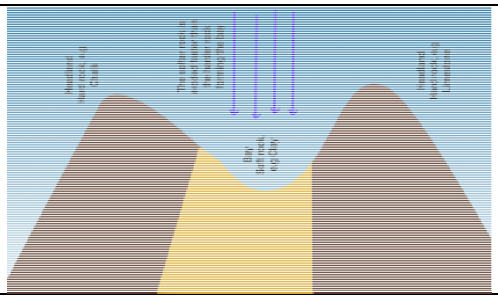
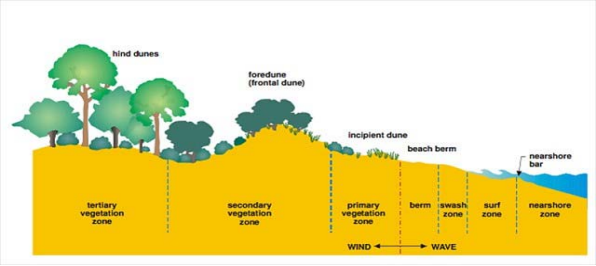
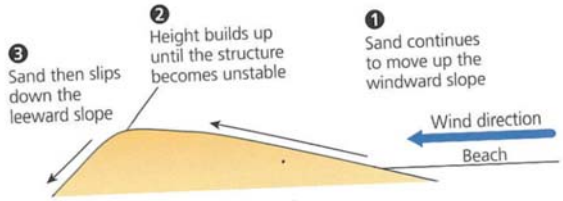
State the location of upland areas in the UK	**State the location of lowland areas in the UK**
Give the definition of landscapes	**Name the two types of wave.**
Describe the characteristics of constructive waves.	**Name the components of a wave.**
Describe the characteristics of destructive waves.	**Define weathering.**
Explain chemical weathering.	**Explain mechanical weathering.**
Define mass movement.	**Explain sliding.**
Explain rock falls.	**Explain slumping.**

Lowland areas include: Central and southern England East Anglia Valley of the river Thames	Upland areas include: Grampian Mountains in Scotland Pennines in Northern England Cambrian Mountains in Wales
Constructive waves Destructive waves	Landscapes are areas characterised
• Waves are caused by wind. • Waves have ***crests*** (high spots) and ***troughs*** (low spots). • The ***wavelength*** (L) is the distance between two crests (or troughs). • The ***period*** (T) is the time between passage of successive wave crests (or troughs).	Constructive waves: • Build beaches • Have a strong swash • Have a weak backwash • Have a low wave in proportion to length • Carry material up the beach and deposit it
Weathering is the breaking down of rock in situ (where it is).	Destructive waves: • Erode beach material away • Have a weak swash • Have a strong backwash • Have a high wave height in proportion to length
Mechanical weathering results in rocks being disintegrated. 2 ways – Freeze-thaw weathering and salt weathering	Chemical weathering is caused by chemical reactions when rainwater hits rocks and decomposes it. 3 ways – carbonation, hydrolysis and oxidation
Landslides occur on steep cliffs previously weakened by weathering. Heavy rocks, soil or mud slide down a line of weakness on a cliff face.	Mass movement is the downslope movement of rock, soil or mud under the influence of gravity.
Slumps occur when a slide takes place on a concave (curved) cliff face.	Bare rocks affected by freeze-thaw weathering are loosened from the cliff face and fall to the bottom of vertical cliffs.

Define marine erosion.	**Explain hydraulic action**
Explain abrasion	**Explain how material is transported along the coastline.**
Outline the causes of deposition at beaches.	**Explain attrition**
Outline the characteristics of headlands and bays.	**Explain the formation of headlands and bays.**
Describe a wave cut platform.	**Explain the formation of wave cut platforms**
Suggest how rock structure or type influences erosion.	**Explain how caves, arches and stacks are formed.**
Compare the characteristics of sandy and pebble beaches	**Outline the characteristics needed for a sand dune to form.**

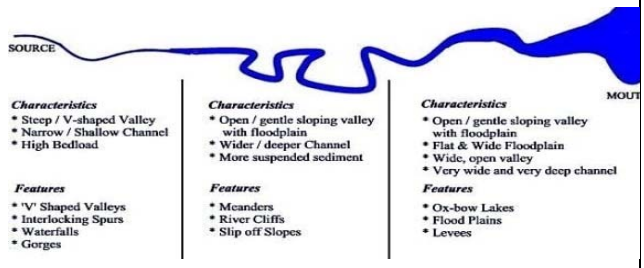
Hydraulic action is the force of waves hitting the cliff face. This forces air into cracks in the rock and pressure weakens the rocks and material collapses.	Marine erosion is the removal of material by waves.	
Load is transported by longshore drift in the direction of the prevailing winds.  	Abrasion is the scratching and scraping of the rock surface by smaller material such as sand a shingle.	
Attrition is the grinding down of load particles during transport when pebbles collide together.	Deposition is caused by: • Low energy waves • Sheltered bays • Weak backwash • Material is trapped by a spit or groyne • Extremely large volumes of sediment	
	Headland is a cliff that juts out into the sea, surrounded by water on 3 sides, made of hard rock. Bays are crescent shaped indentations in the coastline found between 2 headlands, made of sock rock, usually has a beach.	
1. Cliff is weakened by freeze-thaw weathering 2. Hydraulic action erodes the base of the cliff forming a notch 3. Rock breaks off an collects at the base of the cliff just below the notch 4. The notch is enlarged and the cliff above becomes unstable and collapses.	A wave cut platform is an area of bedrock visible at the base of cliffs.	
1. Hydraulic action creates a crack in headland 2. Crack develops into a notch due to erosion 3. Notch is enlarged into a **cave**. 4. Hydraulic action breaks through the cave to form an **arch**. 5. Freeze-thaw weathering weakens top of the arch till it collapses. 6. Pillar of hard rock left behind, **stack**. 7. Stack is weathered and eroded till it topples and becomes a stump.	Soft rock erodes quickly and with little force. Hard rock takes a long time to erode and requires lots of force.	
• Large flat beach • Large supply of sand • Large tidal range • Onshore wind to move the sand to the back of the beach • Obstacles for it for form behind such as drift wood	Sandy: Gentle slope Mainly constructive waves Usually wide Sometimes feature sand dunes	Pebble: Generally steep Mainly destructive waves Usually not wide Large pebbles at the back of beaches

Explain how sand dunes form.	**Describe how sand dunes change inland.**
Describe what a coastal spit is.	**Describe what a coastal bar is**
Explain how a spit is formed.	**Explain how a bar is formed.**
Give an example of a UK coastline and its major landforms.	**Define hard engineering.**
Give the advantages and disadvantages of a sea wall.	**Give the advantages and disadvantages of rock armour.**
Give the advantages and disadvantages of a gabions.	**Give the advantages and disadvantages of a groynes.**
Define soft engineering.	**Give the advantages and disadvantages of beach nourishment.**

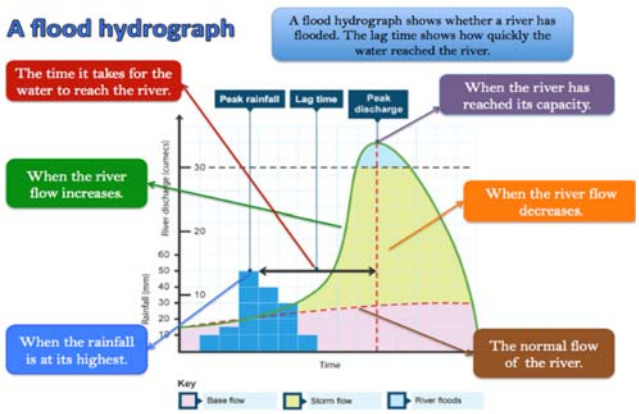
	 Figure 10.29 Sand dune formation
A bar is ridge or sand or shingle that stretches from one side of the bay to the other. Forming a lagoon behind it.	A spit is a sand or shingle beach that is joined to the land but projects downdrift into the sea.
• Longshore drift carries material along the coastline. • A spit is formed from a headland • Eventually so much material is deposited that the spit reaches the next headland and becomes a bar across the bay.	• Spits form where the coastline suddenly changes shape or at the mouth of an estuary. • The material is carried by longshore drift. • Where wave energy is low material will be deposited to form a spit.
Hard engineering is when expensive artificial structures are used from protection of the coastline.	Swanage in Dorset. Coast made of bands of limestone and clay Famous for Swanage Bay. Has a range of bay and headland formations. Lots of caves in the headlands. Spits form off the headlands.

Advantages: Relatively cheap Quick to build Easy to maintain Versatile	Disadvantages: Restrict beach access The highly resistant rocks they are filled with have to be imported Looks ugly	Advantages: Sense of security Lasts a long time Don't impede longshore drift	Disadvantages: Restrict beach access Expensive to build Expensive to repair Can look ugly
Advantages: Act as wind breakers Some locations these are big enough for people to walk along as a view point Cheap to build Allow lots of space of beach activities	Disadvantages: Impede walking along the beach Can be hazardous to children Stop longshore drift Look ugly	Advantages: Cheap and easy to build Blend in well with the environment	Disadvantages: Cannot be used on sandy beaches Regular maintenance is needed Can be hazardous when damaged
Advantages: Winder beach for more activities Attracts tourists Blends with the environment	Disadvantages: Restricts beach access for several weeks Can affect the donor beach area Expensive	Soft engineering works sympathetically with nature to protect the coastline.	

Give the advantages and disadvantages of beach reprofiling.	**Give the advantages and disadvantages of dune regeneration.**
Define coastal realignment	**Give the advantages and disadvantages of managed retreat.**
Give an example of a UK coastal management scheme and reasons for management.	**Describe the management strategy in place at Walton.**
Describe the effects from the management at Walton	**Describe how the long profile of a river changes downstream.**
Describe how the cross profile of a river changes downstream.	**Define the following features of a drainage basin; watershed, tributary, source, mouth and confluence.**
Describe the basic water cycle.	**Describe how a river erodes.**
Describe how a river transports material.	**Name the landforms found in the upper, middle and lower course of the river.**

Advantages: Popular for picnics Costs are very low Increases biodiversity	Disadvantages: During establishment dunes are fenced off – deters tourists Can be expensive to protect No guarantee they will be stable	Advantages: Makes residents feel safe Lower cost Doesn't need as regular maintenance Beach still looks natural	Disadvantages: Bulldozers restrict beach access during work. Can be very expensive Can be uninviting to tourists
Advantages: Takes pressure off other areas Often cheap Creates a nature reserve Increases biodiversity	Disadvantages: People must relocate Communities feel let down High short term costs Large areas of agricultural land lost	Coastal realignment involves creating a new position of the coastline. In the UK this involves moving it inland (managed retreat)	
A 'hold the line' strategy is in place at Walton in the popular tourist area. There are sea walls and groynes. In the unoccupied area a 'do nothing' approach has been taken.		Walton on the Naze, Essex. Popular tourist area 2m of coastline lost each year.	
		Areas which are protected are able to thrive which maintains the tourist income for locals. Some conflict that Naze Tower is in the 'do nothing' area so will be lost to the sea very soon.	
Watershed: An imaginary line marking out the drainage basin. Tributary: Small rivers which join the main river. Source: Where the river starts, usually in an upland area. Mouth: Where the river ends and flows into a sea/lake. Confluence: The point where two rivers join			
Abrasion: Rocks and material in the river wears away the banks and the bed by acting like sandpaper. They are thrown at the channel by the river. Solution: The river dissolves soluble rocks. Attrition: Material and rocks in the river are thrown around and knock into each other becoming rounder and smaller. Hydraulic action: The force of the water in the river hits against the banks and river channel.		Water is evaporated from a river/sea. It cools and condenses and turns into clouds through condensation. It then precipitates (rain, hail, sleet and snow). The rain can also be caught by trees, this is known as interception. The water can also be evaporated from tree leaves this is called transpiration. The water can make its way back to the river through a variety of processes.	
Upper: V-shaped valleys, interlocking spurs, waterfalls and gorges. Middle: Meanders, floodplains and ox-bow lakes. Lower: Floodplains, levees and deltas.		Traction: Larger particles are dragged along the riverbed. Suspension: smaller particles are carried in the river. Saltation: Medium sized particles are bounced along the riverbed. Solution: Soluble particles are dissolved in the river.	

Describe the features of the valley in the upper, middle and lower course of a river.	**Describe the features of the channel in the upper, middle and lower course of a river.**
Explain the formation of a waterfall and gorge.	**Explain the formation of a meander and ox-bow lake.**
Explain the formation of a natural levee.	**Explain the formation of a delta.**
Explain the formation of a flood plain.	**Explain the formation of estuaries.**
Give an example of a UK river and its landforms.	**Describe three physical causes of flooding.**
Describe two human causes of flooding.	**Draw and label the parts of a hydrograph.**

Upper: Narrow, fast flowing, and vertical erosion Middle: Lateral erosion, wider, meanders, and ox-bow lakes Lower: Very wide, lost 95% of energy, flows into mouth, deep, deltas and levees.	Upper: steep sides, narrow bottom, v-shaped, interlocking spurs Middle: flood plain begins, sides still quite steep, u- shaped. Lower: wide, flat floodplain with gentle sides
1. Current is faster on the outside of the bend because the channel is deeper – area of high erosion creates river cliff 2. he current is slower on the inside of the bend because the channel is shallower – area of high deposition creates slip-off slope 3. Erosion causes the outside bends to become closer and the river breaks through. 4. Deposition cuts off the meander forming an ox-bow lake.	1. River flows over an area of hard rock followed by soft rock. 2. Soft rock is eroded more quickly creating a step. 3. A steep drop is created which is called a waterfall. 4. Hard rock is undercut by the erosion and collapses and erodes plunge pool. 5. Overtime more collapses occur and the waterfall retreats creating a gorge, which is a steep sided valley.
1. Rivers are forced to slow down when they meet the sea or a lake. 2. If the sea does not wash away the material it builds up and the channel gets blocked and is forced to split up. 3. Eventually the material builds up so much that low-lying areas called deltas are formed. There are three types.	1. During a flood eroded material that the river has been transporting is deposited over the flood plain because the river loses energy. 2. The heaviest material is deposited nearest the river channel. 3. Overtime the deposited material builds up creating levees along the channel edge.
An estuary is a partially enclosed coastal body of brackish water with one or more rivers or streams flowing into it, and with a free connection to the open sea. Estuaries form a transition zone between river environments and maritime environments.	1. When a river floods onto the flood plain the water slows down and deposits the eroded material. This builds it up. 2. Meanders migrate across the flood plain making it wider. 3. The deposition that happens on the slip off slopes of meanders also helps to build up the flood plain.
Snow melt: When a lot of snow or ice melts it means a lot of water goes into the river in a short space of time. **Geology:** If the rock is impermeable water cannot infiltrate and goes to the river. **Relief**: If the valley is steep the rain just not have a chance to infiltrate and it runs off quickly. **Prolonged rainfall**: After a period of long rainfall the soil becomes saturated, it can't allow any more infiltration. **Heavy rainfall**: Heavy rainfall means that there is a lot of runoff. This increases the volume of water in the river.	River Clyde, Scotland. Source in N Scotland, mouth on NW coast. River flows NE. 4 waterfalls near the source with gorges. Meanders near Glasgow. Estuary with mud flats at the mouth.
	**Urbanisation**: Urban areas have lots of impermeable surfaces such as tarmac. This means the water runs off the surface quickly and to the river. **Deforestation**: Trees intercept the rainwater. They also take up water. Cutting down the trees increases surface-runoff and therefore the volume of water in the river

Give the advantages and disadvantages of two hard engineering flood methods.	**Give the advantages and disadvantages of two soft engineering flood methods.**
Describe the physical causes of a flood in a UK case study.	**Describe the human causes of a flood in an UK case study.**
Describe the effects of a flood in a UK case study.	**Describe the management methods used after a flood for a UK case study.**

Flood warnings: +Impact of flood reduced. +Evacuation can occur. –Doesn't stop the flood. –LICs don't always have access to radios and TVs. **Preparation**: +Impact of flood reduced. + People know what to do. –Does not mean safety. – Can be expensive to modify buildings. **Flood plain zoning**: +Risk of flooding reduced. +Impermeable surfaces are not created. –Urban expansion is limited. –Doesn't help in places that have already been built on.	**Dams and reservoirs:** +Store water. + Produce hydroelectric power. +Control the water flow to prevent floods. –Very expensive. –Can cause flooding downstream. **Channel straightening**: +Water moves more quickly. –Flooding may occur downstream as water gets there more quickly. **Manmade levees**: +Increases rivers capacity so it can hold more water. -Flooding can be catastrophic if levees break.
Human causes: Bridges were low so acted as a dam - debris such as tree trunks caught on them water piled up until it burst through in a great wave. Many buildings & roads were positioned close to the river so more property damage. The drains had a small capacity because they were old.	**Physical causes**: A very wet August (2 times average rain) So the ground was already saturated. Impermeable rocks & thin soils. Steep slopes – rapid runoff. Confluence of Rivers Valency & Jordan is just above the village. A very high tide – made it difficult for water to flow out to sea.
-£4.6m scheme includes: raise car park to safer level; move & raise bridge; widen & lower the river bed to increase the amount of water it can hold -Removing of dead vegetation to stop blocking of the river -'At risk' properties – encouraged to use more flood resistant material, raise height of electrical wiring etc. -Environment Agency – flood warning system + information -Council runs special advice days, encouraging people to have an emergency evacuation pack & to take out insurance. Council has an emergency action plan.	**Primary Impacts:** 50+ cars, and caravans were swept out to sea. A wall of water swept through the village destroying everything in its path. 6 buildings were swept away. Many other houses, shops etc were flooded, with mud + sewage as well as water; possessions also ruined. Roads under 2.75m of water. No deaths, few serious injuries. **Secondary impacts**: 90% of economy dependent on tourism > lost money >20 accommodation providers & tourist attractions/shops forced to shut. Insurance companies pay out £20 million.