GCSE AQA Geography Paper 1: Living with the Physical Environment.

RIVER LANDSCAPES IN THE UK

How to use: *Test yourself by covering the answers found in the right hand column and then quizzing yourself. It is also great to use in pairs or teams to test each other. For an additional challenge, cover the questions in the left hand column and try to work out what the question is.*

C = Core (Grades 1-4) **CH** = Challenge (Grades 5-7) **CH+** = Challenge + (Grades 8-9)

1. RIVER BASIN FEATURES

C	What is a drainage basin?	The area of land drained by a river and its tributaries
	What is the source?	The start of a river
	What is a tributary?	A small stream which joins a larger river
CH	What is the watershed?	The edge of a river basin
	What is the confluence?	The point where a tributary joins a larger river

2. CHANGES IN THE LONG PROFILE OF A RIVER

C	What is the gradient like in the upper coarse?	Steep
	What is the gradient like in the middle course?	Gentle gradient
	What is the gradient like in the lower course?	Very gentle
	What is the long profile of a river?	A diagram to show the journey of a river from source to mouth
CH	What is a cross profile?	An imaginary slice across a river channel and its valley at a particular point.
	What is the valley like in the upper course?	Steep sided and V-shaped
	What is the valley like in the middle course?	Wider, flat floor.
	What is the valley like in the lower course?	Very wide and flat
	What is the river like in the upper course?	Narrow, shallow and turbulent
	What is the river like in the middle course?	Wider and deeper
	What is the river like in the lower course?	Wide, deep with a large sediment load.
	What is vertical erosion and where does it occur?	Downwards erosion-upper course
	What is lateral erosion and where does it occur?	Sideways-middle course
CH+	What is the velocity of the river like in the upper course?	The velocity in mountainous areas varies considerably. Where the water is shallow and turbulent there is friction with the bed and banks, slowing the rate of flow. But if you encounter rapids, where the channel narrows and the river becomes much deeper, you would move much faster.
	What is the velocity like further downstream?	The rivers channel is much deeper due to tributaries bringing additional water. Now less water is in contact with the bed and banks and the velocity increases so even though the gradient is less steep it would be flowing faster.

3. FLUVIAL PROCESSES AND WEATHERING

C	What is weathering?	Weathering is the breakdown of rocks caused by different elements of the natural world
	What is mechanical weathering?	Weathering processes that cause physical disintegration or break up of exposed rock without any change in the chemical composition of the rock
	What is chemical weathering?	The decomposition (or rotting) of rock caused by a chemical change within that rock

	Erosional processes: What is hydraulic action?	Air may become trapped in joints and cracks on the side of a river. When a wave breaks, the trapped air is compressed which weakens the bank and causes erosion.
	Erosional processes: What is abrasion?	Bits of rock and sand in the water grind down surfaces like sandpaper.
	Erosional processes: What is attrition?	The movement of the water smashes rocks and pebbles in the water into each other, and they break and become smoother.
	What is transportation?	The movement of material
	What are the four processes of transportation?	1. Suspension 2. Saltation 3. Solution 4. Traction
CH	What is saltation?	Bouncing of particles too heavy to be suspended
	What is suspension?	Small sediment held in the river
	What is traction?	Large particles rolled on the riverbed
	What is biological weathering?	Trees put down roots through joints or cracks in the rock in order to find moisture. Includes the effect of animals and plants on the landscape.
	What are faults?	Cracks in rocks and can form lines of weaknesses
	Erosional processes: What is solution?	Acids contained in water will dissolve some types of rock such as chalk or limestone.
CH+	When does deposition take place?	Deposition occurs when the velocity of the river decreases, it no longer has enough energy to transport its sediment so it is deposited.
	When are larger rocks likely to be deposited?	In the upper course-they are only transported small distances, mostly by traction, during periods of high flow.
	What happens to finer sediment?	Finer sediment will be carried downstream, mostly held in suspension. This material will be deposited on the river bed and banks, where velocity is slowed by friction.
	Why does deposition happen at the mouth?	Interaction with tides, along with the very gentle gradient, greatly reduces the rivers velocity.
	Which rock is prone to chemical weathering?	limestone
	Types of mass movement: What are slumps?	They involve a whole segment of the cliff moving down-slope along a saturated shear-plane. They can occur after periods of heavy rain, when the water saturates overlying rock, making it heavy and liable to slide. Undercutting of a steep slope by river or sea erosion weakens the rock above, also making a slump likely.
4. EROSIONAL PROCESSES AND LANDFORMS		
C	What landforms are created in the upper course?	Interlocking spurs, gorges, waterfalls, rapids
	What landforms are created in the middle course?	Meanders, oxbow lakes, floodplains
	What landforms are created in the lower course?	Floodplains, estuary, levees.
	How is a waterfall created?	1. A waterfall is created where there are bands of hard and soft rock 2. Softer (less resistant) rocks are eroded quicker than the hard (more resistant rock) and it will form steps in the river bed. 3. When the water falls over the ledge it forms a deep and turbulent plunge pool. 4. The layer of soft rock is undercut forming an overhang, 5. Eventually the overhanging rock will fall and the waterfall will retreat upstream and create a gorge.
	What are gorges?	Steep sided valleys. Usually found immediately downstream of a waterfall.
	What is a meander?	A bend in a river
	How are meanders created?	1. Meanders are created by lateral erosion and deposition

		2. They can occur when there is a slight dent in a river-created by faults in the rock or by biological weathering for example 3. The water is thrown to the outside of the bend causing erosion-(the Thalweg-line of fastest flow) and deep pools 4. Deposition occurs on the inside of the bend-the water is shallower and friction slows it down.
	How are oxbow lakes created?	1. Overtime the meander migrates across the valley floor, they may start to erode towards each other. 2. The neck of the meander narrows until it is completely broken (usually during a flood) to form a new straighter channel. The old meander loop is cut off by deposition to form an ox-bow lake.
CH	What are interlocking spurs?	Fingers of land that jut out-they are found near the rivers source and are not powerful enough to cut through the 'spurs' of land. So has to flow around them.
	What is a flood plain?	1. A floodplain is a wide, flat area of marshy land on either side of a river and are found in the middle and lower courses. 2. Floodplains are made of alluvium-a sediment (silt) deposited by a river when it floods. 3. Floodplains are used for farming as the spoil is very fertile.
	How do processes help create a waterfall?	Processes of erosion-particularly hydraulic action and abrasion. Hydraulic action-the sheer force of the water pounds against the rock-the less resistant rock retreats undercutting the more resistant rock. Abrasion-as the overhang collapses, debris swirls around in the plunge pool making it deeper. The rocks also get thrown against the back wall in the turbulent water-causing further erosion to the less resistant rock underneath.
	How do processes help create a meander?	Hydraulic action-the force of the water in the Thalweg hits the sides of the bank breaking it apart. Abrasion-the pebbles in the water bash against the side breaking the bank apart.
CH+	What are riffles?	Shallow sections in a meander. Riffles result from the deposition of coarse sediment, at times of high flow, and are characterised by more turbulent slower flowing water. During low flow conditions, however, water tends to flow more slowly through a pool section and deposits fine muddy sediment-under these low flow conditions the water may flow slightly faster in the riffle section accounting for the lack of fine sediment here.
	What is a levee?	A levee is a raised river bed (levé in French means rise)-they are found along the lower course and they are formed by flooding over many years-a ridge of sediment is deposited naturally.
	What is an estuary?	In the UK most river mouths form wide tidal estuaries, they are transitional zones between coastal and river environments and are affected by

5. RIVER LANDFORMS ON THE RIVER TEES — Located Example

C	Where is the River Tees?	The north east of England, its source is near the Pennine Hills near Cross Fell.
	What is the name of the waterfall on the River Tees?	High Force
CH	How long is the River Tees?	128Km
	Where is its mouth?	The North Sea at Middlesbrough
	How high is the drop of the waterfall?	20m
	Where are meanders located?	In the middle course e.g. near Sockburn

CH +	What is the underlying rock of the waterfall	Horizontal layers of Carboniferous limestone (less resistant) and dolerite (More resistant)

6. FACTORS INCREASING FLOOD RISK

C	What is flooding?	Where land is not normally underwater becomes inundated-a river flood occurs when a river channel can no longer hold the amount of water flowing in it, water overtops the banks and floods the adjacent land-the floodplain.
	What are physical factors which contribute to flooding?	1. Precipitation 2. Geology 3. Steep gradient
	What are the human factors which contribute to flooding?	1. Urbanisation 2. Deforestation 3. Agriculture
	Explain how precipitation can lead to flooding	Torrential rainstorms can lead to sudden flash floods as river channels cannot contain the sheer volume of water flowing into them. Steady rainfall over several days can also lead to flooding in lowland river basins.
CH	Explain how urbanisation can lead to flooding	Building on a floodplain creates impermeable surfaces such as tarmac roads, concrete driveways and slate roads. Water is transferred quickly to drains and sewers and then into urban river channels. This rapid movement of water makes flooding more likely.
	Explain how deforestation can lead to flooding	Much of the water that falls on the trees is evaporated or stored temporarily on leaves and branches. Trees also use up water as they grow. When trees are removed much more water is suddenly available and transferred rapidly to river channels, increasing the flood risk.
	What is a hydrograph?	A hydrograph is a graph that plots river discharge after a storm
	How do steep slopes increase flooding?	In mountain environments steep slopes encourage a rapid transfer of water towards the river channels. This increases the risk of flooding.
	What affects the shape of a hydrograph?	Rock type Basin size Land use Relief Soil moisture Rainfall intensity Drainage density
	What impact does rock type have on a hydrograph?	Impermeable rocks encourage rapid transfer, permeable rocks encourage slower transfer.
	What impact does land use have on a hydrograph?	Urbanisation encourages rapid transfer, forests encourage slow transfer due to interception
	What impact does relief have on a hydrograph?	Steep slopes lead to rapid transfer, gentle slopes lead to slow transfer
	What impact does soil moisture have on a hydrograph?	Saturated soil results in rapid overland flow, drier soil soaks up water and slows down its transfer.
	What impact does rainfall intensity have on a hydrograph?	Heavy rain may exceed the interception capacity of the vegetation and lead to overland flow, light rain will transfer slowly and most will soak into the soil.
CH+	Explain how geology can lead to flooding	Impermeable rocks such as shales or clays encourage water to flow overland and into river channels, this speeds up water flow and makes flooding more likely.
	Explain how agriculture can lead to flooding	In arable farming soil is left unused and exposed to the elements for periods of time. This can lead to more surface runoff. This is increased

		if the land is ploughed up and down steep slopes, as water can flow quickly along the furrows.
	What is the lag time on a hydrograph?	The time between peak rainfall and peak discharge.
	How does basin size affect a hydrograph?	Small basins lead to rapid transfer, large basins result in slower transfer
	How does drainage density affect a hydrograph?	A high density speeds up water transfer, low density leads to a slower transfer
6. MANAGING FLOODS		
C	What is hard engineering?	Involves using man-made structures to prevent or control natural processes taking place, such as dams or embankments.
	What is soft engineering	Working with natural river processes to manage flood risks, such as afforestation and wetlands.
	What are dams?	Blocking off / regulating the flow of the river. They flood the area behind creating a reservoir. Most dams are multi-purpose having functions such as generating hydro-electric power, recreation, water supply, irrigation and flood prevention.
	What are wetlands?	Wetland areas on river floodplains are very efficient at storing water. Wetlands deliberately allowed to flood to form flood storage areas. Water can be stored to reduce the risk of flooding.
	What is floodplain zoning?	Areas close to the river and at risk from flooding can be kept clear of high-value land uses such as housing and industry. Instead these areas are kept for pasture, parkland or playing fields. Floodplain zoning can reduce overall damage by flooding.
CH	What is channel straightening?	This involves cutting through meanders to create a straight channel. This speeds up the flow of the river.
	What are the positives and negatives of channel straightening?	-They may protect one area from flooding but it may create issues further downstream + reduces the risk of flooding in the area created. +concrete banks stop erosion of the area -very expensive -unattractive
	What are embankments?	This is a raised river bank.
	What are the positive and negatives of embankments?	+ allows the channel to hold more water -can be built using concrete which is unattractive +valuable property is protected +when dredged mud is used for the banks it is cheaper, looks more natural and is more sustainable.
CH+	What is river restoration?	Where the course of the river has been changed artificially-river restoration can return it to its original course. River restoration uses the natural processes and features of a river such as meanders and wetlands to slow the river flow and reduce the likelihood of a major flood downstream.
	How do we prepare for floods?	In England and Wales the Environment agency issues flood warnings if flooding is likely-warnings are sent to emergency services and to the public using social media, text and email. There are three levels of warning 1. Flood watch-low lying land and roads is expected-people are to be aware. 2. Flood warning-there is a threat to homes and businesses 3. Severe flood warning-extreme danger to life and property is expected

	How do the environment agency encourage people to prepare for floods?	1. They make maps to identify at risk areas 2. They offer advice on what to do a. E.g. move valuable things upstairs b. Use flood gates to prevent floodwater from damaging property c. Using sandbags to keep floodwater away from buildings.
	What are flood relief channels?	This is a man-made river channel constructed to by-pass an urban area.
	What are the positives and negatives of flood relief channels?	+ during times of high flow a sluice gate can be opened letting the water into the relief channel. -expensive to create.
	What are the positives and negatives of dams?	+effective at regulating the water flow +water can be stored in the reservoir +create electricity -very expensive -controversial -large areas of land need to be flooded for the reservoir.

8. MANAGING FLOODS AT BANBURY — Located Example

C	Where is Banbury?	It is located in the Cotswold Hills about 50Km North of Oxford.
	What is the population of the town?	45,000
	How has Banbury been affected by flooding?	They have a history of devastating floods. in 1998 it led to the closure of the train station as the platforms were flooded. In 2007 it seriously flooded again.
	What has been done to reduce the risk of flooding?	1. Flood embankment 2. Raised the A361 road 3. Floodwalls 4. Pumping station to remove excess water
CH	When was the flood defence scheme completed?	2012
	How long and high was the earth embankment and where was it?	2.9Km and up to 4.5m parallel to the M40 motorway
	What is the name of the river?	River Cherwell
	What have been the social benefits?	• The raised A361 will be open during periods of flood and will avoid disruption to lives. • Quality of life for local people is improved with new footpaths and green areas • Reduced levels of anxiety through fear of flooding
	What are the economic costs and benefits?	• The cost of the scheme was about £18.5 million • By protecting 441 houses and 73 commercial properties, the benefits are estimated to be over £100 million
	What are the environmental costs and benefits?	• Around 100,000 tonnes of earth were required to build the bank-this was extracted from nearby, creating a small reservoir. • A new Biodiversity Action Plan habitat has been created with ponds, trees and hedgerows. • Part of the floodplain will be allowed to flood if river levels are high.
CH+	How much water is it capable of holding?	3 million cubic metres of water
	What is the BAP?	Biodiversity Action Plan. Habitat with ponds, trees and hedgerows to absorb and store excess water.

Other skills you need for this unit:

-Map skills-scale, compass, 4 and 6 figured grid references, identify pictures of landforms, identify landforms on maps,

-Extended writing skills-Command words: assess, explain, justify, evaluate, to what extent…?

-Drawing sketches from photos

-Using and describing information in photos

-Using OS and Atlas maps

-Describing landforms and processes

Useful revision materials-

-Seneca learning-you should already have access to this, if not speak to your teacher.

-BBC Bitesize,

-you tube clips.

Remember our exam board is AQA!

Products-revision books and workbooks available in bookstores such as Waterstones and WHSmith they are also available online