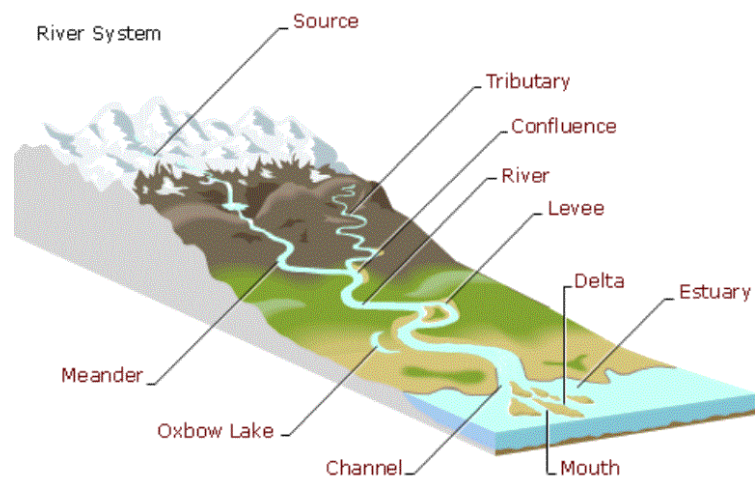


Name: Class:

GCSE Theme 2 book 1



Distinctive river landscapes



Professionalism. Inclusion. Pedagogy. Curriculum.
Be professional. Be inclusive. Be a learner. Be knowledgeable.

UNIT OVERVIEW: Distinctive river landscapes

ENQUIRY: How do people and processes contribute to the development of distinctive river landscapes in the UK?

Unit intention: To understand how people and processes create distinctive river landforms

Success criteria

✓

X

- I can explain how geology affects relief
- I can explain how water moves around the earth
- I can explain how and why discharge and velocity change downstream
- I can compare landform creation in all 3 stages of a river
- I can define the types of erosion/ transportation and explain deposition
- I can use a case study to show that I understand how rivers work

Unit summative and formative assessment details:

EQs throughout. End of booklet test

Home Learning (What and how often):

Every lesson – varies between research/ consolidation/ prep activities

Student Activities Log

✓

X

- Map key physical features of the UK
- Label hydrological cycle
- Draw long profile graph
- Learn key terms
- Complete EQs
- Complete River Tees case study
- Draw landform formation diagrams

Professionalism. Inclusion. Pedagogy. Curriculum. Be professional. Be inclusive. Be a learner. Be knowledgeable.

| Success | End of unit evaluation | Preparation for |
|---------------------------------|------------------------|-----------------|
| 1. | | |
| 2. | | |
| 3. | | |
| 4. | | |
| 5. | | |
| 6. | | |
| How will you improve your work? | | |

Student Assessment sheet

GCSE Theme 1 booklet 1

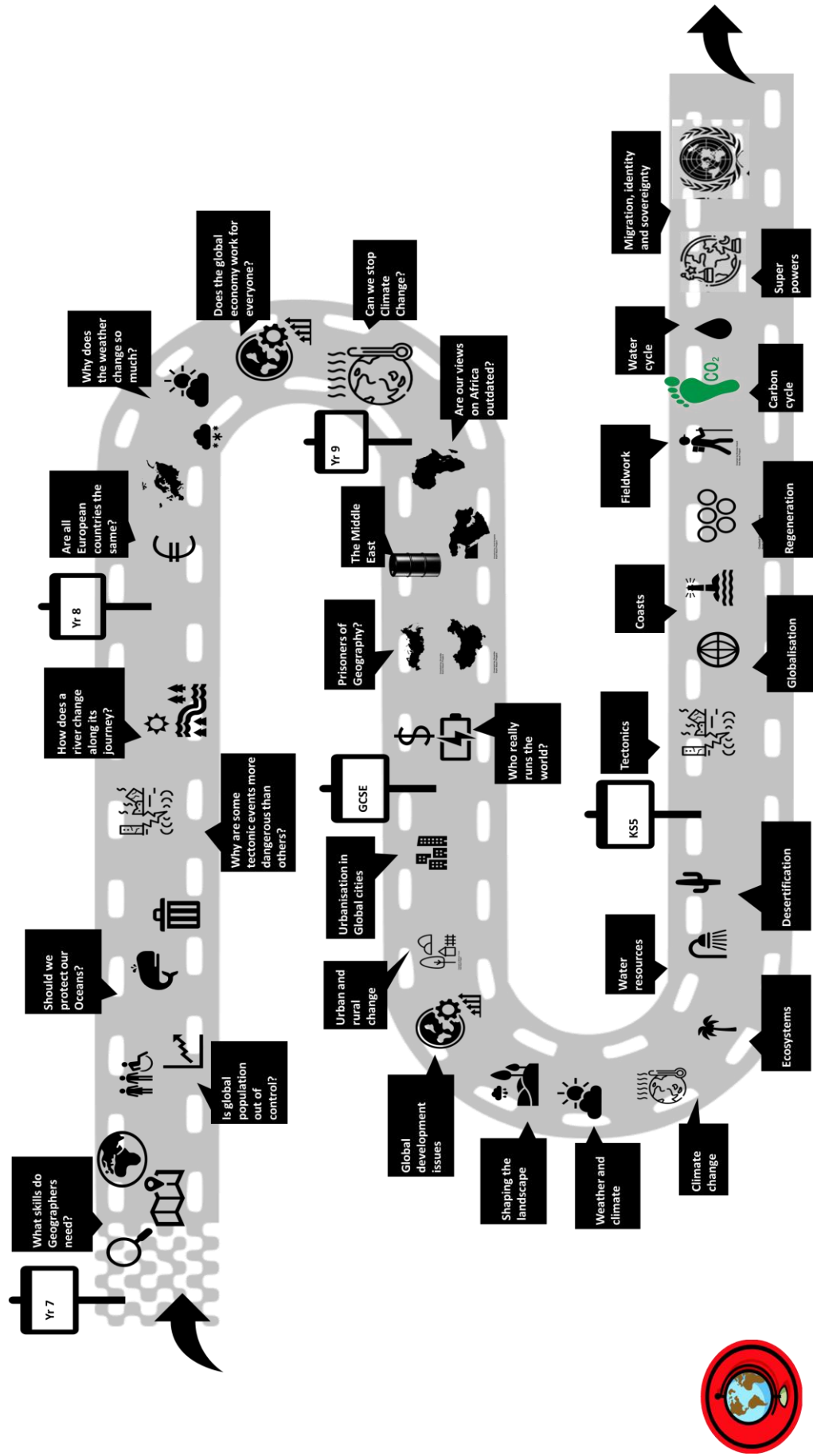
| LI | Extending | Mastering | Learning | Assessment | HW Check |
|---|--|--|---|---------------------|-----------------------------|
| How does relief and geology vary within the UK? | I can explain how geology affects the landscapes of the UK | I can locate the major rivers, lowlands and highlands of the UK | I can define the word relief | EQs | Rivers of the world sheet |
| To understand the water cycle. | To explain how water gets into our rivers. | To describe the water cycle. | To describe the three states of water. | End of booklet test | Guided reading |
| How do rivers change along their course? | I can explain how and why discharge and velocity change downstream | I can describe and explain the key components of the drainage basin system | I can describe the 3 river courses. | EQ | Drainage basin questions |
| How can rivers change the landscape? | I can explain how the processes of erosion, transportation and deposition shape the landscape. | I can describe four examples of transportation and erosion. | I can define deposition, transportation and erosion. | EQ | Seneca revision assignment |
| What is it like in the upper course of a river? | I can explain how waterfalls and gorges are formed. | I can use diagrams to show how erosional landforms are created. | I can describe the upper course using contour lines. | EQ | Find and fix |
| What is it like in the middle course of a river? | I can explain how ox-bow lakes are formed | I can use diagrams to show how meanders are created. | I can describe how the middle course is different from the upper course | End of unit test | Storyboard |
| What is it like in the lower course of a river? | I can explain how flood plains and estuaries are formed | I can use diagrams to show how levees are created. | I can describe how the river has changed along its journey | EQ | Revision questions |
| River Tees case study | I can explain how the landforms on the River Tees were formed | I can use diagrams to show how the landforms on the Tees were formed | I can describe how the River Tees has changed along its journey | End of unit test | Revise for end of unit exam |

Progress grid 1

| | | | |
|---|-------|-----|-----|
| THEME 1 KEY IDEA: 2.2 Shaping the landscape – rivers and river management | Start | Mid | End |
| My knowledge - I can... | | | |
| Describe the processes of erosion – hydraulic action, corrosion, abrasion, attrition | | | |
| Describe the processes of transportation – saltation, traction, solution, suspension | | | |
| Describe how water moves through the hydrological cycle | | | |
| Describe how humans can affect the hydrological cycle | | | |
| Describe river regimes | | | |
| Describe the pattern of highland areas within the UK | | | |
| Identify the different stages of a river course | | | |
| Describe different types of rock | | | |
| My understanding - I can... | | | |
| Explain how waterfalls and gorges are formed | | | |
| Explain how meanders and ox-bow lakes are formed | | | |
| Explain how levees and floodplains are formed | | | |
| Explain how cross-profiles change along the river course | | | |
| Explain how climate affects seasonal variations in river discharge | | | |
| Explain how geology affects water supply | | | |
| Explain the Hjulström curve | | | |
| Explain how to calculate wetted perimeter of a river | | | |
| My analysis | | | |
| I can... | | | |
| I can explain how climate, geology and human activity interact to influence stores and flows of water | | | |
| I can analyse how water moves around the planet | | | |
| To apply the processes of erosion, transportation and deposition to the Hjulström Curve | | | |
| My evaluation | | | |
| I can... | | | |
| Weigh up the different ways to use rivers for water supply | | | |
| My decision making | | | |
| I can... | | | |
| | | | |
| | | | |

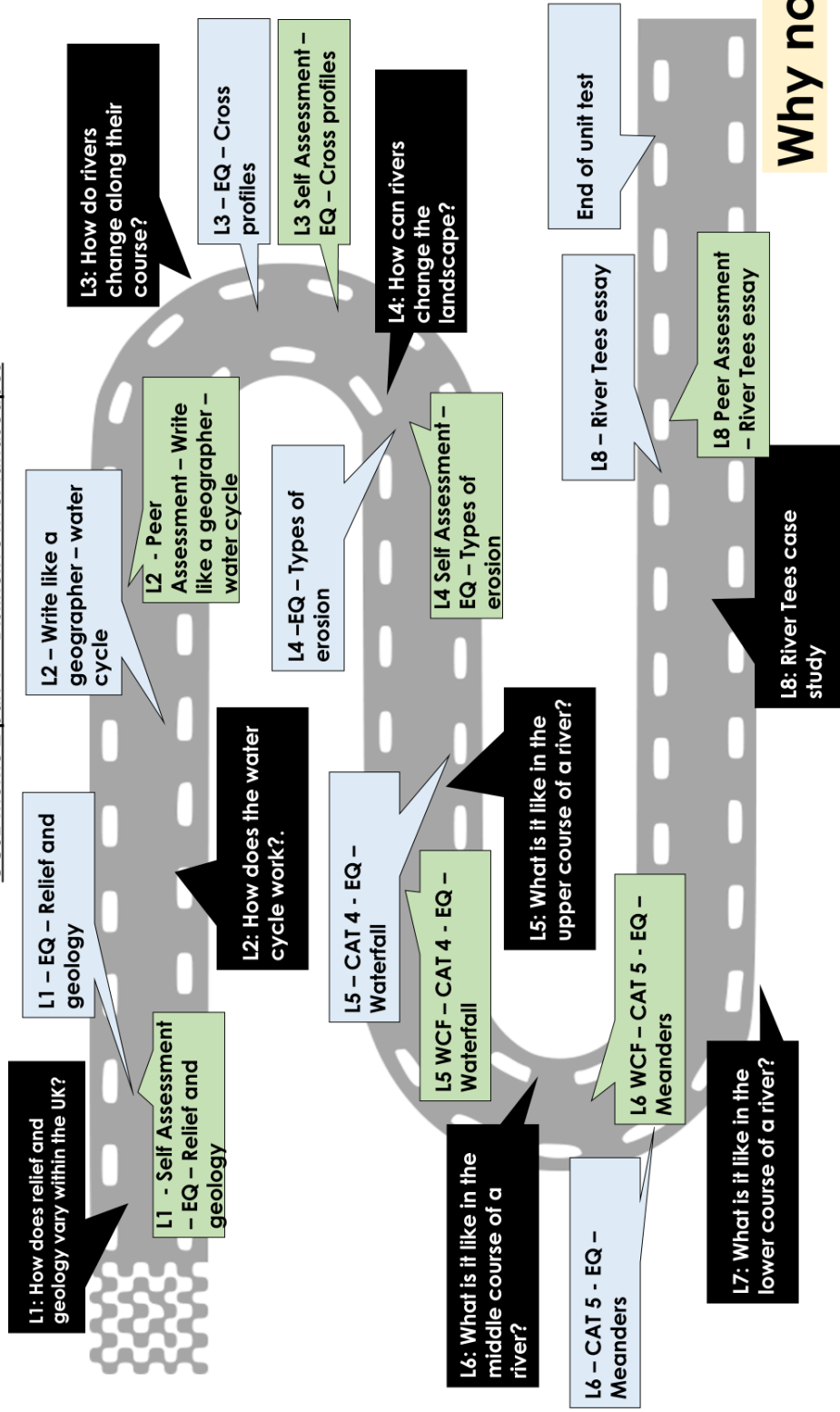
| | |
|------------|-------------------------|
| | Overall self-assessment |
| WWW | |
| EBI | |

Geography at Langdon Park School from September 2020





GCSE Theme 2 part 1 – Distinctive river landscapes



GCSE GEOGRAPHY B

SUMMARY OF ASSESSMENT

Component 1: Investigating Geographical Issues

Written Examination: 1 hour 45 minutes

40% of qualification

Three structured data response questions. The final part of each question will require an extended response.

Question 1 will assess aspects of Theme 1, Changing Places - Changing Economies.

Question 2 will assess aspects of Theme 2, Changing Environments.

Question 3 will assess aspects of Theme 3, Environmental Challenges.

Component 2: Problem Solving Geography

Written Examination: 1 hour 30 minutes

30% of qualification

This component will assess content from across the themes using a variety of structured data response questions.

Part A will introduce an issue and set the geographical context.

Part B will outline a number of possible solutions to the issue.

Part C will provide an opportunity for the candidates to choose a solution and justify their choice in an extended response.

Component 3: Applied Fieldwork Enquiry

Written Examination: 1 hour 30 minutes

30% of qualification

A written examination in three parts using a variety of structured data response questions some of which will require extended responses.

Part A will assess approaches to fieldwork methodology, representation and analysis.

Part B will assess how fieldwork enquiry may be used to investigate geography's conceptual frameworks.

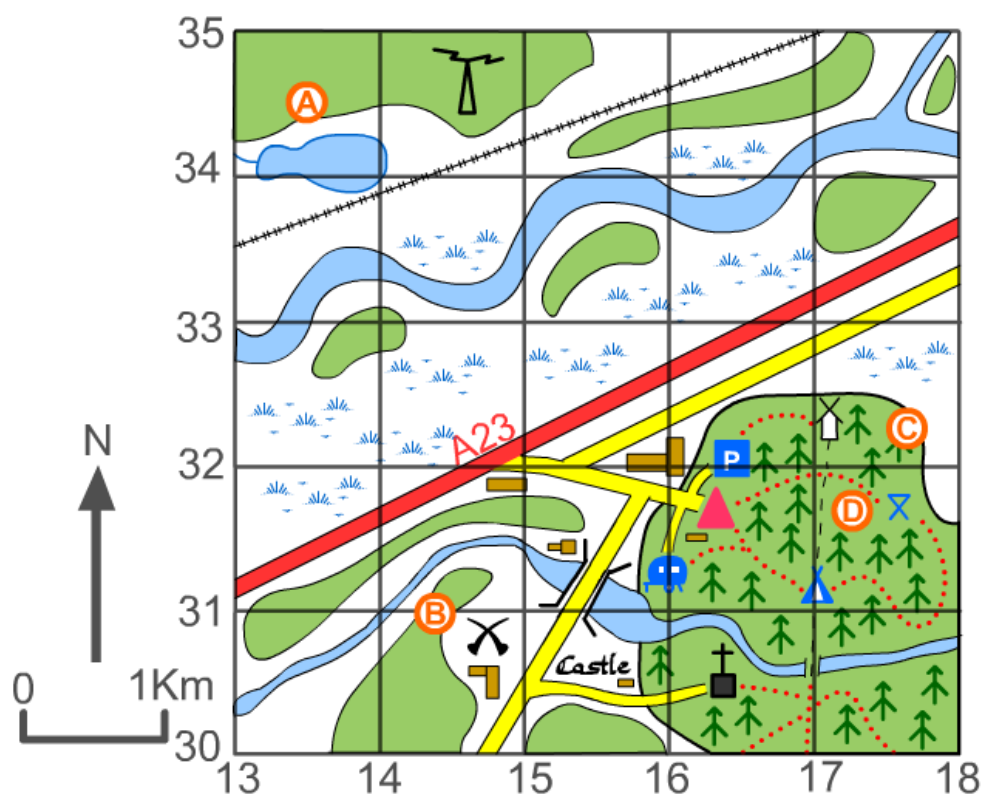
Part C will assess the application of broad geographical concepts to a wider UK context and assess the ability to make and justify a decision.

Lesson 1: Physical landscapes of the UK

Big Picture

| | | I think I can.. | My teacher thinks I can ... |
|-----------|---|-----------------|-----------------------------|
| Learning | I can define the term relief. | | |
| Mastering | I can locate the major rivers, lowlands and highlands of the UK | | |
| Extending | I can explain how geology affects the landscapes of the UK | | |

Do It Now



Give the 6 figure grid references for:

- A) _____
- B) _____
- C) _____
- D) _____

Give the 6 figure grid reference for:

- The triangle _____
- The castle _____
- The church _____

What do we mean by relief and landscape?

What 3 features does relief describe?

Where is the Isle of Arran located?

Name two types of hard rock.

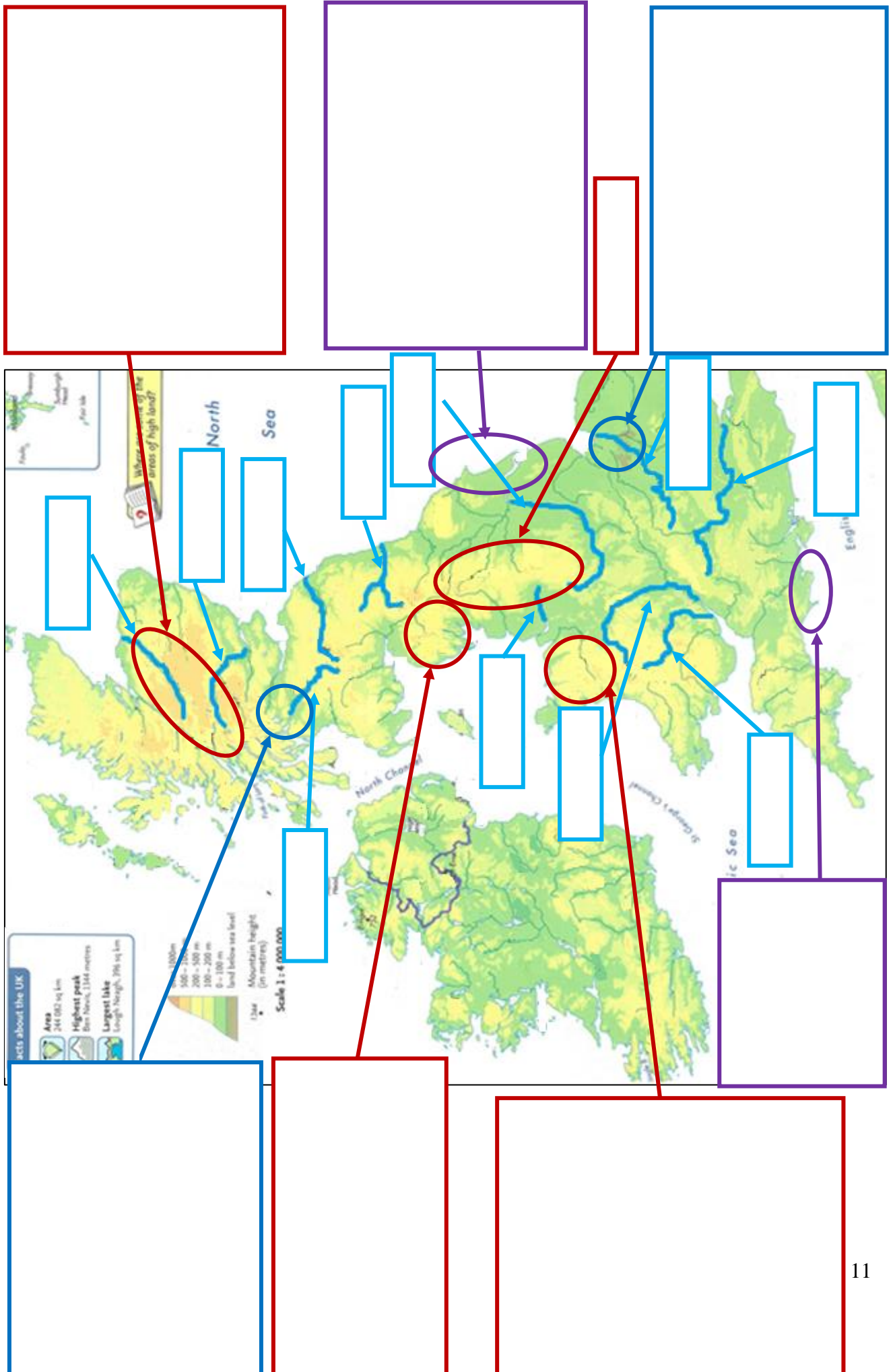
Name two types of soft rock.

What is the term used to describe the starting point of a river?

Describe the pattern of highland areas in the UK.

Identify the highlands located in NW England.

UK Physical Landscapes



| Human factors | Physical factors |
|---------------|------------------|
| | |

What is geology?

Match these definitions

| | |
|------------------|--|
| Igneous rock | Formed from broken up fragments of rock worn down by weathering. Deposited in layers, often under the sea. |
| Metamorphic rock | Volcanic rock made from molten (melted) material brought up to the Earth's surface then cooled into rock |
| Sedimentary rock | Rocks which have been folded and distorted by heat & pressure as tectonic plates move |

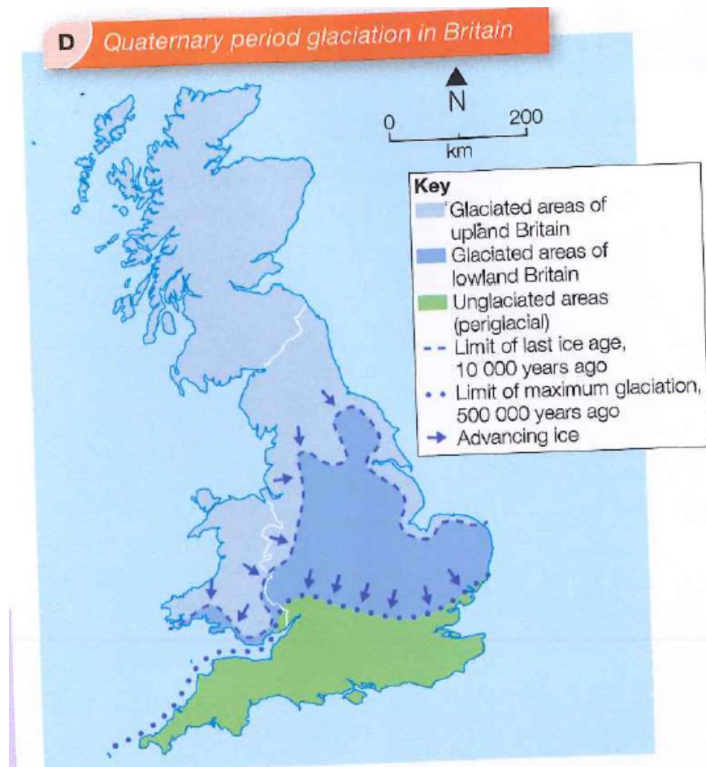
..... rocks are formed when magma cools either beneath the ground (.....) or the surface (extrusive). There are igneous rocks in the UK as, many thousands of years ago, we had i.e. Edinburgh is built on the site of an extinct volcano. Granite, Gabbro and are examples of igneous rocks.

Sedimentary rock is formed from the of old marine organisms and other sediment, laid down at the bottom of Over time, these become (pushed down) and form rocks. Chalk, and gritstone are examples of sedimentary rocks.

Word box

| | | | | | |
|------------|-----------|-----------|-------------|-------------|-------|
| Basalt | skeletons | above | Igneous | heat | Slate |
| Compressed | | intrusive | oceans | sedimentary | |
| Volcanoes | | Limestone | metamorphic | | |

What is glaciation?



Using Map D, describe which parts of the UK were covered by ice during the Quaternary period
(3 marks)

[illegible]

Pen to paper – Time to practice

1 Study **Figure 1**, a map of the UK's upland and lowland areas.

a) Describe the distribution of upland landscapes in the UK.

.....

.....

.....

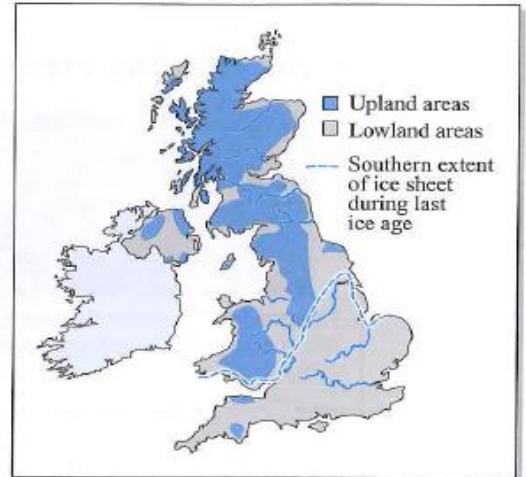
.....

.....

.....

[2]

Figure 1



c) Outline the physical characteristics of lowland areas in the UK.

.....

.....

.....

[2]

Lesson 2: Is water the most recycled object on our planet?

Big Picture

| | | I think I can ... | My teacher thinks I can ... |
|-----------|--|-------------------------|--------------------------------------|
| Learning | To describe the three states of water. | | |
| Mastering | To describe the water cycle | | |
| Extending | To explain how water gets into our rivers. | | |

Do now:

1. Which is the driest place in the world?
2. Water supplied by which company was voted the best tasting tap water in the UK in July 2007?
3. At what temperature does water boil on the top of Mount Everest?
4. Water is colourless. True or false?
5. What percentage of the world's water supply is fresh?
6. The formula for water is H₂O - but which of these is a correct formula for heavy water, used in nuclear experiments and some reactors?
7. Even before it gets to our taps, how much of the water supply in the UK is lost through leaky pipes?
8. In the floods that followed the recent snowstorms, how much rain fell in Shoreham, West Sussex, in one day?
9. Where is the deepest body of freshwater in the UK?
10. How much more rain do the wettest areas of the UK get than the driest areas?

Starter:

Which 3 states does water exist in?

Open and closed systems

Systems are any set of interrelated components or objects which are connected together to form a working unit or unified whole. In geography it is usual to recognise two general types of systems: closed and open.

A closed System - is a system that transfers energy, but not matter, across its boundary to the surrounding environment. The hydrological cycle (water cycle) is often viewed as a closed system.

An open System - is a system that transfers both matter and energy can cross its boundary to the surrounding environment. Most drainage basins are example of open systems.

Both consist of transfers, stores, of water but the hydrological cycle is a closed system as no gains or losses from outside are added to the system.

The drainage basin system is said to be open as both inputs and outputs of energy and material occur. All systems in their natural state aim to be in a state of balance (dynamic

equilibrium) as this is when they function best. Heavy rainfall, drought and human activity such as deforestation can easily upset the balance.

1. The hydrological cycle is a closed system because
2. How is the hydrological cycle different to a river drainage system? Explain.
3. How could increased precipitation affect a river drainage system? And why?

Learning check – Tick the correct answer

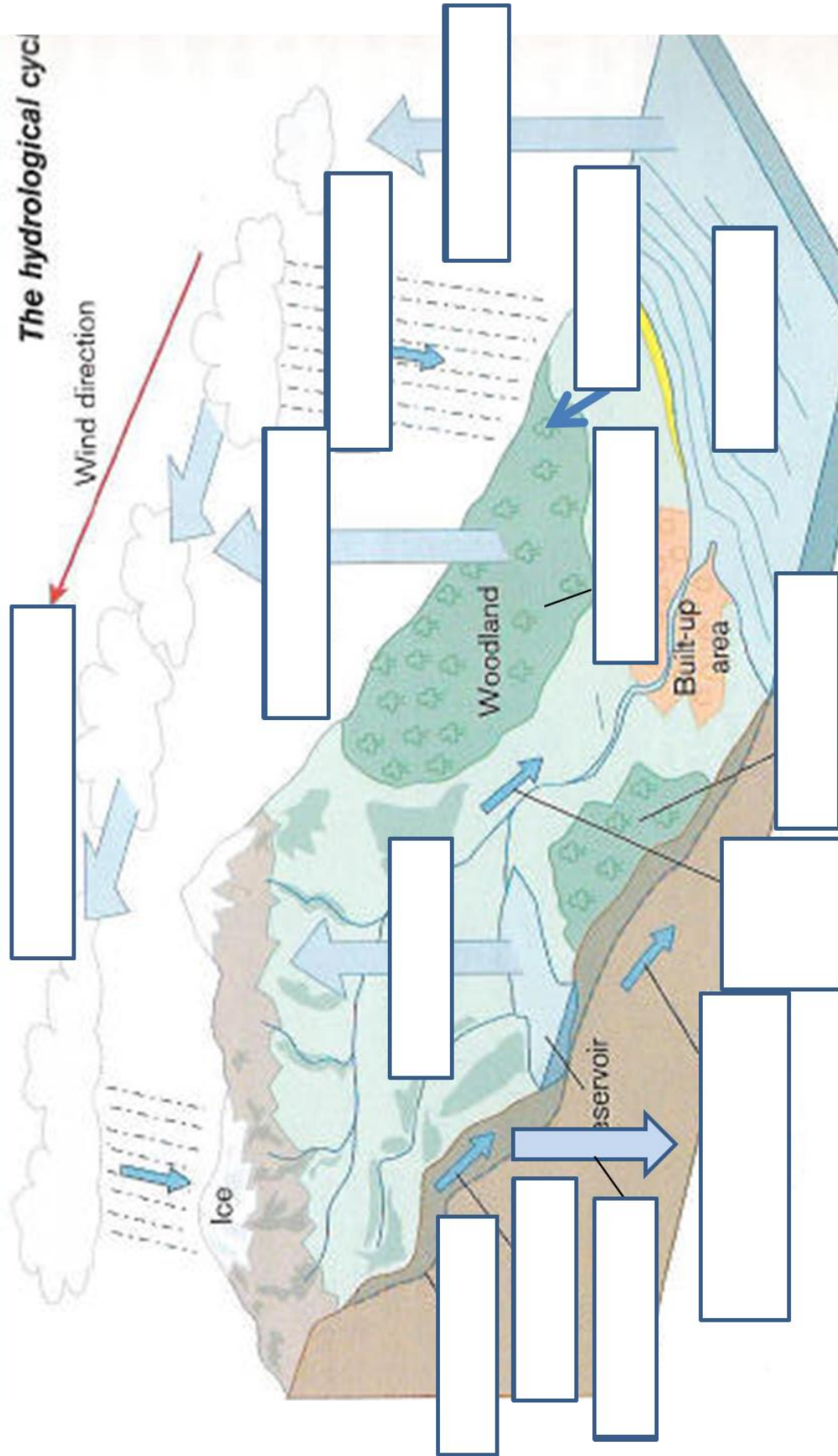
What is the difference between the hydrological cycle and a river drainage basin?

- A) Hydrological cycle has inputs and outputs and the river drainage basin has only flows and stores
- B) Hydrological cycle has only flows and stores and the river drainage basin has only inputs and outputs
- C) Hydrological cycle has only flows and stores and the river drainage basin has inputs, flows, stores and outputs
- D) Hydrological cycle has only inputs, flows and stores and the river drainage basin has inputs, flows, stores and outputs

| | | |
|------------------|--|--|
| EVAPORATION | | The water droplets become bigger and heavier and fall from the sky as rain or snow. |
| TRANSPIRATION | | When water hits the land, some of it flows into rivers. |
| CONDENSATION | | Some water sinks into the rocks underground. |
| PRECIPITATION | | The sun heats water liquid which turns into a gas called water vapor. |
| INFILTRATION | | Water flows through the rocks underground. |
| PERCOLATION | | Water flows though the soil. |
| SURFACE RUN-OFF | | Some water is used by plants and trees and they let out their water vapor back into the sky from their leaves. |
| THROUGH FLOW | | The water vapor cools in the sky and turns back into water liquid. |
| GROUNDWATER FLOW | | Some water is soaked up by the soil. |

| Inputs | Outputs | Stores | Flows |
|--------|---------|--------|-------|
| | | | |

The Hydrological cycle



| | | | | |
|-------------------|-----------------------|-----------------|--------------|----------------|
| Precipitation | Ground water | Surface run-off | Interception | Evaporation x2 |
| Condensation | Transpiration | Ocean | Infiltration | Through flow |
| Ground water flow | Stem flow (leaf drip) | Percolation | | |

Challenge questions:

1. What do you think happens to the flow of water when the rate of infiltration decreases in the hydrological cycle?
2. What do you think happens to the flow of water when the rate of interception decreases in the hydrological cycle?
3. How is the hydrological cycle affected when the volume of surface run-off increases?

Knowledge Check:

Name 3 surface stores of water

Name 2 places water is stored under the ground

Suggest why precipitation falling into a drainage basin of impermeable rocks is likely to reach the river much more quickly than rainwater falling in an area of porous rocks.

Explain how water flows through the river drainage basin (3 Marks)

Explain how water is stored in the river drainage basin (3 Marks)

WRITE You can write like a Geographer...

Pen to paper: Explain the water cycle.

Write your answer using as many of the key terms below as possible! In 5 minutes, you will read your response to the person nearest you. They will add your point up and deduct any points if you use banned words – the aim is to get the highest score!

| 1 point | 2 point | 3 point | - Point |
|---------|---------------|----------------|---------|
| Rain | Evaporation | Infiltration | Like |
| River | Condensation | Ground water | Erm |
| Sea | Precipitation | Surface runoff | I think |
| Rock | Permeable | Throughflow | But |

.....

.....

.....

.....

.....

.....

.....

[illegible]

Plenary – time to reflect

Match the clues to the key words

| | | | |
|--------------------|--|-----------------|--|
| Precipitation | | Transpiration | |
| Stem flow | | Surface run-off | |
| Infiltration | | Interception | |
| Throughflow | | Watershed | |
| Hydrological cycle | | Condensation | |
| Groundwater flow | | Evaporation | |
| Channel flow | | Drainage basin | |

Lesson 3: How do rivers change along their course?

Big Picture

| | | | |
|-----------|--|-------------------------|--------------------------------------|
| | | I think I can ... | My teacher thinks I can ... |
| Learning | I can describe the 3 river courses. | | |
| Mastering | I can describe and explain the key components of the drainage basin system | | |
| Extending | I can explain how and why discharge and velocity change downstream | | |

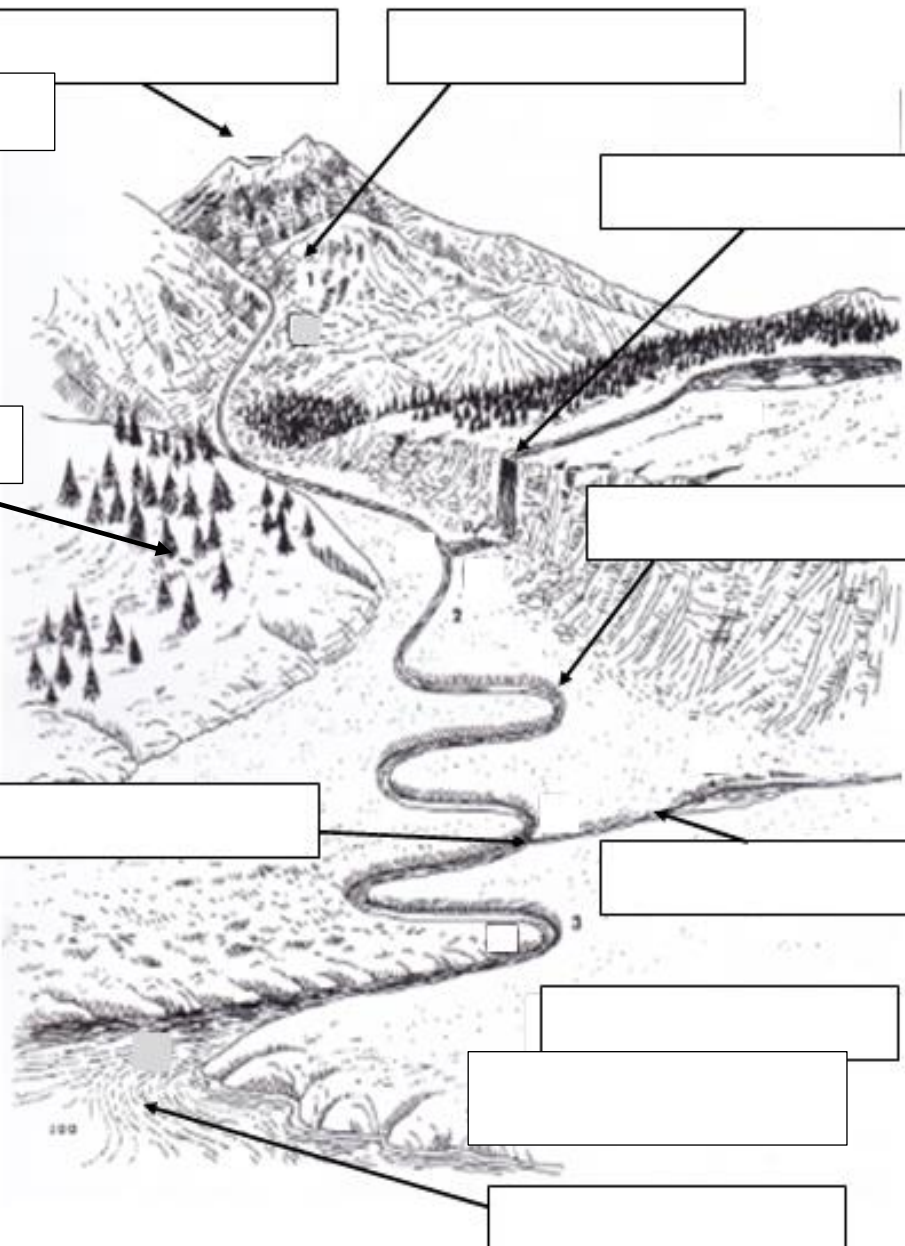
Do now:

| | |
|---|--|
| 1 | |
| 2 | |
| 3 | |
| 4 | |

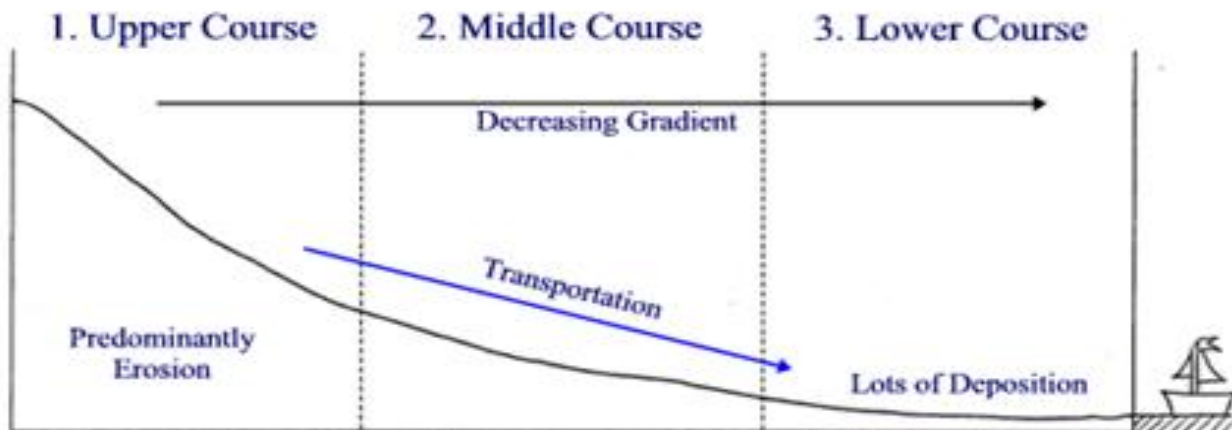
Starter:

Describe the difference between these two images

| Key Term | Definition |
|----------|---|
| | A smaller stream leading into the main channel |
| | The beginning of the river. This can be a spring or marsh |
| | The point at which the tributary meets the main channel or two rivers meet. |
| | Flat land next to the river where flood water flows |
| | Water flowing over a break in relief. |
| | A bend in the river |
| | A V-shape eroded in the upper part of a river |
| | The boundary of a drainage basin. This separates one drainage basin from another and is usually high land |
| | The end of the river. This is usually the sea or a lake |
| | The area of land drained by a river and its tributaries |



Fill in the key words



How do rivers change along their course?

| | |
|----------------------|--|
| Gradient | |
| Channel width | |
| Channel depth | |
| Velocity | |
| Discharge | |

A long profile is

.....

Make notes from the video

| Upper course | Middle course | Lower course |
|---------------------|----------------------|---------------------|
| | | |

| Name of place/ feature | Distance from source (km) | Altitude (m) |
|-------------------------------------|------------------------------|--------------|
| Plynlimon Hills | 0 | 610 |
| Llanidloes | 35 | 170 |
| Welshpool | 95 | 76 |
| Shrewsbury | 135 | 75 |
| Stourport | 215 | 31 |
| Worcester | 240 | 29 |
| Tewkesbury | 265 | 20 |
| Gloucester | 290 | 19 |
| Estuary mouth in Bristol Channel | 355 | 0 |

Upper

Middle

Lower



Explain how the profile of a river changes downstream

The average velocity (speed of water) and discharge (amount of water) of a river **increases** along its course. Although the upper course has a **steep/gentle** gradient and is **v/u** shaped, the velocity depends on how much water comes into contact with the channel banks and bed. In the upper course the channel is **shallow/deep** due to **vertical/lateral** erosion and **narrow/wide**, so there is **much/less** friction. This is because in the upper course the rock is **harder/softer** and so the valley sides **are/are not** widened out much by weathering and erosion. Therefore, velocity is **low/high**.

In the middle course the river is flowing through lower country. The gradient is **less/more** steep, so the river begins to meander and erode **vertically/laterally** into the valley sides. The rate of erosion **increases/decreases** as the rocks that make up the valley sides are **harder/softer**. As the river uses more energy in lateral erosion it is not able to remove all the eroded material so this builds up the valley floor to give it a more **steep/gentle** profile.

The lower course of river flows through low lying land and has a **narrow/wide** and **deep/shallow** channel. Therefore, there is **much/less** friction resulting in a **low/high** velocity. The speed is boosted by the additional discharge from all the tributaries. Deposition from floods builds up the flood plain and meanders migrate. This builds up and **narrows/widens** the valley.

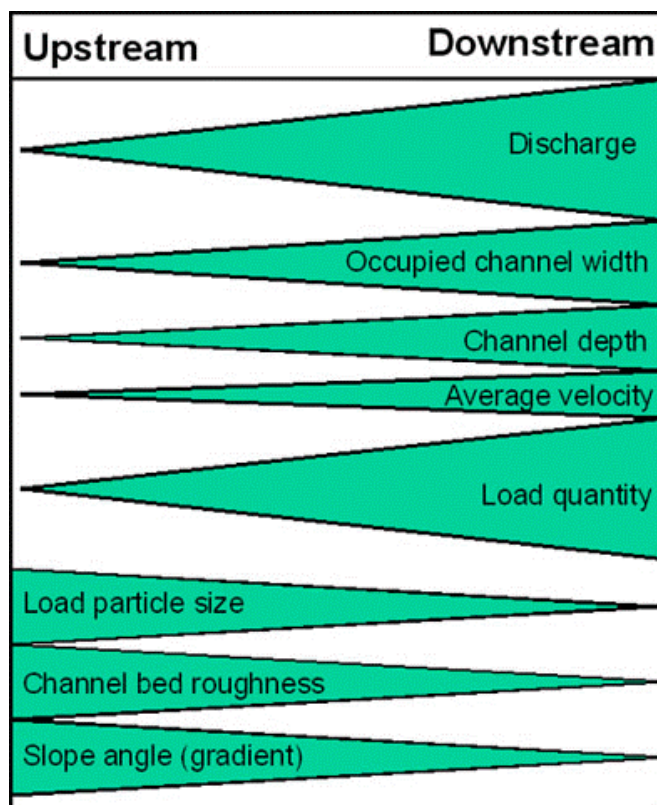


Based on what you have learnt answer the following questions.

1. Describe the change in gradient between Plynlimon and Severn Beach
2. Where will the greatest amount of erosion be taking place?
3. Where will the greatest amount of deposition be taking place?
4. How and why will the amount of discharge change between Plynlimon and Severn Beach?
5. Where will there be the most bedload?
6. Where will the finest material be?

The Bradshaw model

Annotate your diagram

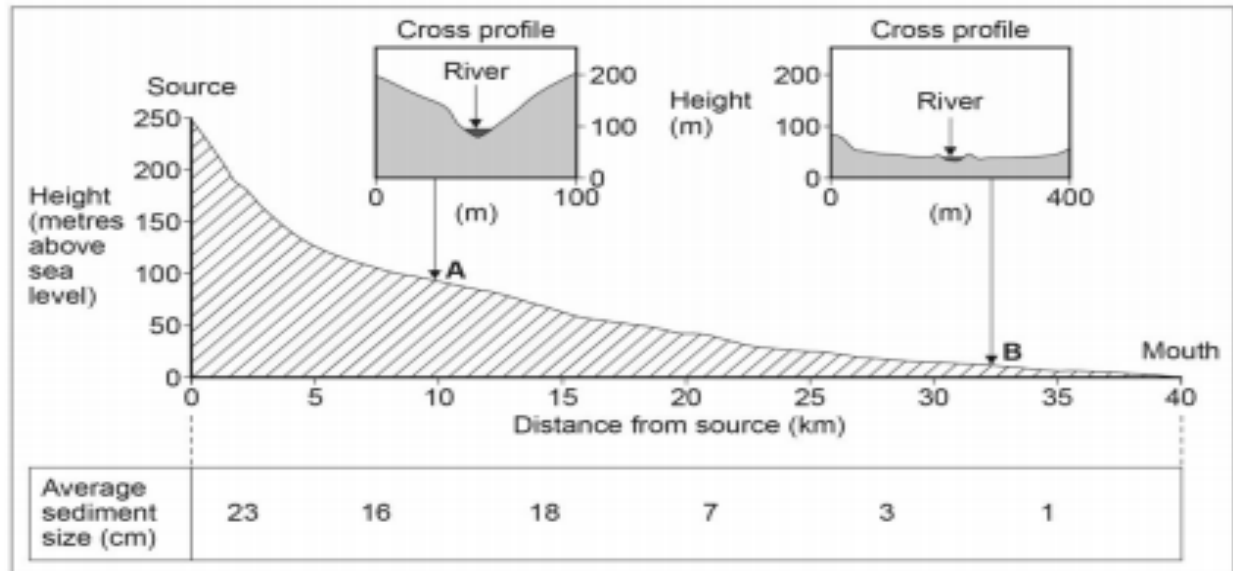


| River Characteristic | Downstream Change (increase or decrease) | Reason for this |
|-------------------------|---|-----------------|
| Channel Width and Depth | | |
| Gradient | | |
| Velocity | | |
| Discharge | | |

| | Upper course | Middle course | Lower course |
|------------------------------|--------------|---------------|--------------|
| Sketch of channel shape | | | |
| Description of channel shape | | | |
| Explanation of changes | | | |

Study **Figure 14**, a diagram showing the long and two cross profiles of a river.

Figure 14



0 4 . 3 Describe the shape of the river's long profile.

[1 mark]

0 4 . 4 Suggest **one** reason why the cross profile of the river valley changes between **A** and **B**.

[1 mark]

0 4 . 5 State **one** reason why the size of sediment carried by the river decreases downstream.

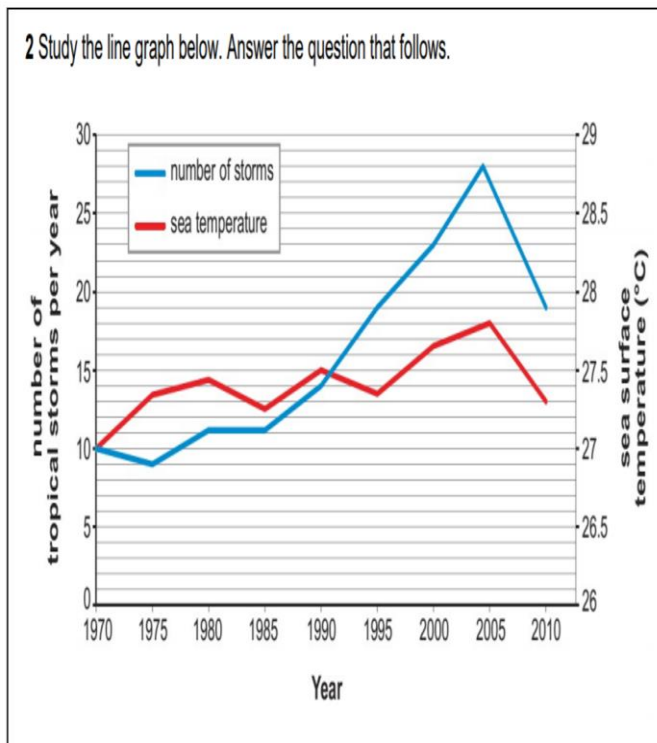
[1 mark]

Lesson 4: To understand how river processes impact the landscape.

Big Picture

| L/M/E | | I think I can ... | My teacher thinks I can ... |
|-----------|--|-------------------|-----------------------------|
| Learning | I can define deposition, transportation and erosion. | | |
| Mastering | I can describe four examples of transportation and erosion. | | |
| Extending | I can explain how the processes of erosion, transportation and deposition shape the landscape. | | |

Do now: Skills – Interpreting line graphs



Tick (✓) **five** statements that are correct

| | Tick (✓) |
|---|----------|
| In 1990 sea temperature was 27.5°C and there were 15 storms | |
| In 1990 sea temperature was 15°C and there were 27 storms | |
| In 1990 sea temperature was 27.5°C and there were 14 storms | |
| Sea temperatures have increased every year | |
| Sea temperatures show an overall increase of 0.3°C | |
| Sea temperatures fluctuate wildly | |
| Between 1970 and 1985 the number of storms fell slightly | |
| Between 1970 and 1985 there was little variation in the number of storms | |
| Between 1970 and 1985 the number of storms increased rapidly | |
| Between 1985 and 2005 there were an average of 11 storms each year | |
| Between 1985 and 2005 there was very little variation in the number of storms | |
| Between 1985 and 2005 the number of storms each year increased steadily | |
| There is no apparent connection between sea temperatures and number of storms | |
| There appears to be a positive connection between sea temperatures and number of storms | |
| There appears to be a negative connection between sea temperatures & number of storms | |

Starter: Use the map and photos on the board to complete the review table

| Name of river basin feature | Description | Number on map | Letter on photograph |
|-----------------------------|--|---------------|----------------------|
| | is the dividing line which separates two adjacent drainage basins / catchment areas. | | |
| | is the end point of a river where it enters the sea. | | |
| | is the name given to a smaller river joining a bigger river. | | |
| | is the place where the river begins, usually in an upland area. It may be from a spring, as melt water from a glacier or in a swampy area. | | |
| | is the point where a tributary meets the main river. | | |

How does erosion shape the landscape?

What is erosion?

Our river landscapes are constantly being changed by weathering and erosion.

Watch this clip and write down how a river changes from source to mouth

What processes do you think have taken place?

What are weathering and erosion?

Complete the table using the information for each type of weathering or erosion

| Name of process | Is it weathering or erosion? | Brief explanation |
|----------------------------------|------------------------------|-------------------|
| Thermal Exfoliation / Onion skin | | |
| Freeze Thaw | | |
| Carbonation | | |
| Hydration | | |
| Attrition | | |
| Hydraulic Action | | |
| Solution / Corrosion | | |

Draw the river cross section and annotate each process – what are they doing to the riverbed and banks?

What are vertical and lateral erosion?

How does erosion change as you move downstream?

Describe the ways in which a river can erode a river channel (4)

What are the 4 processes of transportation? Write the descriptions and draw the diagram

What is deposition?

What impacts do humans have on rivers?

What are site and situation?

Why was the River Thames biologically dead?

What did they do to revive the River Thames?

Time to reflect:

What is name of the transportation process where larger boulders are rolled along the riverbed?

What is the name of the process that compresses air into cracks?

What process is responsible for the vertical deepening of the channel in the rivers upper course?

What process occurs when the velocity in the river decreases?











What is the name of the process when stones collide with one another and the banks and the bed of the river?

Lesson 5: What is the upper course like?

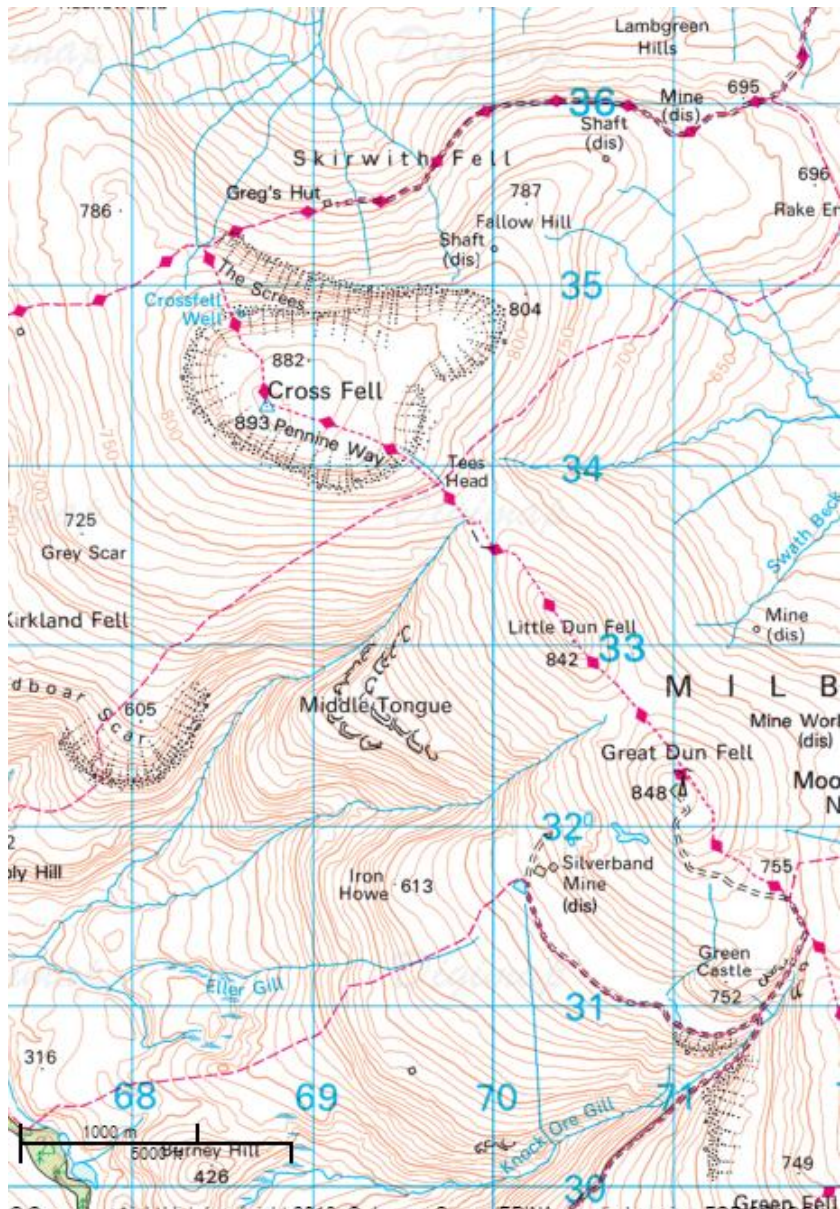
Big Picture

| L/M/E | | I think I can ... | My teacher thinks I can ... |
|-----------|---|-------------------|-----------------------------|
| Learning | I can describe the upper course using contour lines. | | |
| Mastering | I can use diagrams to show how erosional landforms are created. | | |
| Extending | I can explain how waterfalls and gorges are formed. | | |

Do now:

| | | | | |
|---|---|---|---|---|
|  |  |  |  |  |
| Can you remember the key words associated with processes? Can you define them? | | | | |
|  |  |  |  |  |

The upper course of the River Tees



Describe the area around the source of the River Tees

Features of the upper course

Interlocking spurs

Interlocking spurs are

Draw a diagram to explain how interlocking spurs are formed

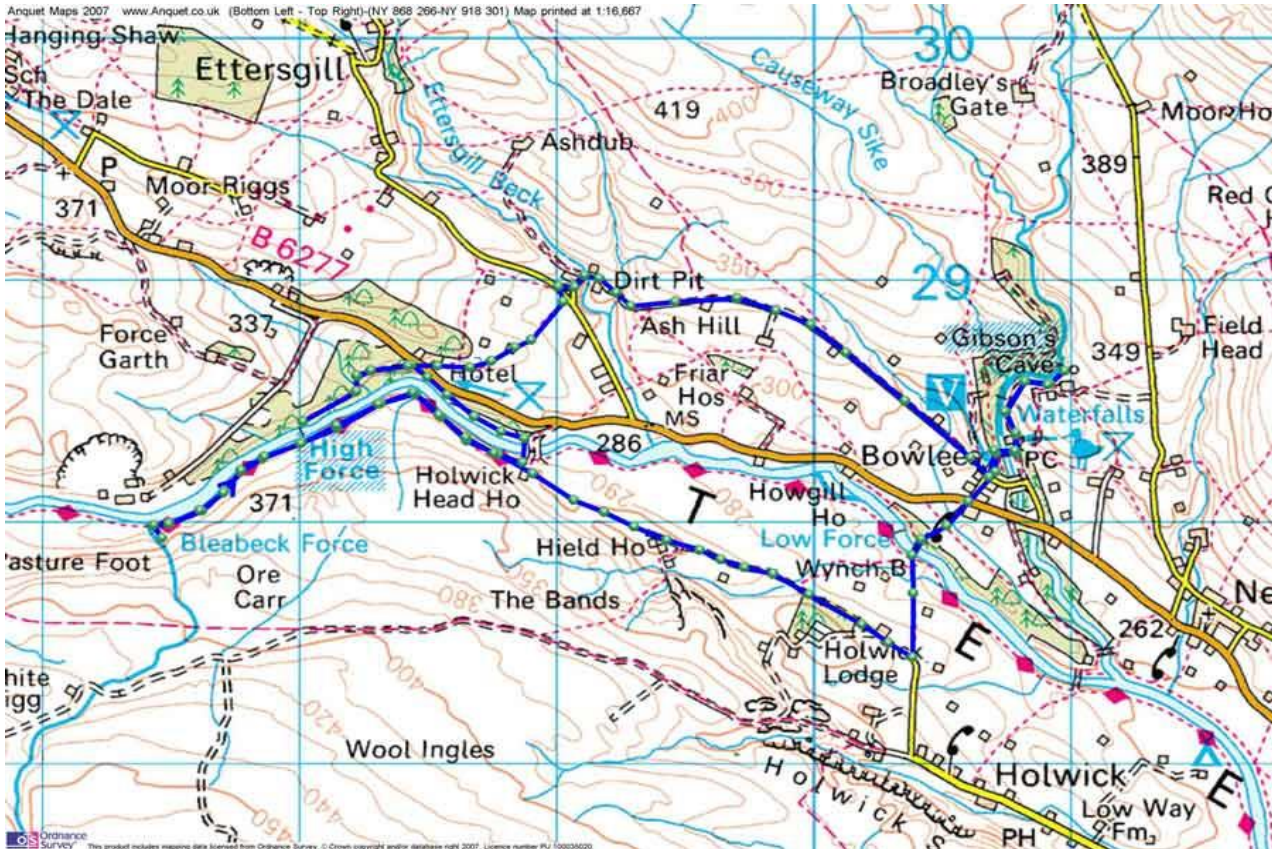
V-shaped valleys

Put these statements in the correct order:

| | |
|---|--|
| This vertical erosion deepens the valley, making the sides steeper and exposed. | |
| As the small stream flows downhill steeply, the bed load will erode downwards and scrape away the bottom of the channel (vertical erosion). | |
| Over time, weathering and gravity wear away the steep valley sides, forcing material into the stream, which it uses to cut the valley deeper. | |
| A small stream will naturally follow small depressions in the landscape. | |

Draw a sketch to explain how V-shaped valleys are formed

| | | | |
|--|---|--|--|
| | | | |
| A river erodes downwards by the process of abrasion. | Vertical erosion leaves the sides open to weathering. This breaks and loosens the rock. | The loosened material slowly creeps down the slope under gravity or is washed away by rainwater. The river transports it downstream. | The end result is a steep sided valley that has the shape of the letter V. |



How has the landscape changed since we moved away from the source?

Waterfalls

Step 1 – 'I' worked example

Read through my stages of the formation of a waterfall and put them into the right order

Step 2 – 'We' Joint construction

Let's collaboratively draw a diagram to show the formation

Step 3 Independent example

By yourself write an explanation of the formation of a waterfall

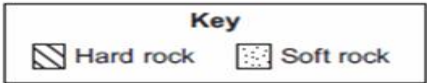
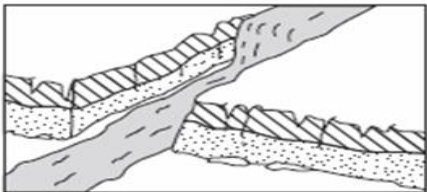
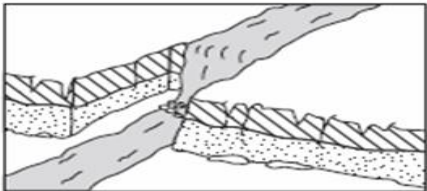
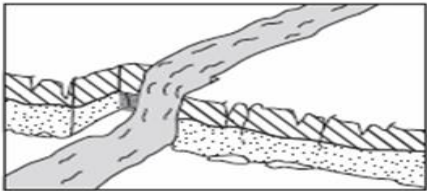
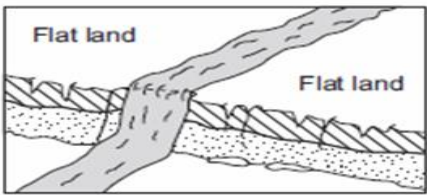
Gorges

A Gorge is

5 (b) (ii) Figure 13 shows the formation of a gorge.
Add a sentence to each box to explain the formation of a gorge.

5 (b) (ii)

Figure 13



(4 marks)

Figure 16



Using figure 16, explain how the landforms shown are created by physical processes (6)

Step 1 – 'I' worked example

Figure 16 shows a waterfall, gorge and plunge pool, all are created by erosional processes. Firstly, the water flows over hard rock, this is the waterfall. As the waterfall flows over the hard rock, the water splashes the soft rock behind it, this means that the soft rock is eroded. Overtime the soft rock continues to be eroded and this causes the hard rock to collapse. The process repeats and the waterfall moves back. Over time this creates a gorge downstream, which is a steep sided valley.



Content

Evidence from figure



Explanation

How and why



Processes

Erosional

Step 2 – Let's collaboratively annotate my answer to improve it

Figure 16 shows a waterfall, gorge and plunge pool, all are created by erosional processes. Firstly, the water flows over hard rock, this is the waterfall. As the waterfall flows over the hard rock, the water splashes the soft rock behind it, this means that the soft rock is eroded. Overtime the soft rock continues to be eroded and this causes the hard rock to collapse. The process repeats and the waterfall moves back. Over time this creates a gorge downstream, which is a steep sided valley.

Now write your own answer

Time to reflect true or false

1. Interlocking spurs are hard rock projections around which a river winds.
2. Gorges are steep sided, wide valleys
3. Waterfalls are found in the upper course of a river course.
4. Deposition is the dominant process in the upper course.
5. Discharge decreases as you go down a river.
6. V-shaped valleys are typically found in the middle course of a river.
7. A rivers cross-profile shows the change in gradient as you go from source-mouth. ...
8. Lateral erosion is dominant in the upper course of a river.

Lesson 6: What is the middle course like?

Big Picture

| L/M/E | | I think I can ... | My teacher thinks I can ... |
|-----------|---|-------------------|-----------------------------|
| Learning | I can describe how the middle course is different from the upper course | | |
| Mastering | I can use diagrams to show how meanders are created. | | |
| Extending | I can explain how ox-bow lakes are formed | | |

Do now:

1. I am a steep sided valley through which a river flows, created as a waterfall retreats upstream – what am I?
2. What is the deep area of water at the base of a waterfall called?
3. We are areas of hard resistant rock around which a river winds – what are we?
4. Top area of hard rock over which waterfalls is known as the what rock?
5. What type of erosion do we call it where a river erodes into its bed?

Starter:

What has happened to relief in the middle course?

What causes a river to lose 95% of its' energy?

What is the remaining 5% of a river's energy used for?

What geomorphological process first occurs in the middle course and why?

Why is the bedload less angular in the middle course?

Meanders:

Why do rivers curve?

What happens when a river meanders?

What transportation and erosion processes are happening?

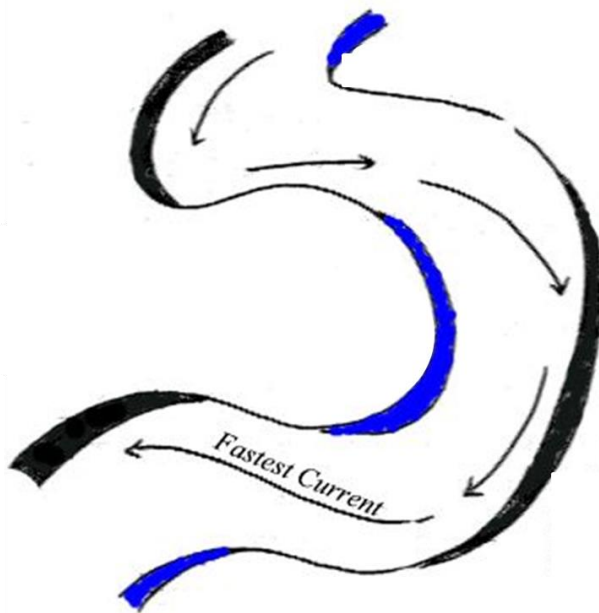
Is any deposition happening? If so where?

What happens when two meanders meet?

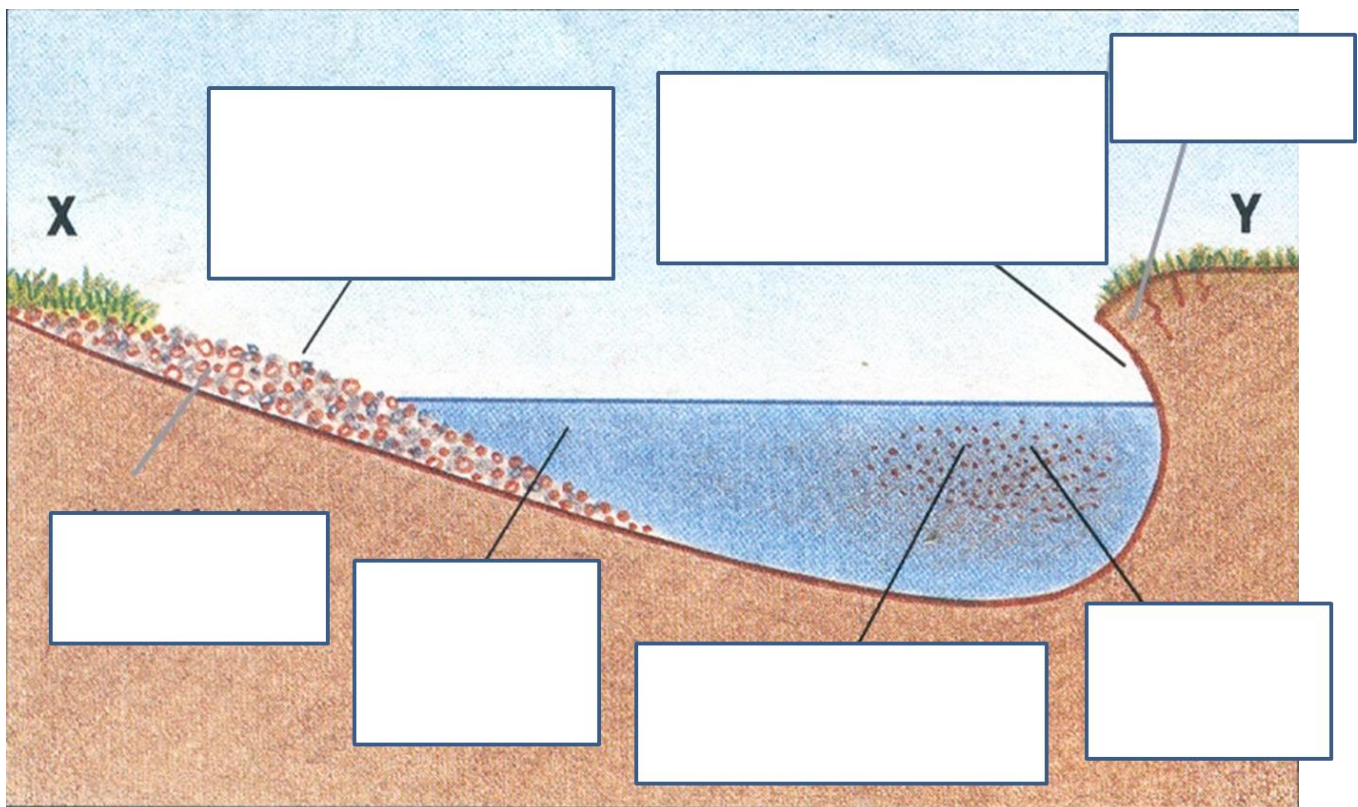
What is the speed of the river on the outside of the bend?

What is the speed of the river on the inside of the bend?

Label the diagram

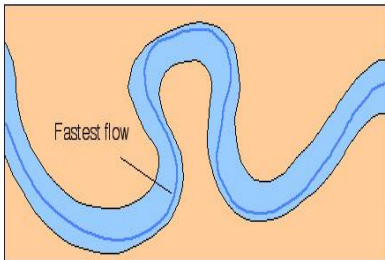


Cross section of a meander – label your diagram

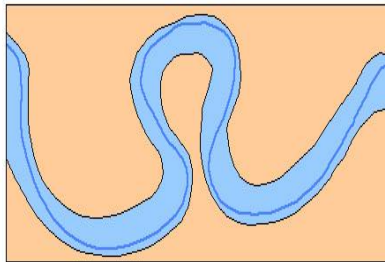


Ox-Bow Lake formation

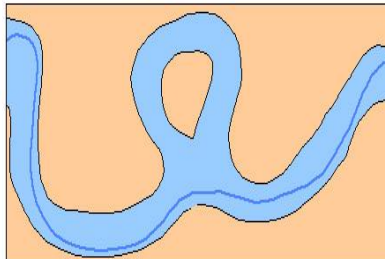
Describe what is happening in each picture to form an OX bow lake.



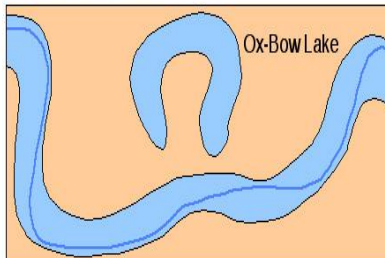
In this diagram the meander...



In this diagram the neck of the meander has become...



The neck of the meander has been...



An ox-bow lake is left because...

Put these sentences in order

| | |
|--|---|
| | A steep river cliff is created |
| | Overtime, deposition occurs on the banks and the cut off lake silts up to become a meander scar |
| | The meander neck gets narrower |
| | The line of fastest flow is called the Thalweg |
| | Erosion (abrasion and hydraulic action) occurs on the outside bend making the meander bend bigger |
| | On the inside bend the river flows more slowly |
| | Water flows fastest on the Outside bend |
| | Deposition can occur here creating a slip off slope |
| | Eventually, in times of flood the neck cuts off to create an Ox-Bow lake |



What part of the river's long profile is this? How do you know this?

What is the name of the main settlement on this map?

What landforms can you identify on this map?

What are the land uses around the meander?

What is the land like next to the river? What evidence have you got to support this?

What is the 6 figure grid reference for Holme farm found adjacent to the River Tees?

What is the 6 figure grid reference for Spell Close Farm?

Why are there many farms found in this area?

Time to reflect: what order do the pictures go in?

EQ. Outline the differences between the inside and outside of a meander. (4)

Explain how an ox-bow lake could form on the river shown in Figure 1. (6)

Lesson 7: What is the lower course like?

Big Picture

| L/M/E | | I think I can ... | My teacher thinks I can ... |
|-----------|--|-------------------|-----------------------------|
| Learning | I can describe how the river has changed along its journey | | |
| Mastering | I can use diagrams to show how levees are created. | | |
| Extending | I can explain how flood plains and estuaries are formed | | |

Do now:

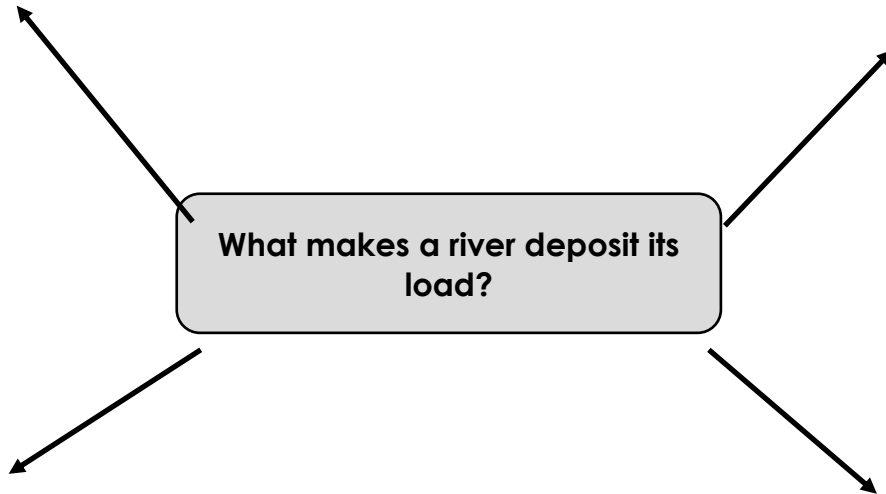


What river features can you identify in the image above?
What will happen to the river during the 'rainy' season?

Starter:

What is the relief like in the lower course?

What has happened to the size of the river and what are the reasons for this?
What landforms are found in the lower course of the River Tees?



Floodplains

Q1) How wide is the river when it floods?

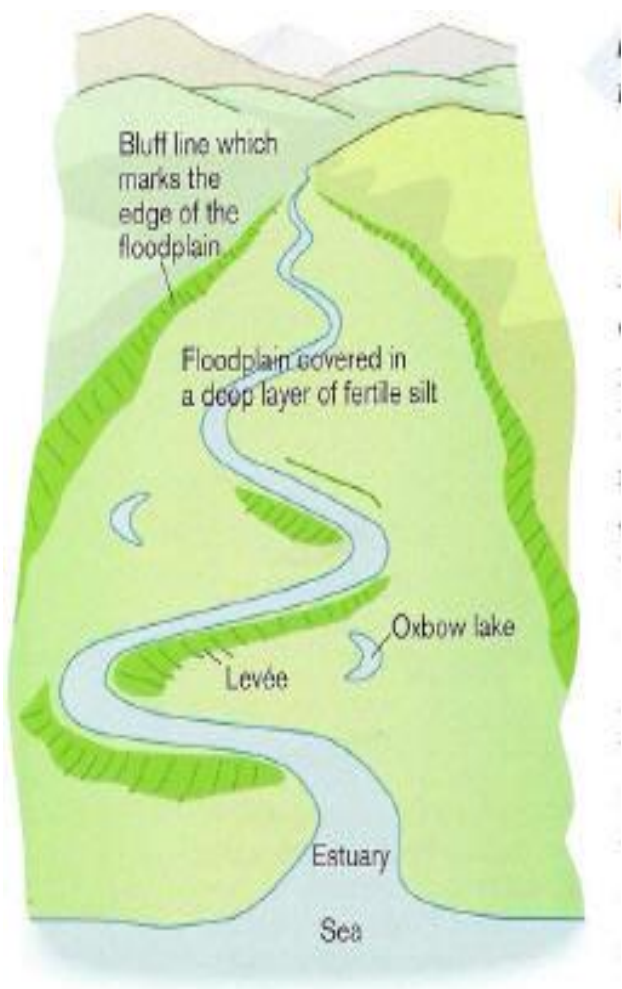
Q2) How often does a river 'spill its banks' (flood)?

Q3) Why is there no visible bedrock in the floodplain?

Q4) What causes the water to slow down on the floodplain?

Q5) What has formed as a result of heavier sediment being deposited closer to the river channel?

Q6) What hasn't been built on a floodplain?



How are flood plains formed?

A floodplain is created by.....

.....
.....

When there is periods of heavy rainfall

.....
.....
.....

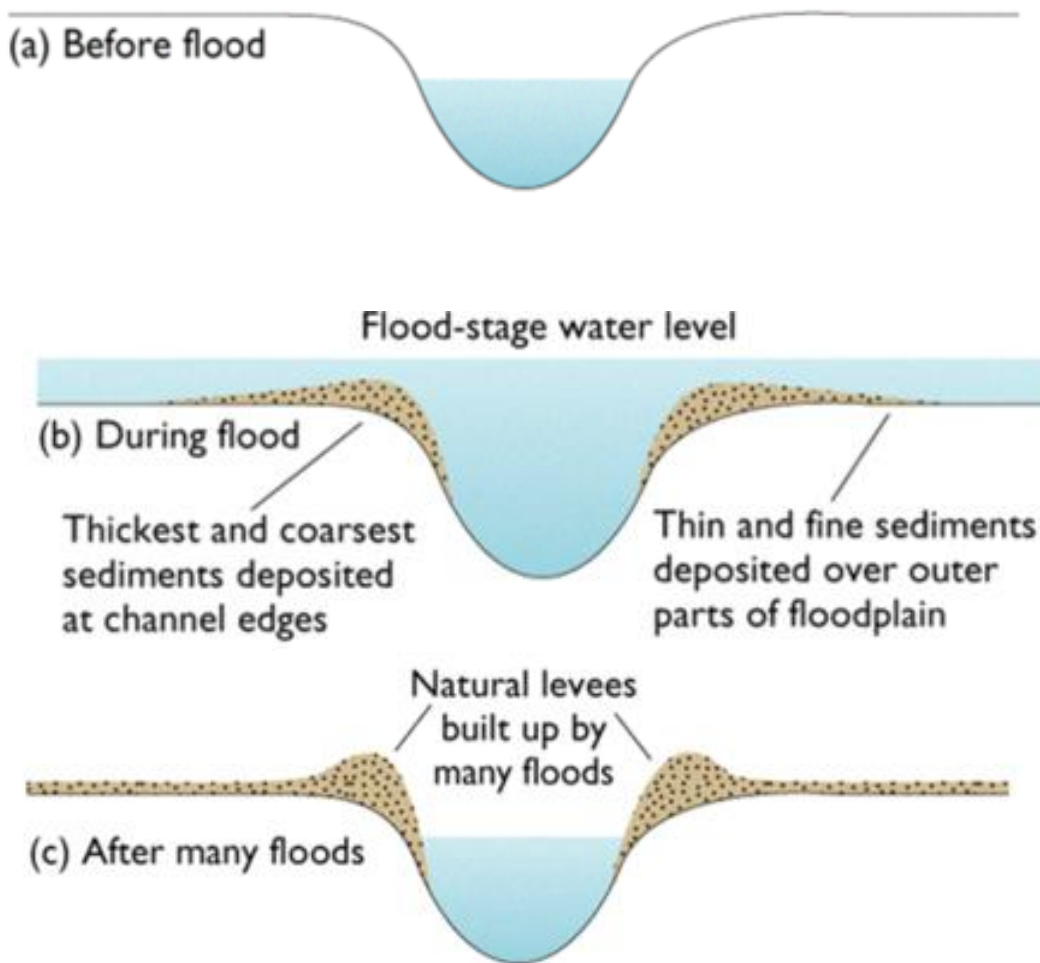
When the floodwater recedes

.....
.....
.....

Larger material is

.....
.....

Levees



Levees are found in the _____ river section. In order for them to form the river must first _____. When the river floods the water leaves the river _____. The water therefore loses _____. As a result _____ occurs. The _____ sediments are deposited first _____ the river bank. The _____ sediments are carried further away. Levees _____ the height of the river banks, and therefore act to _____ flooding in future. However, if the river does flood, levees often make the situation worse, this is because the water cannot _____ to the channel over the _____ river bank.

Levees can only form where a river carries sediment like _____ and _____. This is why they form in the middle and lower sections as the water has enough _____ to _____ sediment in the channel.

Missing Words:

Sediment, Mud, Silt, Energy (x2), Increase, Return, Prevent, High, Flood, Lower, Channel, Deposition, Lighter, Heavier, Nearer, Transport

The mouth

The lower course of the River Tees is _____. There is a lot of _____ along it. There is also _____ on the northern bank. Here the river flows in a _____, wide channel. It flows _____ because there is much less friction. The load it carries is _____, and it carries it by suspension and solution. The sea comes up the river at the mouth. At low tide the edges are exposed. That leaves _____ at the sides of the river.

CHALLENGE:

What impact will rising sea levels have on these environments?

What problems will this create?

Who will be affected?

Estuaries



How are estuaries formed?

Figure 5 shows a photograph of a river landform on the South Coast of Devon. Explain the processes involved in the formation of the landform shown in Figure 5 (6).

Time to reflect – Rivers quiz

Lesson 8: What is the River Tees like?

Big Picture

| L/M/E | | I think I can ... | My teacher thinks I can ... |
|-----------|--|-------------------|-----------------------------|
| Learning | I can describe how the River Tees has changed along its journey | | |
| Mastering | I can use diagrams to show how the landforms on the Tees were formed | | |
| Extending | I can explain how the landforms on the River Tees were formed | | |

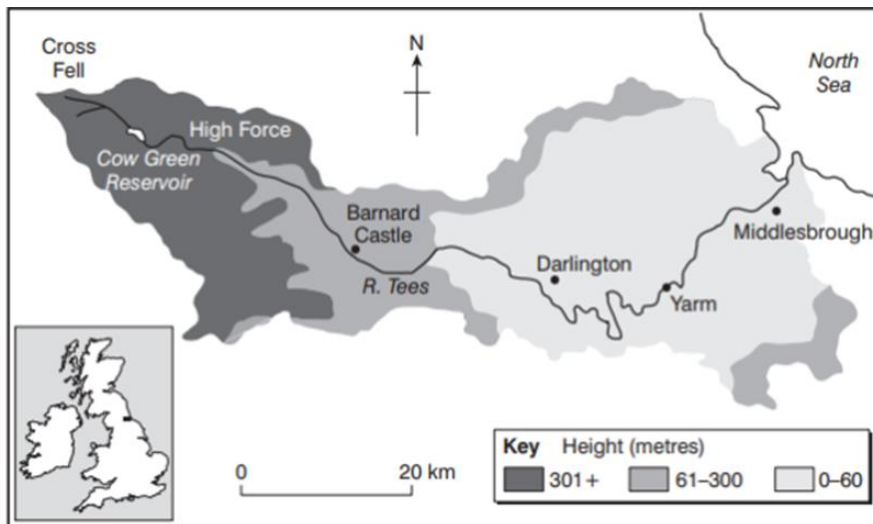
Do now:

Guess who?

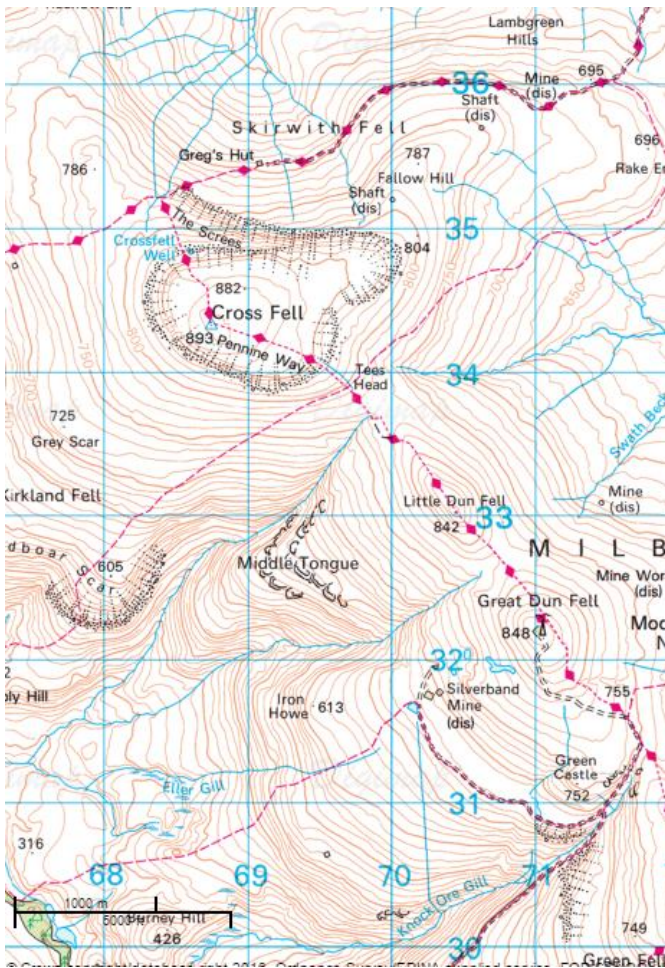
Starter:

Where is the River Tees?

The _____ is an important river in the _____ of England. It's source is high in the _____ near Cross Fell (height: _____). From there it flows roughly _____ for around 128km to reach the _____ at Middlesbrough.



The Source



The source of the River Tees is high up in the Pennines (893m ASL) close to Cross Fell at Tees Head. What is the 6 figure Grid Reference for Tees Head?

What is the relief around the source?

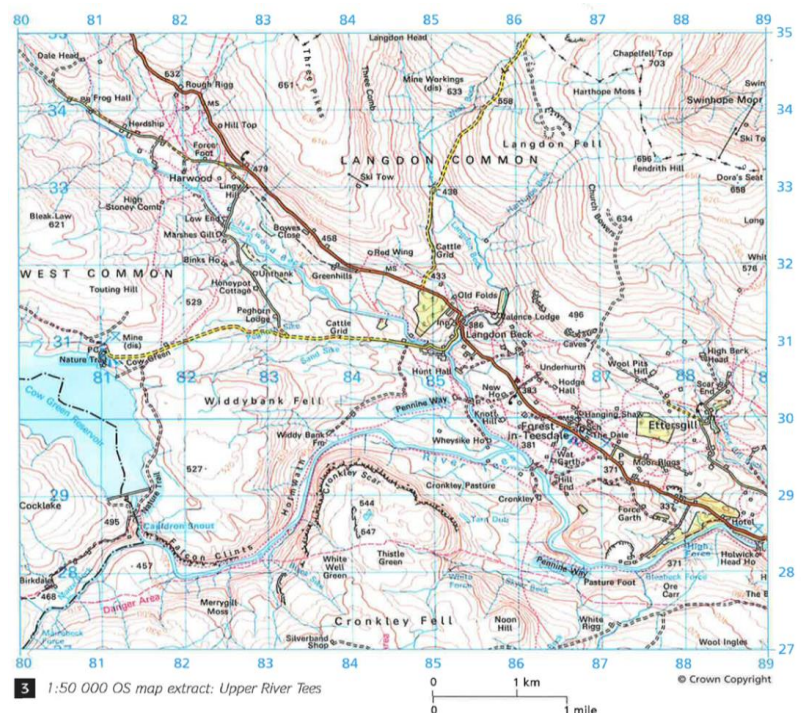
The Upper course

What is the 6 figure grid reference of High Force waterfall?

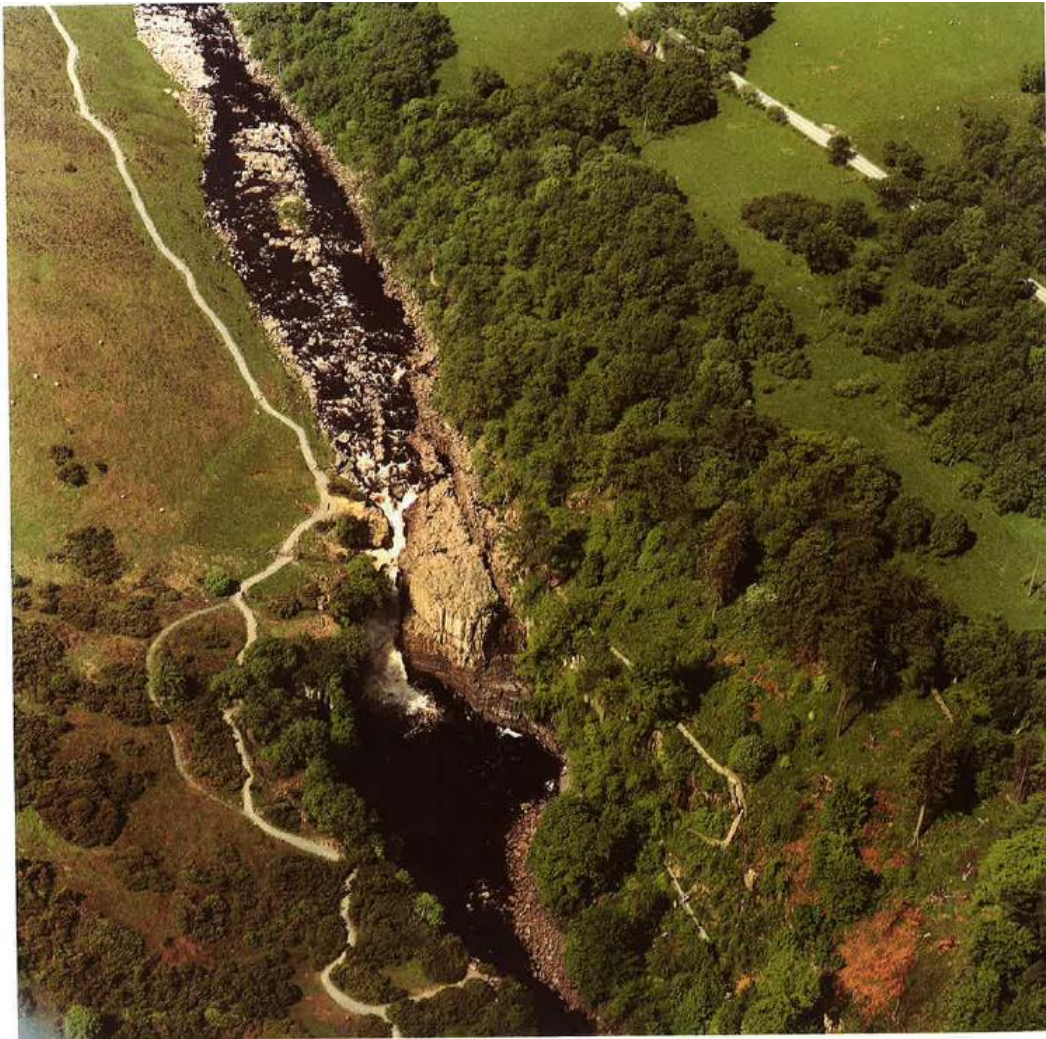
What is the name of the public footpath to the south of the river?

What is the major landuse in this area?

What is the purpose of Cow Green reservoir?



High Force Waterfall



2 High Force from the air

Describe the river channel above the waterfall

.....

.....

.....

What happens to the river channel as it reaches the top of the waterfall?

.....

.....

.....

Why is the plunge pool at the bottom of the waterfall very deep?

.....

.....

Describe the landuse on either side of the river

.....

.....

What evidence is there to suggest that High Force is popular with visitors?

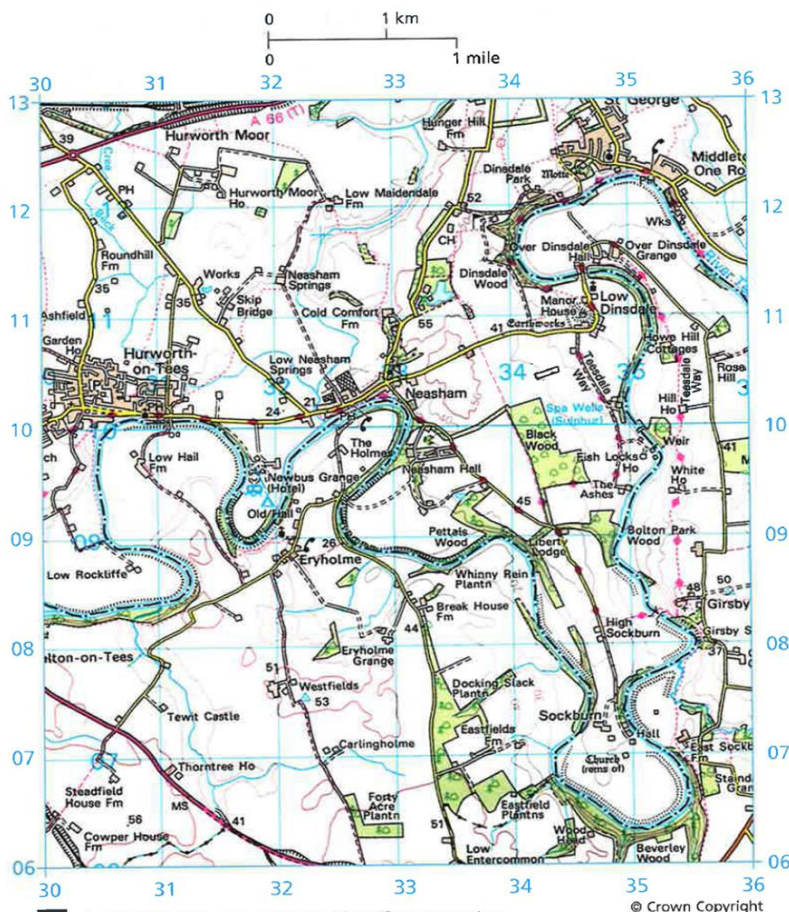
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Meanders



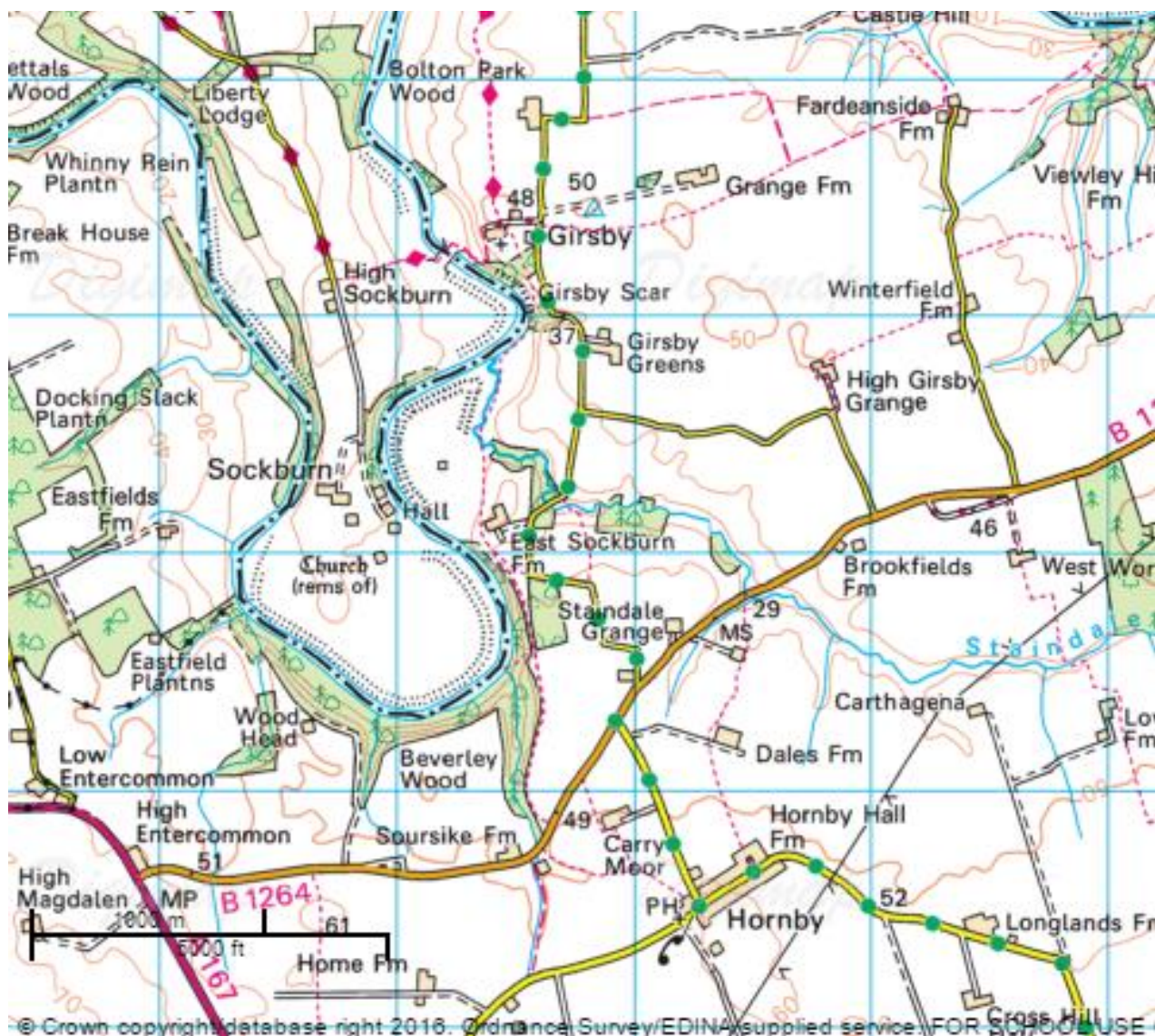
2 Meanders on the Tees near Darlington



1 1:50 000 OS map extract: River Tees meanders

© Crown Copyright

- What is the name of the village at A?
- What is the 6 figure grid reference of the bridge at B?
- What is the landuse at C?
- In which direction is the photograph looking?



Mouth

The River Tees flows roughly east from its source for around 128km to reach the North Sea at Middlesbrough.

How is this meander likely to change in the future?

.....

.....

.....

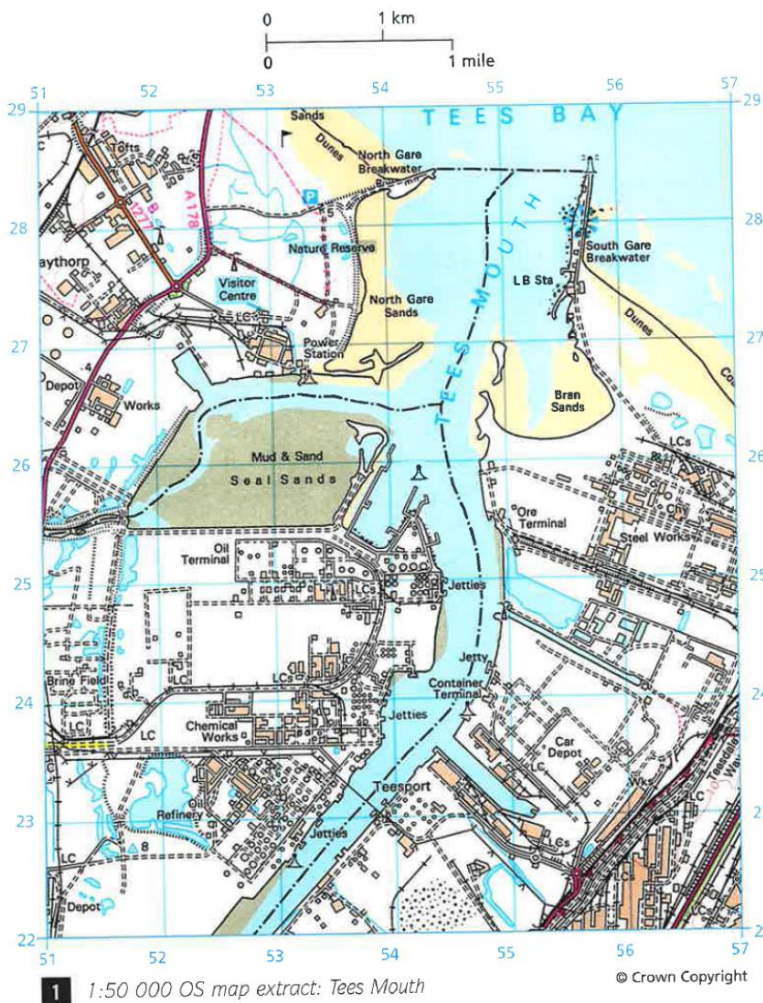
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What evidence is there that deposition is happening at Tees mouth?

.....
the map to name the industries shown by the arrows A, B and C on the photo.

A -

B -

C -

How is ore transported away from the ore terminal in grid square 5525?

.....
What is the meaning of the symbol at 546238 and why is it here?
.....
.....
.....
.....



2 Middlesbrough

Photo 3 – River Tees mouth

Glossary

| Key word | Definition |
|--------------------|------------|
| Relief | |
| Gradient | |
| Evaporation | |
| Condensation | |
| Transpiration | |
| Interception | |
| Surface run-off | |
| Infiltration | |
| Throughflow | |
| Percolation | |
| Groundwater flow | |
| Groundwater | |
| Water table | |
| Precipitation | |
| Drainage basin | |
| Watershed | |
| Source | |
| Tributary | |
| Waterfall | |
| Gorge | |
| V-shaped valley | |
| Interlocking spurs | |
| Ox-Bow lake | |
| Velocity | |
| Levee | |
| Meander migration | |
| River cliff | |
| Slip off slope | |
| Plunge pool | |
| Floodplain | |
| Estuary | |
| Mouth | |
| Erosion | |
| Abrasion | |
| Attrition | |
| Hydraulic action | |
| Corrosion | |
| Transportation | |
| Traction | |
| Saltation | |
| Solution | |
| Suspension | |
| Deposition | |

| | |
|------------------|--|
| Thalweg | |
| Long profile | |
| Upper course | |
| Middle course | |
| Lower course | |
| Alluvium | |
| Permeable rock | |
| Impermeable rock | |
| Rapids | |
| Discharge | |
| Porous | |
| Undercutting | |
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