



IQRA NATIONAL UNIVERSITY

ENGINEERING GEOLOGY

Lecture 02

Geological weathering , Erosion and Deposition

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What is geological weathering ?

In simple words;

Weathering is the process of breaking down surface rocks into smaller rocks/pieces.

The process which tends to break and decompose rock in place including two processes;

Physical/Mechanical weathering

Chemical weathering



PHYSICAL/ MECHANICAL WEATHERING

is a processes by which rocks are broken down into smaller pieces by external conditions without a change in chemical composition.

At the beginning of the weathering process, the rocks are sharp and angular. Eventually the rocks become smooth.



ANGULAR

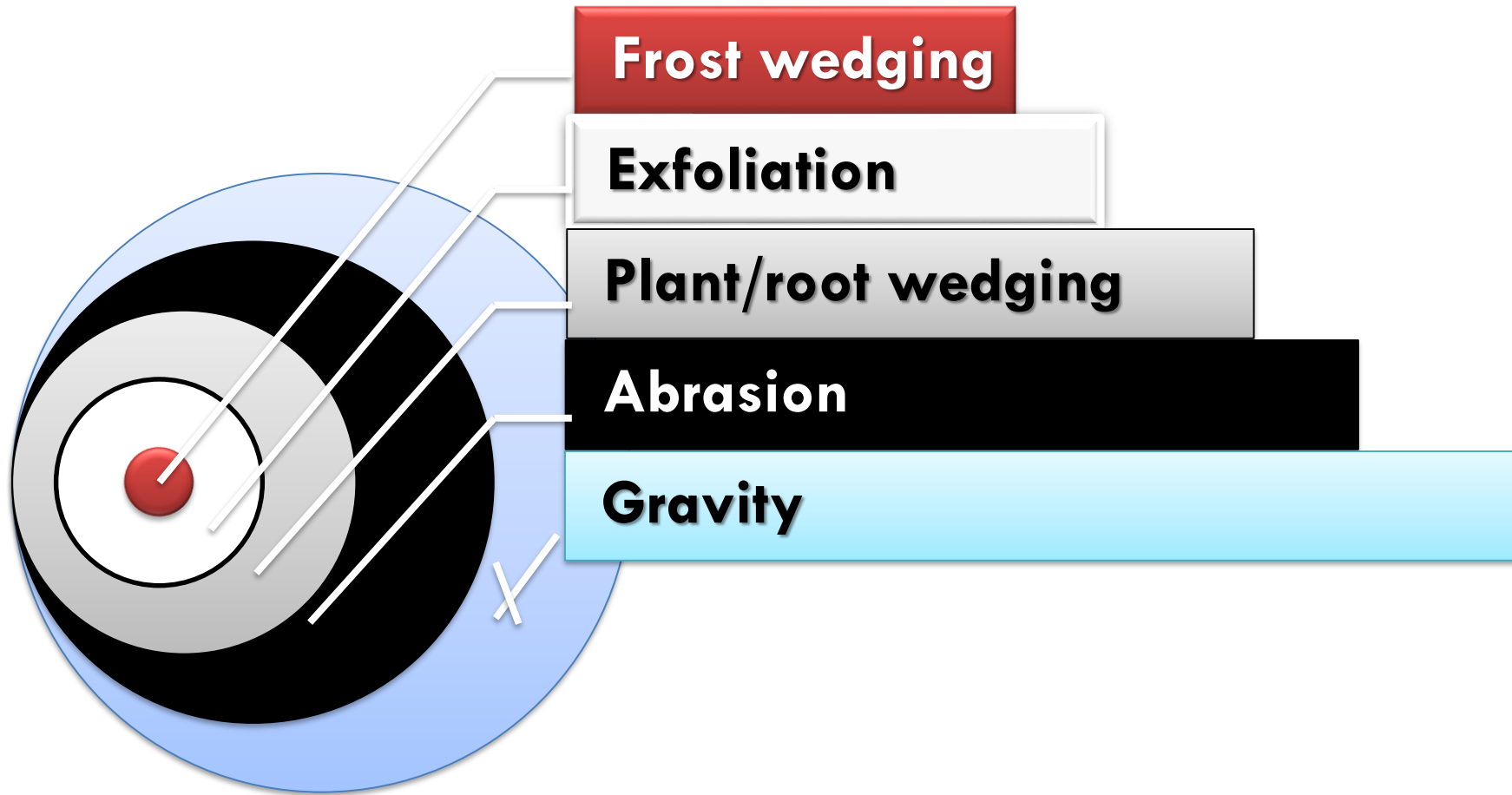


MEDIUM



ROUNDED

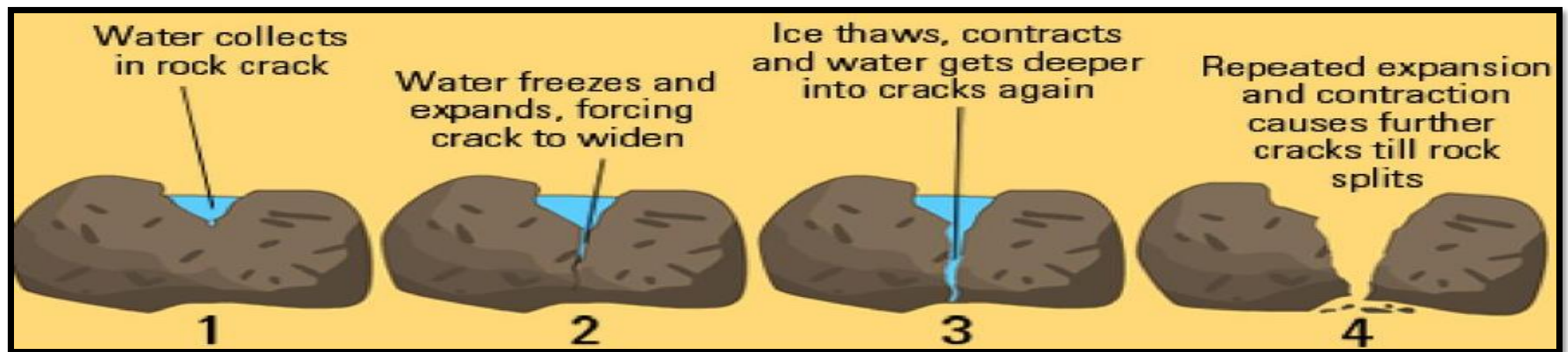
AGENTS OF PHYSICAL/ MECHANICAL WEATHERING



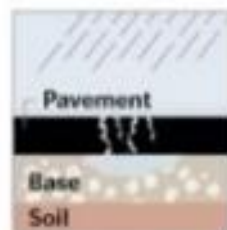
FROST WEDGING

Frost Wedging is the freezing and thawing of water in cracks.

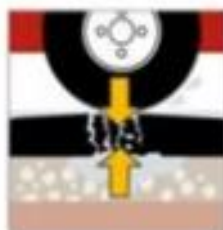
Water will go into cracks in rocks and when it gets cold enough outside (32 degrees F or 0 degrees C), the water inside the rocks will freeze. Due to freezing the volume of water increases forces rock to expand, causing the rock to eventually break into pieces.



Physical Weathering



1. Water seeps through cracks in pavement and softens the road's base, collects, then freezes.



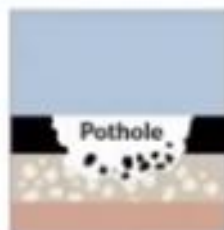
2. When the water freezes, it expands and forces the pavement up. Traffic further stresses the pavement.



3. The sun dries up the water, leaving a hole under the pavement.



4. With no base, the pavement is weakened and collapses under the weight of traffic.



5. A pothole is formed where the pavement collapsed. Wear from additional traffic expands the hole.

EXFOLIATION

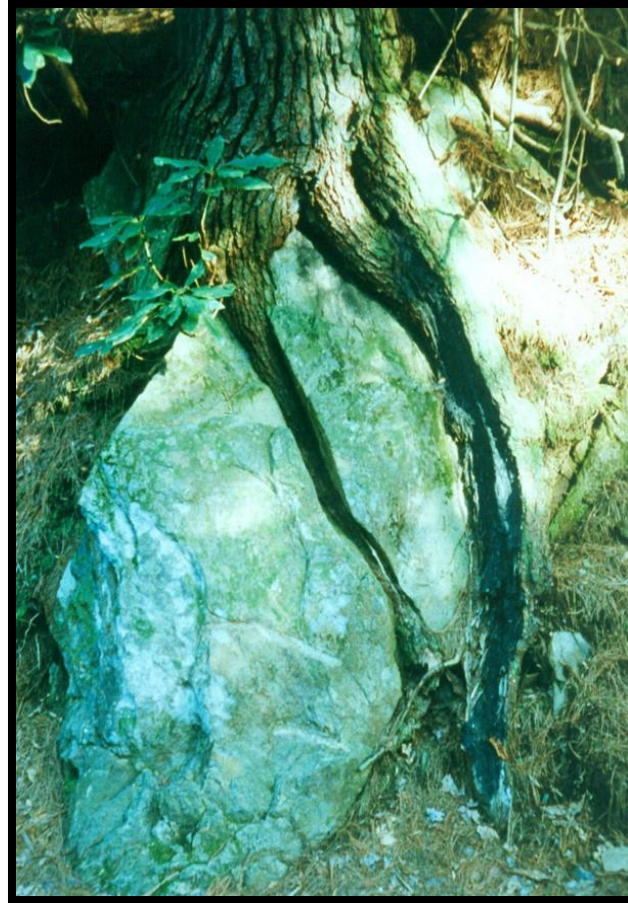
Mechanical Exfoliation is the peeling off of sheets of rock as they expand and crack. During the day time when its sunny, rocks become hotter and expand. During the night, the rocks become cooler and contract.

This continuous process of heating and cooling causes small pieces of the rocks to flake off.



PLANT/ROOT WEDGING (BIOLOGICAL)

Tiny root hairs seek out small cracks and pits in rock. Once the root hairs find a place they grow and expand. The expansion causes great pressure and cracks the rock.



Animals and Mechanical Weathering (Biological Weathering)

Animals that burrow in the ground break up soil and loosen rocks to be exposed to further weathering (Biological Weathering)



ABRASION

Abrasion is a gradual wearing down of bedrock by the constant battering of loose particles transported by wind, water or glacier. Both wind and water can cause abrasion as rock fragments bounce off each other.



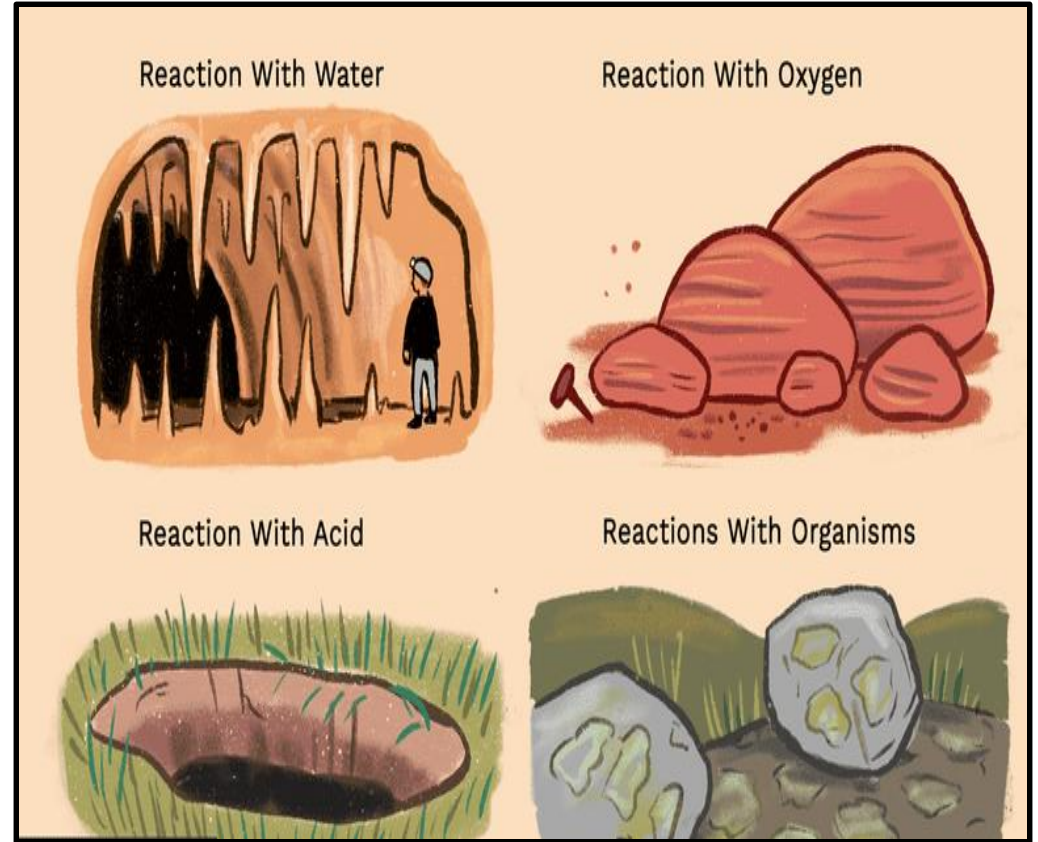
GRAVITY

Gravity will pull loose rocks and soil down a slope, causing a landslide where the tumbling rocks will bump into other rocks on the way down and break into smaller pieces.

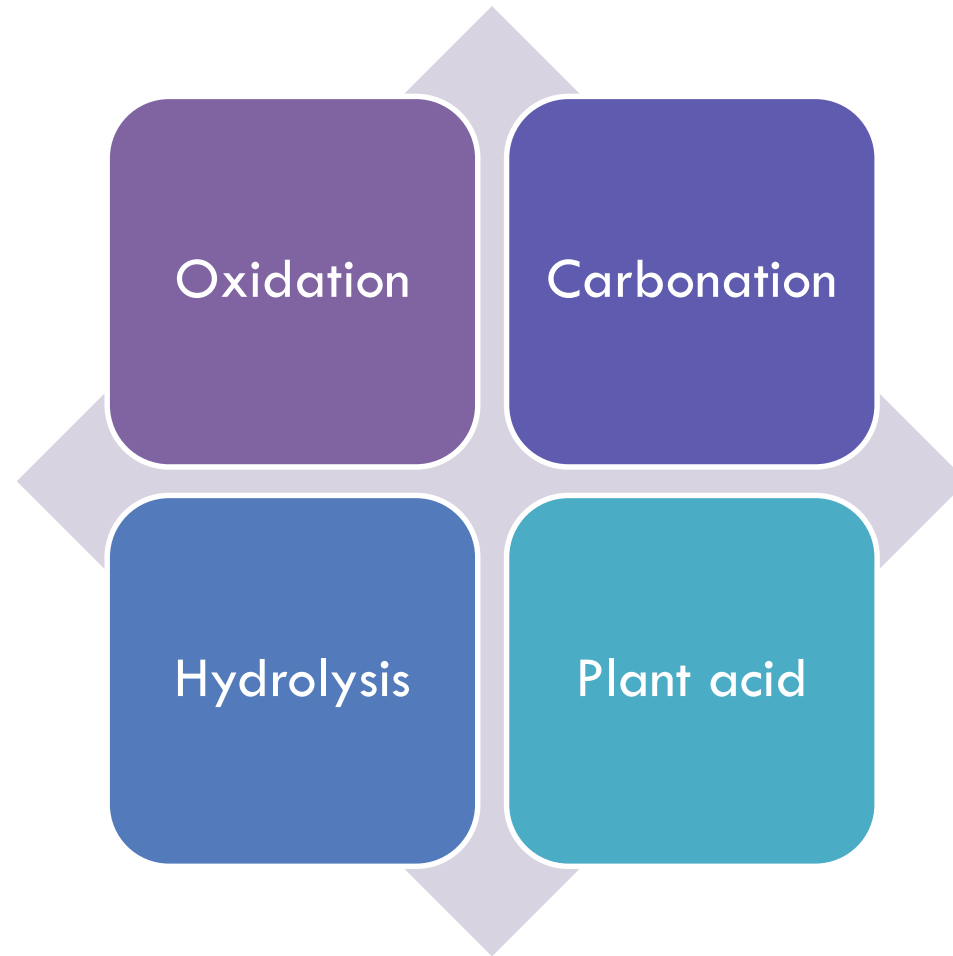


CHEMICAL WEATHERING

is a processes by which rocks are broken down into smaller pieces with a change in chemical composition.



CHEMICAL WEATHERING



OXIDATION

Oxidation is when oxygen combines chemically with some other substance, eventually creating a new substance. Oxidation can actually create rust.



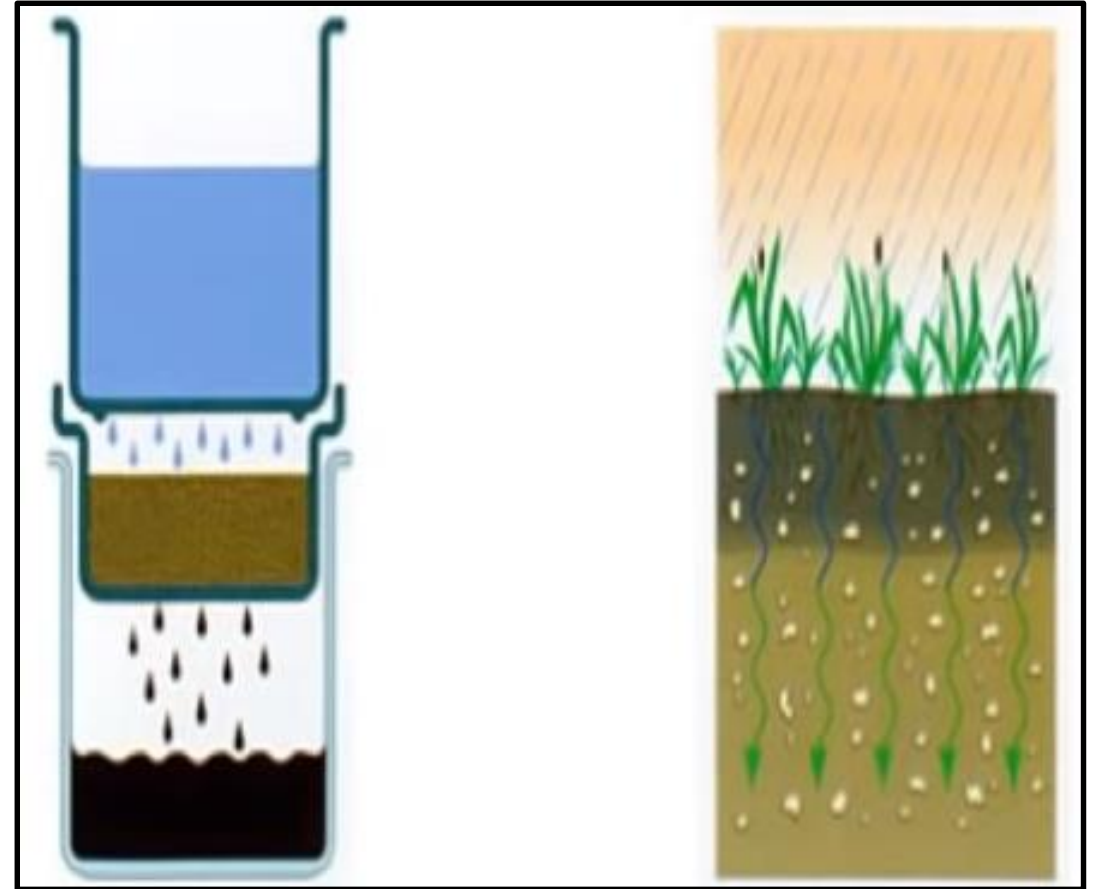
CARBONATION

Carbonation is when chemical reactions occur between certain substances and carbonic acid, which is an acid that comes from carbon dioxide when it dissolves in water. Carbonic acid can be found in rain, that will seep into rocks on the ground and won't actually do too much damage, but it does slowly decompose certain rocks like limestone and feldspar.



HYDROLYSIS

The
reaction of
substance
with water.



PLANT ACID

The plants can not only be an agent of mechanical weathering, but can also be an agent of chemical weathering. Plants actually do produce acids, but not similar to sulfuric acid, plant acids are very weak. But, they do dissolve some minerals in rocks causing the rock to break into pieces over time.



What is Erosion?

Erosion is the process where weathered rocks and particles of soil are moved over land. After the rocks are broken down from weathering, erosion carries that sediment and deposits it in a new location.



AGENTS OF EROSION

WATER



Water can remove soil, rocks, and dissolved material from one area to another. Erosion by water can take different forms: rainfall, river, ocean wave, and floods.

WIND



Large amounts of dust, sand, and volcanic ash can be blown by wind over huge distances. Wind is the agent of erosion that causes sand to form into large sand dunes. Dust has been known to travel over entire oceans.

ICE



Ice can move rocks and rock particles through glaciers. A glacier is a body of ice that is constantly moving very slowly because of gravity.

GRAVITY



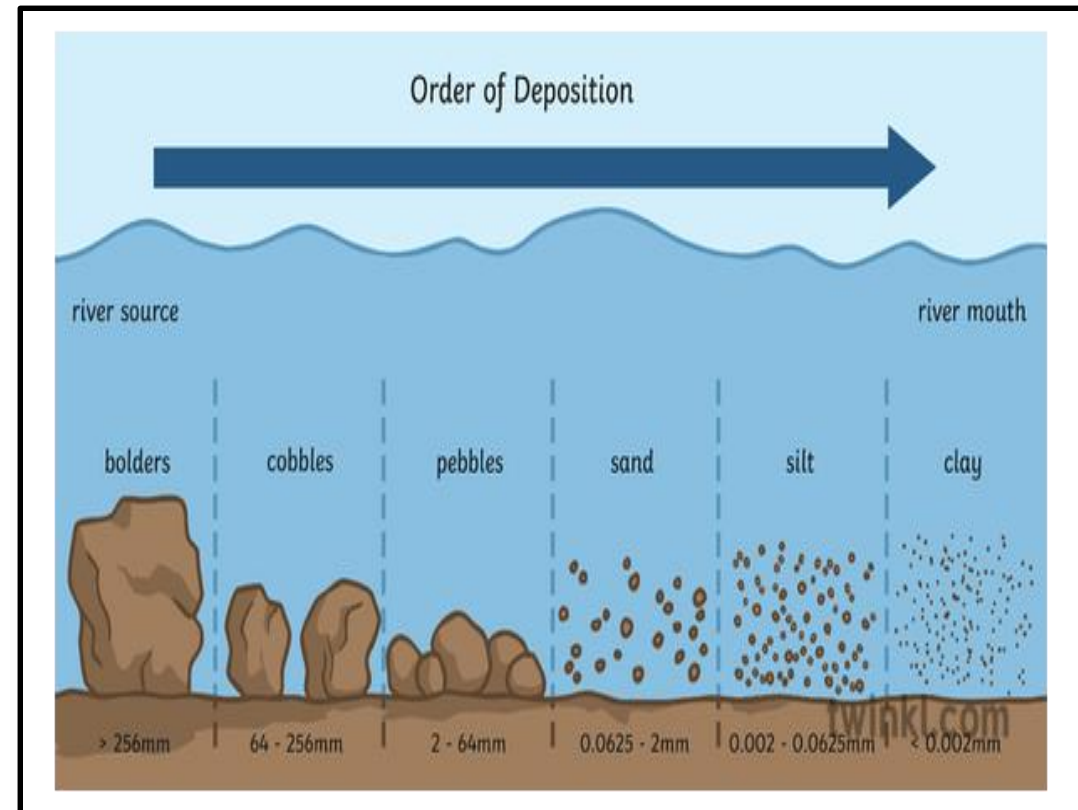
Gravity is also an agent of erosion. When rocks are weathered, the rock particles can fall from the rocks due to the force of gravity. This is also known as mass movement.

DEPOSITION

Deposition is a process where sediments are released/dropped by their agent of erosion.

Most deposition happens in standing/still bodies of water (oceans/lakes).

Deposition is caused by the slowing down (loss of kinetic energy) of the agent of erosion.



END OF THE LECTURE

