

River Landscapes in the UK

AQA GCSE Geography
Revision and Practice Book



Revision
Notes



Retrieval
Practice



Case
Studies



Exam-style
Questions



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Answers

Scan the QR code to access the example answers to activities in this book or visit tinyurl.com/RLITUrevbook



Revision Notes



Retrieval Practice



Case Studies



Exam-style Questions



FEATURES

Revision Pages



LONG AND CROSS PROFILE

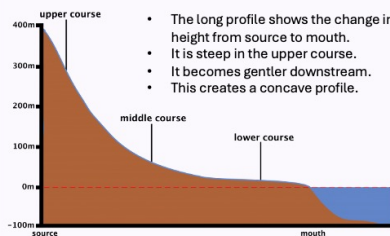
The long profile and changing cross profile of a river and its valley

Important summary facts

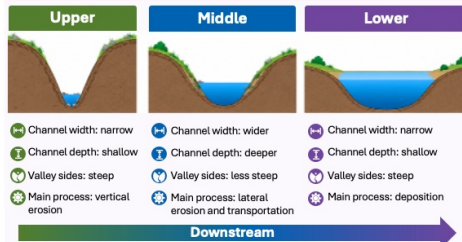
KEY FACTS

- A river flows from its source to its mouth.
- The long profile shows how height changes downstream.
- The cross profile shows the shape of the channel or valley from side to side.
- Downstream, the channel is wider and deeper, and the valley becomes flatter.

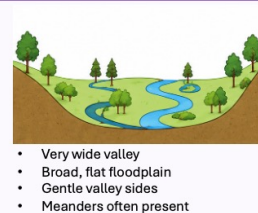
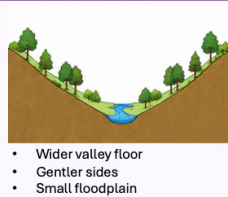
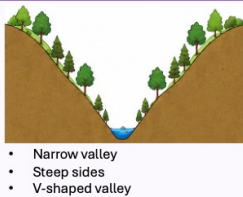
THE LONG PROFILE OF A RIVER



CHANGING CROSS PROFILE



CHANGING CROSS PROFILE OF THE VALLEY



WHY DOES IT CHANGE DOWNSTREAM?

- Gradient decreases**
The slope becomes less steep.
- Discharge increases**
Tributaries add more water to the main channel.
- Vertical erosion**
Deepens the channel in the upper course.
- Lateral erosion and deposition**
Widen the valley and build the floodplain downstream.

CHANGES FROM SOURCE TO MOUTH

Feature	Upper Course	Middle Course	Lower Course
Gradient	Steep	Less steep	Gentle
Channel width	Narrow	Wider	Widest
Channel depth	Shallow	Deeper	Deepest
Valley shape	Narrow, steep-sided	Wider valley	Wide, flat-bottomed valley
Dominant process	Vertical erosion	Lateral erosion and transportation	Deposition

EXAM READY

Describe how the long profile and cross profile of a river change downstream. [4 marks]

GO DEEPER



QR code link to more detailed reference notes on Internet Geography

Exam-style question to attempt

FEATURES

Revision activities: retrieval, application, and exam practice

LONG AND CROSS PROFILE

Revision activities: retrieval, application, and exam practice

Revision

Revise: The long and cross profile of a river – create a mind map or revision cards.

30 Second Recall

Define:
Long profile

List:
Three ways a river channel changes downstream.

Explain:
Why discharge usually increases downstream.

Blur – Build - Check

Step 1 - Blur
Cover the previous page

Step 2 – Build
From memory:
1. Draw and label the long profile of a river.
2. Describe how the channel changes from the upper course to the lower course.

Step 3 - Check
Uncover and correct:
• Missing labels
• Errors in channel changes

Exam Builder

Step 1 – complete the sentences
A river flows from its _____ to its _____. The long profile shows how _____ changes downstream. The cross profile shows the shape of the river _____ or _____ from side to side. In the upper course, the river is usually _____ and _____.

Step 2 – 2 marks
Describe how the long profile of a river changes downstream.

Step 3 – 4 Marks
Describe how the channel and valley cross profile of a river change downstream.

RETRIEVAL GRID

Questions	Answers
What is the long profile of a river?	The change in height of a river from source to mouth
What is the cross profile of a river?	The shape of the river channel or valley from side to side
Where does a river begin?	At its source
Where does a river end?	At its mouth
What is the gradient like in the upper course?	Steep
How does gradient change downstream?	It becomes gentler
What shape does the long profile usually have?	Concave
What is the channel like in the upper course?	Narrow and shallow
What is the valley like in the upper course?	Narrow, steep-sided and V-shaped
What is the main process in the upper course?	Vertical erosion
How does the channel change in the middle course?	Wider and deeper
What is the valley like in the middle course?	Wider valley floor with gentler sides
What is the main process in the middle course?	Lateral erosion and transportation
What is the channel like in the lower course?	Widest and deepest
What is the valley like in the lower course?	Wide, flat-bottomed valley with a floodplain
What is the main process in the lower course?	Deposition
Why does discharge increase downstream?	Tributaries add more water to the river
Why does the valley become wider downstream?	Lateral erosion and deposition widen and flatten the valley

Cover the answers then attempt the questions

EXAM STYLE QUESTIONS

1.1 What is the long profile of a river? [1 mark]

1.2 What is the cross profile of a river? [1 mark]

1.3 State two characteristics of a river channel in the upper course. [2 marks]

1.4 Describe how the valley cross profile changes from the upper course to the lower course. [4 marks]

1.5 Explain why discharge usually increases downstream. [2 marks]

1.6 Describe how the long profile and cross profile of a river change downstream. [4 marks]

Create a revision summary. Use the QR links below to find out more

Quick recall tasks

Check your understanding

Building up to answering an exam question

Practice exam questions

Recall quiz



Revision Cards



Mind Maps



Mark Scheme

LONG AND CROSS PROFILE

The long profile and changing cross profile of a river and its valley

KEY FACTS



A river flows from its source to its mouth.



The long profile shows how height changes downstream.

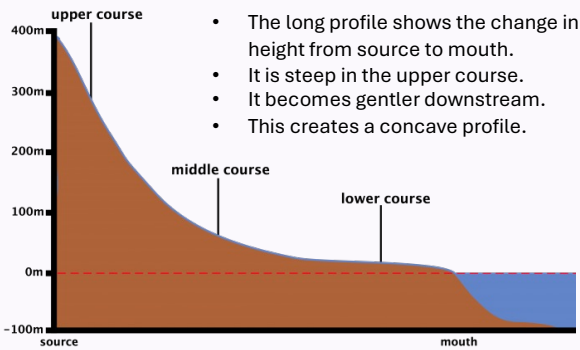


The cross profile shows the shape of the channel or valley from side to side.

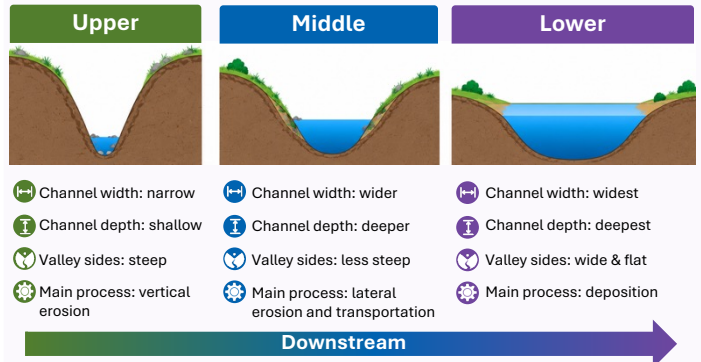


Downstream, the channel is wider and deeper, and the valley becomes flatter.

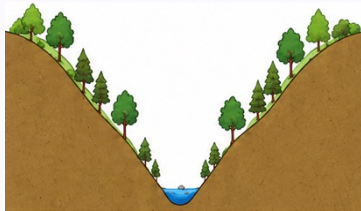
THE LONG PROFILE OF A RIVER



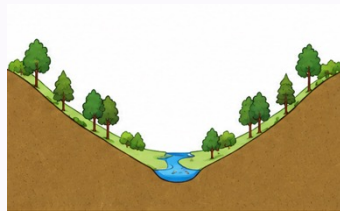
CHANGING CROSS PROFILE



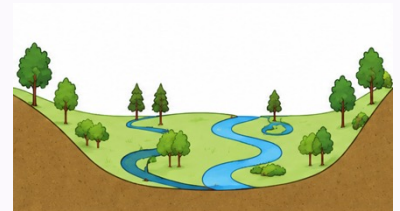
CHANGING CROSS PROFILE OF THE VALLEY



- Narrow valley
- Steep sides
- V-shaped valley



- Wider valley floor
- Gentler sides
- Small flood plain



- Very wide valley
- Broad, flat flood plain
- Gentle valley sides
- Meanders often present

WHY DOES IT CHANGE DOWNSTREAM?



Gradient decreases
The slope becomes less steep.



Discharge increases
Tributaries add more water to the main channel.



Vertical erosion
Deepens the channel in the upper course.



Lateral erosion and deposition
Widen the valley and build the flood plain downstream.

CHANGES FROM SOURCE TO MOUTH

Feature	Upper Course	Middle Course	Lower Course
Gradient	Steep	Less steep	Gentle
Channel width	Narrow	Wider	Widest
Channel depth	Shallow	Deeper	Deepest
Valley shape	Narrow, steep-sided	Wider valley	Wide, flat-bottomed valley
Dominant process	Vertical erosion	Lateral erosion and transportation	Deposition

EXAM READY

Describe how the long profile and cross profile of a river change downstream. [4 marks]

GO DEEPER



LONG AND CROSS PROFILE

Revision activities: retrieval, application, and exam practice

Revision



Revise: The long and cross profile of a river – create a mind map or revision cards.

30 Second Recall



Define:
Long profile



List:
Three ways a river channel changes downstream.



Explain:
Why discharge usually increases downstream.

Blur – Build - Check



Step 1 - Blur
Cover the previous page



Step 2 – Build
From memory:
1. Draw and label the long profile of a river.
2. Describe how the channel changes from the upper course to the lower course.



Step 3 - Check
Uncover and correct:
• Missing labels
• Errors in channel changes

RETRIEVAL GRID

Questions

- What is the long profile of a river?
- What is the cross profile of a river?
- Where does a river begin?
- Where does a river end?
- What is the gradient like in the upper course?
- How does gradient change downstream?
- What shape does the long profile usually have?
- What is the channel like in the upper course?
- What is the valley like in the upper course?
- What is the main process in the upper course?
- How does the channel change in the middle course?
- What is the valley like in the middle course?
- What is the main process in the middle course?
- What is the channel like in the lower course?
- What is the valley like in the lower course?
- What is the main process in the lower course?
- Why does discharge increase downstream?
- Why does the valley become wider downstream?

Answers

- The change in height of a river from source to mouth
- The shape of the river channel or valley from side to side
- At its source
- At its mouth
- Steep
- It becomes gentler
- Concave
- Narrow and shallow
- Narrow, steep-sided and V-shaped
- Vertical erosion
- Wider and deeper
- Wider valley floor with gentler sides
- Lateral erosion and transportation
- Widest and deepest
- Wide, flat-bottomed valley with a flood plain
- Deposition
- Tributaries add more water to the river
- Lateral erosion and deposition widen and flatten the valley

Cover the answers then attempt the questions

Exam Builder



Step 1 – complete the sentences
A river flows from its _____ to its _____. The long profile shows how _____ changes downstream. The cross profile shows the shape of the river _____ or _____ from side to side. In the upper course, the river is usually _____ and _____.



Step 2 – 2 marks
Describe how the long profile of a river changes downstream.



Step 3 – 4 Marks
Describe how the channel and valley cross profile of a river change downstream.

EXAM STYLE QUESTIONS

- 1.1 What is the long profile of a river? [1 mark]
- 1.2 What is the cross profile of a river? [1 mark]
- 1.3 State two characteristics of a river channel in the upper course. [2 marks]
- 1.4 Describe how the valley cross profile changes from the upper course to the lower course. [4 marks]
- 1.5 Explain why discharge usually increases downstream. [2 marks]

- 1.6 Describe how the long profile and cross profile of a river change downstream. [4 marks]

FLUVIAL PROCESSES

Processes of erosion, transportation, and deposition

KEY FACTS



Rivers shape the landscape through three main processes: erosion, transportation and deposition.



These processes work together to wear away, move and build up sediment.



The balance between these processes changes along a river's course.

EROSION – The wearing away of the bed and banks of a river

Hydraulic action

The force of the water hitting the bed and banks compresses air in cracks. When the air is released, it breaks pieces of rock off the bed and banks.



Abrasion (corrasion)

Sediment carried by the river (e.g. rocks and pebbles) scrapes and rubs against the bed and banks, wearing them away.



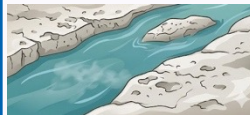
Attrition

Rocks and pebbles collide with each other in the river. They break into smaller, rounder and smoother pieces.



Solution (corrosion)

Some minerals in rocks are dissolved by the water, especially in slightly acidic water. This removes material from the bed and banks.



Types of erosion

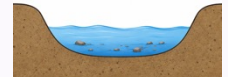
Vertical erosion

Erosion that deepens the river channel.



Lateral erosion

Erosion that widens the river channel.



TRANSPORTATION – The movement of sediment downstream

Traction (rolling)

Large rocks and pebbles that are too heavy to be lifted are rolled along the riverbed.



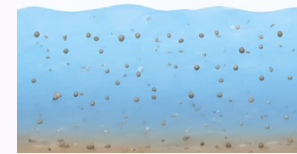
Saltation (bouncing)

Small rocks and pebbles are bounced along the riverbed by the force of the water.



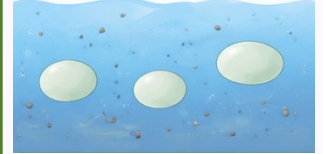
Suspension

Very small particles such as silt and clay are carried within the water and kept in suspension.



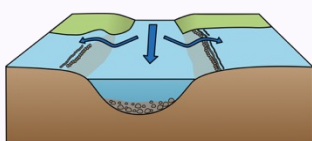
Solution (corrosion)

Minerals are dissolved in the water and carried along.

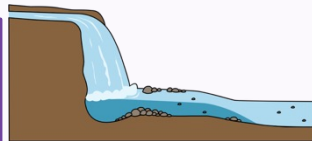


DEPOSITION – The dropping of sediment

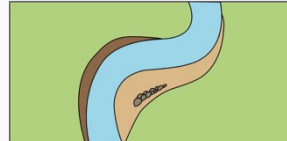
Deposition is when material transported by a river is dropped. Material deposited by a river is known as sediment. The larger the material, the higher the velocity needed to transport it. Therefore, when velocity decreases, the large boulders are the first to be deposited. Finer materials, such as clay particles, are deposited last. Deposition occurs whenever a river loses energy and velocity falls. This can be when:



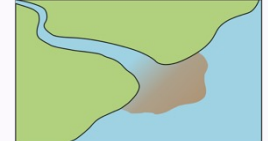
A river enters a shallow area (e.g., when it floods and meets the flood plain)



At the base of a waterfall



On the inside bend of a meander



Towards its mouth, where it meets another body of water.

EXAM READY

GO DEEPER

Explain how hydraulic action and abrasion erode a river channel.
[4 marks]



FLUVIAL PROCESSES

Revision activities: retrieval, application, and exam practice

Revision



Revise: Fluvial processes (ero, dep, and trans – create a mind map or revision cards.

30 Second Recall



Define:
Deposition



List:
Four types of river erosion.



Explain:
How a river transports material.

Blur – Build - Check



Step 1 - Blur
Cover the previous page



Step 2 – Build
From memory:
1. Define erosion, transportation and deposition.
2. Explain the difference between vertical erosion and lateral erosion.



Step 3 - Check
Uncover and correct:
• Confused erosional processes
• Errors in vertical and lateral erosion

RETRIEVAL GRID

Questions

- What are the three main fluvial processes?
- What is erosion?
- What is transportation?
- What is deposition?
- What is hydraulic action?
- What is abrasion?
- What is attrition?
- What is solution?
- What is vertical erosion?
- What is lateral erosion?
- What is traction?
- What is saltation?
- What is suspension?
- What is sediment carried in solution?
- Why does a river deposit sediment?
- Which sediment is deposited first when velocity falls?
- Where can deposition occur on a meander?
- Where can deposition occur near a waterfall?

Answers

- Erosion, transportation and deposition
- The wearing away of the river bed and banks
- The movement of sediment downstream
- The dropping of material carried by a river
- The force of water breaks rock from the bed and banks
- Sediment scrapes and wears away the bed and banks
- Rocks collide and become smaller, rounder and smoother
- Minerals are dissolved by river water
- Erosion that deepens the river channel
- Erosion that widens the river channel
- Large material rolls along the river bed
- Small stones bounce along the river bed
- Fine particles are carried within the water
- Dissolved minerals are carried in the water
- The river loses energy and velocity falls
- The largest and heaviest sediment
- On the inside bend of a meander
- At the base of a waterfall

Cover the answers then attempt the questions

Exam Builder



Step 1 – complete the sentences

Rivers shape the landscape through erosion, _____ and deposition.
Hydraulic action is caused by the force of _____ hitting the bed and banks.
Abrasion happens when sediment _____ against the bed and banks.
Deposition happens when a river loses _____ and can no longer carry its load.



Step 2 – 2 marks

Explain how one process of river transportation moves sediment downstream.



Step 3 – 4 Marks

Explain how hydraulic action and abrasion erode a river channel.

EXAM STYLE QUESTIONS

1.1 Name one process of river erosion. [1 mark]

1.2 What is river deposition? [1 mark]

1.3 Describe the difference between vertical erosion and lateral erosion. [2 marks]

1.4 Explain how traction and suspension transport sediment downstream. [4 marks]


1.5 Suggest why deposition occurs on the inside bend of a meander. [2 marks]


1.6 Explain how erosion, transportation and deposition shape a river channel. [6 marks]


LANDFORMS OF EROSION


The formation of interlocking spurs, waterfalls and gorges

KEY FACTS

 These landforms are formed by vertical erosion in the upper course.

 Rivers erode softer rock more easily than resistant rock.

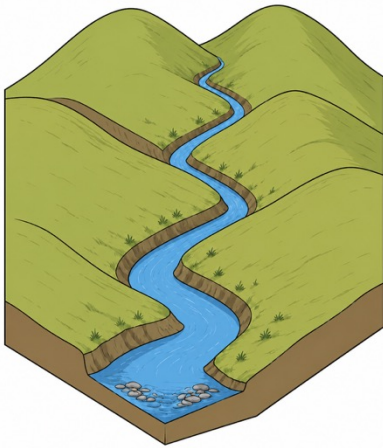
 Waterfalls retreat upstream over time, forming gorges.

 They show the power of a river to shape the landscape.

INTERLOCKING SPURS

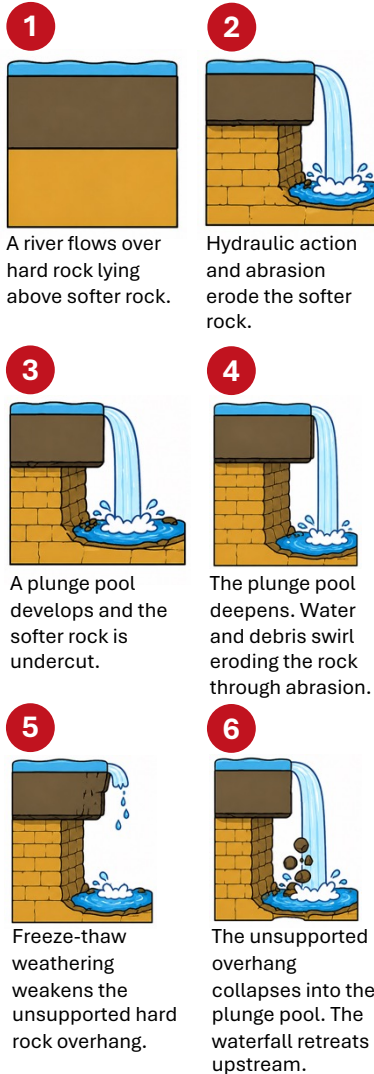
Characteristics:

- Found in steep V-shaped valleys
- River follows a winding course
- Spurs appear to interlock when viewed downstream
- Common in upland areas

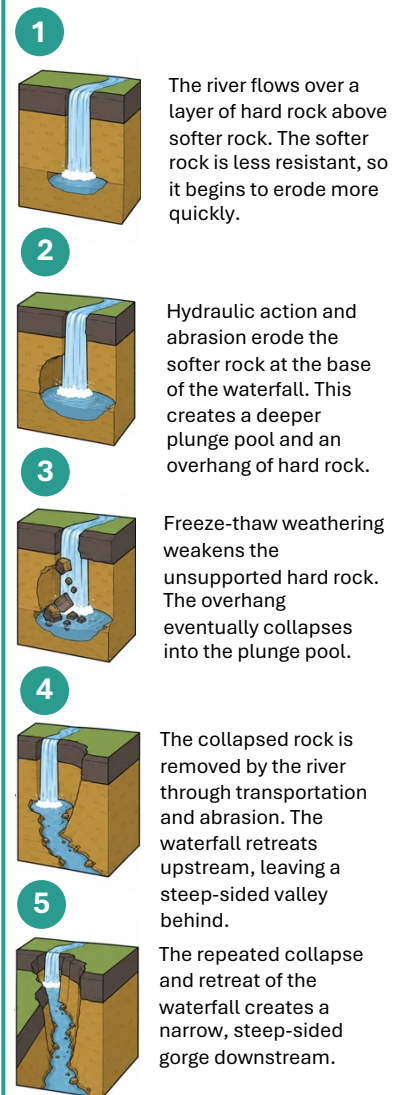


- 1 Vertical erosion creates a V-shaped valley.
- 2 Areas of resistant rock remain.
- 3 The river follows the path of least resistance.
- 4 The river winds around the ridges.
- 5 Interlocking spurs are formed.

WATERFALLS



GORGES



EXAM READY

Explain the formation of a waterfall. [6 marks]

GO DEEPER



LANDFORMS OF EROSION

Revision activities: retrieval, application, and exam practice

Revision



Revise: Landforms of river erosion – create a mind map or revision cards.

30 Second Recall



Define:
Interlocking spur



List:
Three landforms formed by river erosion.



Explain:
Why waterfalls retreat upstream over time.

Blur – Build - Check



Step 1 - Blur
Cover the previous page



Step 2 – Build
From memory:
1. Outline the stages in the formation of a waterfall.
2. Explain how hydraulic action and abrasion help form a plunge pool.



Step 3 - Check
Uncover and correct:
• Waterfall - ensure erosional processes are included
• Ensure both are covered

RETRIEVAL GRID

Questions

What type of erosion mainly forms landforms in the upper course?

What is vertical erosion?

What valley shape is common in the upper course?

What are interlocking spurs?

Why does a river wind around ridges of land in the upper course?

What type of rock is harder to erode?

What type of rock is eroded more quickly?

What landform forms where hard rock lies above softer rock?

Which erosion processes erode the softer rock at a waterfall?

What is a plunge pool?

What happens when softer rock is undercut?

How can freeze-thaw weathering affect the overhang?

What happens when the overhang collapses?

How does a waterfall retreat upstream?

What is a gorge?

Why are waterfalls usually found in the upper course?

Answers

Vertical erosion

Erosion that deepens the river channel

A V-shaped valley

Ridges of land that overlap as the river winds through a valley

It follows the path of least resistance

Resistant rock

Softer rock

A waterfall

Hydraulic action and abrasion

A deep hollow at the base of a waterfall

An overhang of hard rock is formed

It weakens the unsupported hard rock

It falls into the plunge pool

Repeated erosion, collapse and retreat move it backwards

A narrow, steep-sided valley

The gradient is steep and vertical erosion is dominant

Cover the answers then attempt the questions

Exam Builder



Step 1 – complete the sentences
Interlocking spurs form in the _____ course where the river cuts downwards by _____ erosion. A waterfall forms where hard rock lies above _____ rock. Hydraulic action and _____ erode the softer rock, creating a _____ pool. The overhang collapses and the waterfall retreats _____.



Step 2 – 2 marks
Describe one characteristic of interlocking spurs.



Step 3 – 4 Marks
Explain how erosion creates a plunge pool and overhang at a waterfall.

EXAM STYLE QUESTIONS

- 1.1 Name one landform of river erosion. [1 mark]
- 1.2 What is vertical erosion? [1 mark]
- 1.3 Describe one characteristic of interlocking spurs. [2 marks]
- 1.4 Explain why waterfalls often form where hard rock lies above softer rock. [4 marks]
- 1.5 Suggest why waterfalls retreat upstream. [2 marks]
- 1.6 Explain the formation of a waterfall and gorge. [6 marks]

LANDFORMS OF EROSION AND DEPOSITION

The formation of meanders and ox-bow lakes

KEY FACTS



Meanders are bends in a river channel.



Erosion is greatest on the outer bend.



Deposition occurs on the inner bend.



Ox-bow lakes form when a meander is cut off.

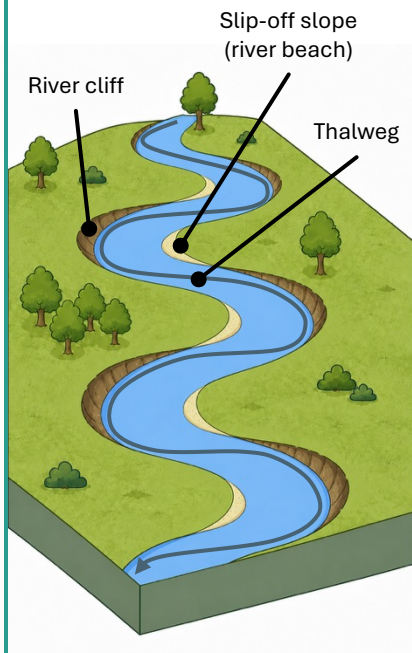
MEANDERS

What are they?

Meanders are bends in a river channel, usually found in the middle and lower course.

Characteristics:

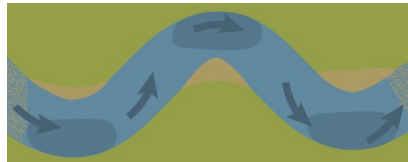
- Found in the middle and lower course
- Outer bend has faster flow and erosion
- Inner bend has slower flow and deposition
- River cliff on the outer bend
- Slip-off slope on the inner bend



FORMATION OF A MEANDER



The fast flow path of the river (thalweg) deflects side to side due to pools and riffles. This creates areas of faster and slower flow, beginning small bends in the channel.



The bends become more pronounced as the thalweg swings from side to side. This increases lateral erosion by hydraulic action and abrasion on the outer bends forming river cliffs, while slower water on the inner bends leads to deposition, forming slip-off slopes.

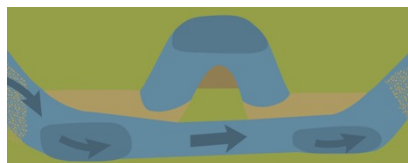


The meanders grow larger over time. Continued outer-bend erosion and inner-bend deposition make the bends more exaggerated, creating a winding meandering channel.

FORMATION OF AN OX-BOW LAKE



Continued lateral erosion by hydraulic action and abrasion on the outer bends narrows the neck of the meander. During periods of high discharge, the river cuts through the narrow neck.



The river now flows along the straighter new channel. Deposition seals off the ends of the old meander loop, leaving an ox-bow lake.

EXAM READY

GO DEEPER

Explain how erosion and deposition lead to the formation of an ox-bow lake. [6 marks]



LANDFORMS OF EROSION AND DEPOSITION

Revision activities: retrieval, application, and exam practice

Revision



Revise: Formation of meanders and ox-bow lakes – create a mind map or revision cards.

30 Second Recall



Define:
Meander



List:
Two features found on a meander.



Explain:
Why erosion is greatest on the outer bend.

Blur – Build - Check



Step 1 - Blur
Cover the previous page



Step 2 – Build
From memory:
1. Draw and label a meander with a river cliff and slip-off slope.
2. Outline how an ox-bow lake forms.



Step 3 - Check
Uncover and correct:
• Check all features have been labelled
• For missing stages / processes

RETRIEVAL GRID

Questions

What is a meander?
Where are meanders usually found?
Where is river flow fastest on a meander?
Where is river flow slowest on a meander?
What happens on the outer bend of a meander?
What happens on the inner bend of a meander?
What is a river cliff?
What is a slip-off slope?
What is lateral erosion?
Which processes erode the outer bend?
Why does deposition occur on the inner bend?
How do meanders change over time?
What is the neck of a meander?
How does the neck of a meander become narrower?
When can a river cut through the neck of a meander?
What happens after the river cuts through the neck?
How is the old meander loop sealed off?

Answers

A bend in a river channel
In the middle and lower course
On the outer bend
On the inner bend
Erosion occurs
Deposition occurs
A steep eroded bank on the outer bend
A gently sloping deposit on the inner bend
Erosion that widens the river channel
Hydraulic action and abrasion
The river has less energy and velocity is lower
They become larger and more exaggerated
The narrow area of land between two outer bends
Outer-bend erosion continues on both sides
During high discharge or flooding
The river follows a straighter route.
Deposition blocks the old channel ends

Cover the answers then attempt the questions

Exam Builder



Step 1 – complete the sentences
Meanders are bends in a river channel, usually found in the _____ and lower course. The fastest flow is on the _____ bend, where hydraulic action and abrasion cause _____. On the inner bend, slower flow causes _____, forming a slip-off slope. An ox-bow lake forms when a meander is cut _____. meander.



Step 2 – 2 marks
Explain why deposition occurs on the inside bend of a meander.



Step 3 – 4 Marks
Explain how erosion and deposition change the shape of a meander.

EXAM STYLE QUESTIONS

1.1 What is a meander? [1 mark]

1.2 Name one feature found on the outer bend of a meander. [1 mark]

1.3 Describe the difference between a river cliff and a slip-off slope. [2 marks]

1.4 Explain why meanders become more pronounced over time. [4 marks]


1.5 Suggest why a river may cut through the neck of a meander. [2 marks]


1.6 Explain how erosion and deposition lead to the formation of an ox-bow lake. [6 marks]


LANDFORMS OF DEPOSITION


The formation of flood plains, levees, and estuaries.

KEY FACTS

 Deposition occurs when a river loses energy and can no longer carry its load.

 Levees are raised banks formed by flood deposition.

 Flood plains are wide, flat areas beside rivers.

 Estuaries form where a river meets the sea.

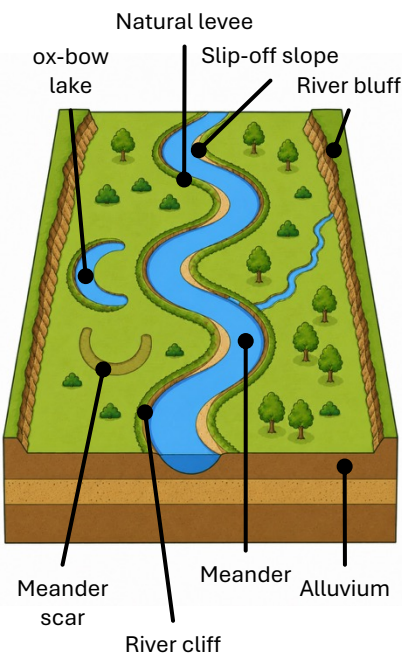
FLOOD PLAIN

What are they?

Flood plains are wide, flat areas of land on either side of a river, usually found in the middle and lower course.

Characteristics:

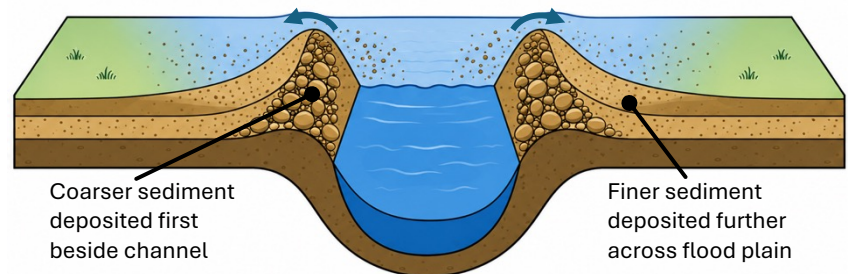
- Wide and flat
- Found beside meandering rivers
- Covered by deposited alluvium
- Often flood during periods of high discharge



LEVEES

What are they?

Levees are raised banks found beside a river channel. They form when floodwater loses energy and deposits sediment beside the river.



1. During a flood, water overtops the riverbanks.
2. As the water spreads out, it loses velocity.
3. Heavier sediment is deposited first beside the channel.
4. Finer silt is deposited further across the flood plain.
5. Repeated floods build up raised banks called levees.

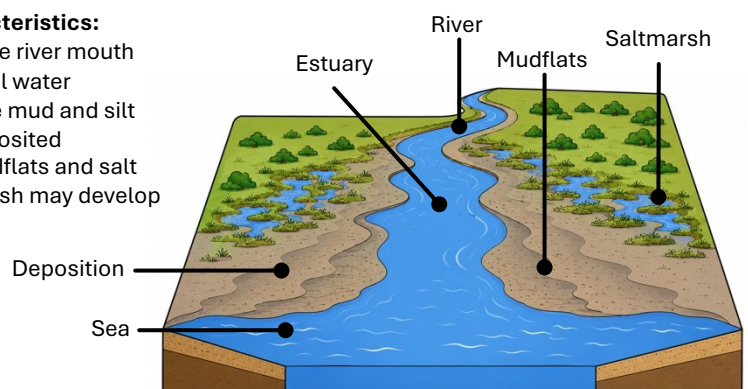
ESTUARIES

What are they?

An estuary is the tidal mouth of a river where fresh water meets the sea.

Characteristics:

- Wide river mouth
- Tidal water
- Fine mud and silt deposited
- Mudflats and salt marsh may develop



EXAM READY

Explain how repeated flooding leads to the formation of natural levees. [4 marks]

GO DEEPER



LANDFORMS OF DEPOSITION

Revision activities: retrieval, application, and exam practice

Revision



Revise: Landforms of river deposition – create a mind map or revision cards.

30 Second Recall



Define:
Alluvium



List:
Three landforms created by deposition.



Explain:
Why heavier sediment is deposited first during a flood.

Blur – Build - Check



Step 1 - Blur
Cover the previous page



Step 2 – Build
From memory:
1. Sketch a flood plain and label at least three features.
2. Explain why deposition occurs when floodwater spreads out.



Step 3 - Check
Uncover and correct:
• Missing flood plain features
• Missing link between velocity and deposition

RETRIEVAL GRID

Questions

What is deposition?
When does deposition occur?
What is alluvium?
What is a flood plain?
Where are flood plains usually found?
Why are flood plains usually wide and flat?
What is a meander scar?
What is a natural levee?
How does flooding help form levees?
What happens when floodwater leaves the river channel?
Which sediment is deposited first beside the channel?
Where is finer sediment deposited?
Why do levees build up over time?
What is an estuary?
Where does an estuary form?
What type of water is found in an estuary?
What material is often deposited in an estuary?
Which habitats can develop in estuaries?

Answers

The dropping of sediment carried by a river
When a river loses energy and velocity falls
Sediment deposited by a river
A wide, flat area of land beside a river
In the middle and lower course
Repeated deposition spreads sediment across the valley floor
A curved mark left by an old meander
A raised river bank formed by flood deposition
Repeated floods deposit sediment beside the river
It spreads out, slows down and loses energy
Coarser and heavier sediment
Further across the flood plain
Sediment is added during repeated floods
The tidal mouth of a river
Where a river meets the sea
A mixture of fresh water and seawater
Fine mud and silt
Mudflats and salt marshes

Cover the answers then attempt the questions

Exam Builder



Step 1 – complete the sentences
Deposition happens when a river loses _____ and can no longer carry its _____. A flood plain is a wide, flat area of land beside a _____. During a flood, heavier sediment is deposited first beside the channel, building _____. Estuaries form where a river meets the _____.



Step 2 – 2 marks
Explain why deposition occurs when a river floods.



Step 3 – 4 Marks
Explain how repeated flooding leads to the formation of natural levees.

EXAM STYLE QUESTIONS

- 1.1 What is deposition? [1 mark]
- 1.2 Name one landform formed by river deposition. [1 mark]
- 1.3 Describe two characteristics of a flood plain. [2 marks]
- 1.4 Explain how natural levees form. [4 marks]
- 1.5 Suggest why mudflats may develop in an estuary. [2 marks]
- 1.6 Explain how deposition creates landforms in the lower course of a river. [6 marks]

UK RIVER VALLEY

Major landforms of erosion and deposition on the River Tees

KEY FACTS



The River Tees flows 137 km from Cross Fell in the Pennines to Teesmouth on the North Sea.



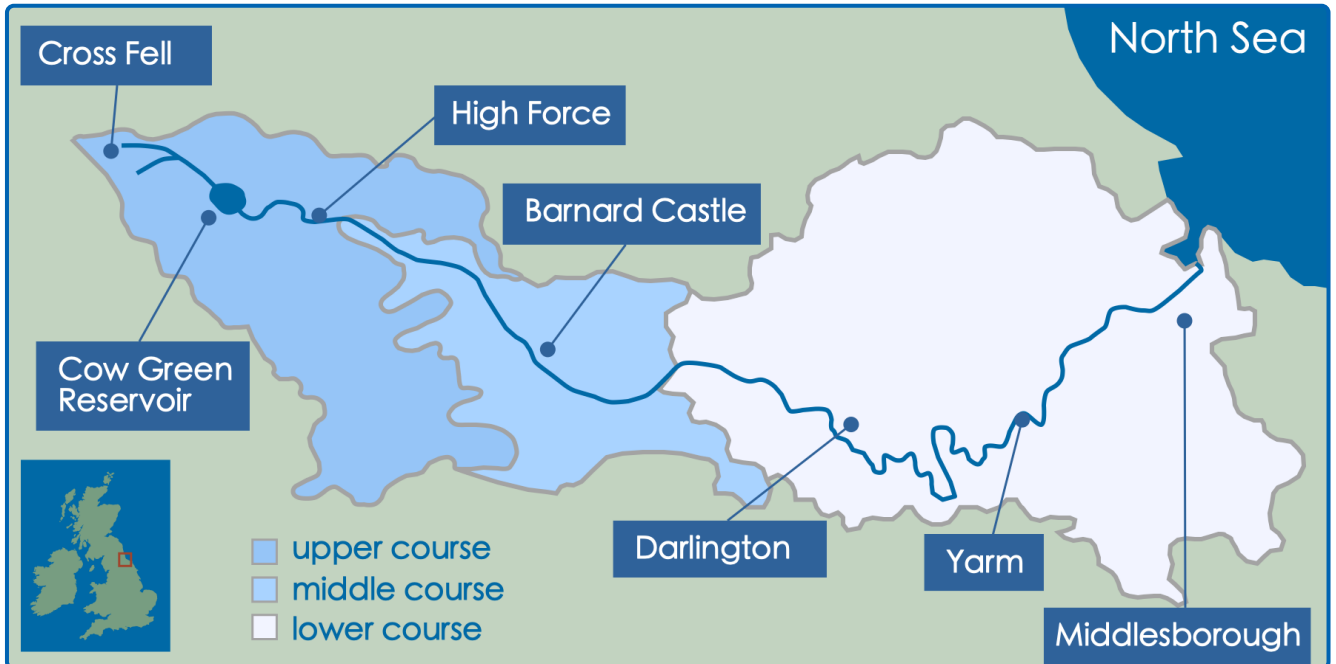
In the upper course, vertical erosion creates interlocking spurs and waterfalls.



In the middle course, lateral erosion and deposition create meanders.



In the lower course, deposition forms flood plains, levees, mudflats and sandbanks.



UPPER COURSE

Characteristics:

- Source near Cross Fell in the Pennines.
- Upper Teesdale has V-shaped valleys and interlocking spurs.
- High Force waterfall and gorge have formed where resistant Whin Sill overlies softer rock.



MIDDLE COURSE

- In the middle course the valley becomes wider.
- Meanders become common e.g. Barnard Castle.
- Outer-bend erosion and inner-bend deposition shape the meanders.



LOWER COURSE

- Large meanders cross the flood plain around Yarm.
- Natural levees build up during flooding downstream of Yarm.
- At Teesmouth, near Middlesborough, the Tees estuary has mudflats and sandbanks.



EXAM READY

For a UK river valley you have studied, explain how landforms change from the upper course to the lower course. [6 marks]

GO DEEPER



UK RIVER VALLEY

Revision activities: retrieval, application, and exam practice

Revision



Revise: The River Tees landforms of erosion and deposition – create a mind map or revision cards.

30 Second Recall



Define:
River valley



List:
Three landforms found in a UK river valley.



Explain:
Why waterfalls are usually found in the upper course.

Blur – Build - Check



Step 1 - Blur
Cover the previous page



Step 2 - Build
From memory:
1. Produce a simple sketch map of your UK river valley example.
2. Name one landform found in the upper, middle, and the lower course.



Step 3 - Check
Uncover and correct:
• Missing features
• Missing/incorrect landforms

RETRIEVAL GRID

Questions

- What is the name of your UK river valley example?
- Where is your UK river valley located?
- Where is the source of your chosen river?
- Where is the mouth of your chosen river?
- What is one landform found in the upper course?
- What process is dominant in the upper course?
- Why are valleys often narrow and steep-sided in the upper course?
- What is one landform found in the middle course?
- What process becomes more important in the middle course?
- How do meanders form in the middle course?
- What is one landform found in the lower course?
- What process is most important in the lower course?
- Why does deposition become more common downstream?
- How does the valley change downstream?
- How does the river channel change downstream?

Answers

- River Tees
- Northeast England
- Cross Fell
- Tees Mouth / Middlesbrough / North Sea
- Waterfall / gorge / interlocking spurs
- Vertical erosion
- The river cuts downwards into the landscape through vertical erosion
- Meander
- Lateral erosion and transportation
- Outer-bend erosion and inner-bend deposition
- Flood plain / levee / estuary / mudflats
- Deposition
- The river loses energy and drops sediment
- It becomes wider, flatter and less steep-sided
- It becomes wider, deeper and more efficient

Cover the answers then attempt the questions

Exam Builder



Step 1 - complete the sentences
In a UK river valley, the upper course is usually steep and dominated by _____ erosion. This can create landforms such as waterfalls, gorges and _____ spurs. In the middle course, the river begins to form _____. In the lower course, deposition creates landforms such as flood plains, _____ and estuaries.



Step 2 - 2 marks
Describe one _____ landform found in the upper course of a UK river valley you have studied.



Step 3 - 4 Marks
Explain how erosion creates one landform in the upper course of a UK river valley you have studied.

EXAM STYLE QUESTIONS

1.1 Name a UK river valley you have studied. [1 mark]

1.2 Name one landform found in the upper course of a UK river valley. [1 mark]

1.3 Describe one landform of deposition found in the lower course of a UK river valley. [2 marks]

1.4 Explain how erosion creates one landform in the upper course of a UK river valley. [4 marks]

1.5 Suggest why deposition becomes more important in the lower course of a river. [2 marks]

1.6 For a UK river valley you have studied, explain how landforms change from the upper course to the lower course. [6 marks]

FLOOD RISK

How physical and human factors affect the chance of flooding

KEY FACTS



Flood risk increases when water reaches the river channel quickly.



Heavy or prolonged rain increases surface run-off and discharge.



Impermeable geology and steep relief increase flood risk.



Land use can increase or reduce flood risk.

PRECIPITATION



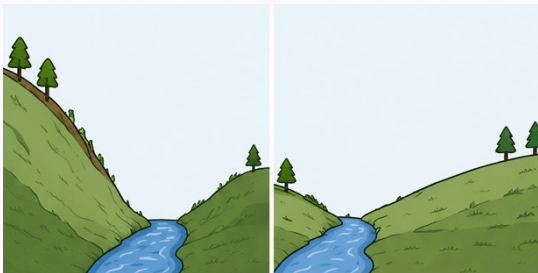
- Heavy rainfall adds large amounts of water quickly.
- Prolonged rainfall saturates the ground.
- More surface run-off reaches the river.
- River discharge rises, increasing flood risk.

GEOLOGY



- Permeable rock allows infiltration and lowers flood risk.
- Impermeable rock limits infiltration.
- More water flows over the surface into the river.
- Clay and granite often increase flood risk.

RELIEF



- Steep slopes speed up surface run-off.
- Water reaches the river channel faster.
- Lag time is shorter.
- Flood risk is usually higher in steep upland catchments.

LAND USE



- Urban surfaces are impermeable.
- Drains move water quickly into rivers.
- Deforestation reduces interception.
- Some land management can reduce flood risk.

EXAM READY

GO DEEPER

Explain how physical and human factors can increase flood risk.
[6 marks]



FLOOD RISK

Revision activities: retrieval, application, and exam practice

Revision



Revise: Physical & human factors affecting flood risk – create a mind map or revision cards.

30 Second Recall



Define:
Flood risk



List:
Four factors that affect flood risk.



Explain:
Why impermeable surfaces increase flood risk.

Blur – Build – Check



Step 1 - Blur
Cover the previous page



Step 2 – Build
From memory:

- Two physical factors that affect flood risk.
- One human factor that affects flood risk.
- How heavy rainfall increases river discharge.



Step 3 - Check
Uncover and correct:

- Missing physical factors
- Missing human factors
- Weak links to surface run-off

RETRIEVAL GRID

Questions

What is flood risk?
What is precipitation?
How can heavy rainfall increase flood risk?
How can prolonged rainfall increase flood risk?
What happens when the ground becomes saturated?
What is infiltration?
What is surface run-off?
How does permeable rock affect flood risk?
How does impermeable rock affect flood risk?
Name one type of impermeable geology.
What does relief mean?
How do steep slopes affect flood risk?
How do gentle slopes affect flood risk?
What is lag time?
How can urbanisation increase flood risk?
Why do drains increase flood risk?
How can deforestation increase flood risk?

Answers

The chance that flooding will occur
Water falling from the atmosphere
It adds lots of water quickly to the drainage basin
It saturates the ground, increasing surface run-off
Less water can infiltrate
Water soaking into the ground
Water flowing over the land surface
It allows infiltration and can lower flood risk
It limits infiltration and increases surface run-off
Clay / granite
The height and shape of the land
They speed up surface run-off
They slow surface run-off
The delay between peak rainfall and peak discharge
It creates impermeable surfaces
They move water quickly into rivers
It reduces interception

Cover the answers then attempt the questions

Exam Builder



Step 1 – complete the sentences
Flood risk increases when water reaches the river channel _____. Heavy or prolonged rainfall increases surface _____. Impermeable rock reduces _____, so more water flows over the surface. Urban areas increase flood risk because roads, roofs and pavements are _____.



Step 2 – 2 marks
Explain how heavy rainfall can increase flood risk.



Step 3 – 4 Marks
Explain how one physical factor and one human factor can increase flood risk.

EXAM STYLE QUESTIONS

- 1.1 What is flood risk? [1 mark]
- 1.2 Name one physical factor that affects flood risk. [1 mark]
- 1.3 Describe how steep relief can increase flood risk. [2 marks]
- 1.4 Explain how geology can affect flood risk. [4 marks]
- 1.5 Suggest how land use can reduce flood risk. [2 marks]
- 1.6 Explain how physical and human factors can increase flood risk. [6 marks]

HYDROGRAPHS

Hydrographs show the relationship between precipitation and discharge

KEY FACTS



A hydrograph shows rainfall and river discharge over time.



Rainfall bars and discharge line show river response.

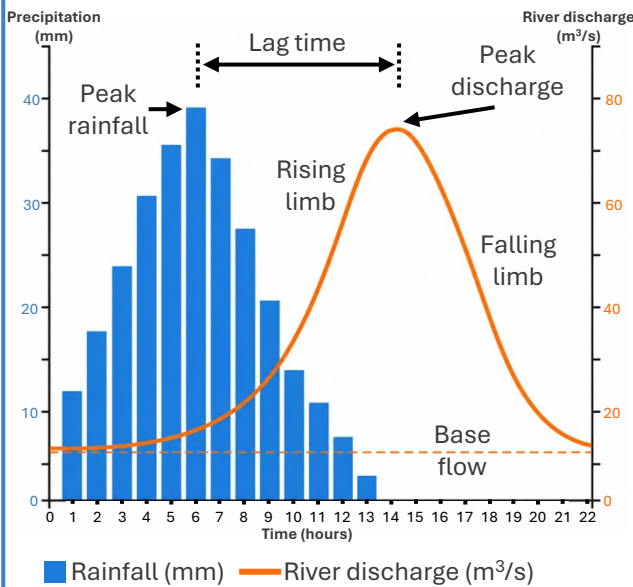


Lag time is the delay between peak rainfall and peak discharge.



A short lag time suggests rapid run-off and a higher flood risk.

STORM HYDROGRAPH



HOW TO READ A HYDROGRAPH

- The rising limb shows discharge increasing after rainfall.
- Peak discharge is the highest river flow.
- The falling limb shows discharge decreasing.
- Lag time shows how quickly the river responds to rainfall. The longer the lag time the longer it takes for rainfall to reach the river.

PRECIPITATION AND DISCHARGE

After precipitation, river discharge usually rises after a time delay. The length of the lag time shows how quickly water reaches the river channel.

FLASHY AND SUBDUED HYDROGRAPHS

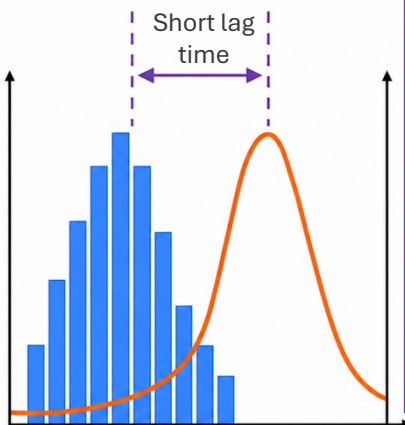
Flashy storm hydrograph

Features:

- Short lag time
- Steep rising limb
- High peak discharge

What drainage basin conditions could cause this?

- Steep slopes
- Impermeable rock
- Saturated soil
- Urban surfaces
- Little vegetation



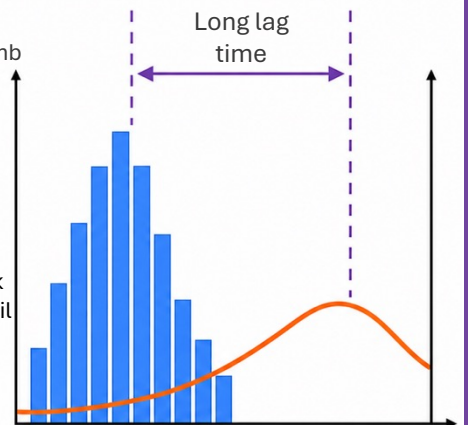
Subdued storm hydrograph

Features:

- Long lag time
- Gentle rising limb
- Lower peak discharge

What drainage basin conditions could cause this?

- Gentle slopes
- Permeable rock
- Unsaturated soil
- Vegetated land
- Less urban development



EXAM READY

Explain what lag time on a hydrograph tells us about a river basin.
[4 marks]

GO DEEPER



HYDROGRAPHS

Revision activities: retrieval, application, and exam practice

Revision



Revise: Hydrographs – create a mind map or revision cards.

30 Second Recall



Define:
Lag time



List:
Three features of a storm hydrograph.



Explain:
Why discharge rises after rainfall.

Blur – Build - Check



Step 1 - Blur
Cover the previous page



Step 2 – Build
From memory:

1. Draw & label a simple storm hydrograph
2. Describe one feature of a flashy hydrograph.
3. Describe one feature of a subdued hydrograph.



Step 3 - Check
Uncover and correct:

- Missing hydrograph labels
- Feature of a subdued / flashy hydrography

RETRIEVAL GRID

Questions

What does a hydrograph show?
What do the bars show?
What does the line show?
What is river discharge?
What is peak rainfall?
What is peak discharge?
What is lag time?
What does the rising limb show?
What does the falling limb show?
What is base flow?
Why does discharge usually rise after rainfall?
What does a short lag time suggest?
What does a long lag time suggest?
What is a flashy hydrograph?
What is a subdued hydrograph?
Name one condition that can cause a flashy hydrograph.
Name one condition that can cause a subdued hydrograph.

Answers

Rainfall and river discharge over time
The amount of precipitation
How river discharge changes over time
The amount of water flowing in a river
The highest amount of rainfall
The highest river discharge
The delay between peak rainfall and peak discharge
Discharge increasing after rainfall
Discharge decreasing after peak flow
Normal river flow before extra rainfall reaches the channel
Water moves through the drainage basin into the river
Rapid run-off and higher flood risk
Slower movement of water to the river
A hydrograph with a short lag time, steep rising limb and high peak discharge
A hydrograph with a long lag time, gentle rising limb and lower peak discharge
Steep slopes / impermeable rock / urban surfaces
Gentle slopes / permeable rock / vegetation

Cover the answers then attempt the questions

Exam Builder



Step 1 – complete the sentences
A hydrograph shows the relationship between precipitation and river _____ over time. The rising limb shows discharge _____ after rainfall. Lag time is the delay between peak _____ and peak discharge. A short lag time suggests water reaches the river _____, increasing flood risk.



Step 2 – 2 marks
Describe what lag time means on a hydrograph.



Step 3 – 4 Marks
Explain why a drainage basin with steep slopes and impermeable rock may produce a flashy hydrograph.

EXAM STYLE QUESTIONS

1.1 What does a hydrograph show? [1 mark]

1.2 What is peak discharge? [1 mark]

1.3 Describe the difference between peak rainfall and peak discharge. [2 marks]

1.4 Explain what lag time tells us about a river basin. [4 marks]

1.5 Suggest one reason why a hydrograph may have a short lag time. [2 marks]

1.6 Explain how drainage basin conditions can affect the shape of a storm hydrograph. [6 marks]

HARD ENGINEERING

The costs and benefits of dams and reservoirs, straightening, embankments, flood relief channels

KEY FACTS



Hard engineering uses artificial structures to control river processes and reduce flood risk.



Hard engineering can reduce flood risk

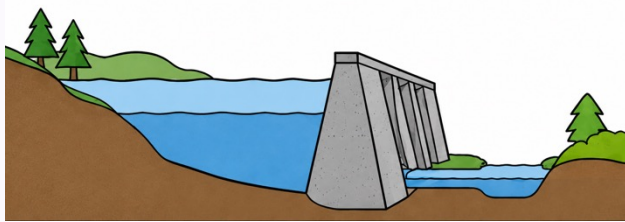


Schemes are often expensive



Some increase flood risk downstream

DAMS AND RESERVOIRS



A dam blocks a river and stores water in a reservoir, releasing it slowly to reduce peak discharge downstream.

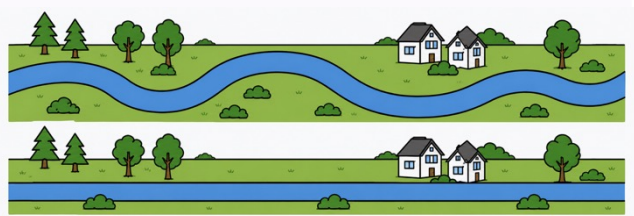
Benefits

- Store water during heavy rain
- Reduce peak discharge downstream
- Provide water and HEP
- Can be used for recreation

Costs

- Very expensive to build
- Flood large areas of land
- People and wildlife may be displaced
- Sediment is trapped behind the dam

RIVER STRAIGHTENING



River straightening cuts through meanders to make the channel shorter and straighter, quickly moving water away.

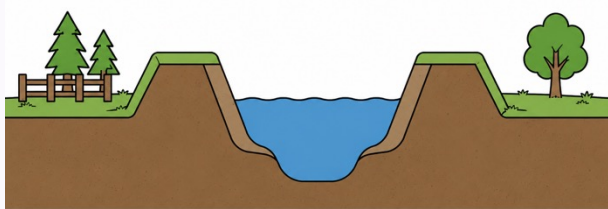
Benefits

- Water moves away more quickly from areas at risk of flooding
- Reduces local flood risk
- Protects homes and businesses

Costs

- May increase flooding downstream as water moves more quickly
- Faster flow can increase erosion
- Damages river habitats

EMBANKMENTS



Embankments are raised riverbanks that increase channel capacity and help keep floodwater within the river.

Benefits

- Increased channel capacity
- Keep floodwater in the channel
- Protect homes and farmland

Costs

- Need maintenance
- Failure can cause dangerous flooding
- Separate river from flood plain
- Can push flooding downstream

FLOOD RELIEF CHANNELS



Flood relief channels are artificial channels that divert excess water away from areas at risk of flooding.

Benefits

- Divert excess water away
- Reduce pressure on the main river
- Protect settlements

Costs

- Expensive to build
- Need land
- Can damage habitats
- May move water to another area

EXAM READY

GO DEEPER

Assess the costs and benefits of hard engineering strategies used to manage river flooding. [6 marks]



HARD ENGINEERING

Revision activities: retrieval, application, and exam practice

Revision



Revise: Hard engineering +/- – create a mind map or revision cards.

30 Second Recall



Define:
Hard engineering



List:
Four hard engineering strategies.



Explain:
How some strategies cause downstream flooding.

Blur – Build - Check



Step 1 - Blur
Cover the previous page



Step 2 – Build
From memory:

- Identify one benefit and one cost of dams and reservoirs.
- Explain why river straightening can cause problems downstream.



Step 3 - Check
Uncover and correct:

- Missing links to flood risk
- Weak explanation of downstream impacts

RETRIEVAL GRID

Questions

What is hard engineering?
What is a dam?
What is a reservoir?
How do dams and reservoirs reduce flood risk?
Name one benefit of dams and reservoirs.
Name one cost of dams and reservoirs.
What is river straightening?
How does river straightening reduce local flood risk?
Why can river straightening increase flood risk downstream?
What are embankments?
How do embankments reduce flood risk?
What can happen if embankments fail?
What is a flood relief channel?
How does a flood relief channel reduce flood risk?
Name one benefit of flood relief channels.
Name one cost of flood relief channels.
Why are hard engineering schemes often expensive?

Answers

Using artificial structures to control river processes and reduce flood risk
A barrier built across a river
A store of water behind a dam
They store water and release it slowly
They reduce peak discharge downstream
They flood land and may displace people or wildlife
Cutting through meanders to make a straighter channel
It moves water away more quickly
Water reaches other areas faster
Raised river banks
They increase channel capacity
Flooding can be sudden and dangerous
An artificial channel that carries excess water away
It diverts floodwater away from areas at risk
It protects settlements
It is expensive and needs land
They need materials, construction and maintenance

Cover the answers then attempt the questions

Exam Builder



Step 1 – complete the sentences
Hard engineering uses artificial _____ to control river processes and reduce flood risk. Dams store water in a _____ and release it slowly. River straightening moves water away more _____. Embankments increase channel _____. Flood relief channels divert excess water away from areas at risk of _____.



Step 2 – 2 marks
Explain how embankments reduce flood risk.



Step 3 – 4 Marks
Explain one benefit and one cost of river straightening.

EXAM STYLE QUESTIONS

- 1.1 What is hard engineering? [1 mark]
- 1.2 Name one hard engineering strategy used to manage river flooding. [1 mark]
- 1.3 Describe how dams and reservoirs reduce flood risk. [2 marks]
- 1.4 Explain one benefit and one cost of embankments. [4 marks]
- 1.5 Suggest why flood relief channels may be expensive to build. [2 marks]

- 1.6 Assess the costs and benefits of hard engineering strategies used to manage river flooding. [6 marks]

SOFT ENGINEERING

The costs and benefits of flood warnings and preparation, flood plain zoning, planting trees and river restoration

KEY FACTS



Soft engineering works with natural processes.



Generally cheaper than hard engineering.



Benefits people, wildlife and the environment.



Often takes longer to see results.

FLOOD WARNINGS AND PREPARATION



Flood warnings inform people of possible flooding so they can take action. Preparation (e.g. sandbags, emergency plans and evacuation) reduces the impact.

Benefits

- Evacuation can save lives and reduce injuries
- Reduces damage to homes and property
- Relatively cheap
- Quick to implement

Costs

- Depends on accurate forecasting
- People may ignore warnings
- Can cause worry and disruption

FLOOD PLAIN ZONING



Flood plain zoning restricts or prevents building on flood plains. This keeps people and property out of high-risk areas.

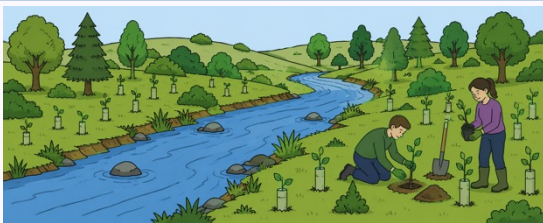
Benefits

- Reduces risk to lives and property
- Low cost
- Natural flood storage is maintained
- Long-term solution

Costs

- Limits development and land use
- May reduce land value
- Compensation may be needed

PLANTING TREES



Planting trees increases interception and infiltration, slows surface run-off and stabilises soil, reducing flood risk.

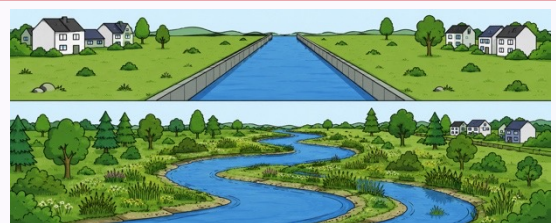
Benefits

- Reduces surface run-off
- Improves soil infiltration
- Provides wildlife habitats
- Improves air quality and landscape

Costs

- Takes time for trees to establish
- Needs ongoing maintenance
- Requires large areas of land

RIVER RESTORATION



River restoration returns rivers to a more natural state, e.g. re-meandering and removing concrete, to slow flow and reduce flooding.

Benefits

- Slows river flow
- Reduces flood peaks
- Improves water quality
- Enhances habitats and biodiversity

Costs

- Expensive
- Takes time to complete
- Needs space for rivers to change naturally

EXAM READY

Assess the costs and benefits of soft engineering strategies used to manage river flooding. [6 marks]

GO DEEPER



SOFT ENGINEERING

Revision activities: retrieval, application, and exam practice

Revision



Revise: Soft engineering +/- – create a mind map or revision cards.

30 Second Recall



Define:
Soft engineering



List:
Four soft engineering strategies.



Explain:
Why soft engineering often works with natural processes.

Blur – Build - Check



Step 1 - Blur
Cover the previous page



Step 2 – Build
From memory:
1. Identify one benefit and one cost of flood plain zoning.
2. Explain how planting trees can reduce surface run-off.



Step 3 - Check
Uncover and correct:
• Missing links to flood risk
• Weak explanation of natural processes

RETRIEVAL GRID

Questions

What is soft engineering?
What are flood warnings?
How can preparation reduce flood impacts?
Name one example of flood preparation.
Why are flood warnings relatively cheap?
What is one limitation of flood warnings?
What is flood plain zoning?
How does flood plain zoning reduce flood risk?
Why can flood plain zoning limit development?
What is one benefit of flood plain zoning?
How does planting trees reduce flood risk?
What is interception?
How do trees improve infiltration?
Why does tree planting take time to be effective?
What is river restoration?
How can river restoration reduce flood risk?
Name one environmental benefit of river restoration.

Answers

Managing flood risk by working with natural processes
Alerts that tell people flooding may happen
People can protect property or evacuate
Sandbags / emergency plans / evacuation
They do not require large structures
Forecasts may be wrong or people may ignore them
Restricting building on flood plains
It keeps people and property out of high-risk areas
Some land cannot be built on
It maintains natural flood storage
Trees intercept rainfall and increase infiltration
Rainfall being caught by vegetation before reaching the ground
Roots create spaces in the soil for water to soak in
Trees need time to grow and establish
Returning a river to a more natural state
It slows river flow and stores more water naturally
Improves habitats and biodiversity

Cover the answers then attempt the questions

Exam Builder



Step 1 – complete the sentences
Soft engineering works with _____ processes to reduce flood risk.
Flood warnings help people take _____ before flooding happens.
Flood plain zoning prevents building in high-risk _____. Planting trees increases interception and _____. River restoration can slow river _____ and reduce flood peaks.



Step 2 – 2 marks
Explain how planting trees can reduce flood risk.



Step 3 – 4 Marks
Explain one benefit and one cost of flood plain zoning.

EXAM STYLE QUESTIONS

1.1 What is soft engineering? [1 mark]

1.2 Name one soft engineering strategy used to manage river flooding. [1 mark]

1.3 Describe how flood warnings and preparation can reduce the impact of flooding. [2 marks]

1.4 Explain how planting trees and river restoration can reduce flood risk. [4 marks]

1.5 Suggest why soft engineering may take longer to reduce flood risk than hard engineering. [2 marks]

1.6 Assess the costs and benefits of soft engineering strategies used to manage river flooding. [6 marks]

UK FLOOD MANAGEMENT

The Jubilee River flood relief channel

KEY FACTS



Flood relief channel on the River Thames



Built to protect Maidenhead, Windsor and Eton from flooding



Opened in 2002 and 11.17 km long



Cost £330 million and includes five weirs

WHY WAS THE SCHEME REQUIRED?



The scheme was built because the River Thames posed a serious flood risk to settlements in the Maidenhead, Windsor and Eton area.

- Frequent flood risk during high discharge
- Homes, businesses and roads needed protection
- Flooding caused social and economic disruption
- Existing channel could not always cope

SOCIAL AND ECONOMIC ISSUES

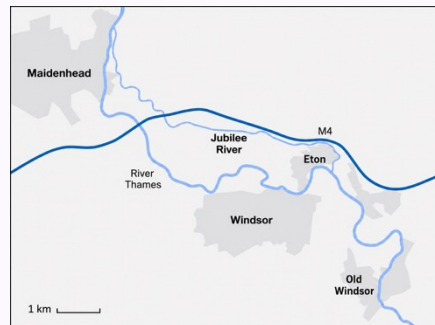
Benefits

- Protects homes in Maidenhead, Windsor and Eton
- Reduces flood damage and disruption
- Helps protect expensive property and businesses
- Can reduce repair and insurance costs

Costs

- Some people say flood risk increased downstream at Wraysbury
- Not fully navigable as promised
- Weirs disrupt leisure use
- One of the UK's most expensive flood schemes
- Weirs were damaged in 2003 and are costly to maintain

THE MANAGEMENT STRATEGY

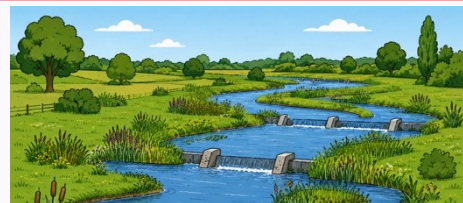


The Jubilee River is an artificial flood relief channel that diverts water away from the River Thames during high flow conditions.

How it works

- Diverts water from the Thames during high discharge
- Reduces pressure on the main river channel
- Lowers flood risk in Maidenhead, Windsor and Eton
- Rejoins the River Thames downstream
- Flow is controlled by five weirs

ENVIRONMENTAL ISSUES



The Jubilee River was designed to look more natural, but it has also created environmental concerns.

Benefits

- Designed with meanders and shallow reed beds
- Created new wetland habitats

Costs

- Concrete weirs can look unattractive
- Algae can collect above the weirs
- Habitats downstream were damaged in flooding in 2014

EXAM READY

For a UK flood management scheme you have studied, assess its social, economic and environmental impact. [6 marks]

GO DEEPER



UK FLOOD MANAGEMENT

Revision activities: retrieval, application, and exam practice

Revision



Revise: UK flood management scheme – create a mind map or revision cards.

30 Second Recall



Define:
Flood management scheme



List:
Three reasons why flood management was needed.



Explain:
How a flood relief channel reduces flood risk.

Blur – Build - Check



Step 1 - Blur
Cover the previous page



Step 2 – Build
From memory:
1. Explain why it was required.
2. Describe the management strategy used.
3. Identify one social, one economic and one environmental issue.



Step 3 - Check
Uncover and correct:
• All reasons it was needed
• Confusion about social, economic, and environmental

RETRIEVAL GRID

Questions

What is the name of your UK flood management scheme?
Which river is the scheme located on?
What type of flood management strategy was used?
Why was the scheme required?
Who or what needed protection from flooding?
How does a flood relief channel work?
When does the flood relief channel carry extra water?
How can the scheme reduce social impacts?
How can the scheme reduce economic impacts?
What is one social benefit of the scheme?
What is one economic benefit of the scheme?
What is one environmental benefit of the scheme?
What is one social issue linked to the scheme?
What is one economic issue linked to the scheme?
What is one environmental issue linked to the scheme?

Answers

Jubilee River Flood relief scheme
Thames
Flood relief channel
Flood risk threatened people, property and infrastructure
Homes, businesses, roads and services
It diverts excess water away from high-risk areas
During high discharge or flood conditions
It protects people and reduces disruption
It reduces damage to property and infrastructure
Fewer homes are flooded / fewer people are disrupted
Reduced repair costs / protection of businesses / reduced insurance costs
New habitats may be created
Flood risk may be transferred elsewhere
The scheme may be expensive to build or maintain
Habitats may be damaged or altered

Cover the answers then attempt the questions

Exam Builder



Step 1 – complete the sentences

A UK flood management scheme may be needed when homes, businesses and _____ are at risk from flooding. A flood relief channel works by diverting _____ water away from the main river during high _____. This can reduce flood risk in some places, but it may increase concern _____. Flood management schemes can create social, economic and _____ issues.



Step 2 – 2 marks

Explain why a flood management scheme may be needed in a UK river valley.



Step 3 – 4 Marks

Explain one benefit and one cost of a UK flood management scheme you have studied.

EXAM STYLE QUESTIONS

1.1 Name a UK flood management scheme you have studied. [1 mark]

1.2 Name one flood management strategy used in a UK scheme you have studied. [1 mark]

1.3 Describe one reason why a UK flood management scheme was needed. [2 marks]

1.4 Explain how the management strategy used in a UK flood management scheme reduces flood risk. [4 marks]

1.5 Suggest one environmental issue caused by a UK flood management scheme. [2 marks]

1.6 For a UK flood management scheme you have studied, assess its social, economic and environmental impacts. [6 marks]

GLOSSARY

Words you need to be able to use and understand

Abrasion

The wearing away of the river bed and banks by sediment carried by the river.

Alluvium

Sediment deposited by a river, usually on the flood plain.

Attrition

When rocks and pebbles carried by a river collide and become smaller, rounder and smoother.

Base flow

The normal flow of a river before extra rainfall reaches the channel.

Channel

The part of a river valley where the water flows.

Channel capacity

The amount of water a river channel can hold before it floods.

Channel straightening

A hard engineering strategy where meanders are cut through to make the river shorter and straighter.

Cross profile

The shape of a river channel or valley from side to side.

Dam

A barrier built across a river to store and control the flow of water.

Deposition

The dropping of sediment carried by a river.

Discharge

The volume of water flowing in a river channel.

Embankment

A raised river bank built to increase channel capacity and keep floodwater in the river.

Erosion

The wearing away of the river bed and banks.

Estuary

The tidal mouth of a river where fresh water meets the sea.

Falling limb

The part of a hydrograph showing river discharge decreasing after peak discharge.

Flashy hydrograph

A hydrograph with a short lag time, steep rising limb and high peak discharge.

Flood plain

A wide, flat area of land beside a river, usually found in the middle and lower course.

Flood plain zoning

A soft engineering strategy that restricts or prevents building on flood plains.

Flood relief channel

An artificial channel built to divert excess water away from areas at risk of flooding.

Flood risk

The chance or probability that flooding will occur.

Flood warnings

Alerts that inform people that flooding may happen so they can take action.

Fluvial processes

The processes by which rivers shape the landscape, including erosion, transportation and deposition.

Gorge

A narrow, steep-sided valley formed when a waterfall retreats upstream.

Hard engineering

The use of artificial structures to control river processes and reduce flood risk.

Hydraulic action

The force of river water hitting the bed and banks, breaking rock apart.

Hydrograph

A graph showing rainfall and river discharge over time.

Impermeable rock

Rock that does not allow water to pass through it easily.

Infiltration

The movement of water from the surface into the ground.

Interlocking spurs

Ridges of land that overlap as a river winds through a V-shaped valley.

Interception

When rainfall is caught and stored by vegetation before it reaches the ground.

Lag time

The delay between peak rainfall and peak discharge on a hydrograph.

Lateral erosion

Erosion that widens a river channel or valley.

Levee

A raised bank beside a river. Natural levees form by flood deposition, while artificial levees are built as flood defences.

Load

The sediment carried by a river.

Long profile

The change in height of a river from its source to its mouth.

Meander

A bend in a river channel.

Meander scar

A curved mark left on the flood plain by an old meander.

Mouth

The place where a river ends, usually where it enters the sea, a lake or another river.

Mudflat

An area of fine mud and silt deposited in a low-energy coastal or estuary environment.

Natural levee

A raised bank beside a river formed by repeated flood deposition.

Ox-bow lake

A curved lake formed when a meander is cut off from the main river channel.

Peak discharge

The highest river discharge shown on a hydrograph.

Peak rainfall

The highest amount of rainfall shown on a hydrograph.

Permeable rock

Rock that allows water to pass through it.

Plunge pool

A deep hollow at the base of a waterfall formed by erosion.

Precipitation

Water falling from the atmosphere, such as rain, snow, sleet or hail.

Reservoir

A store of water, often held behind a dam.

Riffle

A shallow, fast-flowing part of a river channel.

Rising limb

The part of a hydrograph showing river discharge increasing after rainfall.

River cliff

A steep eroded bank on the outer bend of a meander.

River restoration

A soft engineering strategy that returns a river to a more natural state.

Saltation

The movement of small stones and pebbles by bouncing along the river bed.

Salt marsh

A coastal or estuary habitat made of salt-tolerant vegetation and fine sediment.

Sediment

Material such as clay, silt, sand, gravel and rocks carried or deposited by a river.

Slip-off slope

A gently sloping area of deposition on the inner bend of a meander.

Soft engineering

Flood management that works with natural processes to reduce flood risk.

Solution

The dissolving of minerals in river water (erosion), or the transport of dissolved minerals downstream (transportation).

Source

The place where a river begins.

Storm hydrograph

A hydrograph showing how a river responds to a rainfall event.

Subdued hydrograph

A hydrograph with a long lag time, gentle rising limb and lower peak discharge.

Surface run-off

Water that flows over the land surface into a river.

Suspension

The transport of fine particles carried within the water.

Thalweg

The fastest flow path in a river channel.

Traction

The movement of large rocks and pebbles by rolling along the river bed.

Transportation

The movement of sediment downstream by a river.

Tributary

A smaller river or stream that joins a larger river.

V-shaped valley

A narrow, steep-sided valley formed by vertical erosion in the upper course.

Velocity

The speed of river flow.

Vertical erosion

Erosion that deepens a river channel.

Waterfall

A sudden drop in a river's course, often formed where hard rock lies above softer rock.

COMMAND WORDS

Understand how to answer GCSE
Geography exam questions

Command word	What it means	What you should do
Identify / Name	Find it and say what it is	Write the correct word or feature
State	Say the answer clearly	Give a short fact
Give	Provide one example or idea	Write a brief answer
Define	Say what a word means	Write a definition
Calculate	Work out a number	Do the maths
Label	Add the correct name to a diagram/map	Write the name in the correct place
Draw	Produce a diagram or line	Sketch it accurately
Complete	Finish the task	Fill in missing information
Outline	Give the main idea briefly	Write one or two key points
Describe	Say what something is like	Write what you can see or what happens
Compare	Say how things are similar and different	Use words like <i>whereas</i> or <i>both</i>
Suggest	Give a possible reason or idea	Use your knowledge to propose an answer
Explain	Say why or how something happens	Give a reason and develop it
Examine	Look closely at the issue	Explain different aspects
Assess	Judge how important or effective something is	Give evidence and make a judgement
Evaluate	Weigh up both sides and decide	Give pros, cons and a conclusion
Discuss	Give arguments on both sides	Explain different viewpoints
Justify	Give reasons why your choice is correct	Support your answer with evidence
To what extent	How much do you agree?	Give both sides and reach a judgement

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