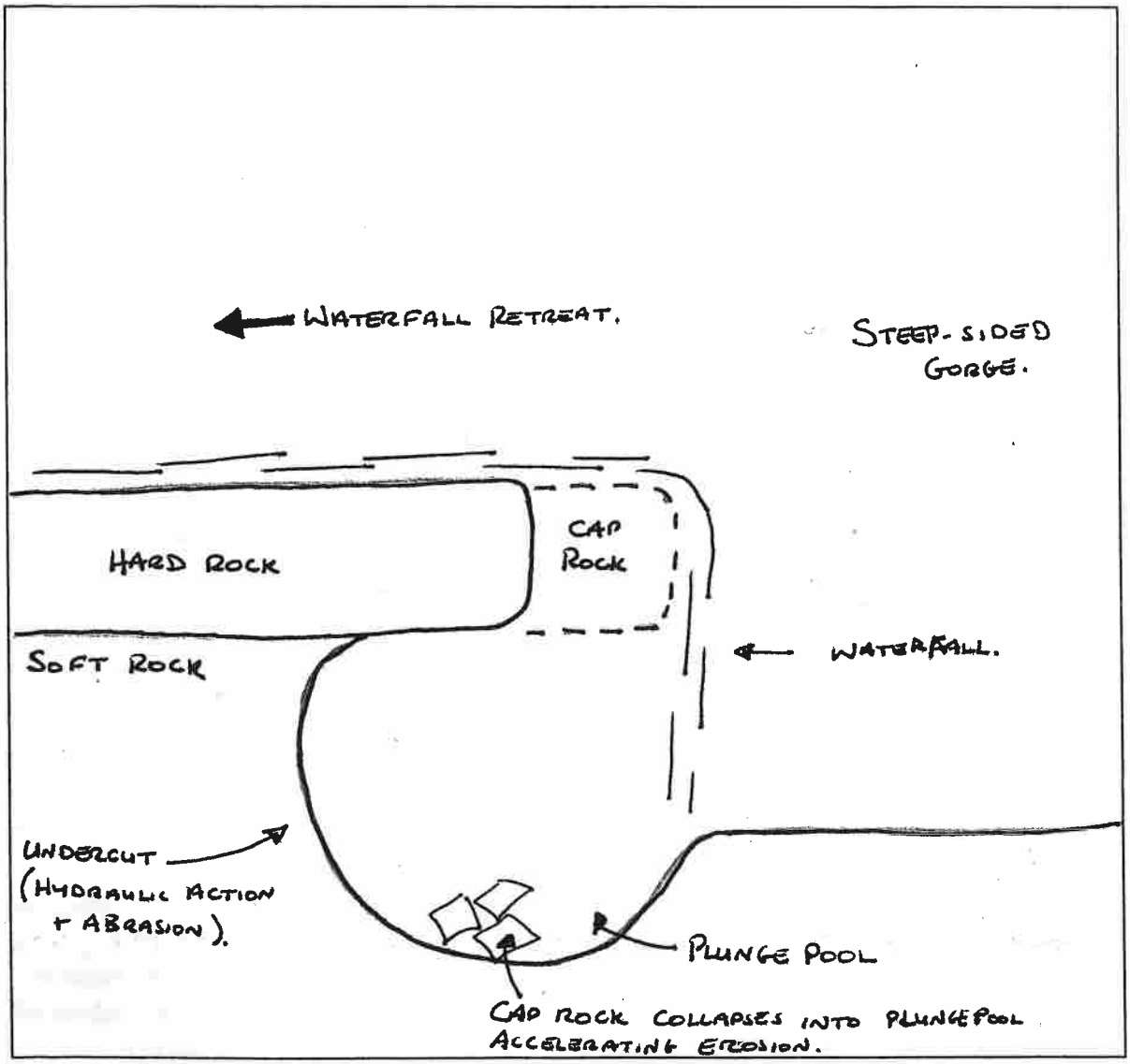
AS Physical Paper 1 Revision

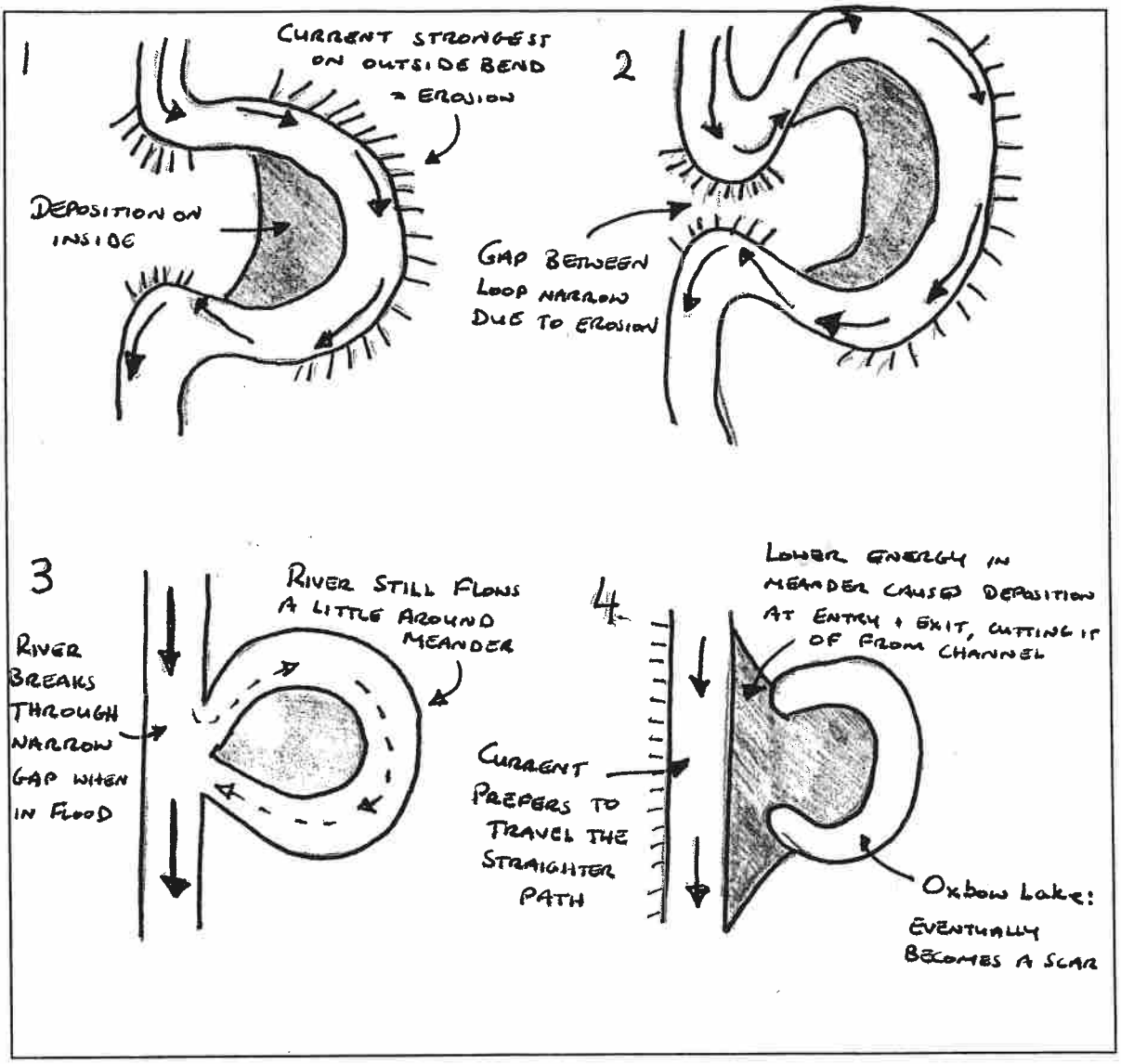
The following document outlines some of the key points needed to draw **annotated diagrams** for several landforms and **explanations** of their formation. You also should have an **example** to go with these landforms.

Waterfalls:



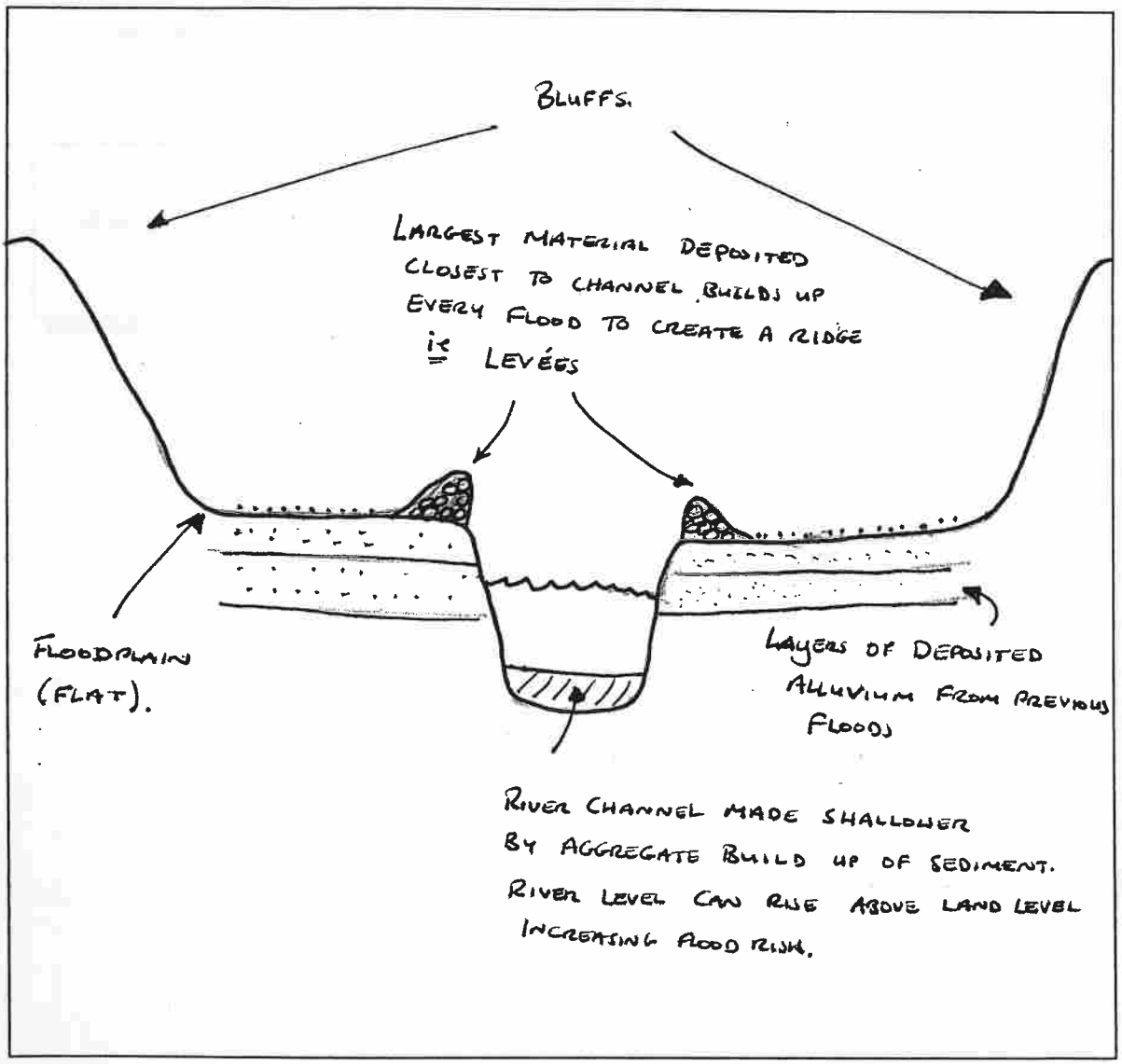
A layer of hard rock sits over soft rock. The soft rock will erode quicker than the hard rock, creating a **step**. Processes of erosion such as **hydraulic action** and **abrasion** continue to work, deepening the step to form a **waterfall**. At the base of the waterfall the force of the water develops the **plunge pool**, which starts to erode the soft rock back, undercutting the hard rock and creating a promontory **cap rock**. Over time as the undercutting retreats further back the cap rock can no longer support its weight and collapses into the plunge pool. This process is repeated and the **waterfall retreats** back towards the source, leaving behind a **steep sided gorge**. An example of this can be seen at the **Gulfoss Waterfall** in Iceland.

Oxbow Lakes:



When a river meander erodes on the outside of the bend, the gap in the **meander loop** becomes narrower. When the river is in flood or erosion joins the loop together, water takes the most efficient route and stops going round the meander and follows the straight channel. At the edges of the old meander, deposition starts to occur and eventually the loop is cut off from the channel, creating an **oxbow lake**. Over time the lake will silt up and become marsh and is known as a **meander scar**. The **Mississippi** is a very sinuous river and has many examples of oxbow lakes and scars along its course.

Floodplains and Levees:



The large areas of flat land on either side of a river are known as floodplains and they are characterised by large amounts of deposition, known as **alluvium**.

The deposition on floodplains comes from 2 main sources:

1. **Point bars/ slip-off slopes**
2. **River flooding**

As a meander migrates, the inside of the bend creates new land due to deposition – Point Bar. The erosion that moves the meanders also widens the floodplain by removing the steep land and often leaves prominent slopes called **bluffs** at the edge of the floodplain.

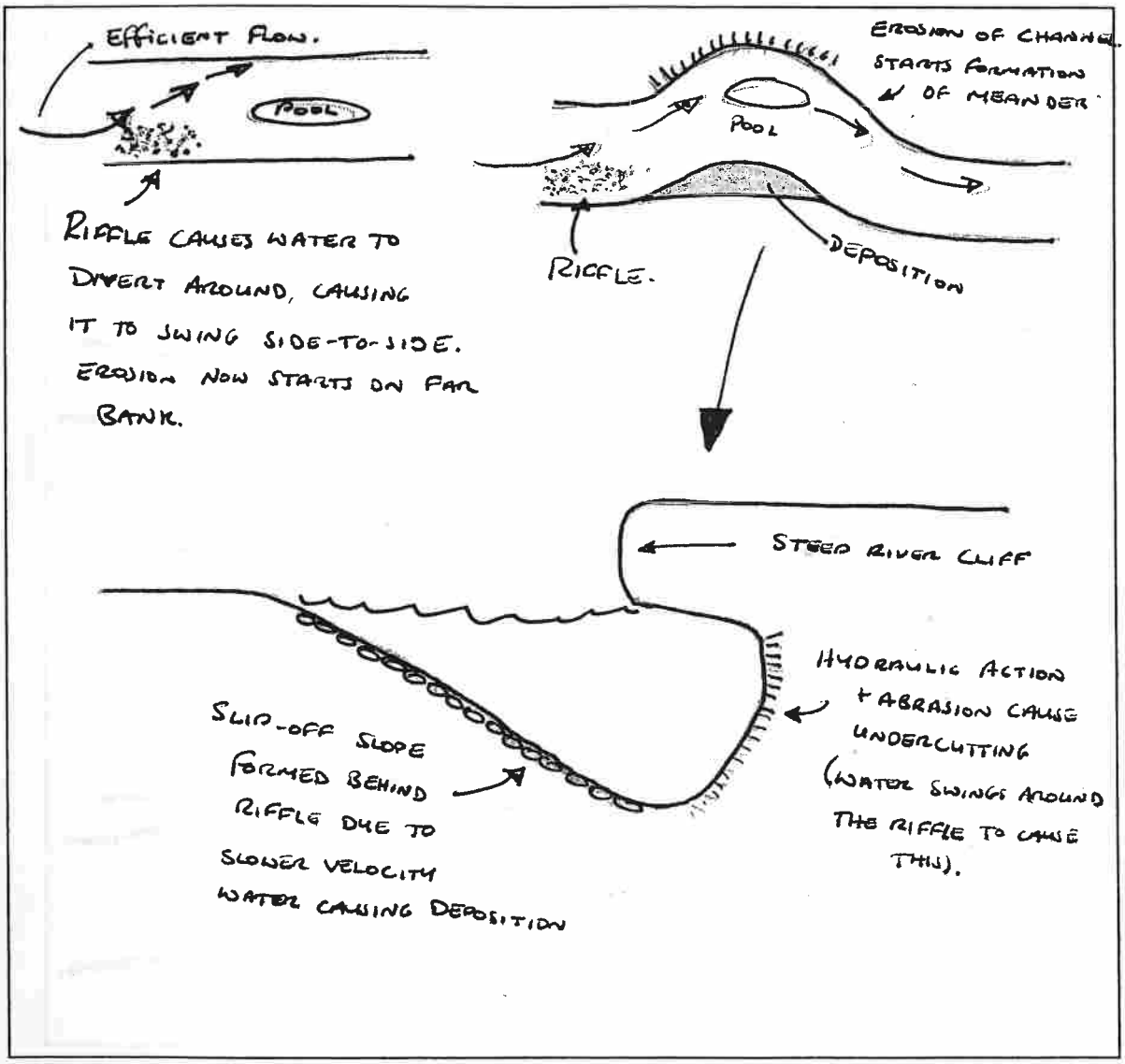
When a river floods and the water breaks its banks, friction takes over and the water loses energy. This causes the heaviest material to be deposited first and finer material can flow and be deposited further from the channel. Where the larger material is deposited at the channel, a low ridge is

formed on either side, raising the bank full level. This is known as a **levee**. The finer material is deposited across the floodplain building up layers to form flat fertile land.

In the **Mississippi**, levees prevent flooding and deposition of material causes an aggregate build up on the riverbed and causes water levels to rise about ground level. This increases flood risks.

EXAM TIP: *You can acquire full marks with a clear, fully annotated diagram that incorporates explanation. The mark scheme demands accurate and clear diagrams and detailed annotation. Make sure you practice – make it habit!*

Pools, riffles/meanders:

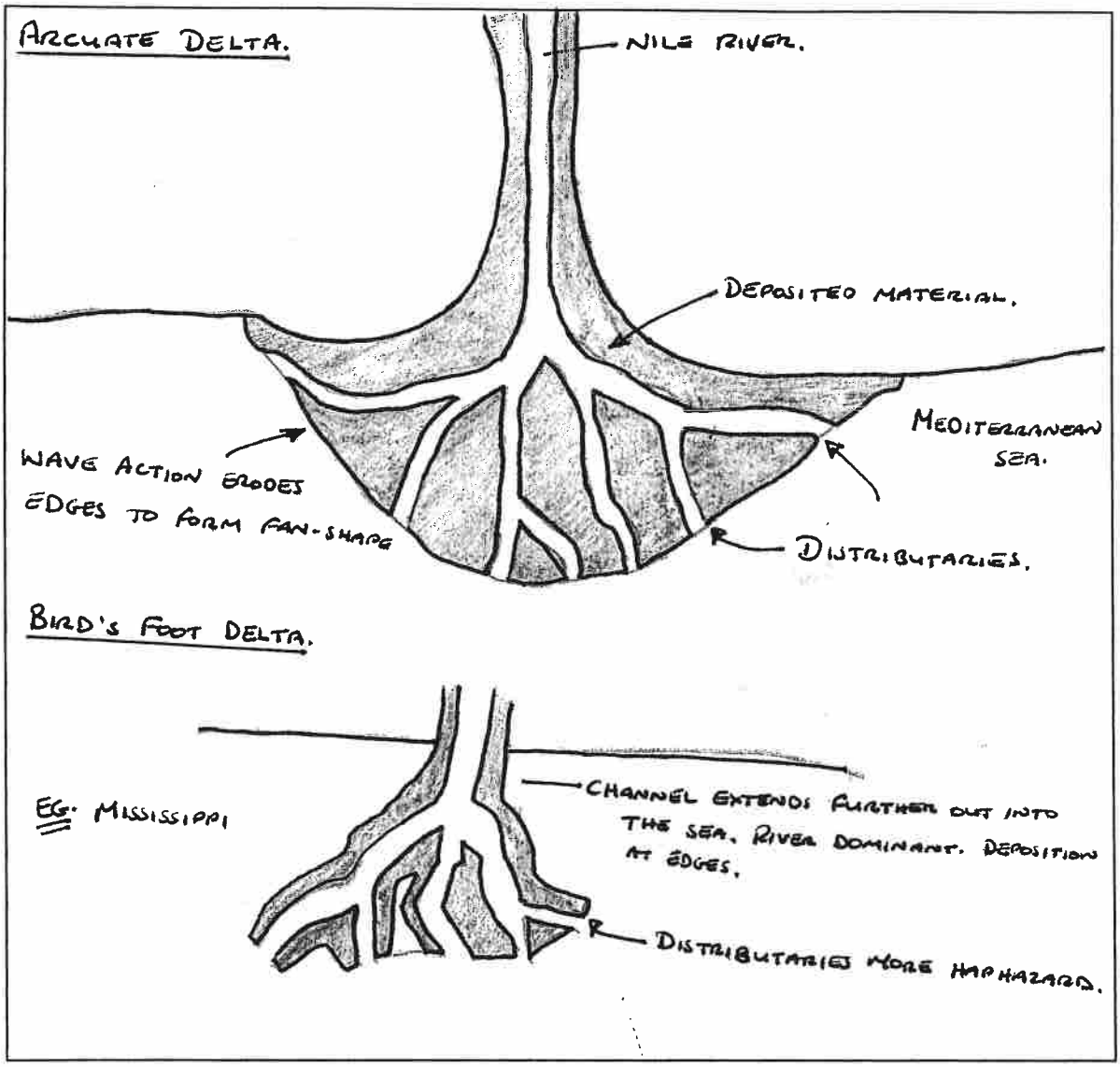


In rivers carrying particles sand sized or larger, we get alternating features or **riffles** and **pools**. Riffles are shallow water areas created by the deposition of larger materials such as gravels or pebbles; whereas, the deeper pool areas have smaller particles such as silt. Due to **friction** caused by the material in riffles, water tends to swing away around the riffle to flow in a more efficient route. This swinging causes a side to side motion of the water and a meander starts to form as erosion starts to occur on the bank opposite the riffle. Water after the riffle is therefore travelling slowly and deposition continues enlarging the riffle and a meander will eventually form.

On the outside of the bank the water causes **hydraulic action** and **abrasion**, undercutting the bank to form a **river cliff**. On the riffle side, velocity is slower and a point bar develops due to deposition.

Meanders continue to grow and migrate downstream, because the fastest flow (thalweg), does not follow the precise shape of the channel and the maximum point of erosion is further downstream of the midway point of the meander. The Mississippi is an excellent example of a river to find meander formed in this way.

Deltas:



The delta is a depositional feature found as an extension of land at the mouth of a river. Deposition builds up and splits the river channel into many smaller channels known as **distributaries**, which weave through the delta.

Deltas are allowed to form when the **rates of deposition exceed rate of erosion**. At the Nile Delta there is a large amount of sediment being deposited and erosion rates are low due to the small tidal range and weak currents of the Mediterranean. The **sea floor will have a gentle gradient**, which increases deposition and promotes the delta formation. Finally **flocculation** occurs when the salt water creates a chemical reaction with sediments such as clay. They gain an **electrical charge** and are attracted together to form heavier clumps of clay and deposit on the bed.

Depending on the energy of the marine environment, 2 types of delta can form:

1. **Arcuate Delta** eg Nile Delta

2. **Bird's Foot Delta** eg. Mississippi

Arcuate deltas form in stronger marine environments, where deposition takes place forming a triangular shape build up of material. This blocks the mouth of the channel, causing it to split into distributaries, which angle out from the original course and deposit material extending the delta out in width also. This forms a convex, fan shape. The erosion along the edge gives it a smooth and more pronounce fan shape.

Birds's Foot Deltas form in weaker marine environments and the river dominates and flows further out into the sea and deposits at its edges and extending channel out into the sea. As distributaries form, they are more haphazard and can look like a bird's foot. An example is the Mississippi Delta.

> ***EXAM TIP:*** *You must be able to save time drawing your diagrams and annotating them quickly.*