

UK Evolving Physical Landscapes - GEOLOGY and COASTS

Geology and past processes (glaciation and past tectonic activity) have influenced the physical landscape of the UK.

There are 3 main types of rock (geology - **posh word for rocks**):

igneous -

e.g. sedimentary -

e.g. metamorphic -

e.g.



The UK can be divided into 2 geologically. The north = igneous and metamorphic. This results in **upland** landscapes.

The south = sedimentary and results in **lowland** landscapes.

The rocks found in the UK are chalk and clay (sedimentary), granite (igneous) slate and schists (metamorphic). They produce distinctive landscapes. The characteristics of these landscapes are:

Chalk and clay	Igneous	Metamorphic
1.	1.	1.
2.	2.	2.
3.	3.	3.

Study the text below. **Highlight** the key words to summarise the main points of **glaciation** (you are not allowed to highlight more than 8 key words or phrases)

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.

Plate tectonic activity

- Millions of years ago, Britain was much closer to plate boundaries
- There were many active volcanoes and the movement of plates caused massive folds and **faults** - these helped to shape the landscape
- Around 300 million years ago, tectonic processes caused molten magma, under intense pressure, to rise through the Earth's crust. These are called extrusive features: volcanoes e.g. Edinburgh Castle is built on the site of a volcano
- Some magma reached the surface as lava, while some cooled and solidified underground. These are called intrusive features: batholiths e.g. Dartmoor

Present day

Physical processes are dynamic, they are constantly changing the landscape. The process of weathering will expose these features, whilst erosion and mass movement will remove rock that has been broken down.

Describe the following types of weathering

Freeze - thaw/mechanical	Chemical	Biological

There are 3 processes that work along a **Coastline**. Define the following:

Erosion

Transportation

deposition

Dartmoor - an upland granite (igneous) landscape

Formed when a massive dome of magma developed underground. It cooled and contracted to form **granite**. Cracks known as **joints** developed. These weaker areas were vulnerable to **freeze-thaw** weathering. Overtime the granite became exposed. Erosion and mass-movement took the broken down rock downhill. Blocks of rock with fewer joints are left standing. These are called **tors**. They are surrounded by **clitter slopes**, smaller rocks, evidence of weathering.

USE the text above to complete a series of diagrams to show the formation of a tor.



Figure 2 Bowerman's Nose

Diagrams to show the formation of Bowerman's Nose

The Yorkshire Dales - one of the largest areas of carboniferous limestone (sedimentary) in the UK

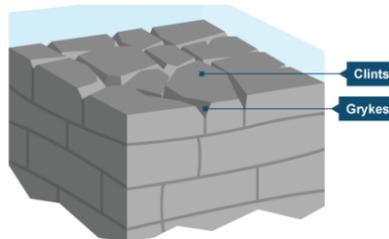
Various processes- erosion, weathering and mass movement, have led to the creation of cliffs, deep gorges, valleys, waterfalls and limestone pavements.

Malham Cove is one of the most distinctive features of the landscape.

- Over millions of years, earth movements caused the softer rock to slip and create a line of limestone Cliffs
- At the end of the last ice age, 15 000 years ago, melting water from the melting glaciers created a massive waterfall and eroded the cliff backwards to its current position

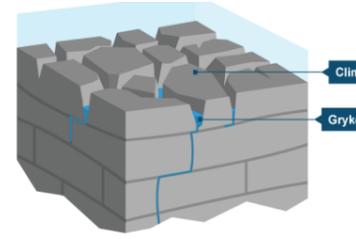


Limestone pavements are also a common feature in the area



The natural acidity in the rainwater enlarges any weakness and creates cracks known as **grykes**.

The exposed blocks of the limestone pavement are called **clints**.

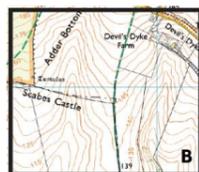


Can you draw these diagrams from memory adding annotations to explain how the feature is formed?

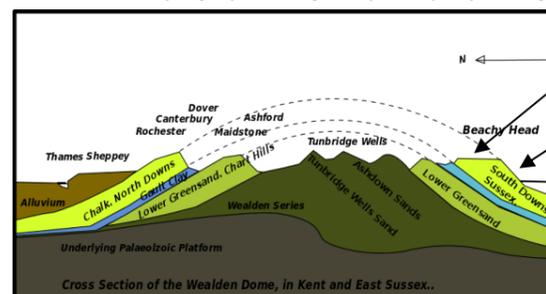
The North and South Downs - chalk (sedimentary) uplands

75 million years ago Britain was covered in a warm tropical sea (imagine!). When sea creatures died their shells and bones were compressed under the weight of the water and they became the chalk foundations for the North and South Downs. 30 million years ago **earth movements** caused these compacted layers of sediment to be forced upwards. This produced a giant chalk-covered dome (the Weald-Artois Anticline).

The dome experienced erosion over time and left the two remaining chalk escarpments of the North and South Downs. In the eroded area between the North and South Downs lies sandstone ridges (High Weald) and gentler, clay vales (Low Weald)



Which of these maps shows a scarp slope and which a dip? Explain your answer.



gentle dip slope
steep scarp slope



What Geographical features can you see on the photo?

An escarpment is a long, steep slope, especially one at the edge of a plateau or separating areas of land at different heights.

Exam - top tips

- read the question **CAREFULLY**
- follow the **COMMAND** words - tell you what to do
- be guided by the **KEY** words - what aspect the question wants you to focus on
- be **PLACE SPECIFIC** - where are you talking about?
- look at the number of **MARKS** available
- USE** the sources suggested
- CHECK** your answer once completed
- SPaG** - for extra marks
- if you're not sure, **HAVE A GO** anyway

The South Downs National Park - how human activity has helped create a distinctive landscape
Study the text below and in 2 different colours highlight the **advantages** and **disadvantages** of the area

Agriculture - the chalk grassland is ideal for grazing sheep with its rich nutrients whilst the clay grassland is suitable for dairy cows. On the south-facing lower slopes, the deep chalk soils are great for arable crops e.g. wheat and barley.

The income generated from farming supports the local economy and provides employment for 6% of the parks employees but changes in farming practice, including the loss of some arable crops, has damaged wildlife and chemicals have damaged the chalk grassland.

Forestry - woodland covers just less than a 1/4 of the park. The woodland, including ancient trees, provide essential habitats for wildlife and sustainable production of woodland provides wood for construction and heating. The clearance of some areas of woodland has however meant that precious woodland has its habitats have been lost

Settlements - around 120 000 people live in the area around the National Park. Many of these settlements reflect the character of the area with their use of local building materials. Demand for housing in the area in recent years have threatened the character of The Downs with the introduction of modern building materials. There has also been a decline in local services: post offices; schools; pubs.

Waves - destructive and constructive

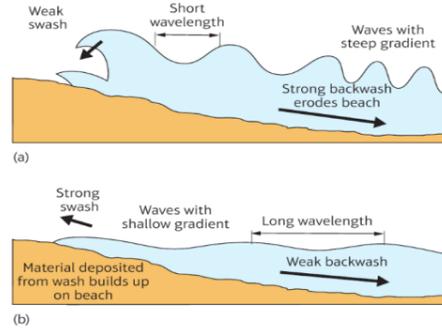


Figure 1 (a) Destructive and (b) constructive waves

Complete the table that compares the characteristics of destructive and constructive waves

	Constructive	Destructive
Formation		
Energy		
Breaking characteristics		
Coastal impact		

Why are constructive waves more likely to deposit material than destructive waves?

Erosion - the sea erodes in 4 ways

- Hydraulic action -
- Abrasion / corrasion -
- Attrition -
- Corrosion / solution



Coastal features of erosion - crack, cave, arch, stack and stump (CCASS)

Use the space below to draw an annotated sketch that shows the formation of CCASS

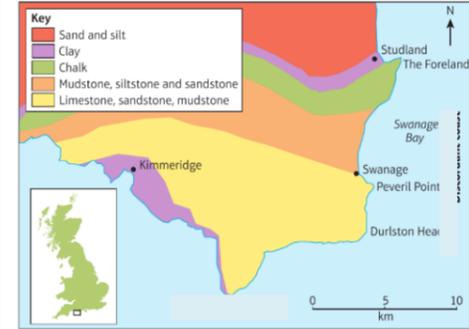
Sub-aerial processes

- 1.
- 2.
- 3.
- 4.

Concordant and discordant coasts

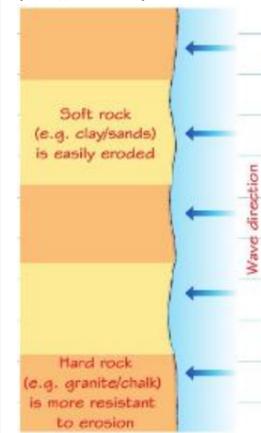
What are concordant and discordant waves?

Study the diagram below. Label the location of the concordant and discordant coastlines



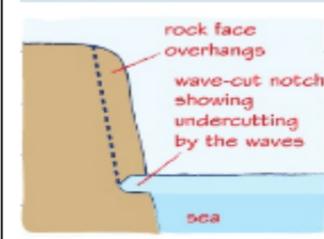
The formation of headlands and bays

Complete the next diagram in the sequence to show the formation of headlands and bays (include annotations)



Coastal features of erosion: waves-cut platforms

Use the space below to complete the next diagram in the sequence. Remember to add annotations.



Impact of climate on the UK

- 1.
- 2.
- 3.
- 4.

Deposition of materials

Different factors influence deposition:

- 1.
- 2.
- 3.

Geology of Coasts

The geological structure of coasts and the type of rock found there influence the rate of erosion and the landscapes that are created

Soft rock (e.g. clay)	Hard rock (e.g. granite - the daddy!)
1.	1.
2.	2.
3.	3.

Human impacts on coasts

Human activities can have direct and indirect, positive and negative, effects on coasts

Development	Industry	Tourism
1.	1.	1.
2.	2.	2.
Agriculture	Coastal management	
1.	1.	
2.	2.	

Transportation

Complete the diagram or the text below to show how waves to transport materials

traction		suspension	
	smaller stones are bounced along the sea bed	sand and small particles are carried along in the flow	

Coastal flooding

Climate change

- 1.
- 2.

Effects of climate change on the coastal environment

- 1.
- 2.

Impacts of increased risk of flooding on people

- 1.
- 2.

Longshore Drift

Waves transport eroded materials along the coast and deposit it when they lose the energy to carry it further. Use the space below to complete an annotated diagram showing longshore drift.

Coastal features of deposition - spit and bar

Complete an annotated sketch to show the formation of a spit

Integrated coastal zone management

- Do nothing
 - Hold the line
 - Strategic realignment
- Which would you chose? Justify your choice

Case Study - The Dorset coast

Coastlines are dynamic environments that are constantly changing through natural processes. The Dorset Coast has magnificent natural landscapes and much of it is a World Heritage Site. However, 25% of the coast has been developed, and human activities here have direct and indirect impacts on the landscape. For example, in the past dredging the seabed for sand and gravel off Dorset has led to increased erosion along the coast. Swanage Bay is a good example of the mixture of the semi-natural and human landscapes along this coast, which need to be carefully managed.

- Durston Bay is part of the World Heritage coast. Landslides and rock falls occur on its unstable cliffs, which contain internationally important fossil beds.

- About half of Swanage Bay is built up. Swanage is a residential and employment centre and an important tourist resort, centred on its wide sandy beach. Sea defences, including groynes, and a sea wall (see Figure 11, page 142) have been built to protect the beach and town.

- North of Swanage to Ballard Point and The Foreland, the beach gives way to scenic limestone cliffs, part of the World Heritage coast, which contain a range of important habitats.

Table 2 Natural and human processes in Swanage Bay

	Natural processes	Human actions
Durston Bay	Mass movement and coastal erosion	Minimal defences
Swanage Bay south	Coastal erosion and deposition	Well defended
Swanage Bay north to Ballard Point	Some erosion of hard limestone cliffs	Unprotected

Study the text in the Case Study box and in 2 different colours highlight the **natural (physical)** and **human** processes in the area.

Coastal flooding

Describe the location of places at risk from coastal erosion



Figure 15 Places in England and Wales most at risk from coastal erosion and flooding

Bars form in the same way as spits, with longshore drift depositing material away from the coast until a long ridge is built up. However, bars grow right across the bay, cutting off the water to form a lagoon.

Coastal management

Managing coastal processes can be done in different ways. All have different costs and benefits. Complete the table.

method	Sea wall		
hard / soft engineering			
image			
advantages		Sand reduces wave energy	
disadvantages			The foot of the cliff still needs protection from the waves