

GCSE Geography Grade Booster

Physical Geography

Exam Paper 1 Question 3

Coastal Landscapes Work Book



When you see this symbol – you need to write an answer or fill in the gaps

This symbol indicates the information you need to revise for the exam



www..... Included in this work book are links to websites and videos that will help you to learn!



Waves

When the wind blows over the sea, it creates waves. The size and energy of the wave depends on certain factors:

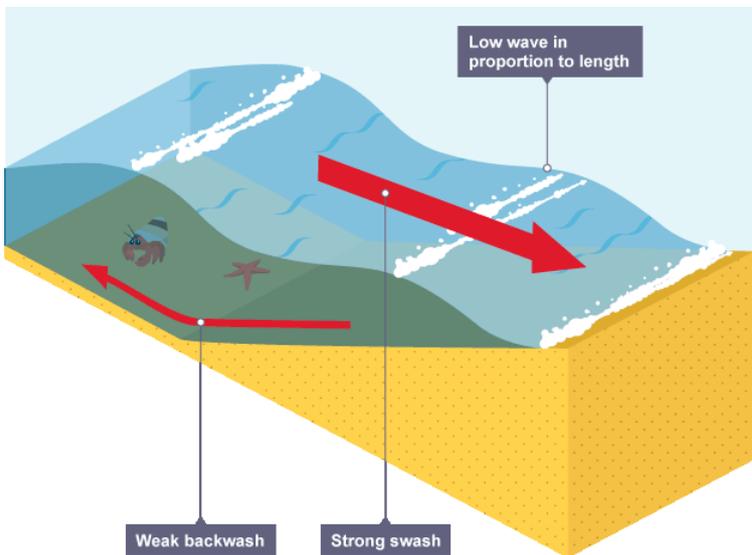
- the fetch - how far the wave has travelled
- the strength of the wind
- how long the wind has been blowing for

Wave types

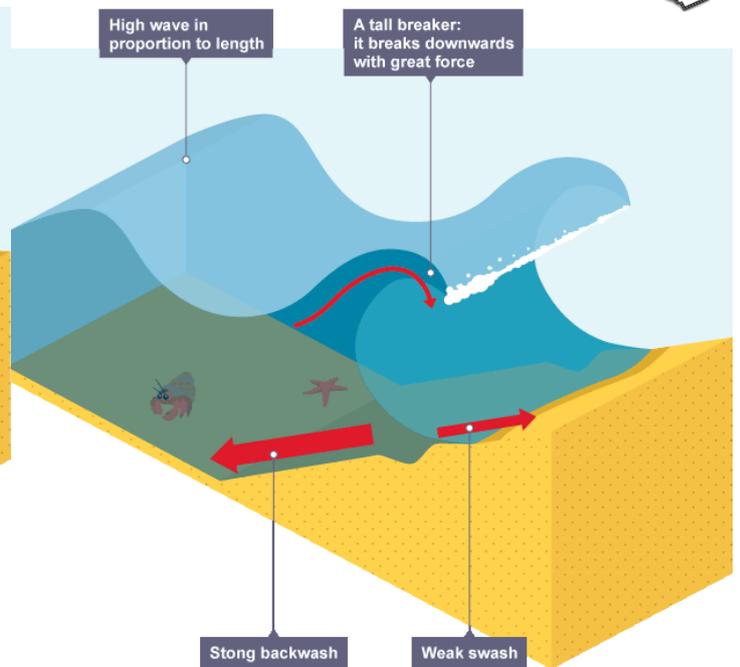
There are two different types of waves - **constructive and destructive**. They can affect the coastline in different ways. When a wave reaches the shore, the water that rushes up the beach is known as the swash. The water that flows back towards the sea is known as the backwash. The energy of the swash and backwash determine the type of wave.



Constructive Waves



Destructive Waves



Task: List the characteristics of constructive and destructive waves

Constructive	Destructive

Coastal Processes

Weathering



Freeze-thaw weathering

1. Freeze-thaw weathering occurs when water enters crack in rock.
2. Water freezes and expands, widening cracks.
3. Ice melts and water goes deeper into crack.
4. Process repeats until rock splits and breaks down.

Task: Draw and annotate the process of freeze- thaw weathering.

Biological Weathering

1. Plant roots can get into small cracks in the rock.
2. As the roots grow, the cracks become larger.
3. This causes small pieces of rock to break away.

Task: Draw and annotate the process of biological weathering.

Chemical Weathering

1. Rainwater and seawater can be a weak acid.
2. If a coastline is made up of rocks such as limestone or chalk, over time they can become dissolved by the acid in the water.

Task: Draw and annotate the process of chemical weathering.

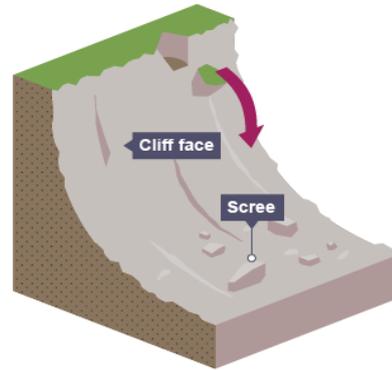
Mass Movement

Another way material can be moved on the coastline is through mass movement. Mass movement is the downhill movement of sediment that moves because of gravity. There are four different types of mass movement.

Rockfall

Rocks fall off the cliff face forming scree at the bottom.

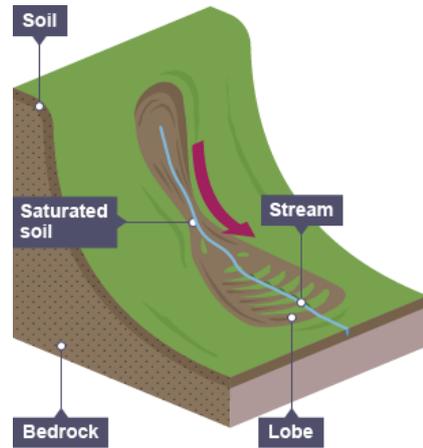
Bits of rock fall off the cliff face, usually due to freeze-thaw weathering.



Mudflow

Saturated soil slides down the bedrock forming a lobe at the bottom with a stream running through.

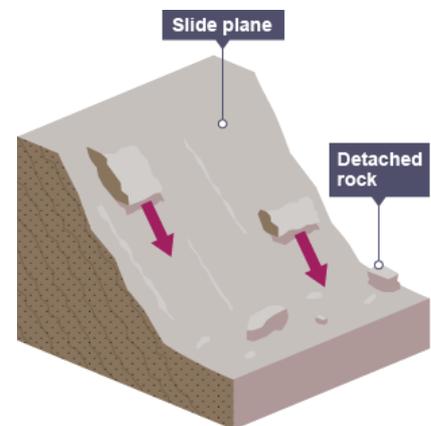
Saturated soil (soil filled with water) flows down a slope.



Landslide

Rocks detach off the slide plane and slide down to the bottom.

Large blocks of rock slide downhill.



Explain one type of mass movement

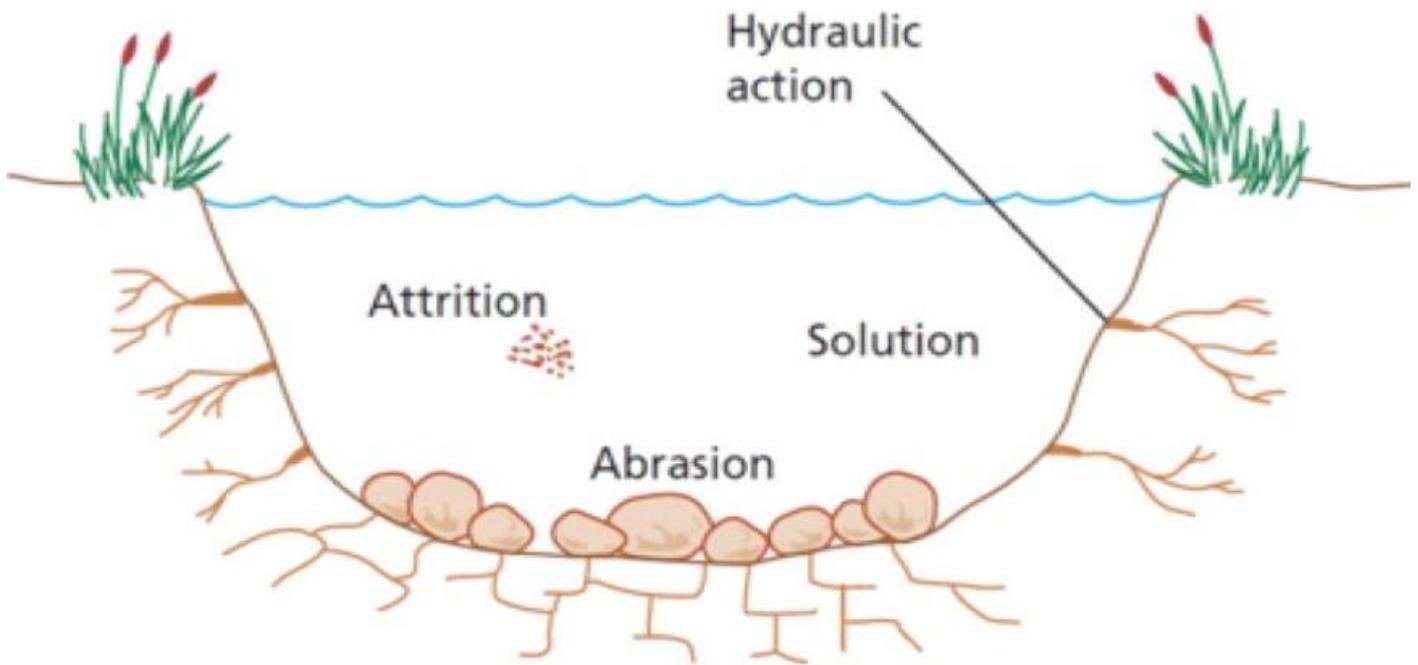
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Erosion



Hydraulic action - this is the sheer power of the _____ as they smash against the cliff. Air becomes trapped in the _____ in the rock and causes the rock to break apart.

Abrasion - this is when pebbles grind along rock, much like _____. Over time the rock becomes smooth.

Attrition - this is when rocks that the sea is carrying knock against each other. They break apart to become smaller and more _____.

Solution - this is when sea water _____ certain types of rocks. In the UK, chalk and limestone cliffs are prone to this type of erosion.

Rounded

Waves

Sandpaper

Cracks

Dissolves



Transportation

Solution - when minerals in rocks like chalk and limestone are dissolved in sea water and then carried in solution. The load is not visible.

Suspension - small particles such as silts and clays are suspended in the flow of the water.

Saltation – where small pieces of shingle or large sand grains are bounced along the sea bed.

Traction – where pebbles and larger material are rolled along the sea bed.



Erosional Landforms

Headlands and Bays

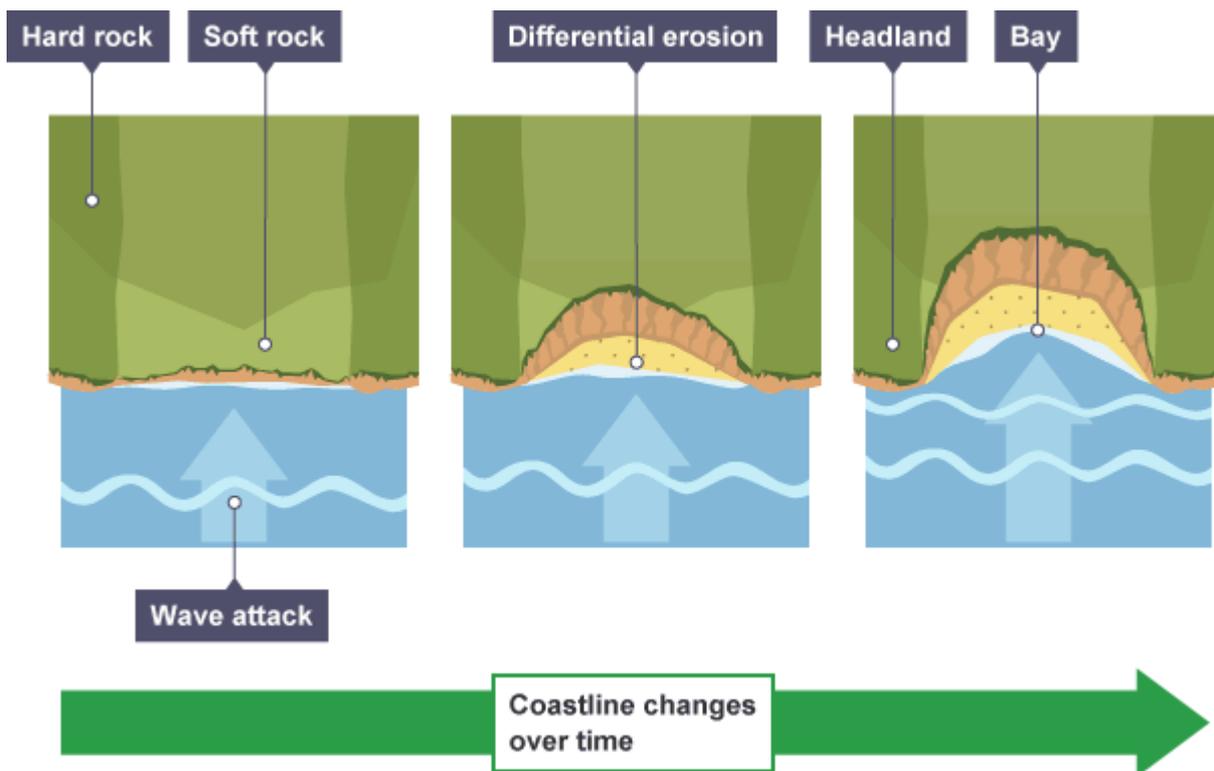
Cliffs along the coastline do not _____ at the same pace. When a stretch of coastline is formed from different types of rock, headlands and bays can form.

Bands of _____ rock such as clay and sand are weaker and therefore they can be eroded quickly. This process forms bays. A bay is an inlet of the sea where the land curves _____, usually with a beach. _____ rock such as chalk is more _____ to the processes of erosion. When the softer rock is eroded inwards, the hard rock sticks out into the sea, forming a _____.

Bays are sheltered with constructive waves which deposit sediment to form a _____.



Erode Beach Inwards Soft Hard Resistant Headland

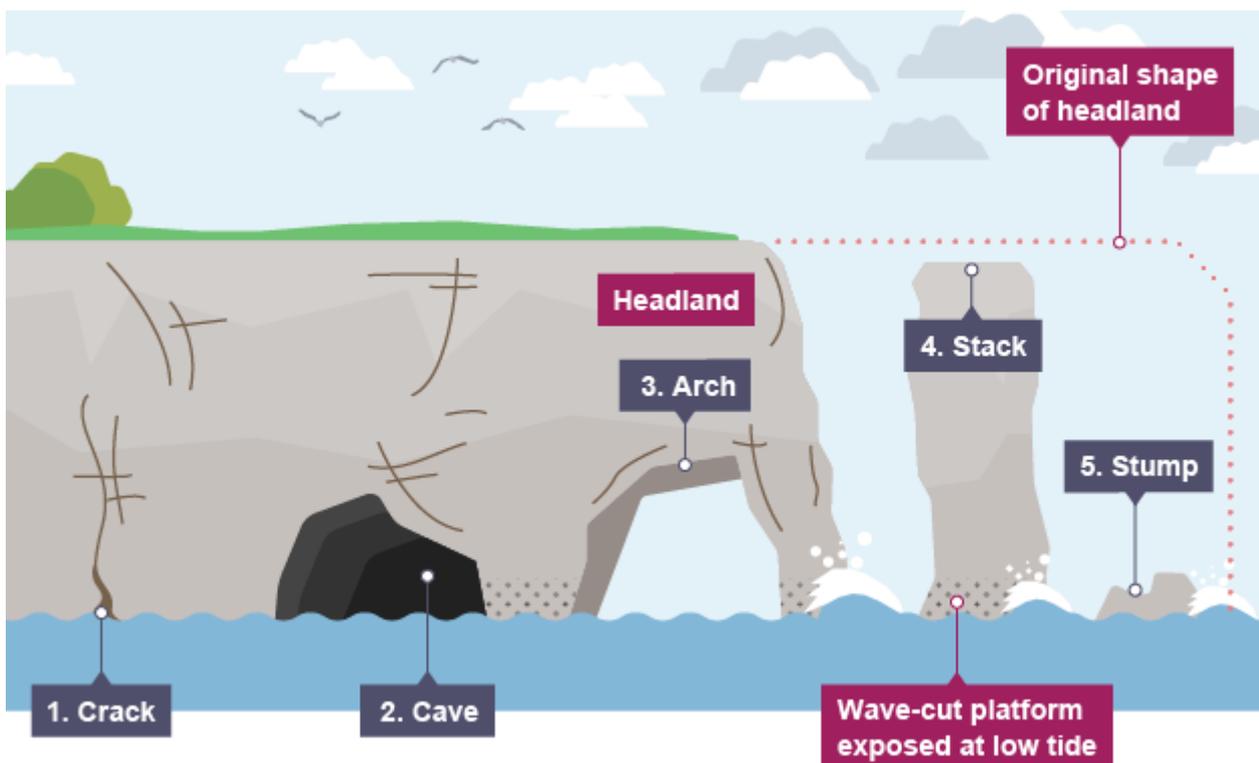


Caves, arches, stacks and stumps



Task: Number the sequence of formation of caves, arches, stacks and stumps.

Caves, arches, stacks and stumps are erosional features that are commonly found on a headland.	1
A crack expands into a cave. A cave expands into an arch. The arch collapses leaving headland and a stack. Wave-cut platform is exposed at low tide. The stack collapses into a stump.	
The cave becomes larger and eventually breaks through the headland to form an arch.	
The stack is undercut at the base until it collapses to form a stump.	7
As the waves continue to grind away at the crack, it begins to open up to form a cave.	
Cracks are formed in the headland through the erosional processes of hydraulic action and abrasion.	
The base of the arch continually becomes wider through further erosion, until its roof becomes too heavy and collapses into the sea. This leaves a stack (an isolated column of rock).	

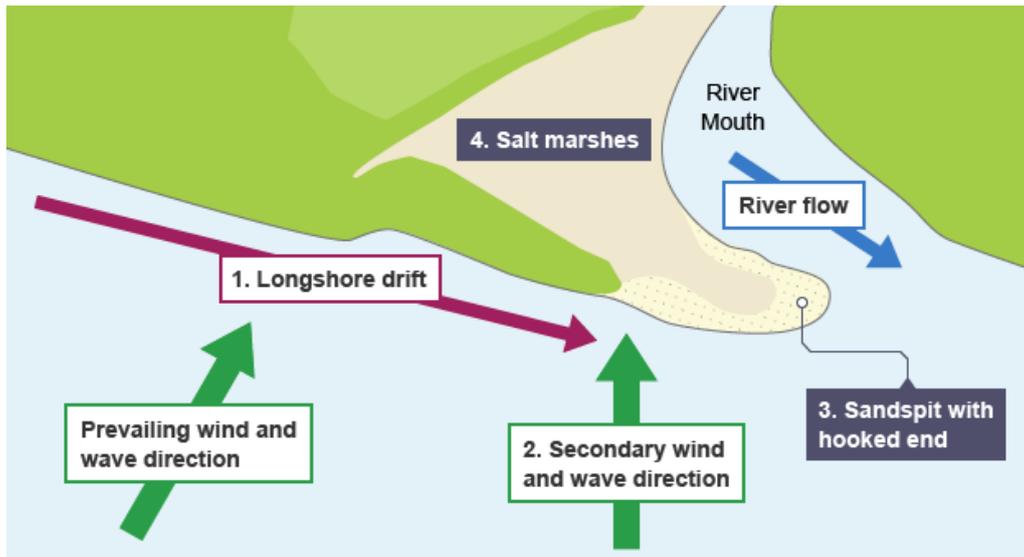


Spits

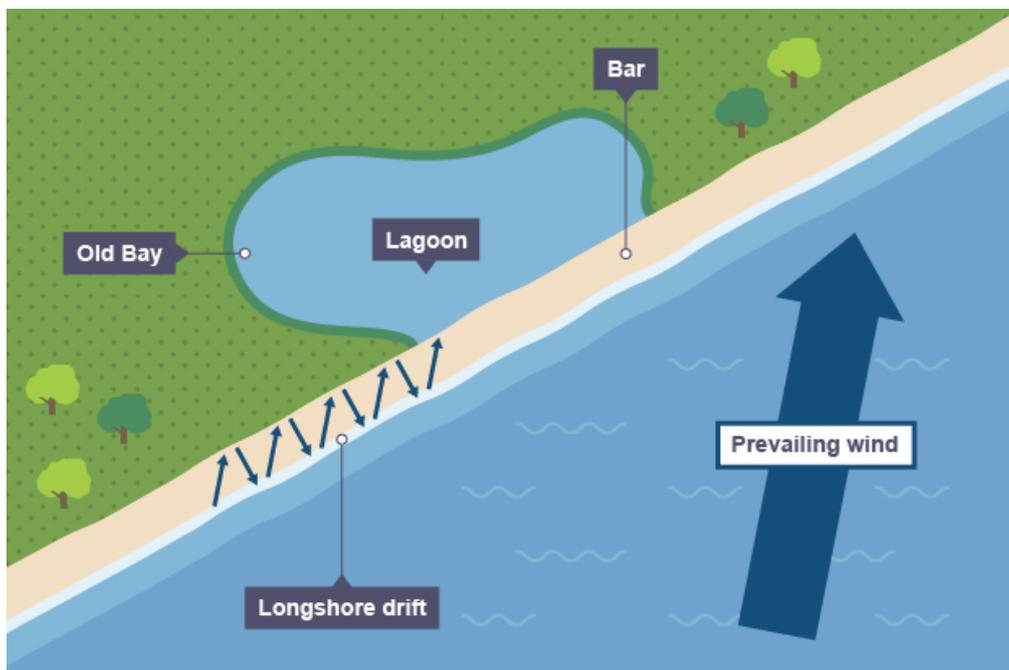
This is how spits are formed:

1. Sediment is carried by longshore drift.
2. When there is a change in the shape of the coastline, deposition occurs. A long thin ridge of material is deposited. This is the spit.
3. A hooked end can form if there is a change in wind direction.
4. Waves cannot get past a spit, therefore the water behind a spit is very sheltered. Silts are deposited here to form salt marshes or mud flats.

No fill in the blanks this time – use this to learn about spits and bars!



Bars



Sometimes a spit can grow across a bay to join two headlands together. This landform is known as a bar. Bars can trap shallow lakes behind the bar - these are known as lagoons. Lagoons do not last forever and may be filled up with sediment.

Coastal Management

Hard engineering

Erosion is a natural process which shapes cliffs. Over time, erosion can cause cliff collapse - therefore the coastline needs to be managed. Hard engineering involves building artificial structures which try to control natural processes. Each engineering strategy has its advantages and disadvantages.

Sea walls

Concrete walls that are placed at the foot of a cliff to prevent erosion. They are curved to reflect the energy back into the sea.

Advantages

Effective at protecting the base of the cliff.

Sea walls usually have promenades so people can walk along them.

Disadvantages

Waves are still powerful and can break down and erode the sea wall.

Expensive - approximately £2,000 per metre.



Groynes

Wooden or rock structures built out at right angles into the sea.

Advantages

Builds a beach - which encourages tourism.

They trap sediment being carried by longshore drift.

Disadvantages

By trapping sediment it starves beaches further down the coastline, increasing rates of erosion elsewhere.

They look unattractive.



Rock armour/rip rap

Large boulders placed at the foot of a cliff. They break the waves and absorb their energy.

Advantages

Cheaper than a sea wall and easy to maintain.

Can be used for fishing.

Disadvantages

They look different to the local geology, as the rock has been imported from other areas.

The rocks are expensive to transport.



Soft engineering

Soft Engineering

Soft engineering does not involve building artificial structures, but takes a more sustainable and natural approach to managing the coast. Each strategy has its advantages and disadvantages for use.

Beach nourishment

Sand is pumped onto an existing beach to build it up.

Advantages

Blends in with the existing beach.

Larger beaches appeal to tourists.

Disadvantages

Needs to be constantly replaced.

The sand has to be brought in from elsewhere.



Offshore reefs

Old tyres and cement can be placed in the intertidal zone, parallel to the coast, to create off-shore reefs. This encourages waves to break offshore. This reduces the energy of the wave which reaches the shoreline and therefore causes less erosion.

Advantages

The natural marine ecosystem is only partly disrupted.

Dunes are allowed to stabilise onshore.

Rocks create a new intertidal habitat for marine wildlife.

Disadvantages

May cause a navigation hazard.

Can create an eyesore at low tide.

Can disrupt the recreational use of the beach, for example the use of jet skis.



Reprofiling

A bulldozer moves sand up the beach

The sediment is redistributed from the lower part of the beach to the upper part of the beach.

Advantages

Cheap and simple.

Reduces the energy of the waves.

Disadvantages

Only works when wave energy is low.

