

Year 8 Geography

Name:

Coastal Landscapes



Brooke Weston
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Useful websites

- BBC Bitesize: <https://www.bbc.co.uk/bitesize>
- Cool Geography: <http://www.coolgeography.co.uk/>
- National Geographic: <https://www.natgeokids.com/uk/category/kids-club/>

Part 1: Coastal Landscapes

Why are coastal landscapes important?

The coast is the zone between land and sea. In the UK you are never more than 72 miles from the coastline, The United Kingdom has approximately 17,820 km of coastline and there are many different types of coastal environment: cliffs, beaches, sand dunes, salt marshes, ports/harbours and seaside resorts.

Task

Using the images below, think of 5 reasons why the coastline is important. Write them in the box below.



The images below show some of the more well-known parts of the UK coastline.



Padstow, a small fishing village on the north Cornwall coastline.



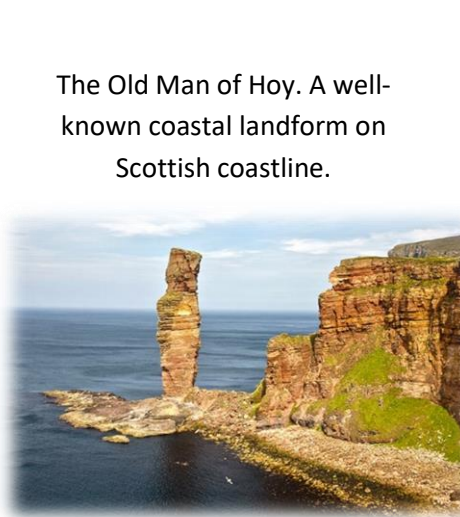
The Jurassic Coast, Dorset, considered one of the most beautiful coastal landscapes in the UK.



Blackpool in north-west England, one of the earlier seaside tourist destinations.



The Giant's Causeway. An impressive geological feature in Northern Ireland.



The Old Man of Hoy. A well-known coastal landform on Scottish coastline.



Happisburgh on the north-east coast of Norfolk. An area that suffers from coastal erosion and flooding.



Liverpool 2, north-west England. One of the busiest trading ports in the UK.

The white cliffs of Dover.



Task

Using the information on the previous page (and possibly some research), complete the table below. You need to match the description and the image to the location and then explain why each place is important, try to develop your explanations further than you did for the first task.

Location Number	Name and description of the location	Importance
1		
2		
3		
4		
5		
6		
7		
8		

Part 2: Coastal Processes

What processes are happening along the coastline?

The action of the waves and the sea constantly changes the shape and form of the coast.

Three key processes take place in the coastal zone:

Erosion - waves can erode the coastline in a similar way to the water in rivers. This usually occurs when the sea has lots of energy from the power of destructive waves.

Transportation - the movement of eroded material up and down, and along the coast.

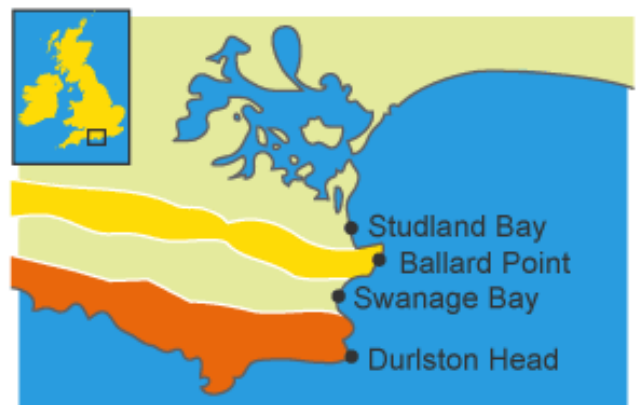
Deposition - when the sea loses energy, it drops the sand, rock particles and pebbles that it has been carrying, depositing them.

Key factors that affect the erosion of the coastline:

Rock type – harder rocks such as chalks and limestone can form steep cliffs, whereas clays and softer rock form large bays.

Rock structure - a discordant coastline, where rocks are at an angle to the edge of the coastline, will erode at different rates. The image to the right shows how the soft rock has been eroded quicker than the hard rock forming a bay.

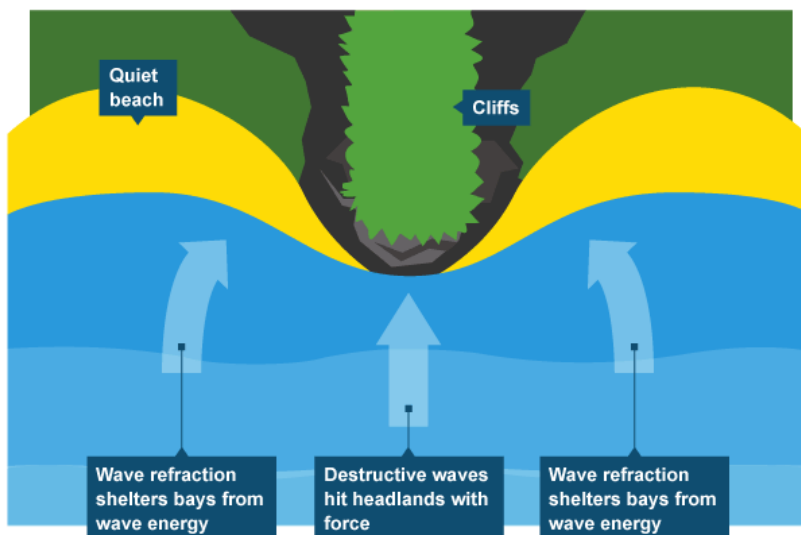
The shape of the coastline - headlands of a coastline are exposed to the full force of destructive waves. Bays are more sheltered from the wave energy because of wave refraction, so erosion is slower. **Wave refraction** (diagram below) is where the waves are slowed down as the water gets shallower which makes the waves less powerful.



Key

	Clay and sands (soft)
	Chalk (hard)
	Limestone (hard)

Below is an image of Swanage Bay (also shown in the diagram above) and the surrounding headlands showing how rock type and structure has influenced the shape of the coastline.



The type of wave - the amount of energy a wave has helps determine the rate of erosion.

Deposition is likely to occur when:

- waves enter an area of shallow water
- waves enter a sheltered bay
- there are calm conditions with little wind

The importance of waves

The power of waves is one of the most important forces that changes the shape of the coast. Waves are created by wind blowing over the surface of the sea.

The size of a wave depends on:

- length of time the wind has been blowing
- strength of the wind
- 'fetch' - how far the wind has travelled

Wave types

Waves can be constructive or destructive.

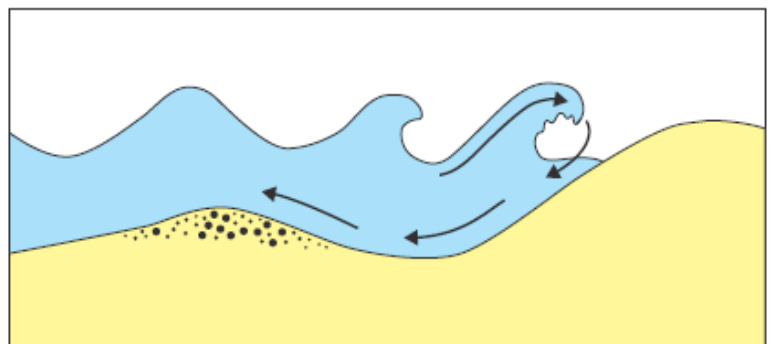
When a wave breaks, water is washed up the beach. This is called the **swash**. Then the water runs back down the beach, which is called the **backwash**.

With a **constructive wave**, the swash is stronger than the backwash. With a **destructive wave**, the backwash is stronger than the swash

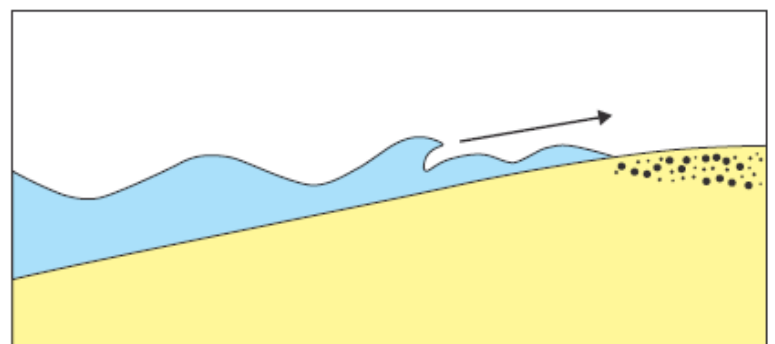
If the swash is stronger than the backwash (constructive wave), some of the sediment carried in the wave will be left behind to build up the beach. This means that the beach increases in size.

If the swash is weaker than the backwash (destructive wave), very little sediment is carried up the beach. With a strong backwash, material will be removed and the beach will decrease in size.

Destructive wave



Constructive wave



Coastal Processes Quiz – click on the circle next to the correct answer

1. What is the correct definition of the coastal zone?

Where the land meets the sea

Where people go on holiday

Where destructive waves are common

2. Which process involves the wearing away of the coastline by powerful waves?

Erosion

Transportation

Deposition

3. How does rock type affect rates of coastal erosion?

Harder rock erodes more quickly

Harder rock erodes more slowly

Older rocks erode more quickly

4. How does a discordant coastline erode?

Evenly, at the same rate

Rapidly

At different rates

5. What is the effect of wave refraction?

It concentrates wave energy on headlands

It prevents waves from reaching the coastline

It concentrates wave energy on bays

6. When is deposition likely to occur?

When the headlands reach far out into the sea

When there are calm conditions with little wind

At the base of steep cliffs

7. How are waves created?

By the rain

By people in boats

By the wind blowing over the surface of the sea

8. Which of the following is typical of a constructive wave?

10-14 waves per minute

Strong swash

Steep shape

9. Which of the following is typical of a destructive wave?

Strong swash, weak backwash

Weak swash, strong backwash

Equal swash and backwash

10. Which of the following factors affect the strength of waves?

The length of the fetch

The amount of water

The distance of the swash

Part 3: Coastal Landforms

What landforms are created by coastal processes?

Coastal landforms created by erosion include headlands, bays and cliffs. Landforms created by deposition include spits, salt marshes and beaches.

Landforms created by erosion

The coastline is constantly eroding. There are four key types of erosion:

Abrasion - waves transport material which hit the cliff and gradually wear it away.

Hydraulic action – the power of the water crashing against the coastline.

Attrition - waves cause the rocks to crash against each other, breaking them down into smaller and rounder pieces.

In addition, changes in landforms can be a result of wind erosion, weathering and processes such as mass movement.

Headlands and bays



Headlands are usually formed of more resistant rock types than bays.

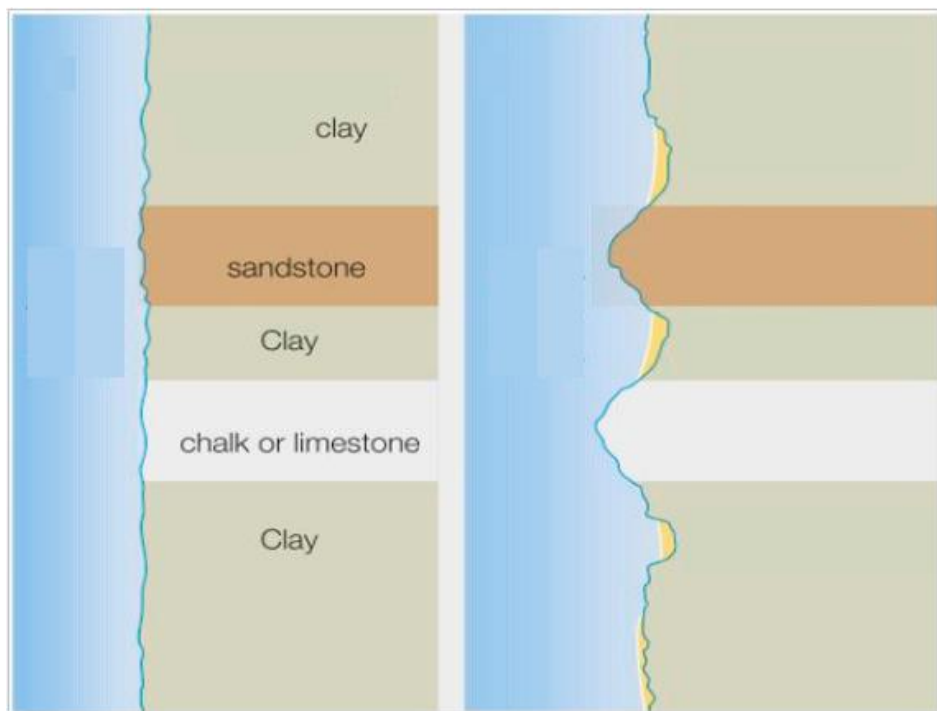
If there are different bands of rock along a coastline, the weaker or softer rock, such as clay, is eroded fastest. This leaves more resistant rock types, such as granite, sticking out.

Task

Using all of the information you have learnt so far, annotate around the image below to **explain** how coastal processes have resulted in the formation of headlands and bays. Use the text boxes provided.

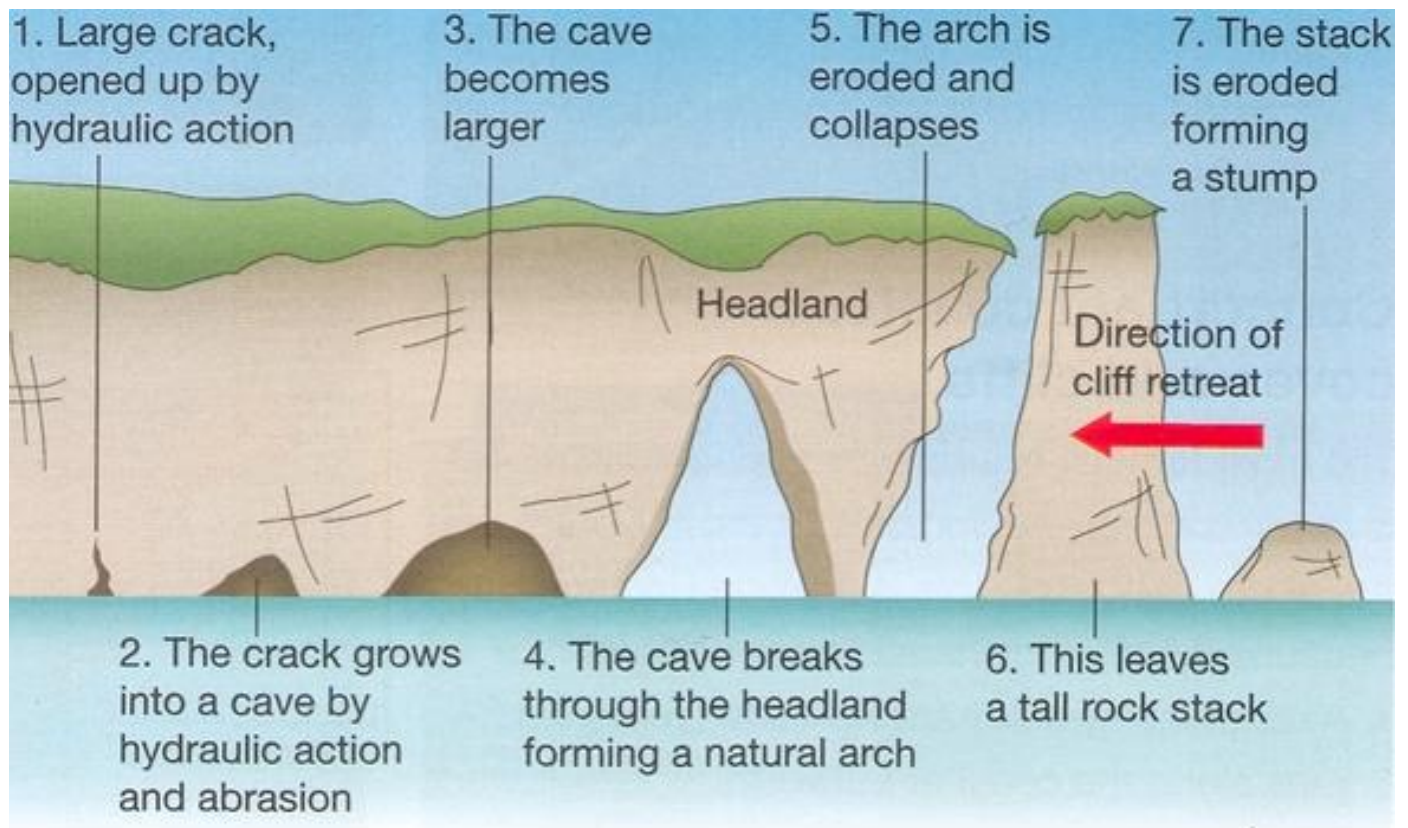
Remember to include

- all relevant key terms
- detailed explanation of the processes
- a real life example



Caves, arches, stacks and stumps

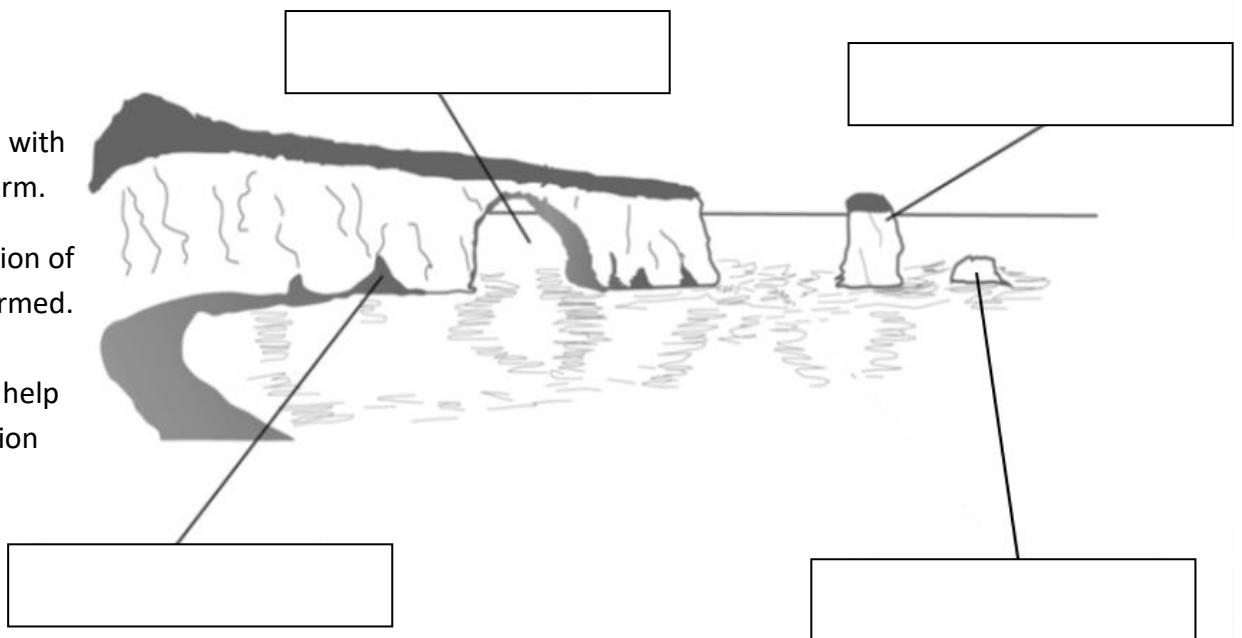
Headlands can be vulnerable to erosion because they stand out from the rest of the coast. Over time, other features may develop on a headland:



Task

Label the diagram with the correct landform.

Write an explanation of how they were formed. You can use the diagram above to help but your explanation should be more detailed.



Area for writing the explanation of how the landforms were formed.

Part 4: Coastal Management

How can the coastline be protected from coastal processes?

Coasts can be protected from erosion through hard engineering, like sea walls, and soft engineering, like beach nourishment. These have both positive and negative effects.

Coasts are important for many different reasons and for different groups of people. They provide:

- places to live
- places to work, eg fishing, ports and power stations
- places to relax - leisure and tourism industries
- wildlife habitats
- beautiful scenery
- educational value, eg geology and natural history

It is not possible to completely stop the power of natural forces from changing the coast. People try to protect some areas from erosion but this can have negative impacts as well as positive. The way the coast is managed can cause conflict between different groups of people.

There are two types of coastal management:

Hard engineering - this involves building structures to protect the coast. Tends to be more expensive and less natural looking.






Soft engineering - this involves working with nature by using natural materials or allowing nature to take back areas.

Below is a range of coastal management strategies being used at Hunstanton in Norfolk.



Task

Read about the different coastal management strategies in the table below. Based on the description, identify whether you think the strategy is hard or soft.

Management Strategy	Advantages	Disadvantages	Is it hard or soft engineering?
Sea wall 	Protects the area behind the wall Can provide a promenade to walk on Helps prevent flooding	Very expensive Waves bounce off the wall and remove material from the beach Can look ugly	
Beach nourishment 	Adds more material to the beach which widens beach and reduces the power of the waves as they approach Looks natural	Doesn't last long before it needs doing again	
Groynes 	Helps to stop longshore drift which is the movement of material along a coastline Traps material and builds up beach	May create problems further along the coast as they starve other beaches of material	
Managed retreat 	Allows the land to flood and becomes a marsh which acts as a buffer and reduces coastal erosion Creates new habitats	Land is lost Land owners need to be compensated Farmland may be lost	
Rock armour or Rip rap 	Large boulders absorb the wave energy and reduce the power of the waves Reduces erosion	Strong waves can remove material from around the boulder Can look ugly Can be dangerous to walk on	

Task

You are the main decision makers for the 'Coastal Environment Agency'; a government agency responsible for managing the coast. You are going to assess the major issues and problems along an imaginary stretch of coastline in the UK and decide what coastal management strategies can be used and where.

Unfortunately you don't have an unlimited budget so you will need to think carefully about which parts of the coastline are most in need of protection as you will not be able to protect the entire coast.

Tasks

- 1) Annotate on your map any problems / issues that you can see along the coastline.
- 2) Complete the key on your map by choosing appropriate different coloured symbols to show the different types of coastal management strategies.
- 3) Look carefully at **budget requirements** table below which shows what different types of protection your organisation is able to afford.

Strategy	Cost (£)	Conditions of use
Sea walls	£5million per kilometre	The company 'Sea Defences' only build sea walls in multiples of 1km stretches
Rip rap	£2million per kilometre	Stretches of rip rap must be a minimum of 1 kilometre in length
Beach nourishment	£1million per kilometre	The dredging company will only take contracts from your organisation if they have a minimum of 1km of beach to 'nourish'
Groynes	£1million each	To be effective in preventing longshore drift groynes need to be about 200metres apart
Managed retreat	£0	None
Taking no action	£0	None

- 4) Using your chosen key, illustrate on your map which methods you wish to implement and on which parts of the coast you wish to have them. You have a total budget of **£30million** and cannot overspend.
- 5) Annotate your map with the decisions you have made and justify why you made those decisions.
 - Explain why you have chosen the different coastal management methods along each part of the coastline; think about the effect it will have on the coastline and why you didn't choose the alternatives
 - If you'd had an unlimited budget would you have done anything differently?

