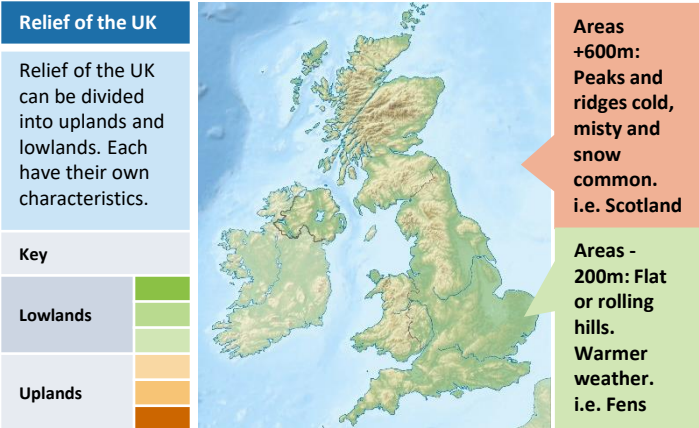




Types of Erosion

The break down and transport of rocks – smooth, round and sorted.	
Attrition	Rocks that bash together to become smooth/smaller.
Solution	A chemical reaction that dissolves rocks.
Abrasion	Rocks hurled at the base of a cliff to break pieces apart.
Hydraulic Action	Water enters cracks in the cliff, air compresses, causing the crack to expand.

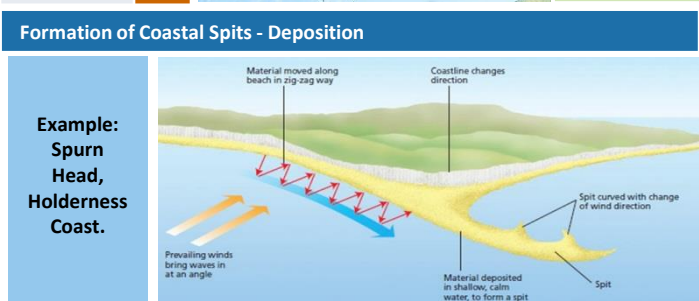
Types of Transportation

A natural process by which eroded material is carried/transported.	
Solution	Minerals dissolve in water and are carried along.
Suspension	Sediment is carried along in the flow of the water.
Saltation	Pebbles that bounce along the sea/river bed.
Traction	Boulders that roll along a river/sea bed by the force of the flowing water.

Mass Movement

A large movement of soil and rock debris that moves down slopes in response to the pull of gravity in a vertical direction.

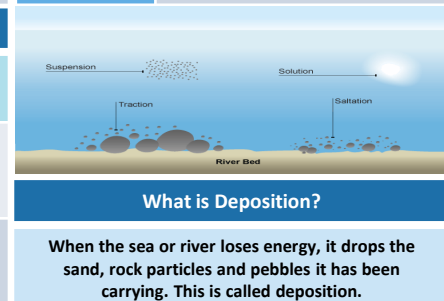
1	Rain saturates the permeable rock above the impermeable rock making it heavy.
2	Waves or a river will erode the base of the slope making it unstable.
3	Eventually the weight of the permeable rock above the impermeable rock weakens and collapses.
4	The debris at the base of the cliff is then removed and transported by waves or river.



Types of Weathering

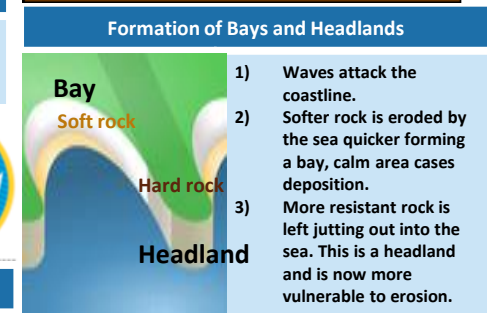
Weathering is the breakdown of rocks where they are.

Carbonation	Breakdown of rock by changing its chemical composition.
Mechanical	Breakdown of rock without changing its chemical composition.



- 1) Swash moves up the beach at the angle of the prevailing wind.
- 2) Backwash moves down the beach at 90° to coastline, due to gravity.
- 3) Zigzag movement (Longshore Drift) transports material along beach.
- 4) Deposition causes beach to extend, until reaching a river estuary.
- 5) Change in prevailing wind direction forms a hook.
- 6) Sheltered area behind spit encourages deposition, salt marsh forms.

Unit 1c Physical Landscapes in the UK

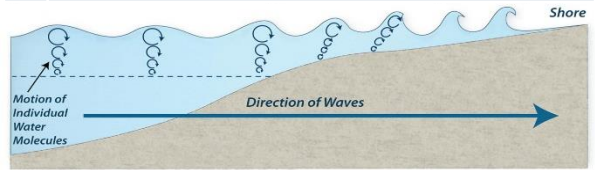


How do waves form?

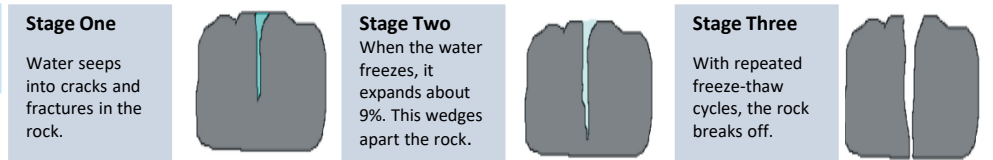
Waves are created by wind blowing over the surface of the sea. As the wind blows over the sea, friction is created - producing a swell in the water.

Why do waves break?

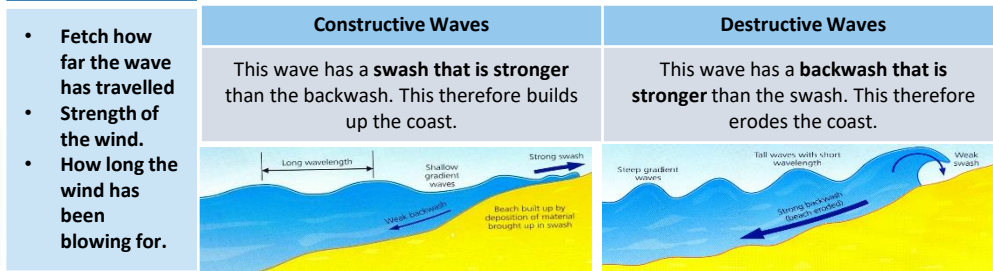
- 1 Waves start out at sea.
- 2 As waves approaches the shore, friction slows the base.
- 3 This causes the orbit to become elliptical.
- 4 Until the top of the wave breaks over.



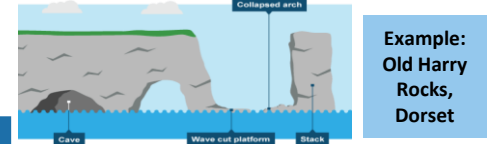
Mechanical Weathering Example: Freeze-thaw weathering



Size of waves



Formation of Coastal Stack

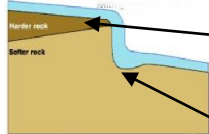
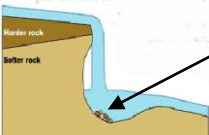
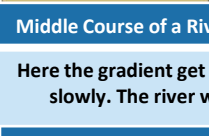
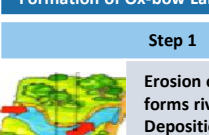
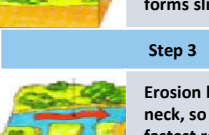


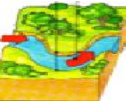
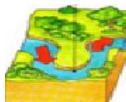
- 1) Hydraulic action widens cracks in the cliff face over time.
- 2) Abrasion forms a wave cut notch between HT and LT.
- 3) Further abrasion widens the wave cut notch to form a cave.
- 4) Caves from both sides of the headland break through to form an arch.
- 5) Weather above/erosion below –arch collapses leaving stack.
- 6) Further weathering and erosion eaves a stump.

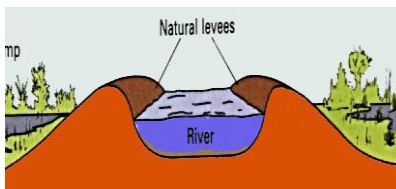
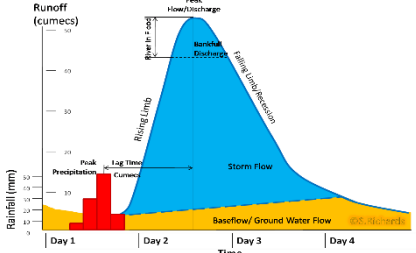
Coastal Defences			
Hard Engineering Defences			
Groynes	Wood barriers prevent longshore drift, so the beach can build up.	✓ Beach still accessible. ✗ No deposition further down coast = erodes faster.	
Sea Walls	Concrete walls break up the energy of the wave . Has a lip to stop waves going over.	✓ Long life span ✓ Protects from flooding ✗ Curved shape encourages erosion of beach deposits.	
Gabions or Rip Rap	Cages of rocks/boulders absorb the waves energy, protecting the cliff behind.	✓ Cheap ✓ Local material can be used to look less strange. ✗ Will need replacing.	

Soft Engineering Defences			
Beach Nourishment	Beaches built up with sand, so waves have to travel further before eroding cliffs.	✓ Cheap ✓ Beach for tourists. ✗ Storms = need replacing. ✗ Offshore dredging damages seabed.	
Managed Retreat	Low value areas of the coast are left to flood & erode.	✓ Reduce flood risk ✓ Creates wildlife habitats. ✗ Compensation for land.	

Case Study: Dorset Coast	
Location and Background Located on the South coast of England. The county is a coastal area for tourists to visit all year round.	
Geomorphic Processes - Dorset is dominated by headlands and bays with alternate bands of hard and soft rock. -The northern area of Studland bay is dominated by sand dunes -Swanage bay is very touristic with the use of groynes and a sea wall to prevent beach and coastal erosion -Longshore drift travels south along the coast from Bournemouth creating the famous Sandbanks spit. -The headland Ballard Point is home to the famous landmark ‘Old Harry’ which is a coastal stack.	
Management -Dorset is protected by a number of groynes. These trap sand to build up the beach for better protection by preventing longshore drift. -The area is also protected by large sea walls to prevent flooding and deflect the waves energy. -\$15 million has been spent on beach nourishment to add sediment to beach for increased protection against flooding.	

Water Cycle Key Terms	
Precipitation	Moisture falling from clouds as rain, snow or hail.
Interception	Vegetation prevent water reaching the ground.
Surface Runoff	Water flowing over surface of the land into rivers
Infiltration	Water absorbed into the soil from the ground.
Transpiration	Water lost through leaves of plants.
Physical and Human Causes of Flooding.	
Physical: Prolong & heavy rainfall Long periods of rain causes soil to become saturated leading runoff.	Physical: Geology Impermeable rocks causes surface runoff to increase river discharge.
Physical: Relief Steep-sided valleys channels water to flow quickly into rivers causing greater discharge.	Human: Land Use Tarmac and concrete are impermeable. This prevents infiltration & causes surface runoff.
Upper Course of a River	
Near the source, the river flows over steep gradient from the hill/mountains. This gives the river a lot of energy, so it will erode the riverbed vertically to form narrow valleys.	
Formation of a Waterfall	
	1) River flows over alternative types of rocks.
	2) River erodes soft rock faster creating a step.
	3) Further hydraulic action and abrasion form a plunge pool beneath.
	4) Hard rock above is undercut leaving cap rock which collapses providing more material for erosion.
	5) Waterfall retreats leaving steep sided gorge.

Middle Course of a River			
Here the gradient get gentler, so the water has less energy and moves more slowly. The river will begin to erode laterally making the river wider.			
Formation of Ox-bow Lakes			
Step 1 		Step 2 	
Step 3 		Step 4 	

Lower Course of a River	
Near the river’s mouth, the river widens further and becomes flatter. Material transported is deposited.	
Formation of Floodplains and levees	
When a river floods, fine silt/alluvium is deposited on the valley floor. Closer to the river’s banks, the heavier materials build up to form natural levees.	
✓ Nutrient rich soil makes it ideal for farming. ✓ Flat land for building houses.	
River Management Schemes	
Soft Engineering Afforestation – plant trees to soak up rainwater, reduces flood risk. Demountable Flood Barriers put in place when warning raised. Managed Flooding – naturally let areas flood, protect settlements.	Hard Engineering Straightening Channel – increases velocity to remove flood water. Artificial Levees – heightens river so flood water is contained. Deepening or widening river to increase capacity for a flood.
Hydrographs and River Discharge	
River discharge is the volume of water that flows in a river. Hydrographs who discharge at a certain point in a river changes over time in relation to rainfall	
1. Peak discharge is the discharge in a period of time.	
2. Lag time is the delay between peak rainfall and peak discharge.	
3. Rising limb is the increase in river discharge.	
4. Falling limb is the decrease in river discharge to normal level.	

Case Study: The River Mersey	
Location and Background Located in the North West of England and flows 70 miles from the Pennines to the Irish Sea at Red. It starts its River as the Mersey in Stockport.	
Geomorphic Processes Upper – Features include V-Shaped valley, rapids and waterfalls. Middle – Features include meanders and ox-bow lakes. The meander near Woolston has become a tourist feature within an area of parkland. Lower – Greater lateral erosion creates features such as floodplains & levees. Mudflats at the river’s estuary. The estuary is a very popular area for people and wildlife and famous landmarks such as the Mersey ferry are found in this estuary.	
	
Management -Towns such as Warrington are economically and socially important due to houses and jobs that are located there. -Dams and reservoirs in the upper course, controls river’s flow during high & low rainfall. - Flood walls, better flood warning systems, more flood zoning and river dredging reduces flooding in the lower course of the Mersey around Warrington	