

Year 9

Geography Booklet

Coasts

Heads or Tails? Match the word to the definition.

Hydraulic Power

This is the chemical action on rocks by sea water. Weak acids in the water dissolve the rock and it is most effective on limestone or other carboniferous rocks.

Corrasion

This is the sandpapering effect of pebbles grinding over a rocky platform, often causing it to become smooth.

Attrition

Breaking waves throw sand and pebbles against the rock face. These break off pieces of rock and causes undercutting. Large storms will even move boulders causing even greater damage.

Abrasion

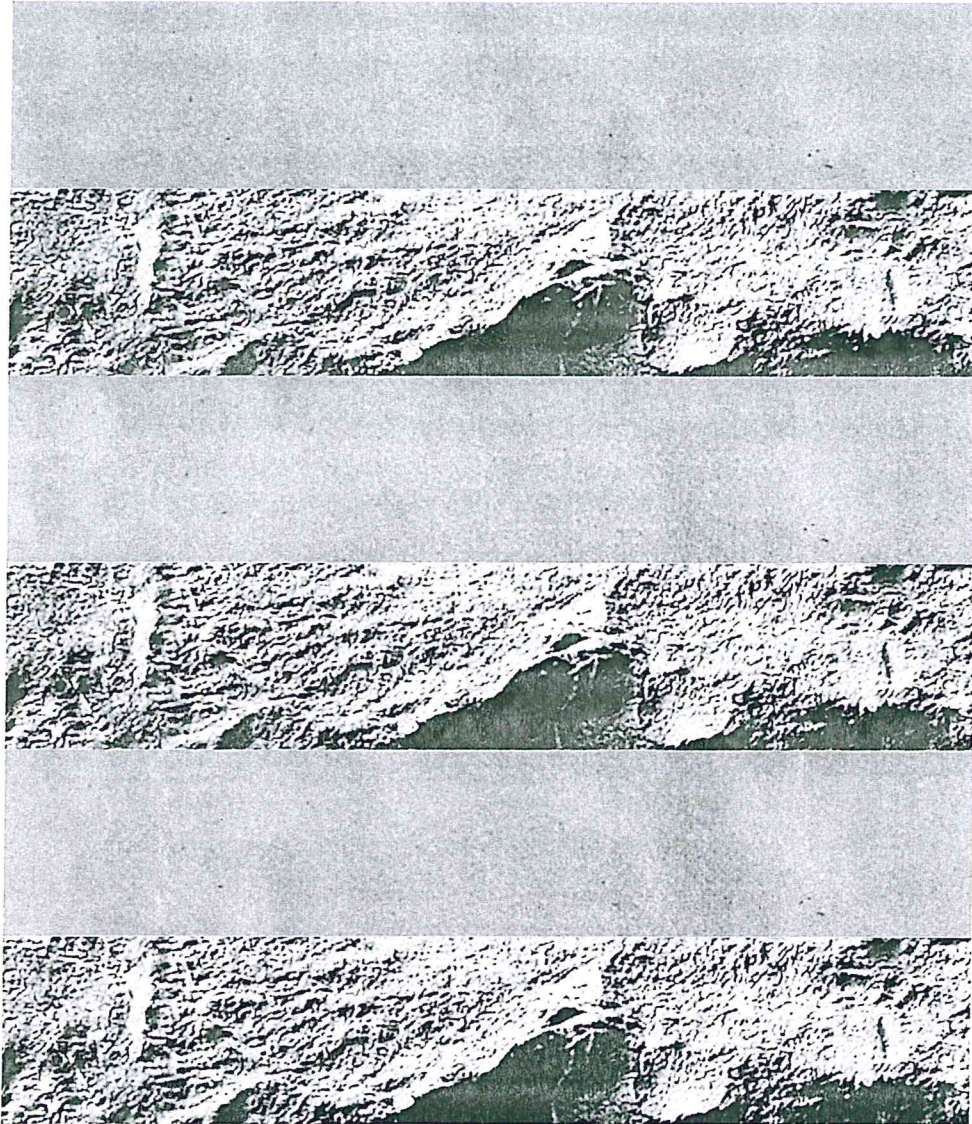
Particles carried by waves are reduced in size as they collide with the rock face and one another. Boulders and pebbles are broken down into sand sized particles which are easier for waves to transport.

Corrosion/Solution

This is the sheer weight and impact of water against the coastline. It is greatest under storm conditions when hundreds of tonnes of water may hit the rock face. Air trapped in cracks and caves is suddenly compressed by breaking waves, which increases pressure on the rocks. This is called **cavitation**.

What features can we think of that are formed by these processes?

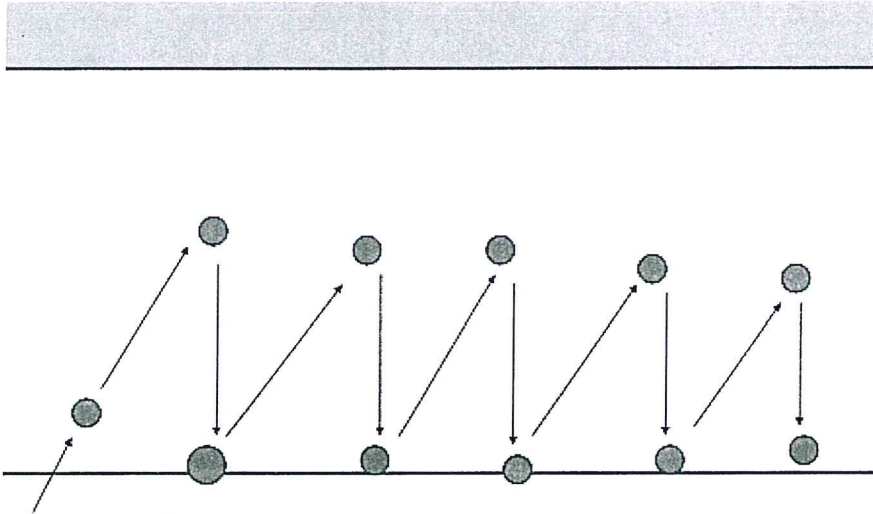
Concordant and Discordant Coastlines



1. On the diagram above, label the following
 - Where you would expect to find headlands
 - Where you would expect to find bays
 - Concordant coastline
 - Discordant coastline
 - Wave direction for each of the above
 - Add the label 'Rocks 90 degrees to coastline'
 - Add the label 'Rocks parallel to coastline'
2. Explain why on discordant coastlines you get the formation of headlands and bays?

Longshore Drift:

Label this diagram as completely as possible. Include the following key words or phrases:



- Prevailing wind
- Swash
- Oblique angle
- Backwash
- Right angle
- Gravity
- Direction of sediment movement
- Repeated process

Coastal Erosional Landforms

18/03/2020

Do Now

With the support of a diagram, explain longshore drift



Aim

- To understand how the coast forms landforms through erosion

Factors which help shape our coastline

1. Geology

The resistance of the rocks

-limestone, chalk and granite are resistant rocks (often forming cliffs and headlands) and erode relatively slowly, whilst less resistant rocks such as clay are easily eroded.

2. Sediment supply

3. Beach profile – wide beaches protect cliffs more than narrow beaches

4. The shape of the coastline

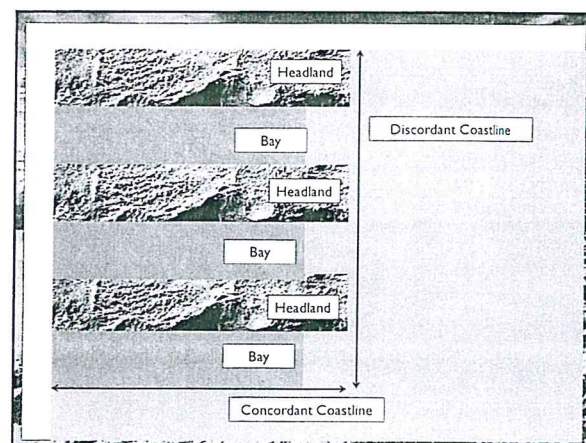
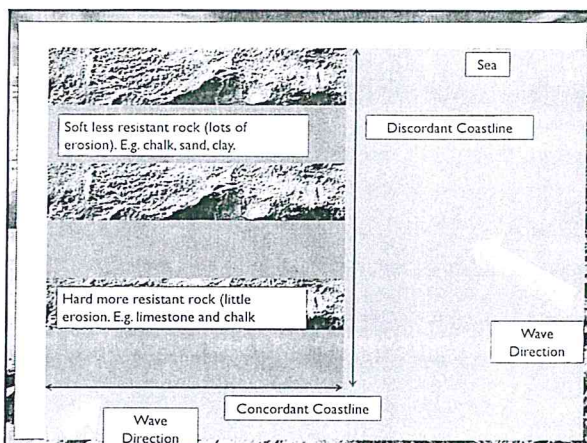
Concordant coastlines = rocks are parallel to the wave front and therefore rates of erosion are similar along the coastline.

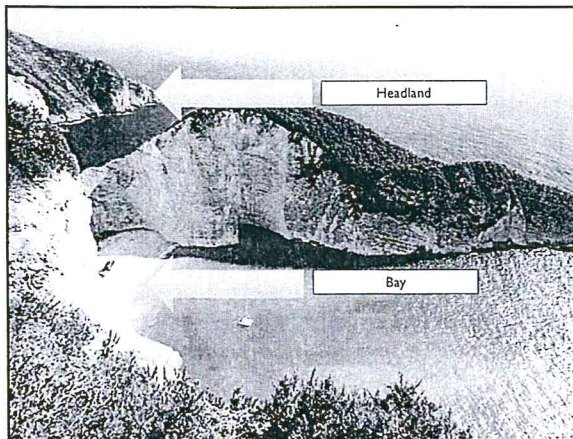
Discordant coastlines = differential erosion may occur, where bands of hard and soft rock outcrop at right angles to the sea.

Headlands and bays form along discordant coastlines and whilst headlands remain exposed to the force of the waves, bays are sheltered.

Geological Structure

- The geological structure of the coastline is key to the features that occur
- The coast will either be concordant or discordant





Task

Complete the coastline worksheet



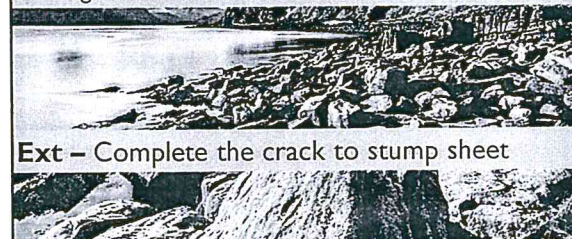
Caves, arches & stacks

- Lines of weakness in a headland – known as a fault – are very vulnerable to erosion
- Waves attack this fault and can create a cave
- Over time 2 caves may form back to back creating an arch
- Eventually the arch will collapse – leaving a stack behind

Task

Using the Durdle door sheet –

Explain how a cave, arch and stack form on the Swanage coastline



Ext – Complete the crack to stump sheet

What have we learnt today?

Aim

- To understand how the coast forms landforms through erosion



What we will learn next...

- Coastal Depositional Landforms

Coastal Landform Processes

18/03/2020

Do Now

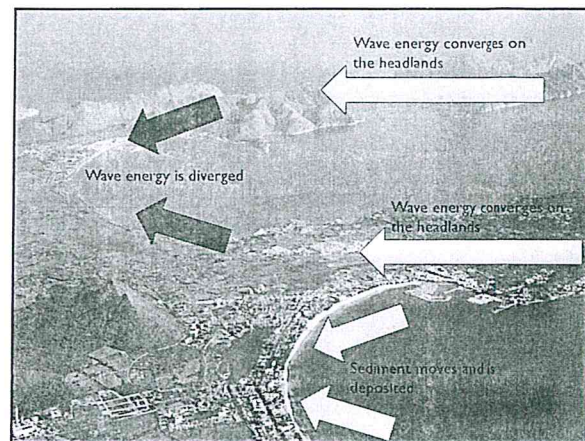
Copy below:

When waves lose energy material is deposited. This typically happens in sheltered areas such as bays, this explains why beaches are found here. Wave refraction is where the energy of the wave is reduced



Aim

- To understand the process acting on the coast that leads to landforms



<http://www.bbc.co.uk/education/clips/zsmb4wx>



Erosion

Destructive waves will erode the coastline in four different ways:

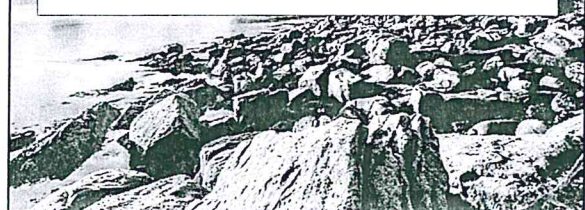
1. Hydraulic Power
2. Corrasion
3. Attrition
4. Corrosion
5. Abrasion

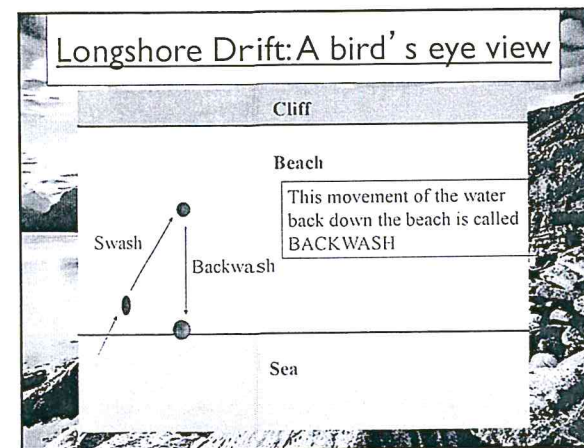
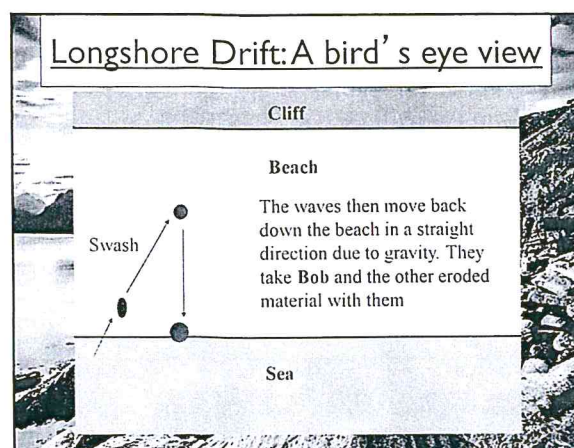
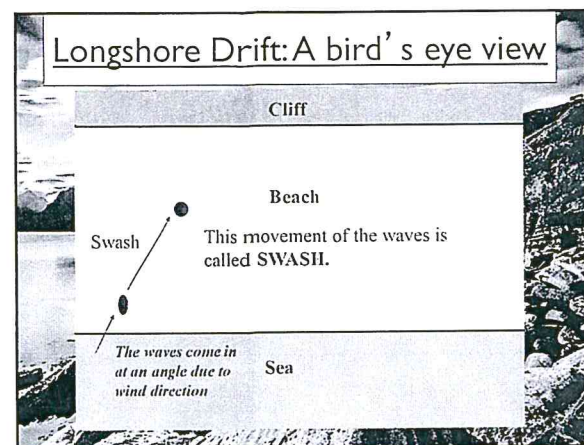
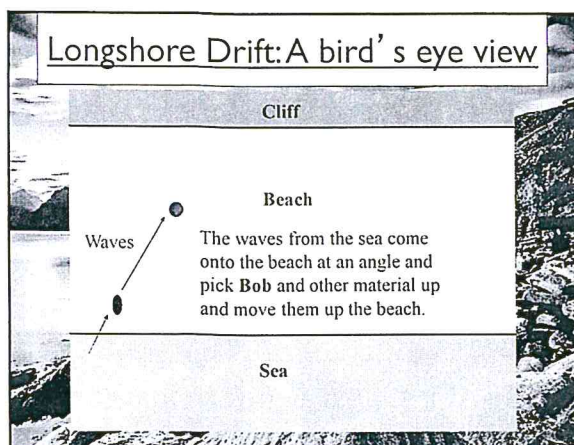
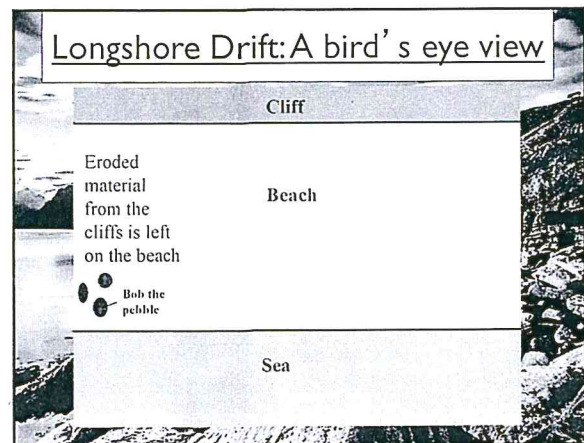
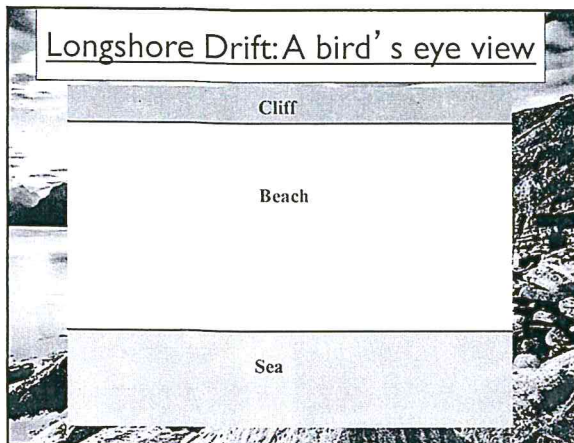
Complete your erosion sheet

Longshore Drift

- “**Longshore drift** is a process by which sediments such as sand or other materials are transported along a beach.”
- The general direction of longshore drift around the coasts of the British Isles is controlled by the direction of the dominant wind.

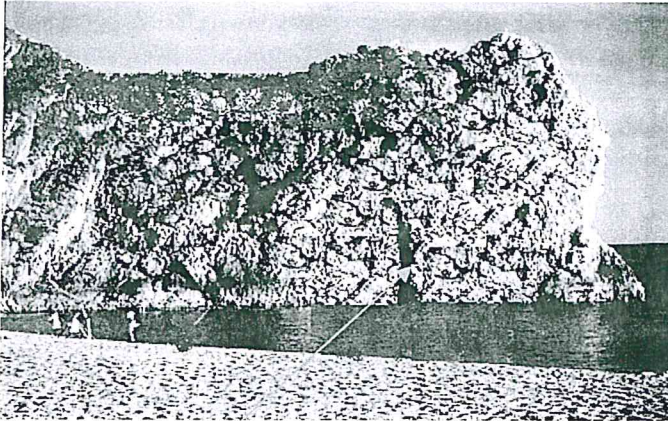
<http://www.bbc.co.uk/learningzone/clips/the-coastline-longshore-drift-and-spits/3086.html>





An example of how a coastline changes over time – the Durdle Door Arch, Dorset's Jurassic Coast

The Past (several thousand years ago.....)

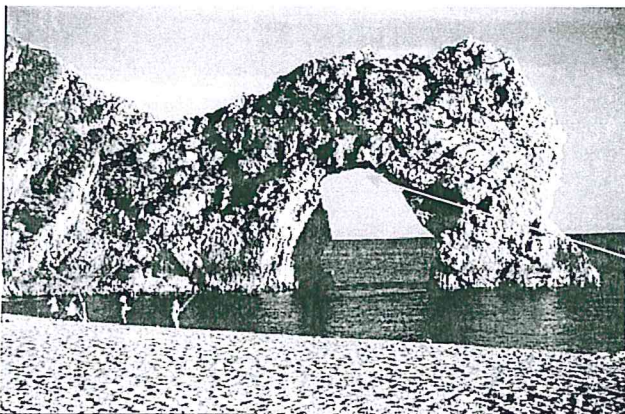


Use these key words and explain their meaning/role in detail:

Headland (limestone)
Fault
Hydraulic Power and Cavitation
Corrasion
Cave
Enlarges over time

Fault in the
Limestone Headland

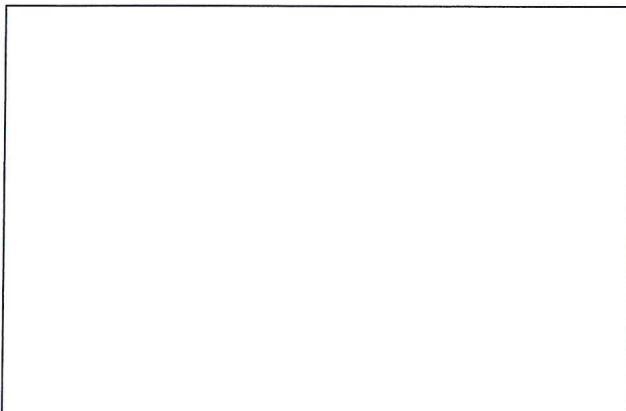
The Present (Durdle Door today)



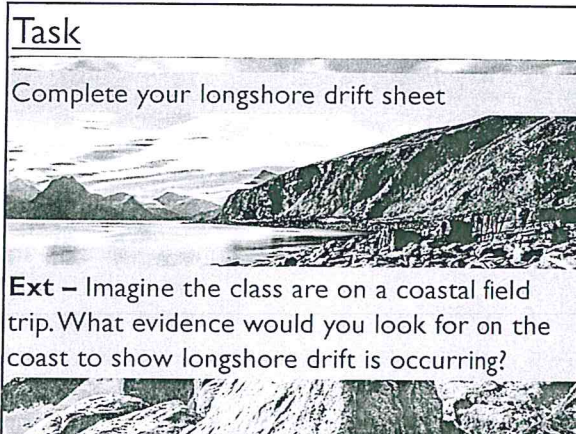
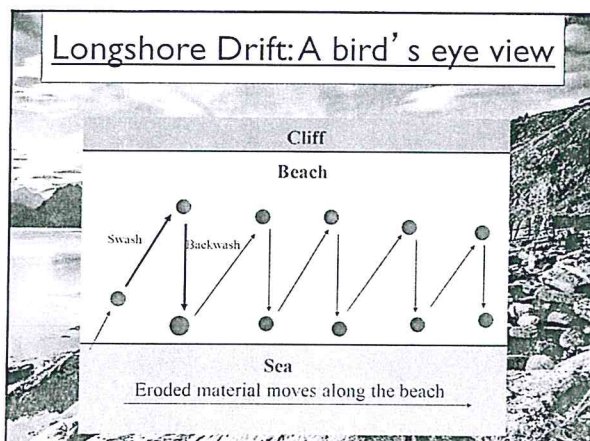
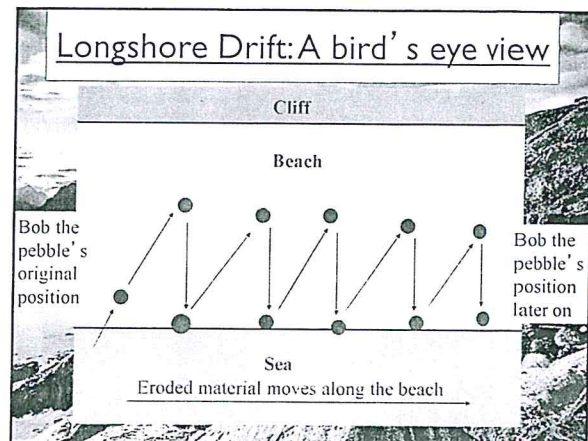
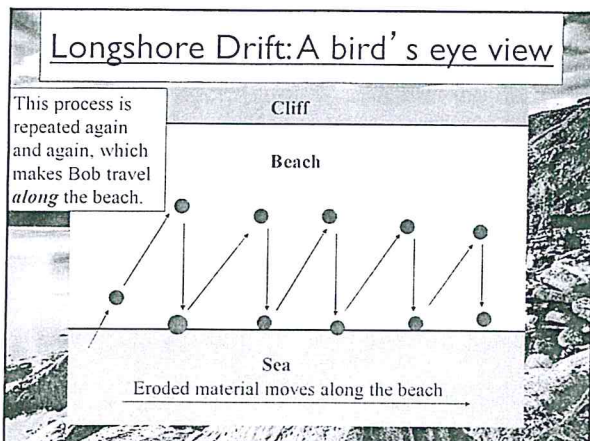
Cave
Wave refraction around headland
Hydraulic Power and Corrasion
Arch

Arch

The Future:

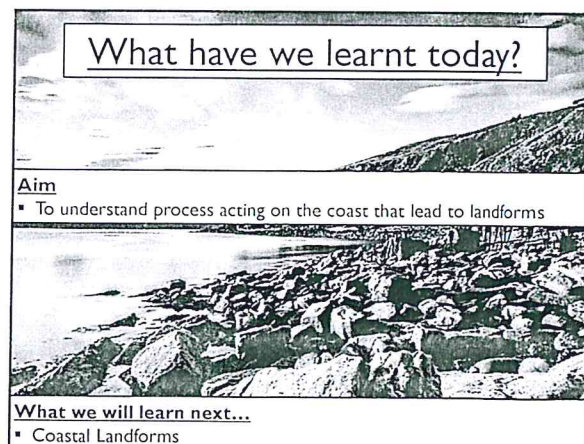


Further erosion
Freeze thaw weathering
Destabilising
Collapse
Gravity
Stack
Stump
Retreat of coastline



Copy the definitions below and draw a diagram to show the transportation processes occurring

- **Traction** - the rolling of large material along the sea floor by the waves.
- **Saltation** - the bouncing of slightly lighter material along the sea floor.
- **Suspension** - Small particles of material carried by the water.
- **Solution** - Material is dissolved and carried by the water.

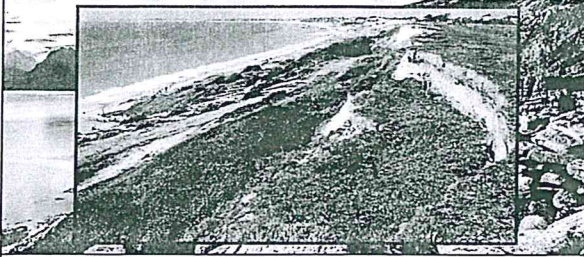


Coastal Processes

18/03/2020

Do Now

What is happening in the image below?



Aim

- To understand weathering, cliff collapse and mass movement

Cliff collapse

- Weathering is one of the main acting agents that leads to cliff collapse

Weathering

There are three types of weathering:

- Mechanical
- Chemical
- Biological

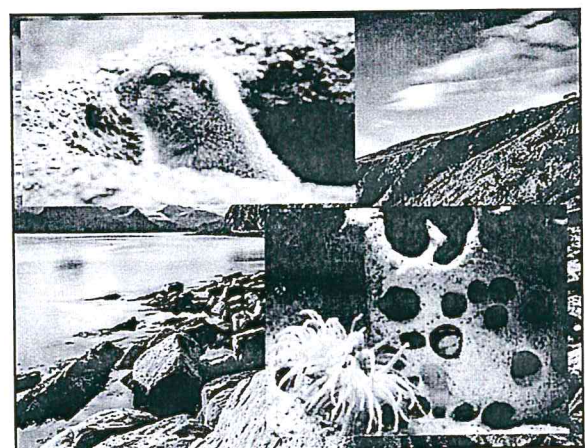
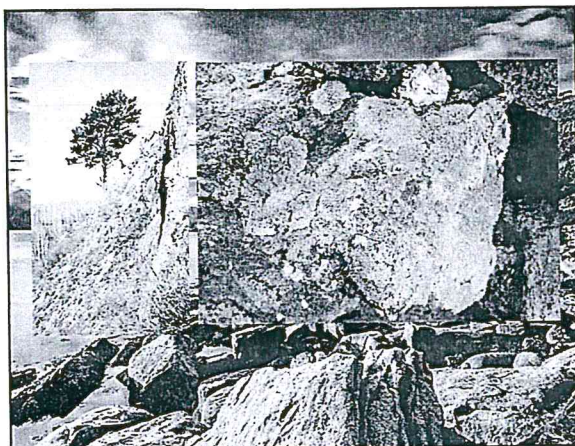
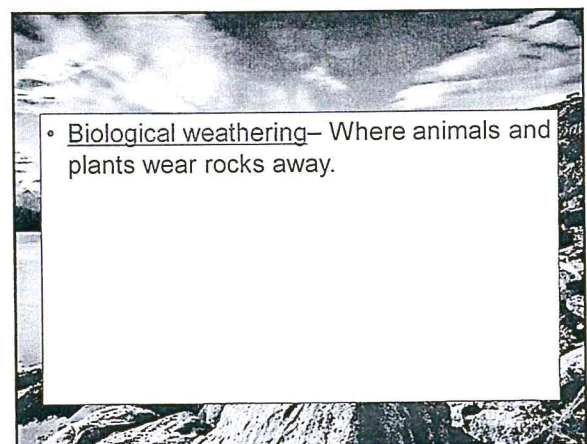
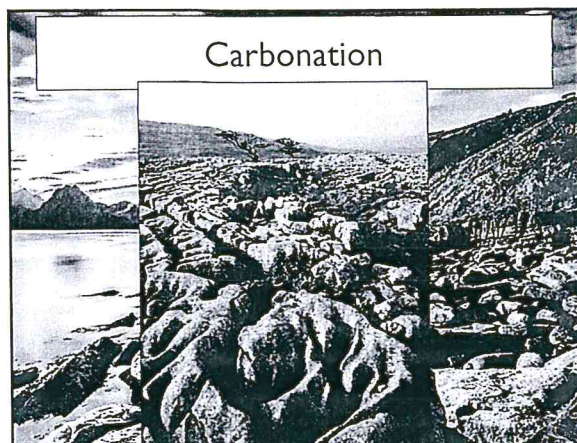
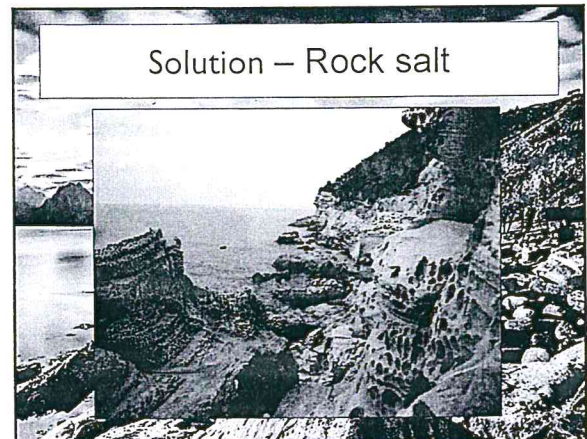
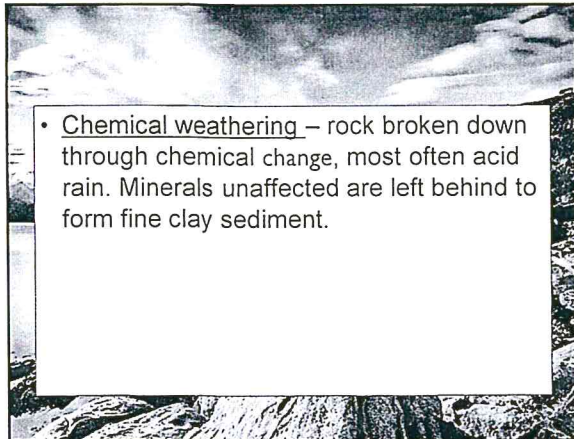
- Mechanical weathering – physical weathering, the breakup of rock without any chemical change taking place

Freeze-thaw weathering



Exfoliation





Task

Complete the table below

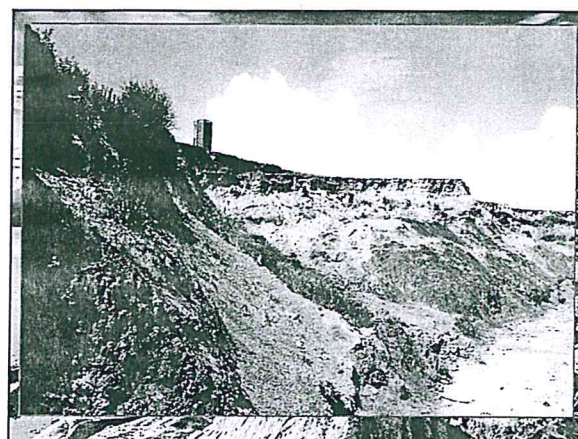
Type of Weathering	Description	Image
MECHANICAL		
CHEMICAL		
BIOLOGICAL		

Mass Movement

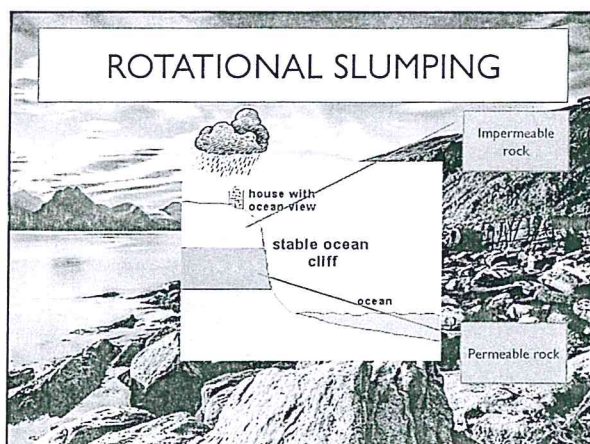
- The downward movement of material due to gravity

ROTATIONAL SLUMPING

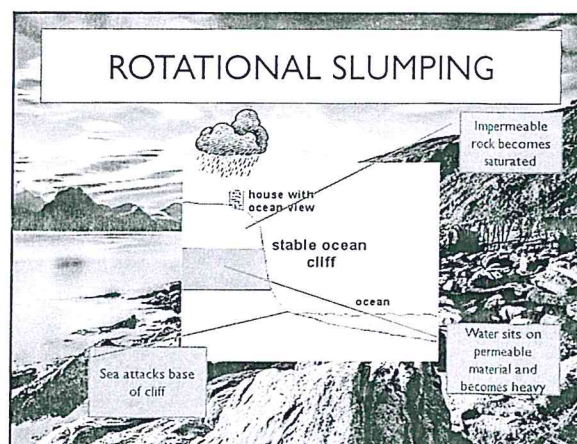
- Rotational slumping** is a rapid movement of a mass of earth or rock sliding along a concave surface.
- They can occur after periods of heavy rain, when the water saturates overlying rock, making it heavy and liable to slide.

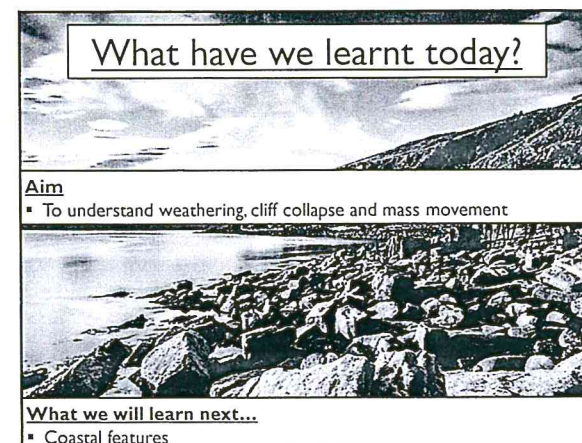
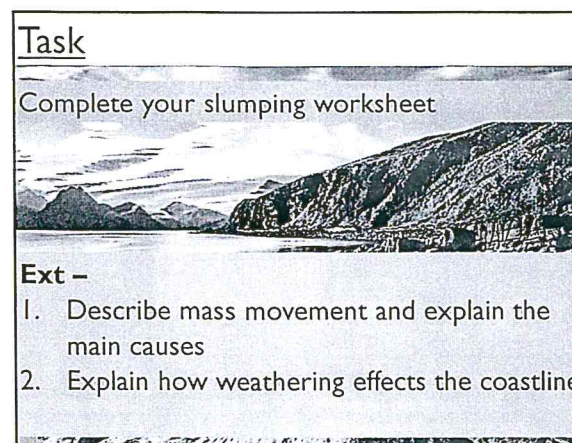
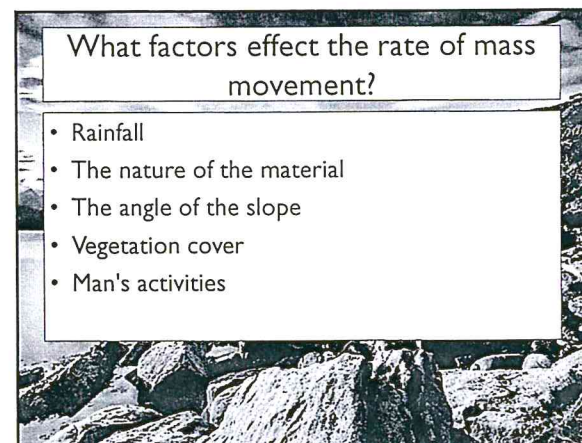
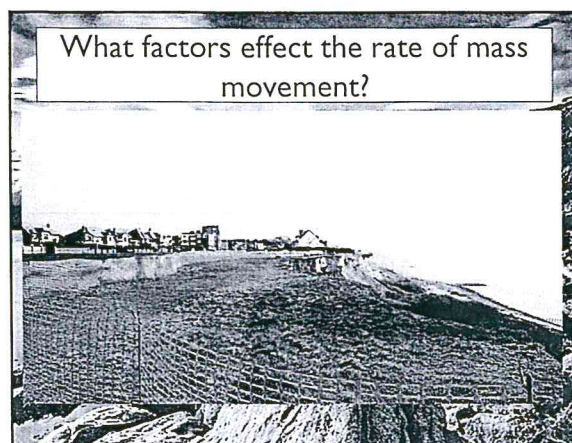
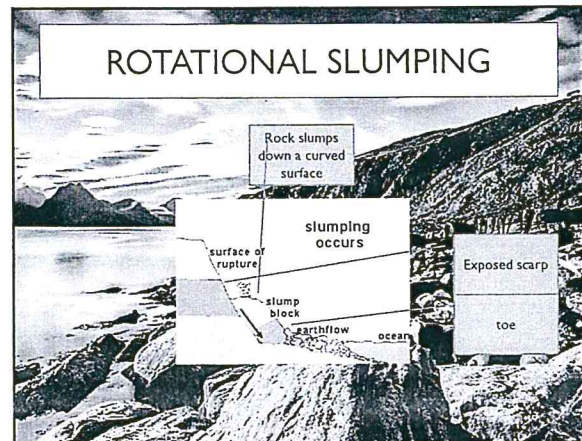
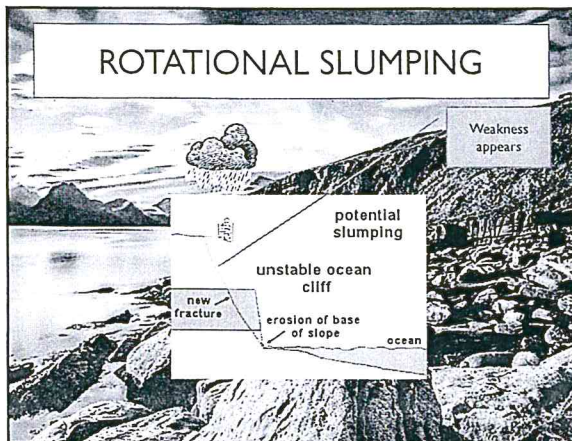


ROTATIONAL SLUMPING



ROTATIONAL SLUMPING





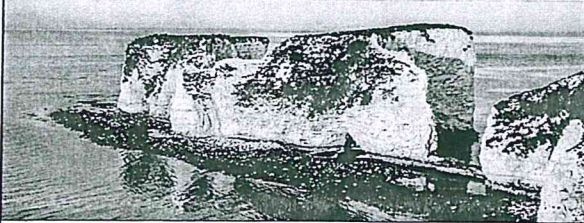
Spits are long narrow ridges of sand and shingle projecting out to sea from the coastline.	Spits may continue to grow until deposition can no longer occur, for example due to increased depth, or the spit begins to cross the mouth of a river and the water removes the material faster than it can be deposited - preventing further build up.
Occasionally a spit is able to grow right across a bay, trapping a freshwater lake or lagoon behind it. This feature is called a bar.	The formation of a spit begins due to a change in the direction of a coastline and where longshore drift transports material from further down the coast.
On the landward sheltered side of the spit where the water is calm, mudflats and salt marshes form. These are important habitats for plants and birds.	This continues via the process of longshore drift and the deposition of material.
A change in prevailing wind direction often causes the end of spits to become hooked.	Where the water is calmer and sheltered by the headland, longshore drift will deposit material at a faster rate than it can be removed and gradually a ridge is built up.

Coastal Deposition

18/03/2020

Do Now

Look at the image below. Explain how it was created and how it might look in 100 years time



Aim

- To understand how depositional features form

Beaches

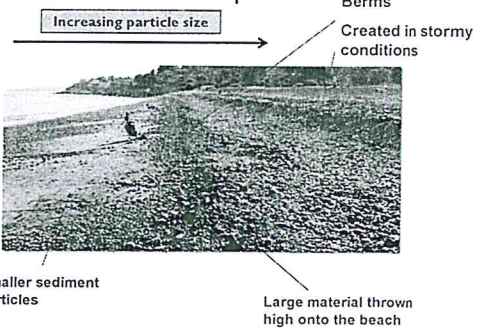
- Deposition occurs in sheltered areas where the build up of sand and shingle is greater than its removal.
- A beach is a deposit of sand or shingle at the coast, often found at the head of a bay.

Shingle vs Sand

- Sandy beaches have **gently sloping** profiles and shingle and pebble beaches are **steeper**.



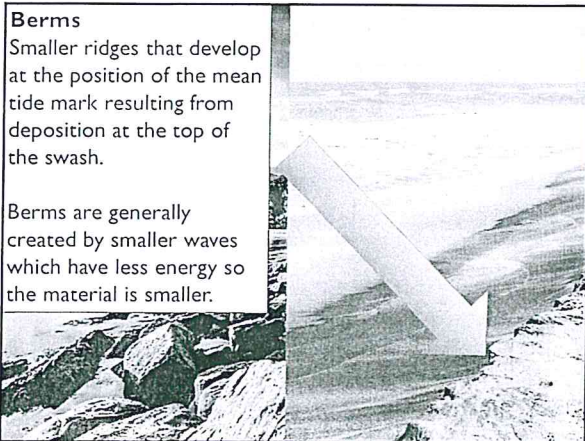
Beach profile



Berms

Smaller ridges that develop at the position of the mean tide mark resulting from deposition at the top of the swash.

Berms are generally created by smaller waves which have less energy so the material is smaller.



Stages of beach formation

Stage I

- Deposition is the main process that creates a beach.

Stage 2

- This occurs where waves have limited energy and so beaches often form in sheltered areas, such as bays where wave energy is less than on exposed headlands.

Stage 3

- Here, waves are likely to be constructive, where the swash is dominant and the backwash is weaker, so that material is left on the beach, rather than being taken away by the waves.

Stage 4

- Over time, this beach material will accumulate in the sheltered bay, and may be composed of different sediments from pebbles to fine sands

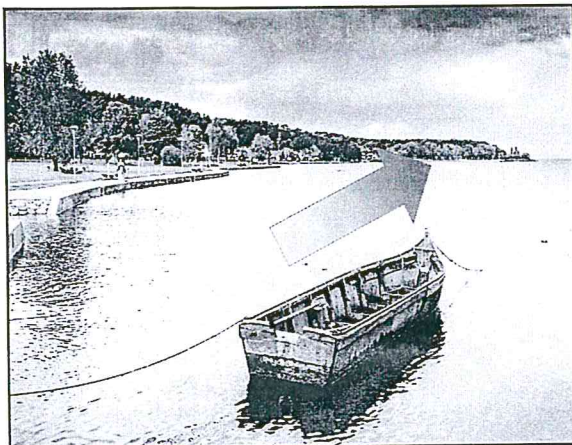
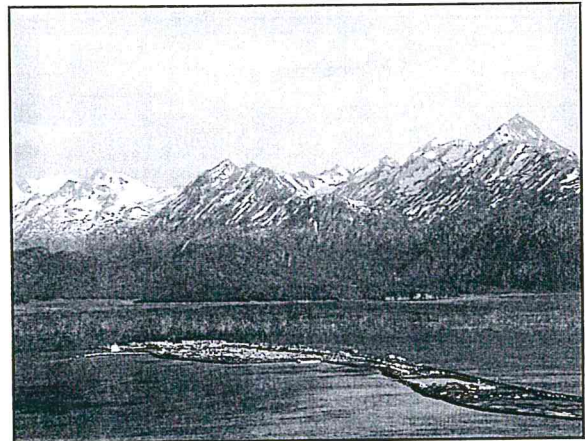
Stage 5

- Beaches are under constant change, from processes like longshore drift. Beaches can also grow over time when constructive waves dominate, or even shrink in size during winter periods in the UK, when we are more likely to get storms and destructive waves

Spits and Bars

- Spits are long narrow ridges of sand and shingle projecting out to sea from the coastline.
- The formation of a spit begins due to a change in the direction of a coastline and where longshore drift transports material from further down the coast.
- Where the water is calmer and sheltered by the headland, longshore drift will deposit material at a faster rate than it can be removed and gradually a ridge is built up.
- This continues via the process of longshore drift and the deposition of material.

<http://www.bbc.co.uk/learningzone/clips/the-coastline-longshore-drift-and-spits/3086.html>



How do spits form?

