Paper 2: Topic 4 – The UK's Evolving Physical Landscape

KO4/9

Uplands and lowlands

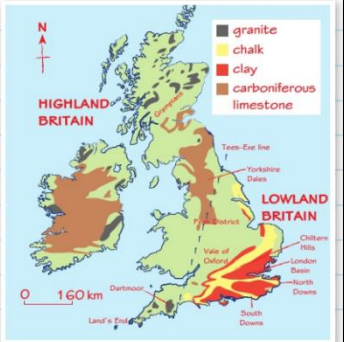
Geology and past processes – such as glaciation and past tectonic activity – have influenced the physical landscape of the UK.

There are three groups of rock type.

- **Igneous** – made from magma (granite)
- **Sedimentary** – compressed sediment (e.g. clay, chalk, limestone)
- **Metamorphic** – igneous or sedimentary rock changed by heat or pressure (e.g. shale into slate)

The UK is split into two halves geologically.

- The geology of the top half is mainly igneous and metamorphic rocks. This forms **upland** landscapes.
- The geology of the bottom half is mainly sedimentary rocks. These rocks are characteristic of **lowland** landscapes.



Glaciation

The top half of the UK was glaciated during the last Ice Age. Ice sheets and glaciers hundreds of metres thick covered the land as far south as London. The ice pressed down on the landscape and eroded it in distinctive ways.

The bottom half of the UK was not covered in ice sheets, but it was heavily influenced by glacial deposition. Clays, sands and silts eroded by glaciers in northern areas were dumped and washed over southern areas. The south was frozen, even if it was not ice-covered.

Worked example

Study the picture opposite, which shows Arthur's Seat, a long-extinct volcano near Edinburgh. Explain **two** ways in which the UK's landscape has been influenced by past tectonic processes. **(4 marks)**

North of the Tees-Exe line the UK's geology is largely igneous: rock formed from magma, associated with tectonic events. Long-extinct volcanoes also form other hills and mountains in the UK.

This is a good answer because it relates tectonic events to the UK landscape.

Now try this

Draw an annotated sketch of **one** of the following UK landscape features: a U-shaped valley (upland), a meandering river (lowland), a chalk coastal cliff and stack, a clay cliff slumping into the sea. **(3 marks)**

The role of geology, plate tectonic processes and glaciers

Millions of years ago, Britain was much closer to plate boundaries than it is today. There were many active volcanoes, and plate movements caused massive folds and **faults** in the rocks. These **tectonic processes** helped shape the geology and landscapes of today.

UK upland landscapes are formed of harder, resistant rocks that have eroded at a much slower rate than the softer, lowland rocks. These include the igneous and metamorphic rocks found in Scotland, North Wales, the Lake District and parts of south-west England (Figure 1). Around 300 million years ago, tectonic processes caused molten **magma**, under intense pressure, to rise through the Earth's crust. Some magma reached the surface as lava, while some cooled and solidified underground. Today, these are areas of high relief, for example the Cairngorm Mountains in Scotland and Dartmoor in Devon.

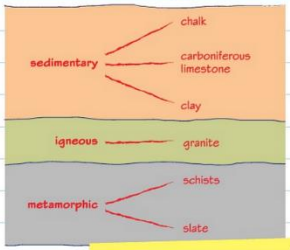
Many lowland UK landscapes are formed from softer, younger sedimentary rocks, which are less resistant to erosion. Examples include the North and South Downs in south-east England. These hills are formed of chalk, with even softer clay in the valleys between them.

Some upland areas are also formed of harder sedimentary rocks. An example is **carboniferous limestone**, formed 250–350 million years ago when Britain was surrounded by warm tropical seas that were rich in plant and animal life. When the plants and sea creatures died, the calcium in their shells and skeletons built up in layers on the seabed, forming limestone made of calcium carbonate.

Main UK rock types

The UK's main types of igneous, metamorphic and sedimentary rocks help produce some characteristic UK landscapes.

Main UK rock types



Sedimentary, igneous and metamorphic rocks in the UK

Chalk and clay landscapes

- Chalk is strong and **permeable** – water moves through it. It forms cliffs when it occurs at coastlines.
- Chalk is only found in lowland Britain.
- Clay is weak and **impermeable** – water cannot move through it.
- Clay is found all over Britain. Clay landscapes are typically wide, flat plains with lots of lakes, streams and rivers.

Water draining through the chalk flows out as springs along the line where the permeable chalk meets **impermeable** clay.

Igneous and metamorphic rocks

- Granite is hard and resistant to erosion but is susceptible to chemical weathering.
- Granite is impermeable and granite landscapes are badly drained – boggy.
- Tors are features of some granite landscapes: towers of granite chemically weathered into blocks.
- Metamorphic rocks are very strong and very resistant to erosion and weathering.
- Slate is formed from clay. Layers in the original clay form weak planes in the slate.
- Schists are formed from shale. The word schist originally meant 'to split'. Schist rocks split easily.

1. Much of the UK used to be covered in ice.
2. There have been lots of glacial (cold) periods during the last 2.6 million years
3. During these periods the UK was covered in a massive ice sheet.
4. At its maximum ice covered most of Scotland, Ireland and Wales and came as far south as the Bristol Channel.
5. Ice is very powerful so it was able to erode the landscape, carving out large u-shaped valleys in upland areas such as the Lake District.
6. Glacier also deposited lots of material as they melted. Landscapes formed by glacial meltwater and deposits extend south e.g. large parts of eastern England are covered in till (an unsorted mix of clay, sand and rocks) deposited by melting.

Physical Processes alter the landscape

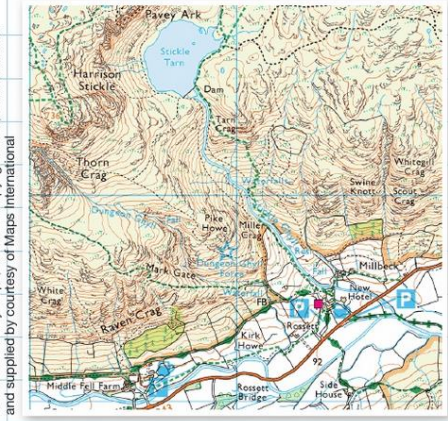
1. Weathering is the breakdown of rock into smaller pieces (mechanical, chemical or biological)
2. Erosion wears away rock. Ice eroded the landscape.
3. Post-glacial river processes – melting ice made rivers much bigger than normal with more power to erode the landscape leaving landforms like hanging valleys.
4. Slope processes including mass-movement e.g. rock falls, slides, slumps and soil creep?

There are 3 main ways that past tectonic activity has shaped the UK landscape:

1. Active volcanoes – forced magma through the Earth's crust which cooled to form igneous rocks like granite.
2. Plate collisions – Caused folding and uplifting forming mountain ranges e.g. the Scottish Highlands/The Lake District
3. Plate movements – UK position has changed from being near the tropics and partly under water.

Physical processes

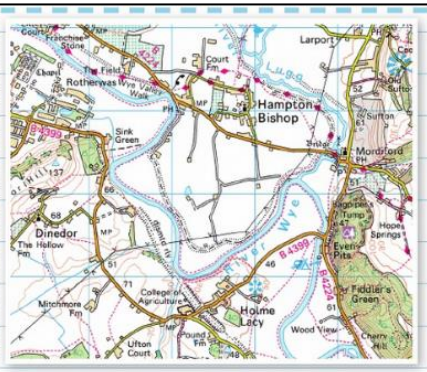
Some distinctive upland and lowland UK landscapes result from different physical processes working together.



Upland landscapes

This upland landscape is in the Lake District. The (OS) map extract scale is 1:25 000.

- Stickle Tarn, at the top of the map extract, is a 'post-glacial' feature. It is where a glacier formed during the Ice Age creating a corrie.
- The crags in the map extract are exposed rock faces. Weathering of the rock leads to rock fragments breaking off and falling to the base of the cliff to form a scree slope.
- The high precipitation in the Lake District means there is a lot of surface drainage over the impermeable rocks – lots of streams.
- The valley floor at the bottom of the map extract is too wide for the stream that is in it. The flat bottom and steep sides show that the U-shaped valley was formed by a glacier.



Lowland landscapes

This lowland landscape is in Herefordshire. The OS map extract scale is 1:50 000.

- The landscape has been formed by the actions of two rivers: the River Lugg and the River Wye.
- As the rivers have meandered, they have eroded a wide valley between low hills.
- The rivers transport silt eroded from the river channel.
- When there is prolonged heavy rain in the region, the rivers flood and water spreads out all over the valley floor, depositing the silt to form a wide, flat **floodplain**.

Worked example

Study the photo opposite of a limestone pavement near Malham in the Yorkshire Dales. Bedding planes in carboniferous rocks are widened as rainwater, which is weakly acidic, reacts with the limestone, slowly dissolving it.

Which of the following is the name of this form of weathering? **(1 mark)**

- ☐ **A** mechanical weathering
- ☐ **B** sub-aerial weathering
- ☐ **C** biological weathering
- ☒ **D** chemical weathering

Human activity

The UK has been settled by humans for many thousands of years and all its landscapes have been heavily influenced by human activity.

Agriculture

This OS map extract is at 1:25 000 scale. It shows a region of Suffolk in the east of the UK.

- The blue lines are drainage ditches, built to drain water away from low-lying agricultural land to allow crops to grow.
- Trees have been cleared to make way for agriculture.
- Straight lines on maps are not often produced by natural physical processes so they are a good indication of human activity.

Forestry

Forestry is planting, managing and caring for forests for different purposes such as nature conservation, landscaping, recreation and timber production.

- Many UK upland landscapes have been planted with trees. Sometimes they are in straight rows to make forestry processes easier to manage.
- The UK would naturally be covered by deciduous woodland. However, some UK landscapes feature conifer plantations, which have been planted for timber production and are very distinctive.

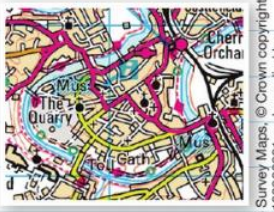
When trees are felled for timber, a section of the plantation may be cleared. The aerial photo above shows a cleared area in the Strathyre Forest, Scotland.

Settlements

Settlements grew up where the landscape offered particular advantages. For example:

- river meander loops made good defensive locations
- natural harbours were sites for fishing villages
- shallow points of rivers were used as fords
- springs gave people reliable freshwater.

As settlements grew, the settlements took over the landscape. In big cities, many streams and small rivers now run in tunnels underground.



Exam practice:

Explain two ways in which human activity has influenced the landscape of the UK. (4)