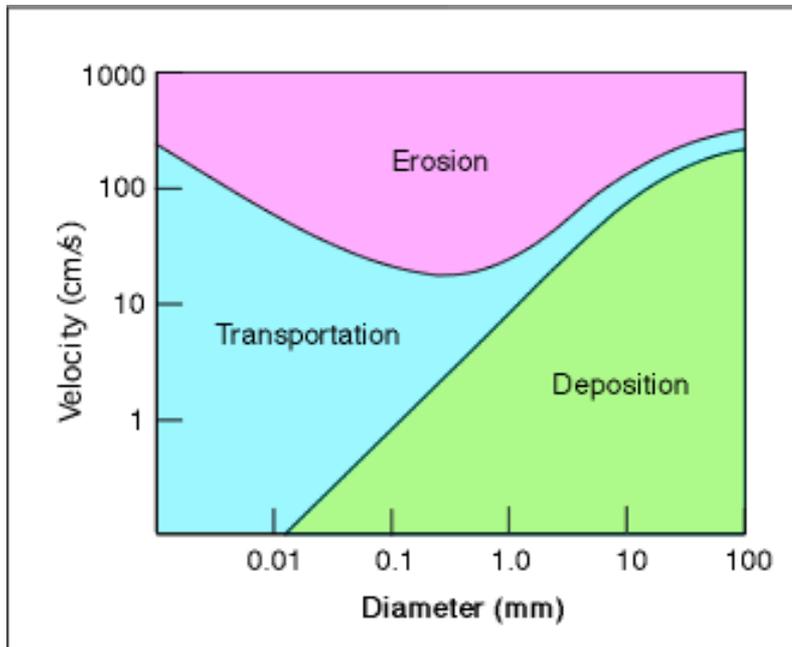


Hjulstrom Curve

The blue section shows that large 10mm diameter particles are transported between velocities of about 85-110cm/sec. If the velocity dropped below 85cm/sec (and enters the green section) the particles would be deposited



Task 3: Apply your understanding to the Hjulstrom Curve – a graph used by hydrologists.



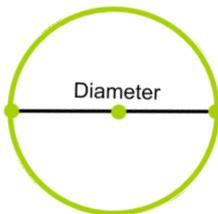
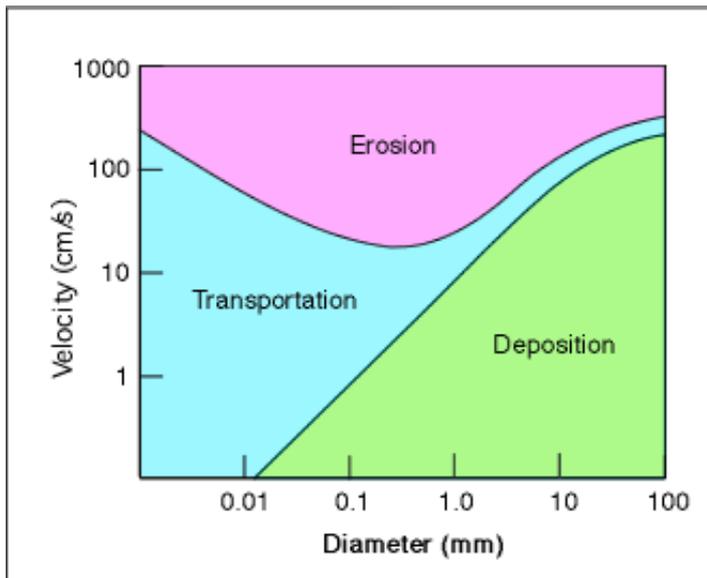
Using the Hjulstrom Curve, **suggest** how velocity (speed of the river) affects the processes of erosion, transportation and deposition (4).

MARK SCHEME:

Suggest the general relationship between particle size and the velocity at which erosion occurs (use data to back it up).

Suggest the general relationship between particle size and the velocity at which deposition occurs (use data to back it up).

TASK 3: Apply your understanding to the Hjulstrom Curve – a graph used by hydrologists.



Using the Hjulstrom Curve, **suggest** how velocity (speed of the river) affects the processes of erosion, transportation and deposition (4).



MODEL ANSWERS:

The higher the velocity the more erosion that occurs (1), for example when the river flows between 400cm/s material is likely to be eroded regardless of diameter (1).

The larger the boulder the more deposition that occurs (1), for example when the particle size has a diameter between 1.0 and 100mm, the particle will be deposited at speeds between 0 and 300cm/s (1).