



Answer(s)



Question(s)

Define the terms:
(a) watershed
(b) source
(c) confluence

Watershed – marks the edge of a drainage basin (it is the highest point of land)
Source – the starting point of a river
Confluence – the point at which a smaller river (tributary) joins the main river

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Answer(s)



Question(s)

Define the terms:
(a) tributary
(b) mouth

Tributary – a small stream which will join the main channel
Mouth – point at which a river enters the sea.

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Answer(s)



Question(s)

Name and explain the processes of abrasion, attrition and corrosion in the context of rivers

Abrasion – caused by the scraping away of the river bed and banks by the load carried by the water.
Attrition – occurs as rocks bang each other in the river channel – gradually breaking each other down
Corrosion – dissolving of minerals in the rocks in the bed and banks which are carried away in solution

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Answer(s)



Question(s)

Describe what is meant by the long profile of a river.

The Long profile of a river is the change in gradient as the river goes from source to mouth. It is usually steep initially, become much flatter towards the lower course and tends to have a concave profile.

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Answer(s)



Question(s)

How and why does width and depth of a channel change from source to mouth

Width and depth increases – initially due to vertical erosion followed by lateral erosion as the river moves along its coast.

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Question(s)

Describe and explain what happens to the following river characteristics with increasing distance downstream:

- (a) Velocity
- (b) Gradient
- (c) Discharge

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Answer(s)

Velocity – this is the speed of flow which increases with distance downstream (as there is less friction due to less contact between the river bed and its banks).

Gradient – this is the slope of the river bed) – will decrease as the river flows downstream as it passes from the upland area down to the lowland area where it enters the sea

Discharge – amount of water passing a given point in a given time – as the river goes downstream it is fed by more tributaries and therefore the discharge increases.

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Question(s)

Name the typical features found in the upper course of a river

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Answer(s)

- a. V-shaped valley
- b. Waterfalls and plunge pools
- c. Rapids
- d. Gorges
- e. Potholes

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Question(s)

Where in a river would you expect to find the following features:

- a. Meanders
- b. Levees
- c. Gorges
- d. Ox-bow lakes

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Answer(s)

Meanders and Ox-bow lakes – Middle Course
 Levees – Lower Course
 Gorge – Upper Course

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Question(s)

Which river features are a product of both erosion and deposition processes?

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Answer(s)

Floodplains, Meanders and Ox-bow lakes

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Question(s)

Describe and explain the formation of waterfall

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Answer(s)

Example – High Force (River Tees)

- these form where a river crosses a band of less resistant after flowing over resistant rock (dolerite) – creates a small ‘step’ over which water flows as a vertical drop
- the soft rock is eroded quicker than the hard rock – gradually the hard rock is undercut by hydraulic action and abrasion
- force of the falling water creates a plunge pool
- eventually the cap rock is left unsupported due to the undercutting and collapses
- fallen rocks enlarge the plunge pool by abrasion
- process repeats itself and a gorge forms as the waterfall retreats upstream

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Question(s)

Describe and explain the key changes in valley cross profile as a river passes downstream.

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Answer(s)



Description – starts as a steep sided, narrow and deep v-shaped valley becoming broader in the middle course with a small floodplain and less steep sides. In the lower course there is a large floodplain either side of the river

Explanation – the steep v-shape in the upper course is due to vertical erosion and harder rock means the valley sides remain steep. The gradient becomes less steep in the middle course and lateral erosion and meanders broaden the valley. As the meanders continue to migrate they widen the valley in the lower course and deposition builds up a floodplain

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Question(s)

Describe and explain the formation of a meander

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Answer(s)



- meanders are bends in the river which are asymmetrical in cross section (deeper on the outer bank and shallower on the inner bank).
- the swing of the flow of the water within the channel results in water being flung to the outer bank causing faster flow and therefore great erosion on the outer bank
- creates a river cliff due to undercutting by lateral erosion
- on the inner bend – slow flowing due to shallower, low energy zone (increased frictional drag) – deposition occurs due to lower velocity, creating a slip-off slope

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Question(s)

Describe and explain the formation of a floodplain and levee

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Answer(s)



- Floodplains are flat areas of land surrounding the river, levees are raised banks surrounding the river.
- When a river floods, water spreads over the surface and there is increased frictional drag resulting in deposition
- Subsequent periods of flooding results in layers of material building up a fertile floodplain
- When a river bursts its bank the largest material is deposited closest to the edge of the river (as heavier) and finer material travels further (needs less energy to transport) resulting in the formation of levees.

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Question(s)

Give 3 situations in which a river may deposit its load

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Answer(s)



- inner bends of meanders
- when a river floods – increased friction, slowing velocity – largest material dropped first – then finer material
- when the river enters the sea – velocity slows down and deposition occurs

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Question(s)

Describe and explain how an ox-bow lake will form

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Answer(s)



- meander neck narrows due to erosion on the outer bends
- eventually the two outer bends meet and the river cuts through the neck of the meander – water now takes its shortest route rather than flowing around bend
- deposition gradually seals off the old meander bend – forming straighter river
- old meander bend has been left isolated from the main channel
- over time this feature may fill up with sediment

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Question(s)

Describe and explain the differences in velocity between the inner and outside bend of a meander

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Answer(s)



- Outer bend – fast flowing (as deeper and less frictional drag) – greater velocity – resulting in erosion
- Inner bend – slow flowing (shallower – more frictional drag) – slower velocity – results in deposition.

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Question(s)

Describe the typical characteristics of a waterfall

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Answer(s)



- Water falling over a 'step' in the landscape
- steep sided gorge
- deep plunge pool

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Question(s)

Describe and explain the main changes in a river channel from the upper to the lower course

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Answer(s)



- Upper Course** – narrow channel – only a few metres wide and very shallow
- Middle Course** – channel becomes wider and will often be over a meter deep
- Lower course** – river channel becomes wider and deeper still.

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Question(s)

Why is the Banbury area prone to flooding?

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Answer(s)



The River Cherwell is a major tributary of the River Thames. The geology around Banbury is a clay-lined valley which responds quickly to rainfall and is therefore susceptible to flooding.

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Question(s)

Give examples of what has been done as part of Banbury's flood management scheme.

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Answer(s)



- 2m high / 400m long embankments have been built to protect the industrial estate from flooding.
- 860m of the A361 road was raised and tunnels build underneath to help improve drainage
- A biodiversity action plan with new habitats including ponds and trees to intercept, absorb and store excess water
- A new flood storage area has been created with an earth embankment holding 3 million cubic metres of water
- A pumping station was built at Moorfield Brook.

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Question(s)

Give 3 examples of river management which are hard engineering techniques.

Answer(s)

- Dams and Reservoirs
- Channel straightening
- Embankments
- Flood-relief channels



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Question(s)

What is a dam and reservoir and how do they help manage rivers?

Answer(s)

Dams are large concrete barriers built across rivers to impede flow and a large artificial lake called a reservoir is formed behind which enables the flow of a river to be controlled and reduces the risk of flow downstream.



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Question(s)

What is a hydrograph?

Answer(s)

A hydrograph is a graph which shows how a river's discharge changes in response to a precipitation event.



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Question(s)

Define the terms:

- Lag time
- Rising Limb
- Peak discharge
- Base flow

Answer(s)

- **Lag Time** – this is the time difference between peak rainfall and peak discharge.
- **Rising Limb** – this shows how quickly the discharge rises after a rain storm
- **Peak Discharge** – this is the highest recorded discharge following a rainfall event
- **Base flow** – normal flow of a river when its water level is sustained by groundwater flow.



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Question(s)

Give 3 possible situations which may lead to a flashy hydrograph (i.e. a short lag time)

Answer(s)

Anything that will lead to rapid surface runoff – for example

- Ground already saturated so no more water can be absorbed
- may be clay soil so difficult for water to infiltrate
- may be steep-sided valley floor so water runs quickly downslope
- may be an urban area with impermeable surface
- may have little vegetation or vegetation removed by deforestation (lack of interception means water reaches ground quickly and goes as surface runoff.



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Question(s)

Give 3 possible ways in which change rural land-use can increase flood risk.

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Answer(s)

- Forestry – chopping down trees reduces interception and less water is taken up from the soil
- Up-down ploughing creates channels for water to easily flow down hill
- Increasingly Greenfield sites are being sold off to developers for housing or other human land-use – increasing impermeable surfaces.
- Farming – increase arable farming – when crops have been harvested – soil is bare in winter so nothing to intercept the rainfall

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Question(s)

Define the following terms:

- (i) Soil moisture
- (ii) Evaporation
- (iii) Water table

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Answer(s)

Soil moisture – water held in the soil

Evaporation – water lost from the ground / surface (from liquid to vapour)

Water table – upper level of the saturated zone in the soil

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Question(s)

Name a river valley you have studied and give an example of a description of a feature found in each course of the river.

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Answer(s)

River Tees – NE England (runs from Pennines to Middlesborough)

- **Upper Course** – High Force Waterfall (20m drop into plunge pool with 700m gorge) (formed by erosion)
- **Middle Course** – meanders such as Sockburn (near Darlington) with slip off slope on inner bend and river cliff on outer bend (formed by erosion and deposition)
- **Lower course** – Tees estuary – wide with mudflats and sandbanks formed by deposition.

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Question(s)

Describe the four main processes of transport in rivers

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Answer(s)

- **Salutation** – small pebbles and stones are bounced along river bed (load is picked up and then dropped as velocity rises and falls)
- **Traction** – large boulders are rolled along the river bed (BEDLOAD)
- **Suspension** – fine light material held with the rivers flow itself (SUSPENDED LOAD)
- **Solution** – minerals dissolved in water and carried like this (SOLUTE LOAD)

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Question(s)

How does channel straightening help to reduce flood-risk.

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Answer(s)

By widening, straightening and deepening the course of the river provides a more efficient channel allowing water to pass through quicker reducing the likelihood of a flood (flow is slower in meandering channels due to friction).

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