

*Date: Wednesday, 13 May 2020*

*Title: Erosional Landforms: Interlocking Spurs, Waterfalls and Gorges*

**Learning objectives:** To explore the formation of Interlocking Spurs, Waterfalls and Gorges.

**SUCCESS CRITERIA:**

I can **list** three erosional river landforms.

I can **describe** the formation of an interlocking spur.

I can **explain** the formation of waterfalls and gorges.

I can **discuss** why a waterfall is only a temporary feature on a river's course

**TASK 1: Knowledge Retrieval Quiz**

Complete the knowledge quiz on Kerboodle



# Upper course of the River

**Upper course** river features include:

1. V-shaped Valleys

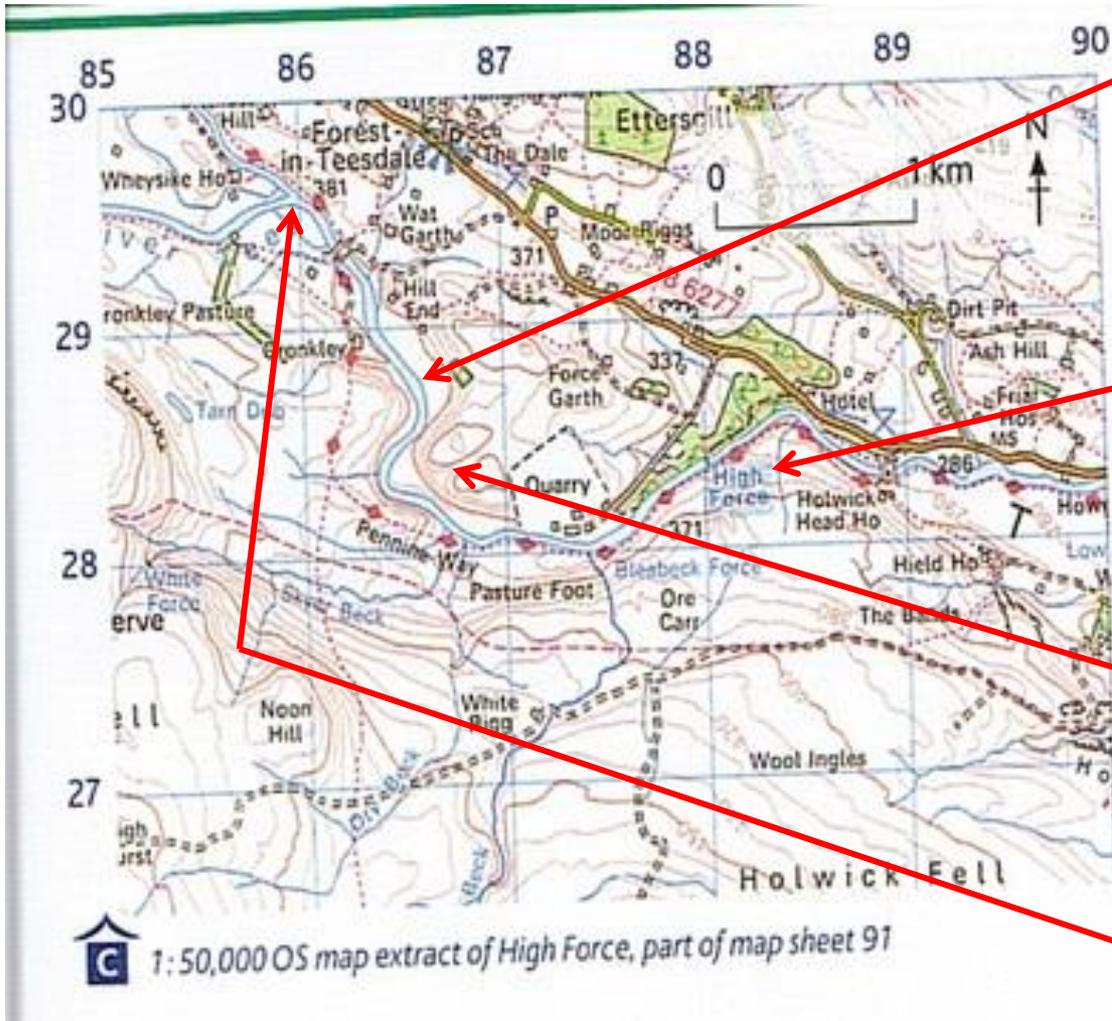
2. Waterfalls

These are all features formed by what?

Erosion



# Upper course on an OS map



Narrow river

Fairly straight course

High Force - name of a waterfall

Contour lines are tightly packed indicating a steep-sided or v-shaped valley

Confluence is shown

# *Step by Step Walkthrough - V-shaped valleys and interlocking spurs*

In the upper course of a river most of the erosion is vertically downwards. This creates steep-sided V-shaped valleys.



**Watch the clip below explaining the formation of V-Shaped Valleys.**

[V-Shaped Valley - clip](#)

# *Step by Step Walkthrough - V-shaped valleys and interlocking spurs*

The rivers aren't powerful enough to erode laterally – they have to wind around the high hillsides that stick out in their paths either side.

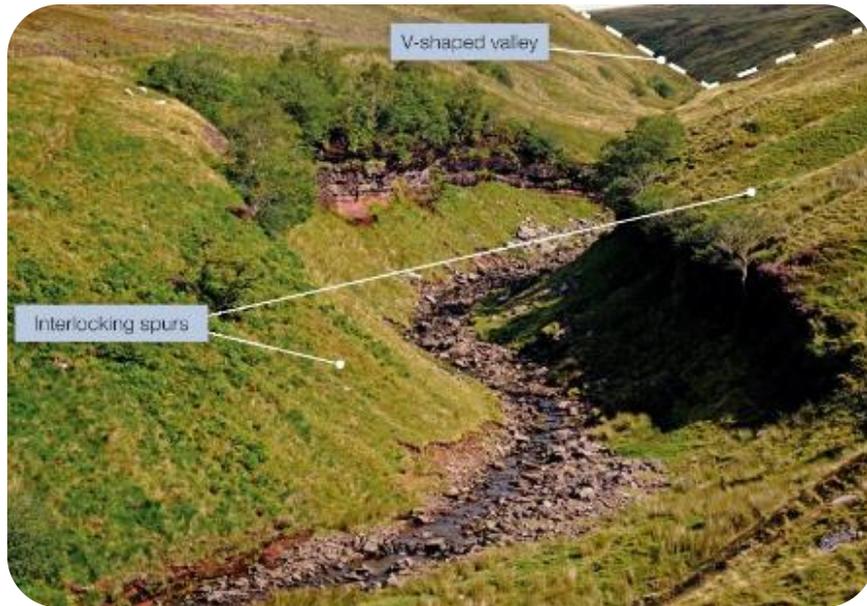
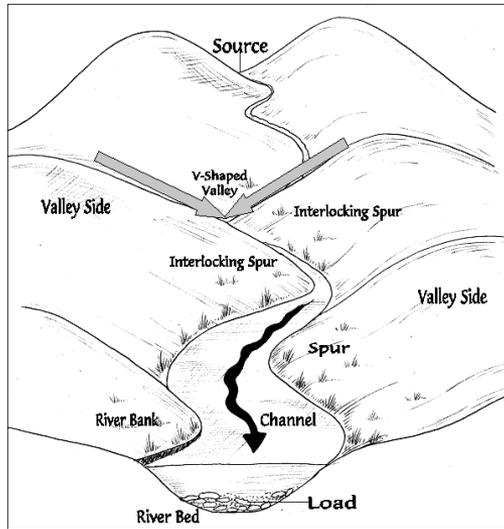


# *Step by Step Walkthrough - V-shaped valleys and interlocking spurs*

The hillsides that interlock with each other (like a zip) as the river winds around them are called interlocking spurs.



# Interlocking Spurs



## **COPY DEFINITION:**

Interlocking spurs are projections of high land that alternate from either side of a V-shaped valley.

They are formed by fluvial erosion and are found in the upper course of a river where rocks are hard.

Formed when the river is **small** and has **less erosive power**.

It does not remove the hillsides (spurs) but instead winds around them.

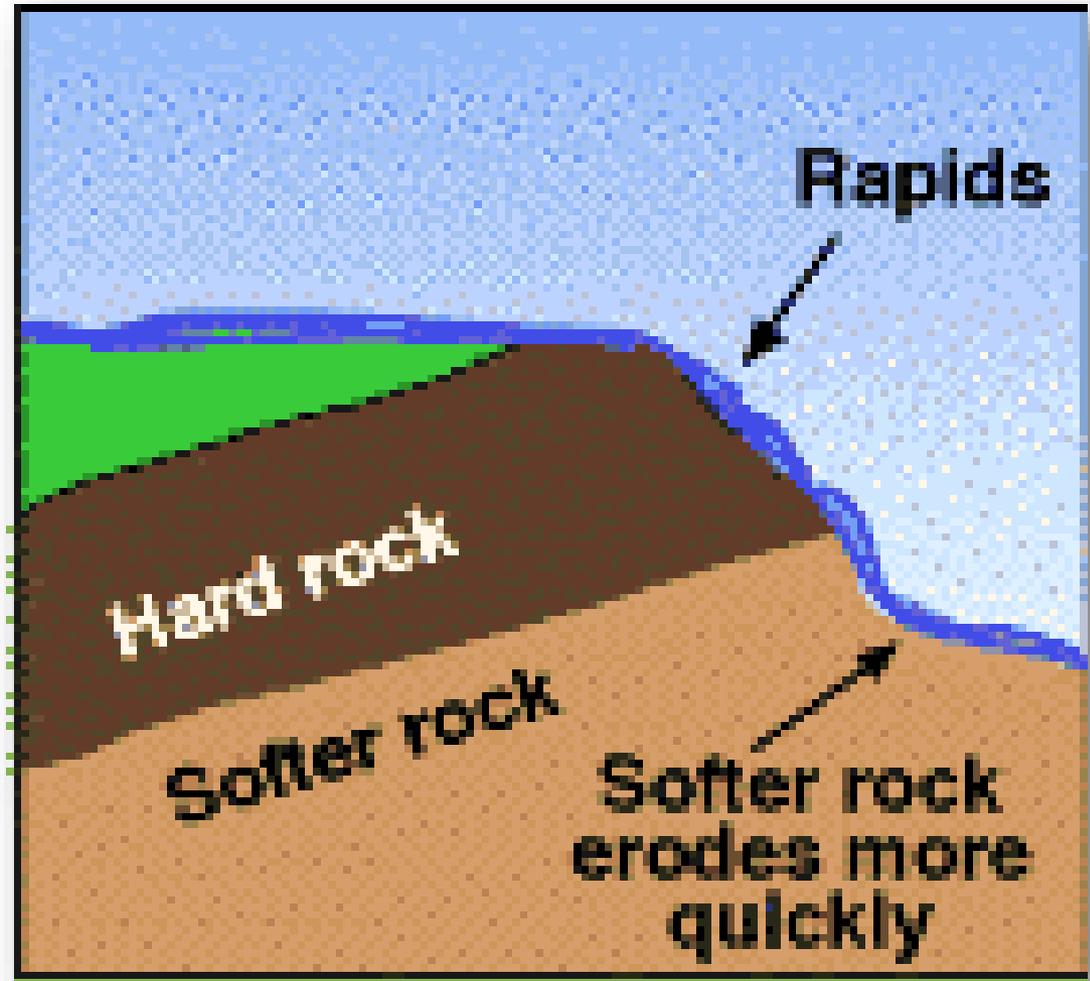
Erosion is **vertical** and **headward** (towards the mouth).

# *Waterfalls*



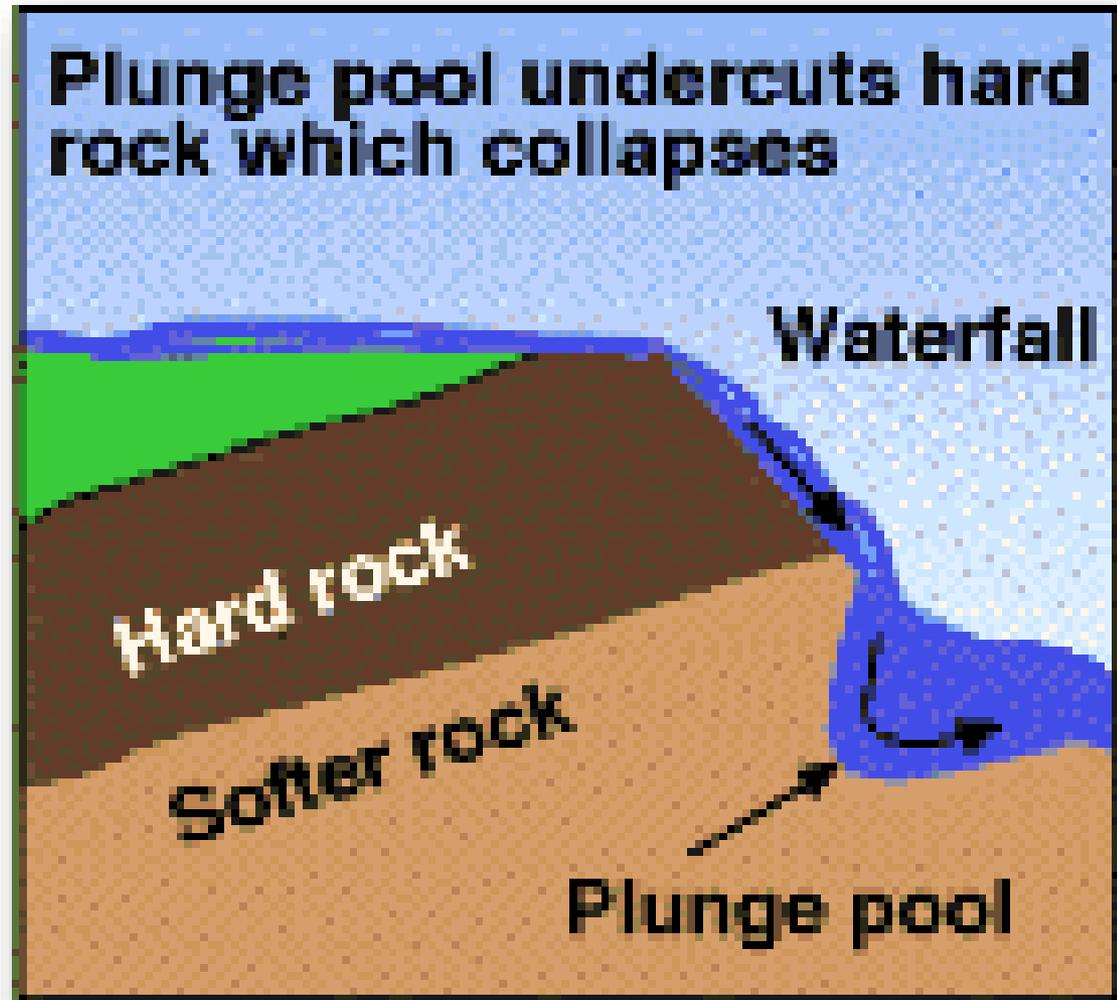
# Step by Step Walkthrough - Waterfalls Formation

Waterfalls form where a river flows over an area of hard rock followed by an area of softer rock.



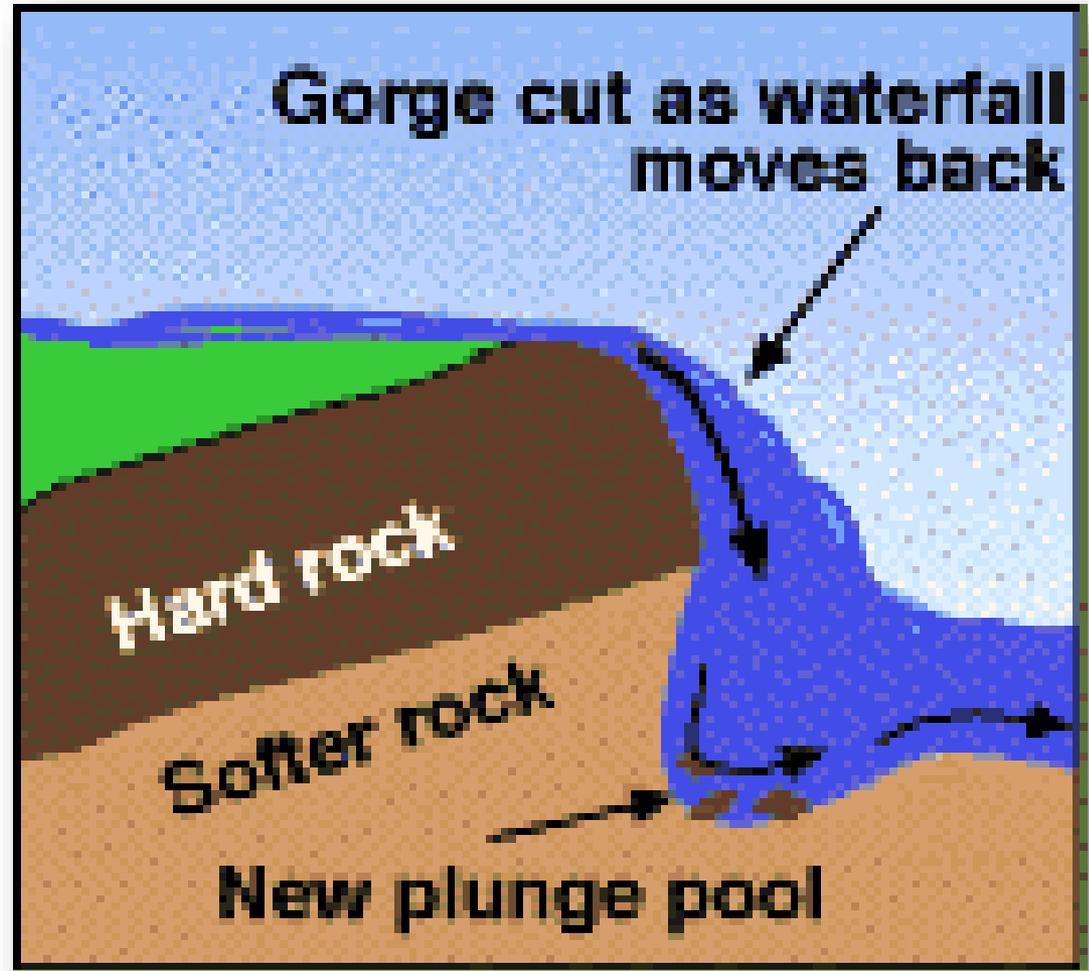
# Step by Step Walkthrough - Waterfalls Formation

The softer rock is eroded (more than harder rock) by hydraulic action and abrasion. This creates a “step” in the river. This gets eroded more and more.



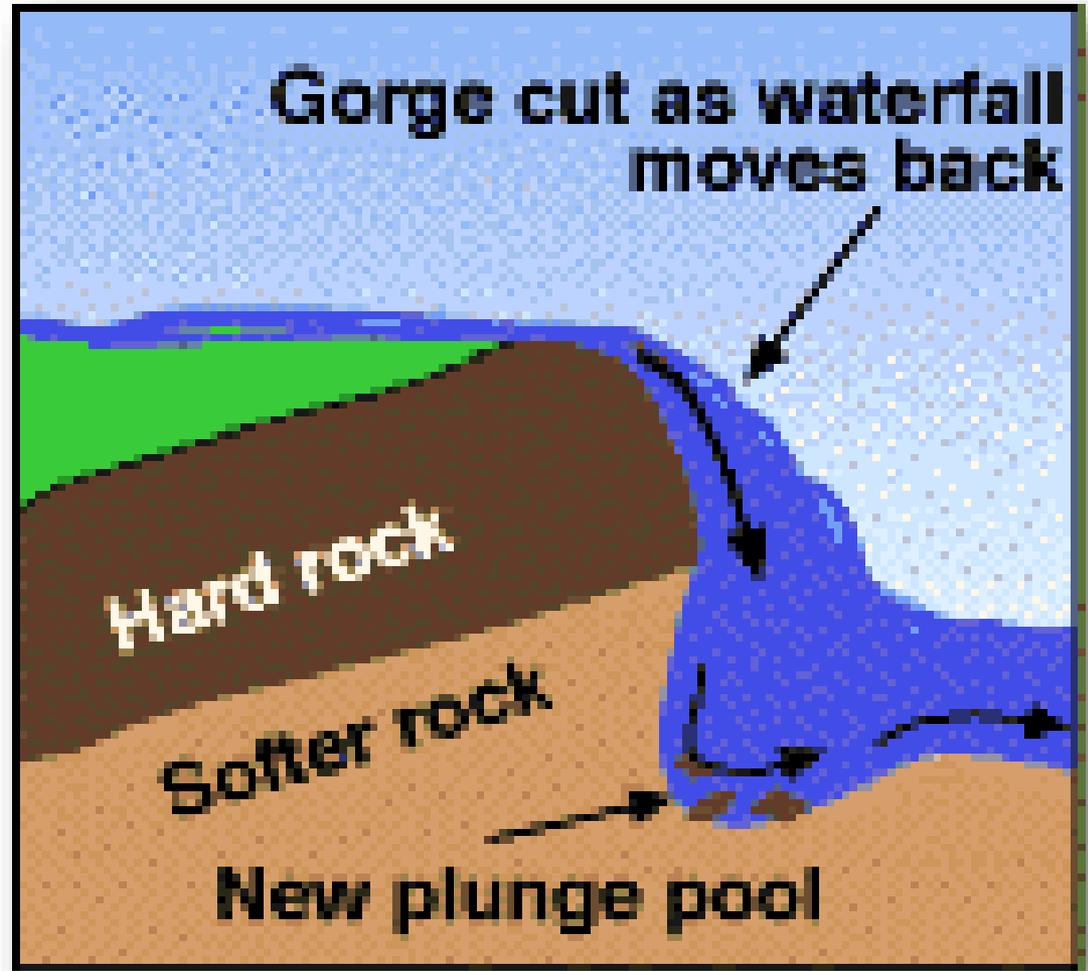
# Step by Step Walkthrough - Waterfalls Formation

The hard rock is eventually undercut by erosion. It becomes unsupported and collapses.



# Step by Step Walkthrough - Waterfalls Formation

The collapsed rocks are swirled around at the foot of the waterfall where they erode softer rock by abrasion. This creates a deep plunge pool.

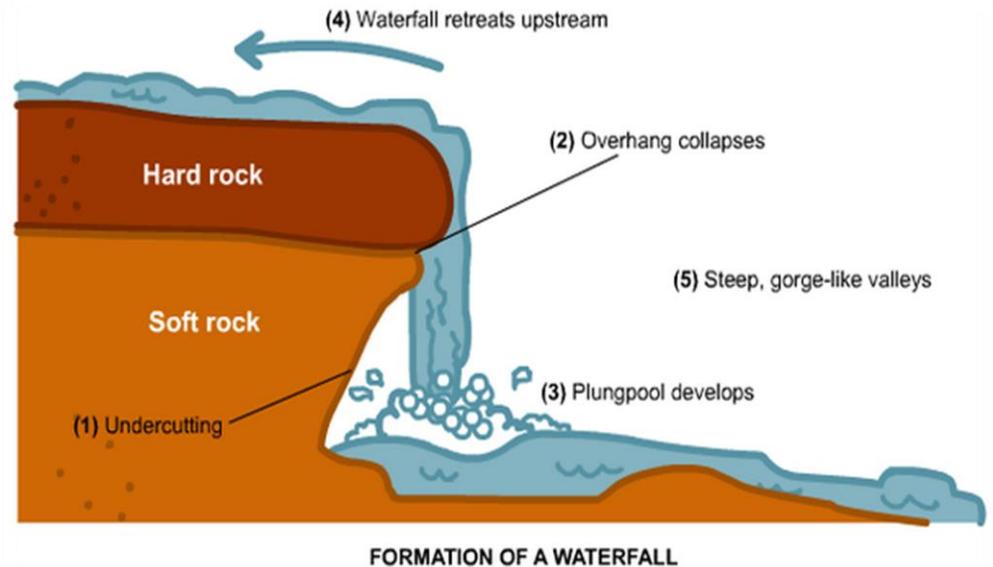


# Waterfalls

## SUMMERISE

**DEFINITION:** As it makes its way from source to mouth, a river flows over different types of rock. Tougher, more resistant rocks are less easily eroded than weaker rocks and they will perform 'steps' in the long profile of a river. These steps form waterfalls.

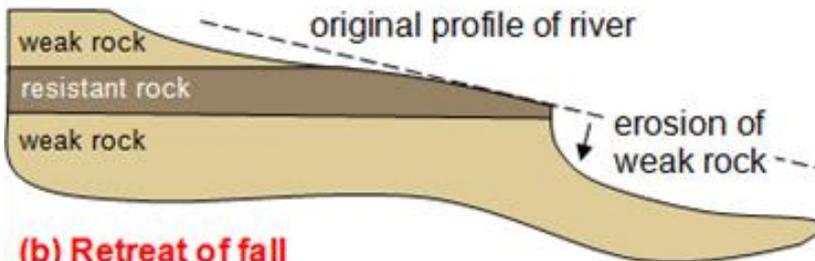
Waterfalls are most commonly formed when a river flows over a relatively resistant band of rock. When the river plunges over a waterfall it forms a deep and turbulent plunge below. Here the processes of erosion (hydraulic action and abrasion) are active and they undercut the waterfall. Eventually, the overhanging rock collapses and the waterfall retreats upstream. Over many years the waterfall will leave behind a steep sided gorge.



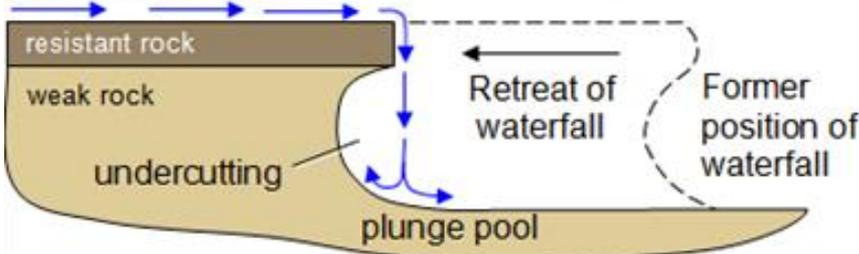
# Waterfalls → Gorge

Over time, the more undercutting causes more collapses. The waterfall will retreat (move back up the channel) leaving behind a steep-sided gorge.

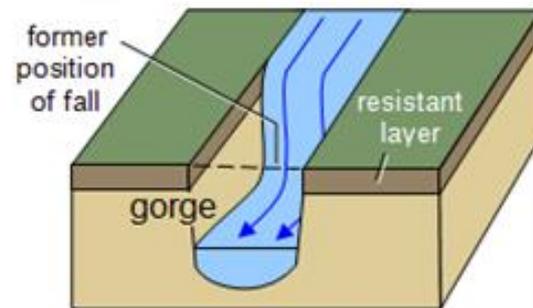
(a) Origin



(b) Retreat of fall

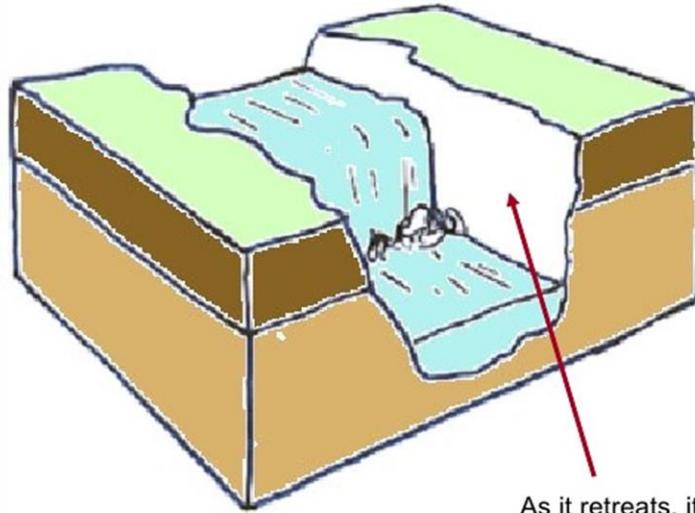


(c) Gorge created by retreat of fall



# Gorge

A gorge is a vertical narrow steep sided valley that is usually found immediately downstream of a waterfall. The river channel is found on the valley floor. There is often many areas of bare rock, with turbulent, fast flowing water.



As it retreats, it leaves behind a steep sided **gorge**.



# TASK

**Task 1:** Using the information from the videos and the power point complete the worksheets to explain the formation of interlocking spurs, v-shaped valleys, waterfalls and gorges.

**Task 2:** Annotate the photograph of the waterfall to highlight and explain key features. This is a vital geographical skill you will need to learn for the exam.

LESSON 4 - RIVER LANDFORMS

TASK: Using the YouTube video ([CLICK HERE](#)), draw and explain the step by step formation of interlocking spurs and v-shaped valleys

The first has been done for you.

STEP 1

STEP 2

STEP 3

In the upper course of a river, the discharge is low. The river uses most of its energy overcoming friction with the channel. What energy it has leftover is used by hydraulic action to deepen the channel by vertical (downwards) erosion.

*EXAM QUESTION: Explain why a waterfall is only a temporary feature on a river's course (4 marks)*

**SUCCESS CRITERIA:**

**Level 1 (1-2)** Demonstrates some knowledge of river processes and environments. Shows limited geographical understanding of the interrelationships between river environments and processes.

**Level 2 (3-4)** Demonstrates specific and accurate knowledge of river processes and environments. Shows thorough geographical understanding of the interrelationships between river environments and processes.

# EXAM QUESTION - MODEL ANSWER

The river will try to develop a smooth long profile. A waterfall is formed where the river flows over a band of more resistant rock **(1)**. This represents an irregularity in the river's long profile that it will try to remove. Where the more resistant rock overlays less resistant rock, different rates of erosion take place as the less resistant rock is eroded faster than the overlying harder rock by abrasion and hydraulic action **(1)**. Over time the less resistant rock is removed leaving a shelf of more resistant rock overhanging. Eventually this overhang will collapse and the waterfall will retreat further upstream **(1)**. This process continues until all the more resistant rock has been removed, the waterfall disappears and the river's long profile is smoothed out, therefore a waterfall is only a temporary feature **(1)**.



# Re-Cap Quiz

1. Which erosional landform retreats upstream?

- A) Gorge    B) Waterfall    C) Interlocking Spurs

2. Where would you find interlocking spurs?

- A) Upper Course                      B) Middle Course                      C) Lower Course

3. What processes of erosion undercut a waterfall?

- A) Hydraulic Action and Abrasion  
B) Hydraulic Action and Attrition

4. What particular rock feature do you need for a waterfall to form?

- A) Soft Rock  
B) Hard Rock

# Re-Cap Answers

1. Which erosional landform retreats upstream?

- A) Gorge    B) **Waterfall**    C) Interlocking Spurs

2. Where would you find interlocking spurs?

- A) **Upper Course**                      B) Middle Course                      C) Lower Course

3. What processes of erosion undercut a waterfall?

- A) **Hydraulic Action and Abrasion**  
B) Hydraulic Action and Attrition

4. What type of erosion would you find in the upper course?

- A) **Vertical Erosion**  
B) Lateral Erosion