

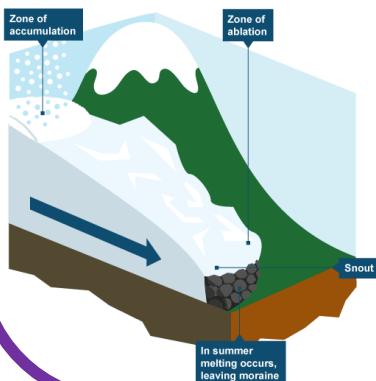
Week 1

The UK used to be covered in ice:

- There have been lots of **glacial periods** during the last 2.6 million years.
- During glacial periods, parts of the UK were covered in ice.
- The map shows the maximum extent of ice cover during the last ice age, 20,000 years ago.
- The ice covered most of Scotland, Ireland and Wales.
- The **erosion, transport and deposition** of material **by ice** has shaped the landscape of the UK.
- The shape of the land and other formations show where the glaciers used to be.



Formation of a glacier



Glaciers form where **more snow falls** each year than can **melt**. This build-up of snow is called **accumulation**. Over time, this **accumulated snow** causes the layers beneath to become **compacted and dense**. The **weight** of the ice mass causes it to **slide and advance** downhill due to gravity. In warmer months, melting (**ablation**), may take place at the **snout** of the glacier causing it to **retreat**.

Week 4

U-shaped valleys

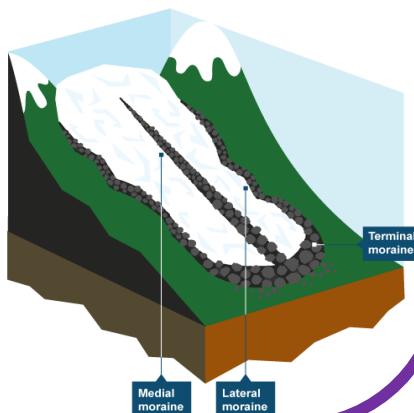
A glacier descends an old river valley. It changes the **V-shaped valley** into a **u-shape**. This happens due to **plucking and abrasion** beneath the glacier. This **deepens and widens** the valley. At the front end of the glacier it acts like a bulldozer, shifting and removing soil, **plucking rock from interlocking spurs and truncating** them. This creates **truncated spurs**, which are interlocking spurs without the land that interlocks.



Glaciers can move materials; this is called **transportation**. The material transported is known as **till**. The material is **frozen in** the glacier, **carried on** its surface, **or pushed** in front of it. When the ice carrying the material **melts**, the material is **deposited**.

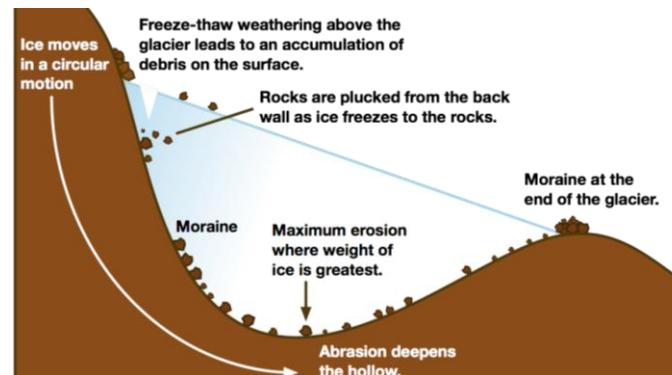
Moraines – depositional landforms

1. **Lateral moraine** – a long mound deposited where the **side** of the glacier was. It is formed by material eroded from the valley walls.
2. **Medial moraine** – a long ridge of material deposited along the **centre** of a valley floor. When **two glaciers meet**, the lateral moraines from the two edges join and form a line running along the centre. When the glaciers retreat, this material which is now in the middle is deposited.
3. **Terminal moraine** – builds up at the **snout**. Material eroded by plucking and abrasion is transported at the **front** of the glacier when the glacier melts this is deposited. It marks the furthest point that the glacier reached downhill.



Week 2

Corrie formation



1. The weight of the ice in a glacier makes it move downhill (advance), eroding the landscape as it goes.
2. The ice erodes by **plucking and abrasion**.
3. At the top of the glacier the ice moves in a **circular motion**, called rotational slip. This erodes hollows in the landscape, turning them in to bowl shapes.
4. **Freeze-thaw weathering** also takes place, breaking rock off the mountain face behind the glacier.



- Corries begin as **hollows** containing a small glacier.
- The ice moves downhill by **rotational slip and abrasion**.
- Eroding the hollow into a **steep sided armchair shape**, with a lip at the bottom.
- A **bowl-shaped corrie** is left.
- When the ice melts it leaves behind a small circular lake known as a **tarn**.

Week 3

When more than one corrie forms on a mountain, it can change the shape of the land by erosion.

Arêtes

- Two glaciers need to flow in **parallel valleys**.
- Corries then form back-to-back.
- The glaciers erode the 2 valleys, by **abrasion and plucking**.
- This **sharpens the ridge** between the 2 valleys.
- This **leaves a jagged profile**, like the blade of a knife.



Pyramidal peak



- A pyramidal peak is a pointed mountain peak, with three sides (Arêtes will form along the edge of each side of the peak).
- It is formed when **three or more back-to-back glaciers** erode a mountain.
- This leaves a **sharply pointed mountain summit** behind.
- A famous pyramidal peak is the Matterhorn in Switzerland.

Year 9 Geography: Glaciation

Assessment

Week 6

- Students will be provided with revision materials and assessed on a piece of extended writing.

Week 5

Why are glacial landscapes under threat?

Climate change:

1. **Climate change** is the main cause of glacial retreat.
2. In the past 150 years, global temperatures have **increased by approx. 0.8°C**.
3. This is causing glaciers to retreat at a much quicker rate. Glacier National Park in the USA only has 25 glaciers of the 150 remaining.



Impacts of glacial retreat:

An **increase in natural hazards**. Rapid melting can cause flooding, rockslides and avalanches. These hazards destroy habitats and disrupt food chains. Meltwater from retreating glaciers **raise the sea level** which can cause coastal flooding. **Fish species** have adapted to live in waters fed by the cold meltwater of glaciers. When the glaciers have gone, the temperature of the water in such places will increase and the fish will die. As meltwater decreases **hydro-electric power plants** that use the meltwater will be less productive and may need to close. The ice will no longer be available for recreational use, so **industries** located in the area may need to **close** e.g. ski resorts.

Glacial Lake Outburst Flood (GLOF)

Moraine lakes often form as the terminal moraine acts as a dam and holds the melted water from the glacier in a lake. As global warming causes an increase in the speed at which glaciers melt, the lakes grow in size. If the water level rises above the moraine, it can overtop and flood areas downhill. Sometimes, the moraine breaks (breaches) and a huge amount of water can move downhill quickly and cause catastrophic floods. This is common in the Himalayas where glacial retreat is a growing problem.

Key words:

1. **Glacier** - Large masses of ice that fill valleys or the sides of mountains.
2. **Abrasion** – when bits of rock stuck below the glacier scrape the land as it moves downhill.
3. **Plucking** – rocks on the ground freeze into a glacier and are then 'plucked' from the landscape as the glacier advances.
4. **Freeze thaw weathering** – water gets into cracks in rocks, freezes and expands. This widens the crack. This repeats until large sections of rock break off.
5. **Accumulation Zone** - More snow falls in the glacier than melting occurs. The glacier grows.
6. **Ablation** – when glacier ice melts.
7. **Moraine** – frost-shattered rock debris and material eroded from the valley floor and sides, transported and deposited by glaciers.
8. **Snout** – the end of a glacier.
9. **Freeze-thaw action**– Water gets into cracks in rocks, freezes and expands. This widens the crack. This repeats until large sections of rock break off.

Week 1

Questions	Answers
What is a glacier?	A glacier is a large ice mass that fills valleys or the sides of mountains.
How do we know that glaciers covered large areas of the UK in the past?	Glaciers leave behind clues in the landforms or shape of the land. This is how we know that Scotland and large areas in northern England were covered in ice in the past.
What must happen on a mountainside for a glacier to form?	For glaciers to form, there must be more snow fall than melt each year. This is called accumulation.
Explain why glaciers retreat.	Glaciers may retreat (get smaller) due to an increase in temperature. This can be seasonal, in the summer, and reversible, or long-term causing the glacier's permanent retreat.
How have glaciers shaped our landscapes?	Glaciers have left behind landforms such as U-shaped valleys and lakes at the bottom of them. The shape of the land as we know it today has probably been changed by glaciers.

Week 2

Questions	Answers
Why do glaciers move downhill?	Glaciers move downhill because of the weight of the glacier being pulled by gravity.
Explain the main types of erosion at the bottom of glaciers.	Plucking (the freezing and thawing of water at the bottom of a glacier) and abrasion (the scraping on rocks moved by the glacier on the valley floor) are the two main types of glacial erosion.
What is a tarn and how are they formed?	Tarns are lakes located at the bottom of corries that have been hollowed out by glaciers that have since melted.
How do temperature changes cause erosion?	Freeze-thaw action depends on the temperature changing enough at night to freeze the water in cracks in rocks and then melt it during the day.
How have glaciers shaped our landscapes?	Glaciers have deepened and widened the hollows on mountainsides into corries which can still be seen today.

Week 3

Questions	Answers
How many corries need to form back-to-back to form an arête?	Two corries need to form back-to-back to form an arête.
Describe an arête?	An arête is a long, sharpened ridge formed between corries. It is often described as a knife edge.
What is the difference between an arête and a pyramidal peak?	An arête requires only 2 corries to form back-to-back and is a long, sharp ridge, whereas a pyramidal peak requires 3 or more corries to form back-to-back and is a pointed structure.
What type of landforms are arêtes and pyramidal peaks?	Both arêtes and pyramidal peaks are erosional landforms (rocks are scraped and worn away to form them).
How have glaciers shaped our landscapes?	Glaciers have formed some famous landforms like the Matterhorn pyramidal peak in Switzerland, which is a popular tourist attraction.

Year 9 Geography: Glaciation

Week 4

Questions	Answers
Glaciers change the shape of valleys. What shape do they become?	Glaciers create U-shaped valleys because they are made of ice. The valley was most likely a V-shaped valley formed in the upper course of a river before the ice deepened and widened it.
What is the front end of a glacier described as?	The front end of a glacier is called the snout and is often described as a bulldozer.
What type of landform are moraines?	Moraines are depositional landforms. This means they are made from material the glacier has dropped or moved into place.
What is the mound at the snout of the glacier called?	The mound at the snout of the glacier is called the terminal moraine. It shows the furthest point the glacier came to.
How have glaciers shaped our landscapes?	The peaks and valleys left behind by glaciers are now considered areas of scenic beauty, often attracting many tourists. The Lake District is an example of this in the UK.

Week 5

Questions	Answers
How are humans contributing to glacial retreat?	The enhanced greenhouse effect, caused by the amount of CO ₂ produced by human activity, has contributed to global warming which increases temperatures resulting in melting glaciers.
Describe an environmental impact of glacial retreat?	Sea levels are rising due to the melting of glaciers and ice caps. This can have catastrophic effects on coastal environments.
What is a human impact of glacial retreat?	Glaciers are money-making tourist attractions; when they melt and disappear, jobs that depend on them will be lost.
Why are glacial lake outburst floods becoming more common?	GLOFS are on the increase because the rate at which glaciers are melting is putting too much pressure on moraines, causing breaches and over-topping.
How have glaciers shaped our landscapes?	The retreat of glaciers is forming new glacial lakes, closed in by moraines and filled by meltwater.

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