Zig Zag Education

Geography

GCSE (9–1) | OCR B | J384

2016 specification
first exams in 2018

GCSE OCR B Case Studies

Topic 3: Distinctive Landscapes: Coastal

The Jurassic Coast

Update 2nd Edition, November 2023

A teaching and learning resource endorsed by

OCR
Oxford Cambridge and RSA

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POD 12418

Contents

Teacher's Introduction

This resource has been developed to provide case studies and practice material to support the GCSE OCR B specification (J384) **Topic 3: Distinctive Landscapes: Coastal and River.**

This detailed case study is on **The Jurassic Coast** representing a **UK coastal landscape**.

The case study includes a main content section which can be used as part of a lesson plan or distributed to students for self-guided research; a selection of ICT interactive links to further students' research around each topic and a set of Springboard Images and discussion questions (also available as a PPT file accessible by digital download) which makes a fantastic starter activity.

*A webpage containing all the links listed in this resource is conveniently provided on ZigZag Education's website at **zzed.uk/8853***

You may find this helpful for accessing the websites rather than typing in each URL.

The practice section which follows the case study contains a summary table, bringing together all of the key facts and figures relating to the case study; rapid-fire revision questions (with answers) to help recall and retention of the main points and extension questions to challenge your high achieving students. A practice question and mark scheme is also included in the practice section, so that students can practise answering questions relating to case studies and applying relevant knowledge in their answers.

The resource may be used as a source of reference for the required case studies for individual study, or for group work leading to discussion or debate. Subheadings in the information sections are designed to enable tabulated comparisons of social, economic and environmental impacts.

Other detailed case studies are available for this topic area representing coastal and river landscapes from around the UK:
The Seven Sisters

- The River Thames
- The River Spey

A PowerPoint presentation containing the Springboard Images starter activity to accompany this resource is provided on the ZigZag Education Support Files system, which can be accessed via **zzed.uk/productsupport**

November 2018

Endorsement update, Second Edition, November 2023
To meet endorsement requirements, the following changes have been made:

- Disclaimer added (page 1 reminding teachers that questions are designed to practise exam skills but are not endorsed by OCR.
- Various changes have been applied across the resource regarding references to 'exam-style' questions and 'exam preparation'.
- Amendments applied to content on Durdle Door (page 4), Chesil Beach (page 6) and Lyme Regis (pages 9–10) to provide greater application, depth and explanation in regard to geomorphic processes.
- Amendments applied to Lulworth Cove content (page 5) to improve terminology used describing resistance of rocks.
- Springboard 3 questions (page 16) and answers (page 19) have been expanded to include coverage of tourism.
- Changes have been applied to the 6-mark practice question and mark scheme on pages 28 and 29 to better reflect the terminology used by OCR.

The Jurassic Coast

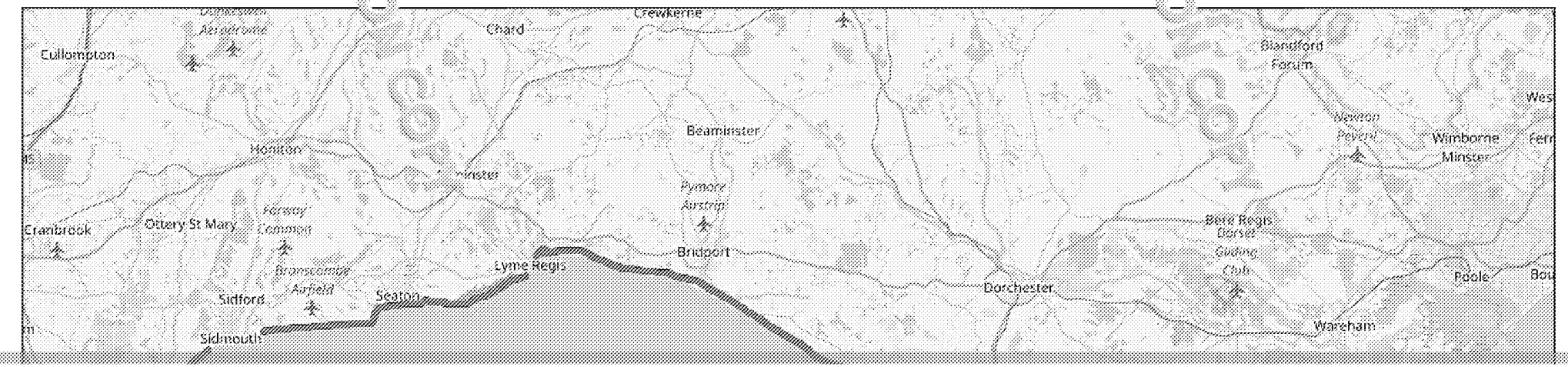
Part 1: Case Study

Content

Introduction

The Jurassic Coast is a distinctive stretch of coastline situated in the south west of the UK. It spans approximately 95 miles across the counties of Devon and Dorset, beginning at Orcombe Point in Exmouth and finishing at Old Harry Rocks by Studland Bay.

The coastline is a very important landscape due to its unique geological history, beauty and array of coastal landforms. It attracts millions of visitors each year who come to enjoy the beaches, the walks and to search the coast for fossils. It became a world heritage site in 2001 demonstrating its significance as a site of global importance.



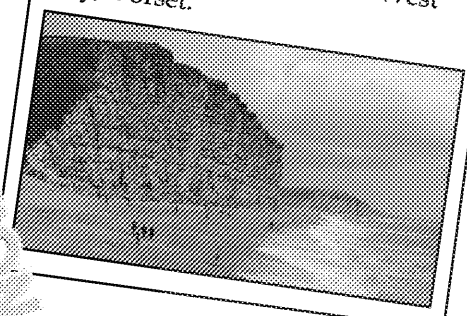
The unique geology of the coastline gives an insight into Earth's past environments; revealing the secrets of the climate, flora and fauna of a time well before humans were around. The rocks found at the east of the coast date back around 65 million years and as you travel west towards Exmouth, you travel back in geological time to rocks from around 250 million years.

So how was this unique stretch of coastline formed?

The rocks are all from a period of time called the Mesozoic Era which began around 250 million years ago. Within this era there are three different time periods that the rocks come from: the Triassic, Jurassic and the Cretaceous. Normally, these types of rocks would build up on top of each other vertically. However, due to shifts in plate tectonics the layers of the rock tilted onto their side and exposed this unique landscape that spans a period of 185 million years. Take a look at the timeline on the following page to find out more about these time periods.

Did you know?

The Jurassic Coast is also a popular site for filming. Most recently, the TV programme Broadchurch was filmed in West Bay, Dorset.



Jurassic Coast Timeline

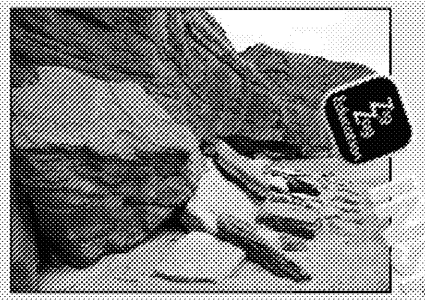


Figure 2 Exmouth Red Cliffs.

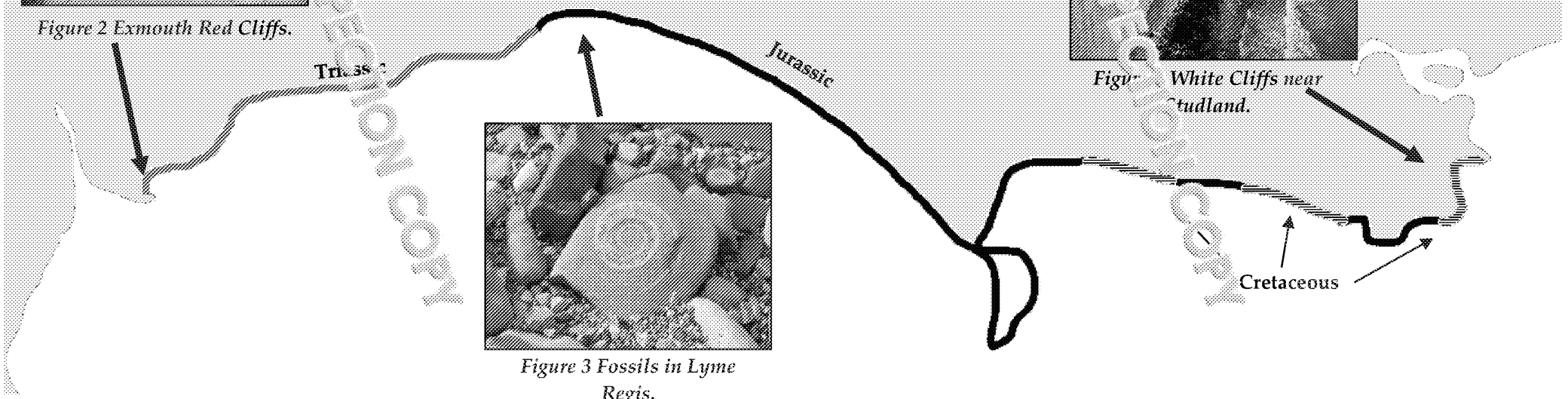


Figure 3 Fossils in Lyme Regis.

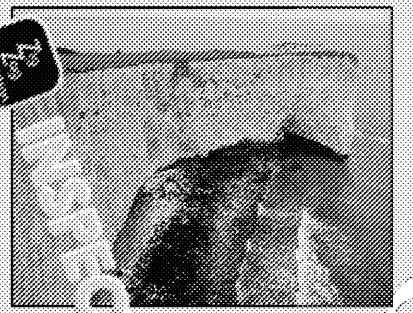


Figure 4 White Cliffs near Studland.

The Triassic Period	The Jurassic Period	The Cretaceous Period
The Triassic Period began around 250 million years	The Jurassic Period spanned from 200 million years ago	The Cretaceous Period began around 145 million years

Landforms

The Jurassic Coast is home to many different coastal features and landform
making the coastline so interesting. These are mainly formed through the g
weathering, erosion and deposition. The length of the Jurassic Coast, along
means that some areas are concordant and others discordant, which also he
landforms. Below is more information on particular distinctive landforms t

Durdle Door is a very famous coastal arch formed through erosional proce

Figure 5: Durdle Door

Rock type(s): Portland limestone, which is a hard rock.

Formation: This arch has formed over years of erosion from the sea a
time ago the arch would have been a headland. Gradual
limestone headland would have begun to erode as it was
processes such as erosion (predomin ly hydraulic acti
chemical and biological wea in freeze thaw, carbon
At first this would h rm a cave in the headland.
processes co ne cave would eventually have ero
arch e today. In time, further erosion and weatheri
c apse (mass movement, another geomorphic process),
further eroded and weathered to form a stump.

Lulworth Cove is situated nearby to Durdle Door. It demonstrates a great
concordant coastline.

Figure 6: Lulworth Cove

Rock Type(s): Variety of different rock types. The headlands are made
cliffs are made of clay.

Formation: The unique cove that has formed in Lulworth was caused
processes and geology. Lulworth lies on a concordant co
to the shore. The front of the coastline is made of hard / r
cove cliffs are made of soft / less resistant rock. Thousand
not have existed. Instead, a river flowed through the land
through the different types of rock but eroded the clay ar
more easily than the surrounding hard / more resistant r
widen where the soft rock was. Over time the sea has co
than the surrounding rock, creating ve. The river that
reduced to a small stream le vi behind a beautiful cov

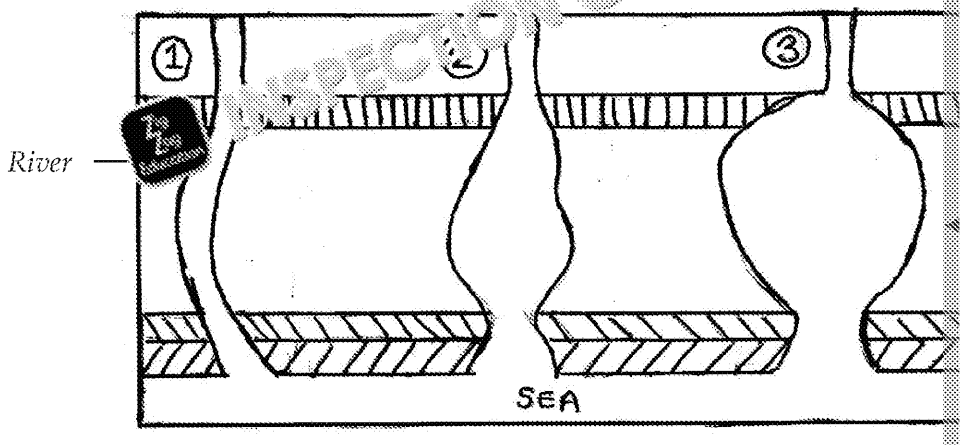


Figure 7: Lulworth Cove forma

Chesil Beach is an example of a tombolo (where a spit joins mainland to a depositional processes.

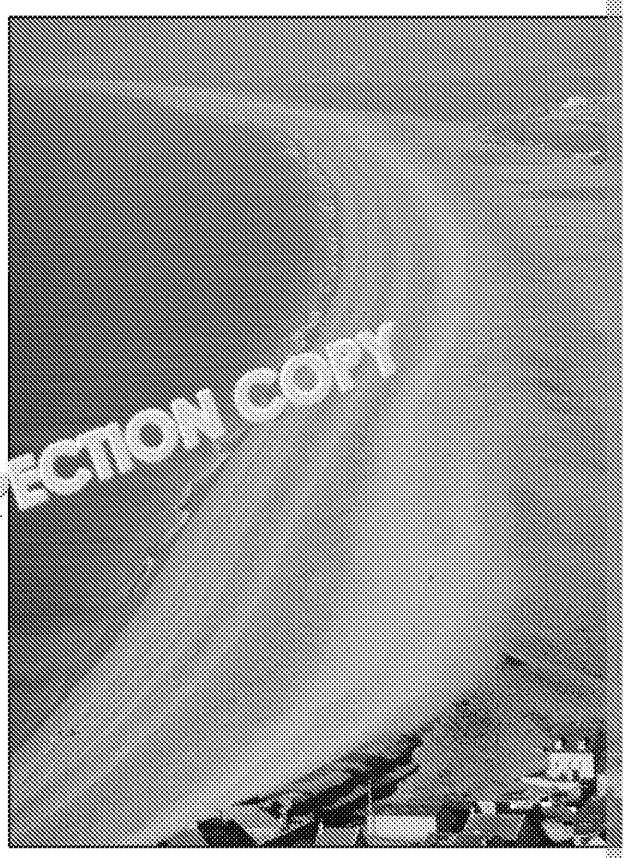


Figure 8: Chesil Beach

Sediment Type: Beach is made up of shingle and large pebbles.

Formation: No one knows exactly where the vast amount of sedimen Beach but there are theories that it came from landslides were retreating thousands of years ago. The prevailing s long fetch (over several thousand kilometres) caused the sediment towards the Isle of Portland through the proces saltation, suspension, solution). This would have first fo sediment continued to be transferred in the direction of t southwest, it would have extended eastwards to form a s deposition of sediment at the eastern end of the spit caus of Portland, connecting the island to the mainland and c today. Chesil beach itself is ver[illegible] demonstrating the area. This type of beach is called a storm beach and acts lagoon behin

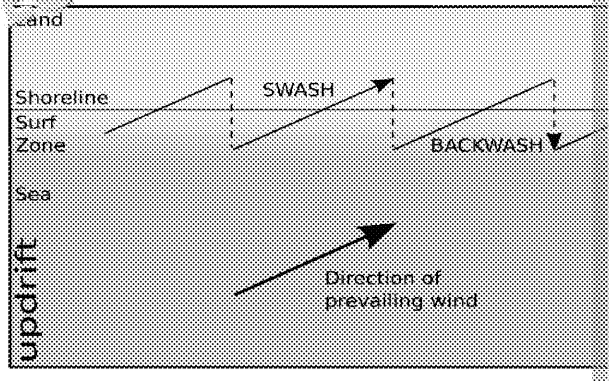


Figure 9: Diagram of longshore drift – how Che

Physical influences on the Jurassic Coast

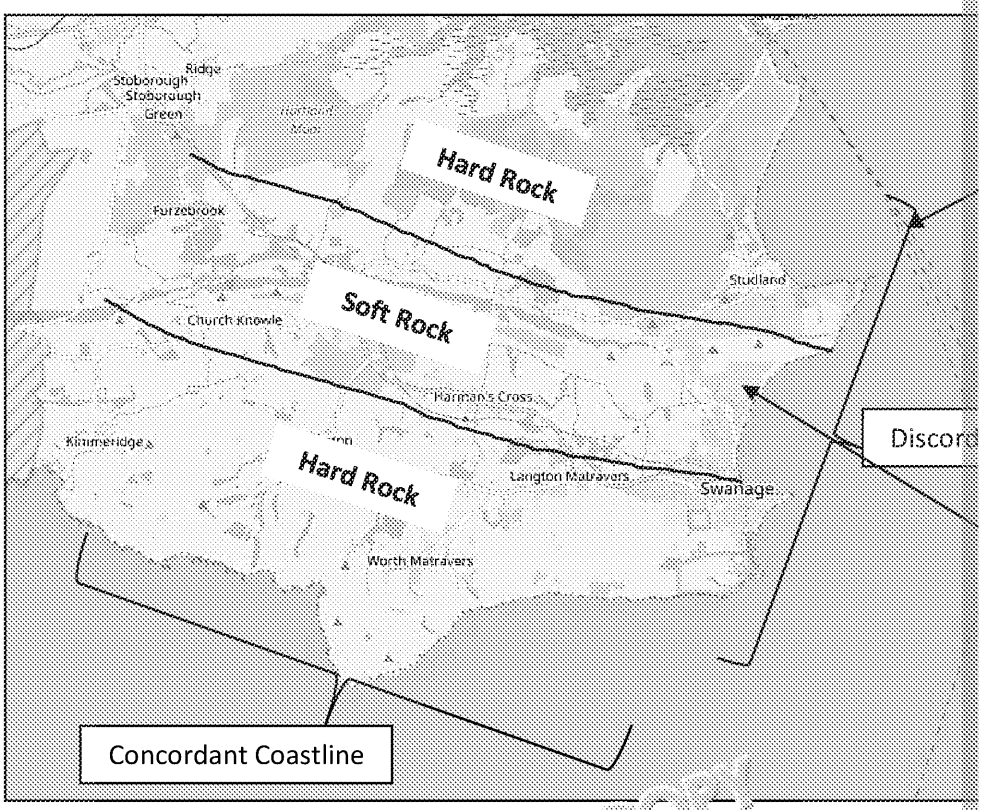
The shape and features of the Jurassic coast have been mainly formed thro
However, there are other physical factors that influence the effectiveness o
geology of the landscape and the climate can play significant roles in shap

Geology

As we have already established, the geology of the Jurassic Coast varies co
geology has played a significant role in shaping the landscape.

- The harder rocks such as the limestones, sandstones and chalk have h
headlands, arches and stacks as they are not as affected by geomorphi
- The softer rocks have helped to form bays and coves as they are more
- In addition, the variation in concordant and discordant coastlines has
well as unusual landforms such as Lulworth Cove.

The diagram below shows an example of an area of the Jurassic coast that
and discordant coastline.



Climate

Climate is also a factor that can influence the shape of the landscape as we
geomorphic processes. The Jurassic Coast feels the full force of the UK's so
This wind helps to increase erosion processes along the coastline by creati
addition, the wind brings in storms from the Atlantic Ocean. These storms
coastline gradually over time, but also rapidly over the course of just a few
this was during the winter storms of 2013/14.

The winter storms of 2013/14 was the stormiest period for 20 years with tw
in quick succession, over the period of December to February. Coastlines w
the Jurassic Coast was subject to extreme levels of weathering, erosion and
completely changed the shape of the coastline in the space of a few days.

How the winter storms (2013/14) changed the shape of the Jurassic Coast

Chesil Beach and the Isle of Portland were particularly affected by the wint
of the coast is already exposed to strong winds and waves so the winter sto
changing the shape of the coastline. Below are two examples of how the sh

A stack formation known as Pom Rock on Portland Bill was completely des
effects as shown in these images:

Before:

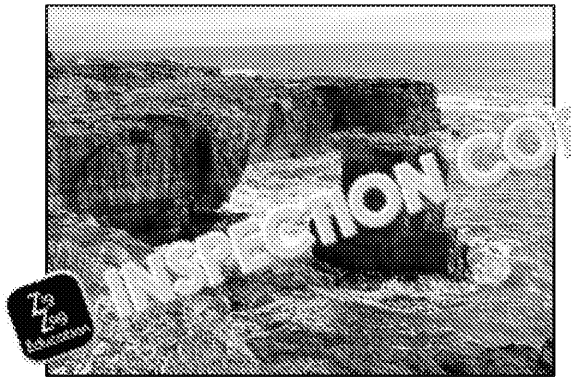
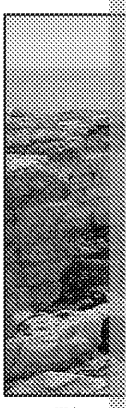


Figure 10: Pom Pom Rock before the winter storms

After:



Figur

The force of waves during the storms changed the shape of Chesil Beach by forcing the sediment on the beach inland creating an even steeper bank. The storm waves even threw pebbles onto the pavements and road behind the beach.

Figure 12 shows the beach being replenished and flattened with pebbles and sediment after the storms.

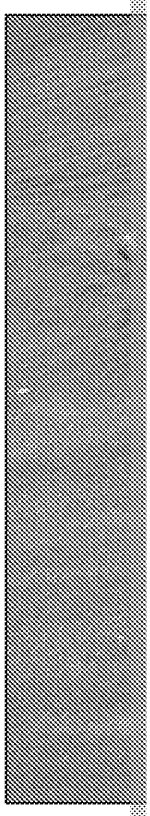


Figure 12:

Anthropogenic climate change (climate change caused by human activity such as the burning of fossil fuels) is another factor which may change the shape of the Jurassic Coast in the future. The two main ways it may affect the Jurassic Coast is through:

1. **Sea level rise**
   With the sea level rising, it gives the waves more power over more of the coastline. This means that there could be increased erosional processes, such as hydraulic action. In addition, some of the coastline may become submerged by the sea.
2. **More frequent storms**
   Experts are also suggesting that climate change will increase the number of storms the UK experiences. As shown above, storms can rapidly change the shape of a coastline through increased geomorphic processes.

Human influences on the Jurassic Coast

Humans are influencing and changing the shape of the Jurassic Coast all t
attractiveness of the coastline has made it both a popular place to live and
The main way that humans influence the Jurassic Coast and the geomorpl
through coastal management.

Why would humans want to manage the Jurassic Coast?

- To preserve the unique coastline
- To protect the infrastructure of the towns and villages near the coast
- To protect human life from the risks that coastal erosion brings

There are many different types of management th[illegible] been used along
engineering in the form of beach replenish[illegible]t [illegible]ard engineering in the
armour. Sometimes the manage[illegible]t strategy is simply to 'do nothing'! Al
management have helped [illegible]e the Jurassic Coast to what we see today
example wh[illegible] all [illegible] management have taken place.

Lyme Regis

Lyme Regis is a town along the Jurassic Coast that lies on the border between Devon and Dorset. It is home to around 3,700 people. It is also a popular tourist destination with thousands descending on the town each year. They come to enjoy the iconic harbour, Cobb and beach. Due to its location, it is also a top site for fossil hunters and people have been coming to Lyme in search of fossils since around the 1800s.

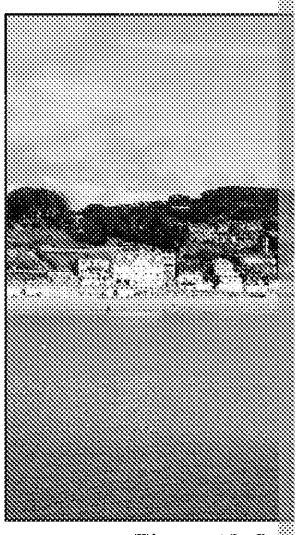


Figure 13: Ly

The town has also been in a battle with the sea and its erosional power for many years. The area of land that the town sits on is highly vulnerable to landslides which can be triggered by a combination of geomorphic processes and their interaction with the local g
prone to mass movement in the form of slumping, particularly during the
totals are high and storms increase the erosional power of the waves.

Water percolates through the softer greensand which lies over harder, less
greensand becomes saturated which makes the cliff unstable. This instabil
worse) by the slope of the land, which dips down towards the sea, and by
of the cliffs, which causes slumping. Unlike landsli[illegible]s slumps occur over

Over the last 20 years the town has b[illegible]ject to various stages of coasta
the effects of these issues.

Why does L[illegible]Reg[illegible] coastal management schemes?

- Anthr[illegible]ic climate change (climate change caused by human acti
fossil fuels) is likely to increase the risk of mass movement in the form
- The sea itself has a powerful effect on Lyme Regis by washing sedime
quickly and triggering landslides.
- Lyme Regis is also a very popular place to live and has been for many
there need protection from the erosion and landslides that threaten th
- Tourism is one of the main incomes for the town, so preserving the to
keep the tourism trade going.

The management strategy

The main management strategy for Lyme Regis was planned in the early 1 to be completed over the course of 20 years. These schemes mainly consist although some soft engineering techniques have also been incorporated. T came to around £56 million.

Phase 1	
Completed:	1995
Cost:	£10 million
What:	• Hard engineering: New sea wall was built which als promenade for people to w[illegible]g. A sewerage s the sea wall to help provide a better sewerage syste • Hard engi[illegible]ons: Rock armour was put in place as w[illegible]

Phase 2	
Completed:	2007
Cost:	£26 million
What:	This phase was more extensive than the last as it focuse well as protecting the land from the sea. The following • Hard engineering: The sea wall was extended • Hard engineering: Rock armour was extended off th • Hard engineering: The old wooden groynes were d stone groynes • Soft engineering: The beach was replenished with 7 the sand came all the way from France and the rock • Hard engineering: The sloping land was stabilised u bored piles and 2,300m of trenches were made and the drainage

Phase 3	
Completed:	-
Cost:	-
What:	Soft engineering: Phase 3 was designed to tackle Ware C to the west of Lyme Regis. However, upon consideratio low-risk area and that spending th[illegible]oney to save the l would not be worth it. It w[illegible]s, therefore, decided to 'do its course in that a[illegible].

Phase 4	
Comple	2015
Cost:	£19.5 million
What:	This part of the plan focused on the east side of the town to landslides. The following works were completed: • Hard engineering: Slope stabilisation took place on including piling, the installation of 2,500 soil nails a • Hard engineering: The sea wall was extended by 39 of Lyme Regis and under the unstable cliffs

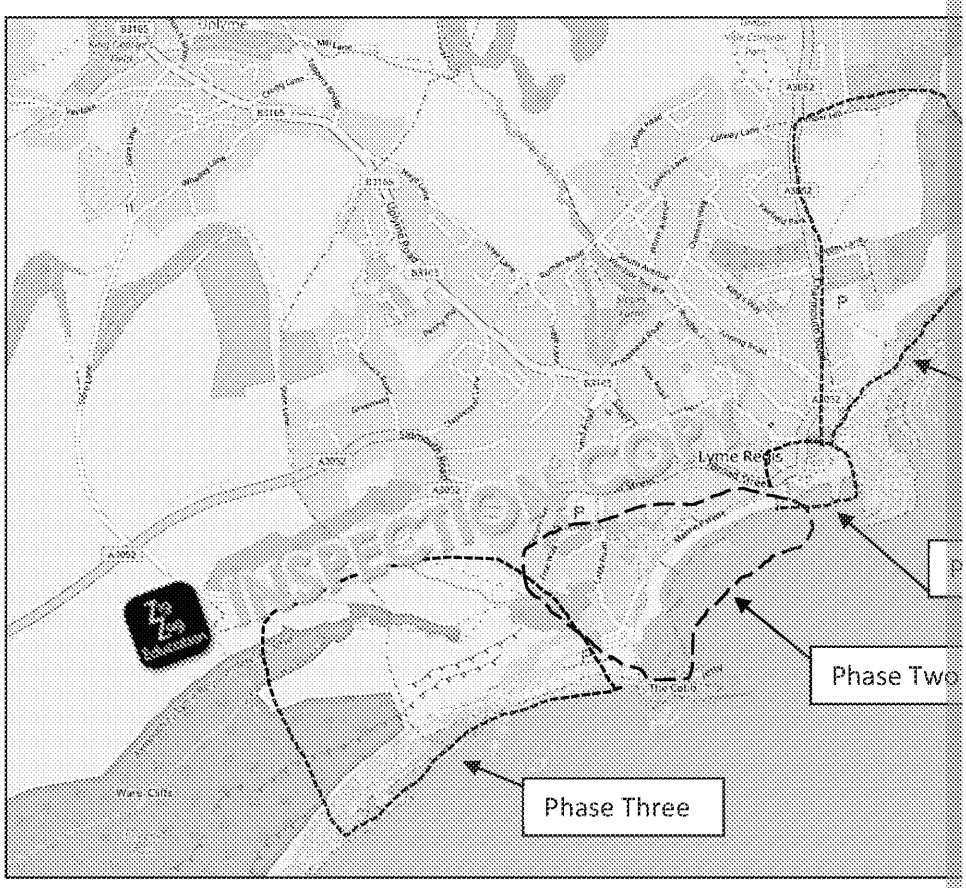


Figure 14: Map showing different phases of Lyme Regis ma

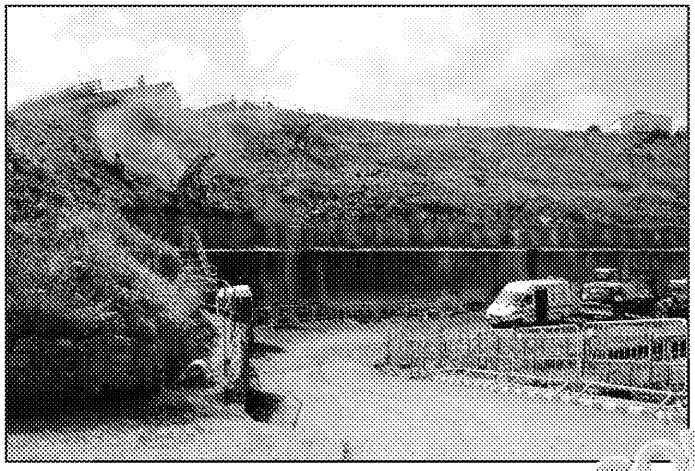
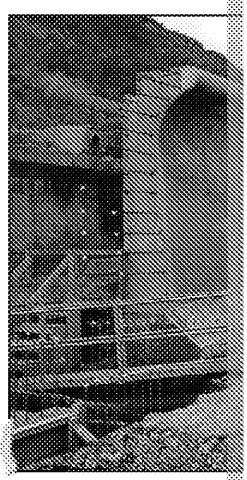


Figure 15: Soil nailing in East Cli



Figure

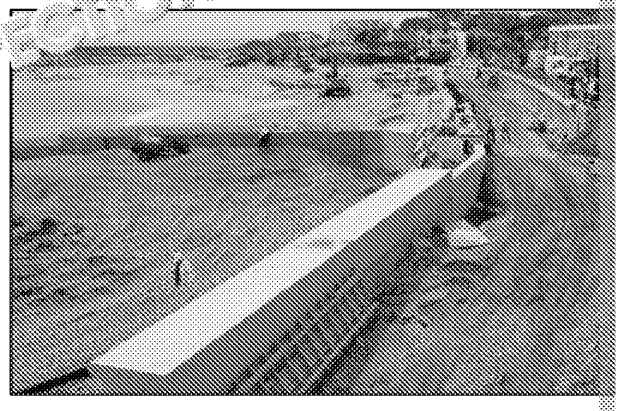


Figure 17: Beach replenishment in Lyme Reg

Effects and conflicts

The hope for all these phases of coastal management was to provide long-s
and the coast. So how effective have they been and has there been any con

Effects:

- The sea wall has been effective at protecting the seafront properties an
been useful in promoting the town as a tourist destination due to the s
scenic views across the bay.
- The slope stabilisation projects help to prevent landslides that could b
The stabilisation strategies in the East Cliff area have helped to save a
metres of road that would have been destroyed in 50 years' time if no
- The residents of Lyme Regis feel more se[illegible] their own homes as th
won't be damage from landslide
- The beach replenishment is not only providing extra protection for th
is also attracting [illegible] tourists to the area as there is a 'new' beach.
- Touris[illegible] has increased as the beaches and coastline are now m

Potential Conflicts:

Altogether the project cost a lot of money – could it be better spent elsewhere?

Landslides can be good in the right place as they release more fossils and bring more income to the town. Preventing them could be a bad thing.

Some of
around
repairin
cost eve

The sea will continue to erode the shoreline anyway so shouldn't we just let the natural process of erosion happen? A managed retreat [illegible] have been more ap[illegible]

The sea wall ha
be extended or
more of the tow
too much?

Overall it is hard to say whether the coastal management at Lyme Regis h
time will tell!

Fact Table

Location:	South West UK
Counties:	Devon and Dorset
Length:	95 miles
Age of the oldest part:	250 million years old
Age of the youngest part:	65 million years old
Time span:	185 million years
Rock types:	Mudstone, sandstone, limes Pu[illegible]), clays, white chalk
Erosional landforms:	D[illegible]rdle Door (arch) Lulworth Cove Old Harry Rocks (stack) Headlands
Deposition[illegible]landforms:	Chesil beach (tombolo) Beaches
Geomorphic processes:	Weathering Erosion: hydraulic action, a deposition
Physical influences on the landscape:	Geology • Rock type • Concordant/discordan Climate • Storms • Climate change
Human influences on the landscape:	Walking, tourism, residenti
Lyme Regis population:	3,700
Lyme Regis hard engineering :	• Sea wall • Groynes • Slope stabilisation – pil buttresses • Rock armour
Lyme Regis soft engineering:	• Beach replenishment • 'Do nothing' – west sid and Monmouth Beach)
Total cost of management plans:	Approximately £56 million
Cost of Phase 1:	£[illegible]0 million
Cost of Phase 2:	£26 million
Cost of Phase 4:	£19.5 million
Amount of [illegible]in[illegible]used for beach replenish[illegible]	70,000 tonnes
Number of bored piles used to stabilise the land in Phase 2:	1,150
Length of gravel drainage trenches made in Phase 2:	2, 300 metres
Length of sea wall extension in Phase 4:	390 metres

ICT Interactive Page

Rather than type out these w

Videos

Jurassic Coast Trailer
- **https://www.youtube.com/watch?v=NXGVNYYeuvA**

What is the Jurassic Coast?
- **http://jurassiccoast.org/about/what-is-the-jurassic-coast/**

360° View of Jurassic Coast
- **https://www.youtube.com/watch?v=h.[illegible]wMOy8Y**

What makes the Jurassic Coast special?
- **https://www.youtube.com/watch?v=VFKTFOu_dm8**

Chesil Beach Winter Storms 2013/14
- **https://www.youtube.com/watch?v=84EQtsgA0_8**

Crack appears in Jurassic Coast
- **http://www.bbc.co.uk/news/uk-england-dorset-36035800**

Lyme Regis Landslide
- **https://www.youtube.com/watch?v=eLvwr80KLHo**

Lyme Regis Coastal Management
- **https://www.youtube.com/watch?v=DEZKCy7lpCU**

News Stories

BBC – Cliff Collapses on Dorset's Jurassic Coast
- **http://www.bbc.co.uk/news/uk-england-dorset-37102619**

The Guardian – Winter Storms on Chesil Beach
- **https://www.theguardian.com/uk-news/2014/jan/07/uk-floods-chesil**

Government Press Release – Flood defence repair work on Chesil Beach
- **https://www.gov.uk/government/[illegible]d-defence-repair-work-c**

BBC – Isle of Portland [illegible] Storms
- **http://www.bbc.co.uk/news/uk-england-dorset-26232313**

BBC – Lyme Regis Coastal Management
- **http://www.bbc.co.uk/news/uk-england-dorset-33060524**

Springboard 1

Figure 18: Red Cliffs of Ladram Bay, Jurassic C

1. Name any coastal landforms you can see in this picture.
2. Describe how they might have been formed.
3. From which part of the Jurassic Coast do you think this photo was tak

Springboard 2

Figure 19: Erosion on Old Beer Road, Jurassic C

1. Why might this part of the cliff have collapsed?
2. This section of road is now closed for good. Discuss why they might h than repair the damage and reopen the road.
3. What effects might this have had on the local people?

Springboard 3

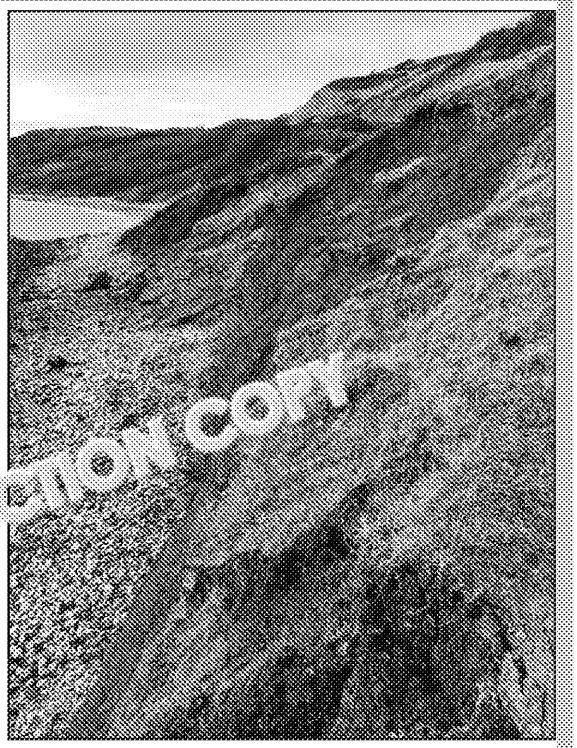


Figure 20: Slumping near Ringstead, Jurassic Coa

1. What geomorphic processes have shaped this landform?
2. How might climate change affect the processes which create this featu
3. Discuss how slumps, rockfalls and cliff collapses impact the economy

Springboard 4

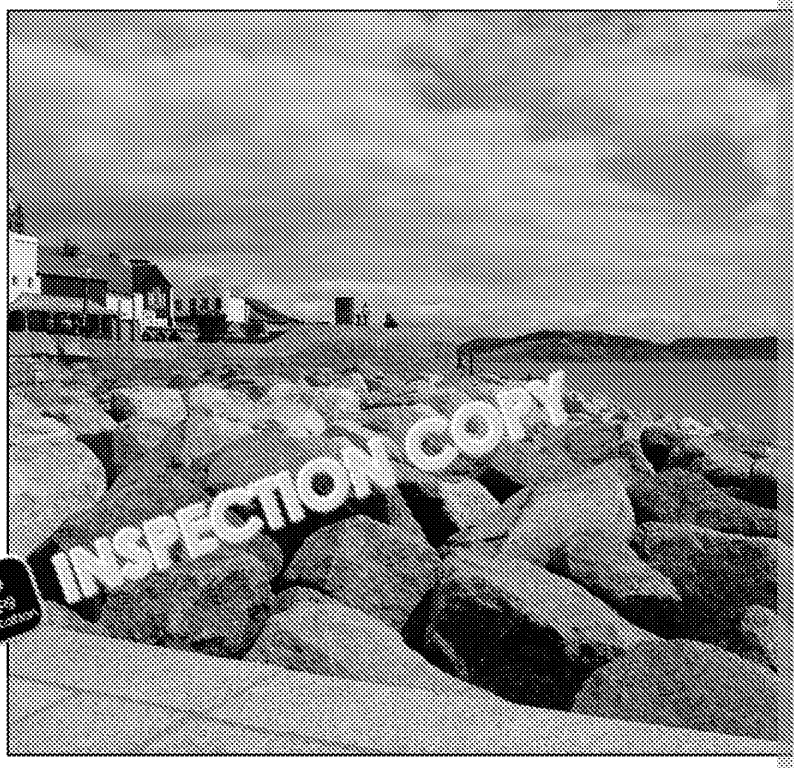


Figure 21: Hard engineering in Lyme Regis

1. What type of hard engineering can you see in the photo?
2. How does it help to protect the town?
3. Can you think of any other hard engineering strategies that could hel

Figure 22: Soft engineering in West Bay, Bridport

1. What soft engineering technique is shown in the photo?
2. How does this help to protect the beach and town from erosion?
3. Discuss the advantages and disadvantages of soft engineering.

Springboard Suggested Answers

Springboard 1

1	• Stacks • Bays • Headlands • Stumps
2	• Headlands and bays formed because the erosion rate of the s the headland is faster than the erosion r f the hard rock w headland. • Stacks and stumps have f d as the headlands have erode leaving the ha st n t resistant rock remaining in the form the st e away creating a stump.
3	T ss section of the coastline due to its red colour which in de Pangea.

Springboard 2

1	The cliff may have collapsed because of the effects of weathering a may have weakened over time and eventually crumbled. It could influenced by rainy or stormy weather which may have increased and weathering. It may also have been a softer rock so was more e
2	They may have chosen not to repair the damage and reopen the r have cost too much. Also, the road will only continue to erode an happen again. It looks like a small road so it also may not have be make it viable to repair.
3	If there are any people living on the road it would be quite inconv be shut. It may also be worrying if you live close to the cliff edge i to your house. It could also be a threat to human life.

Springboard 3

1	Like all coastal landforms, slumping is caused by a combination o down the rock and erosion wearing away the rocks at the foot of t processes are exacerbated (made worse) by rainfall, which saturat destabilises the slope.
2	Anthropogenic climate change (climate change caused by human burning of fossil fuels) will lead to rising sea levels which will inc also cause more powerful and more frequent storms which will m rapid. Higher rainfall during winter will make the soil more satur increase the rate of slumping.
3	Tourism is very important for the Jur[illegible] coast so images like th negative impact, putting peo[illegible] visiting. Coastal walking is a on the Jurassic Coast, [illegible]particularly the South West Coast Path, wi of hikers. Slumping and rockfalls may cause footpaths to be close b[illegible] below to be closed to tourists. They would particularly in wi[illegible]rch the cliffs for fossils. All of these impacts would dama with people losing jobs and businesses closing.

Springboard 4

1	• Rock armour • Sea wall
2	• The rock armour helps to spread the wave's power before it l • The sea wall acts as a barrier so the waves are reflected instea the town's sea front.
3	*Examples*: • Building groynes would help to stop too much sand and sedim • Stabilising the land would help the land to be less affected by • Gabions could help to dissipate the power of the waves.

Springboard 5

1	Beach replenishment
2	By replacing the sediment which gets lost through erosion it resto normal size and the sea will wash away the new sediment instead acts as a kind of barrier to the town so by restoring the sediment i from the powerful waves.
3	*Advantages*: • Cheaper • Allows the natural process of erosion to continue • [illegible] *Disadvantages*: • Has to be replaced regularly • Is only partially effective • Often has to be used with hard engineering techniques – is the

Summary

Jurassic Coast

Introduction

- The Jurassic Coast is a geologically unique coastline found in the sout
- It spans 95 miles across East Devon to Dorset, covering 185 million ye
- The rocks are from the Mesozoic Era, specifically from the time period Cretaceous.
- The Triassic Period began around 250 million years ago until 200 milli this time period is mainly coloured mudstone and sandstone.
- The Jurassic Period began around 200 million years ago until 145 milli range from clays to sandstones and limestones, all of which are full of
- The Cretaceous Period began around 145 million years ago and spann The rocks found in this period range from sandstone to limestone and

Landforms

- The Jurassic Coast is home to many coastal landforms formed through depositional processes.
- Durdle Door is an example of an arch formed through erosional proce
- Lulworth Cove is an example of an erosional landform on a concorda
- Chesil beach is an example of a tombolo formed through depositional p

Physical influences on the shape of the coastline

- The type of rock and the way it lies (the geology) can influence how e processes, such as erosion and weathering, are.
- Softer rocks erode more easily whereas harder rocks resist erosional p helps to form different landforms.
- Concordant coastlines and discordant coastlines allow the formation o
- Climate and weather also affect the shape of the coastline; for exampl rapidly changed the shape of parts of the coast in a matter of days.

Human influences on the shape of the coastline

- One of the main ways human activities shape the coastline is through
- The Jurassic Coast is managed by the through hard engineering and so
- An example of an area that has had a lot of management is Lyme Reg
- There were four types of management planned, three of which have ta
- Examples of the hard engineering that has been put in place: sea wall and rock armour.
- Examples of soft engineering that has been put in place: beach replenishme
- The work has mainly been effective in stopping landslides and slowin
- However, it could be suggested that too much money was spent on th will continue its erosional processes and some of the engineering may
- In the future, anthropological climate change may also have an effect with the potential for more frequent storms and a rise in sea level.

Jurassic Coast Quick-fire Questions

1	Where is the Jurassic Coast situated?	
2	Which two counties does the coastline cross?	
3	How long is the Jurassic Coast?	
4	What year did it become a World Heritage Site?	
5	How old is the oldest part of the coastline?	
6	How old is the youngest part of the coastline?	
7	What length of time does the Jurassic Coast span?	
8	Which era is the Jurassic Coast from?	
9	What are the three time periods within that era that the coastline is	

14	What rock is Durdle Door made of?	
15	What landform is Chesil Beach?	
16	Through what depositional process was Chesil beach formed?	
17	How does the hardness of the rock affect the shape of the Jurassic Coast?	
18	How did the winter storms of 2013/14 affect Chesil beach?	
19	Name two consequences of climate change that may affect the Jurassic Coast.	
20	Name one reason why humans would want to manage coastlines.	
21	Name two hard engineering strategies used in Lyme Regis.	
22	Where did the sand come from for the beach replenishment of Lyme Regis?	
23	How much did the total cost of the coastal management strategy in Lyme Regis come to?	
24	How many homes did Phase 4 help to save?	

Jurassic Coast Quick-fire Answers

1	Where is the Jurassic Coast situated?	*The south west of the UK*
2	Which two counties does the coastline cross?	*Devon and Dorset*
3	How long is the Jurassic Coast?	*95 Miles*
4	What year did it become a World Heritage Site?	*2001*
5	How old is the oldest part of the coastline?	*250 million years old*
6	How old is the youngest part of the coastline?	*65 million years old*
7	What length of time does the Jurassic Coast span?	*185 million years*
8	Which era is the Jurassic Coast from?	*The Mesozoic Era*
9	What are the three time periods within that era that the coastline is from?	*Triassic, Jurassic and Cretaceous*
10	What type of rocks can be found in the Triassic area of the coastline?	*Red-coloured mudstone and sandstone*
11	What type of rocks can be found in the Jurassic area of the coastline?	*Clays, sandstones and limestones (Portland and Purbeck)*
12	What type of rocks can be found in the Cretaceous area of the coastline?	*Sandstones, limestones and white chalk*
13	What type of landform is Durdle Door?	*An arch*
14	What rock is Durdle Door made of?	*Portland limestone*

20	Name one reason why humans would want to manage coastlines.	*Any of the following:* • *To preserve the coastline* • *To protect human settlements* • *To protect human lives*
21	Name two hard engineering strategies used in Lyme Regis.	*Any of the following:* • *Sea wall* • *Slope stabilisation* • *Rock armour* • *Groynes*
22	Where did the sand come from for the beach replenishment of Lyme Regis?	*France*
23	How much did the total cost of the coastal management strategy in Lyme Regis come to?	*Approximately £56 million*
24	How many homes did Phase 4 help to save?	*480*
25	Give one potential conflict to the coastal defence in Lyme Regis.	*Examples:* • *Project cost too much money* • *Some defences will need repairing or replacing in only 50–60 years costing more money* • *Landslides can be good as they release more fossils and that should not be stopped* • *The sea will continue to erode – it should just be left to go through its natural process and humans should work around it*

Jurassic Coast Extension Questions

1. Describe the geological history of the Jurassic Coast.
2. Explain how Lulworth Cove was formed.
3. Suggest what Durdle Door will look like in the future and explain wh
4. Explain how geology can influence the shape of the coastline.
5. In what ways did the winter storms of 20[illegible] affect the Jurassic Coas
6. Discuss the consequ[illegible] of climate change on the Jurassic Coast.
7. Explai[illegible] difference between hard engineering and soft engineering more effective.
8. Using your knowledge of the geology of Lyme Regis, explain why the management.
9. Describe and explain how hard engineering techniques used in Lyme landslides and the sea.
10. Evaluate the success of the coastal management in Lyme Regis.

Extension Answers

1. The Jurassic Coast's geology reveals 185 million years of earth's history acros
The reason it shows so much geological history is because the movement of t
tilted the rocks vertically.
The oldest rock is from the Triassic period and is 250 million years old and is
used to be a desert.
The Jurassic rocks range from 200 million years old to 145 million years old.
which is evidence of thriving life during this period.
The Cretaceous rocks range from 145 million years old to 65 million years old
showing the fluctuating sea level during this time period. The youngest rock
white chalk.

2. Lulworth Cove was formed through erosional processes.
The erosion started with a river flowing through the rocks to the sea.
Lulworth has a concordant coastline so the hard rock (limestone) lies by the sea
lies behind.
The water eroded through the soft rock more quickly than the hard rock, formi
Over time the river has reduced to a small stream and the softer clay has con
rate than the harder limestone by the sea, forming the cove we see today.

3. Durdle Door will likely become a stack and eventually a stump in the future
This is because the sea will continue to erode it through processes such as hy
causing the rock to weaken.
The process of weathering will also weaken the rock.
Eventually the arch will collapse into the sea forming a stack. Eventually thi
a stump.

4. Geology influences the shape of the coastline because it influences how effec
can be.
For example, soft rocks are more easily eroded than harder rocks and this ma
landforms.
The areas of soft rock in the Jurassic Coast have helped to form its bays and c
The areas of hard rock in the Jurassic Coast have helped to form its headland
The order in which the rock lies also affects the shape of the coastline. For ex
coastlines (where hard and soft rocks lie parallel to the coast) create landform
Discordant coastlines (where hard and soft rocks lie perpendicular to the coa
and headlands.

5. The winter storms affected the Jurassic Coast b
   - Causing more rapid erosion proces
   - Causing flooding.
   - Changing the sh Beach by pushing the sediment towards th
   - The ve also destroyed Pom Pom Rock from a stack to a stu

6. Climate change consequences of the Jurassic Coast:
   - Sea level rise could mean that some areas of coastline are submerged by
   - It could also mean that more of the coastline will be affected by erosiona
     the sea increases.
   - It could also mean that there are more storms which will also increase th
     affecting the coastline.
   - The summers could be warmer which may attract more people. This co
     the area but also increase any damage to the environment caused by hu

7. Hard engineering is the use of built structures to control the coastline where
more natural way of manipulating the coastline.
Different stakeholders will have differing opinions on which type of manage
Soft engineering techniques are effective, unobtrusive and often better for the
engineering. However, some strategies, such as beach replenishment, need r
hard engineering techniques.
Soft engineering in terms of a managed retreat could also mean a loss of hom

8. The town is built on unstable land.
The bedrock far below the town is made of hard limestone.
On top of this lies softer rocks which slide over the limestone making it unsta
The land is also sloped towards the sea making the la[illegible]ven more unstable
Heavy rain and the power of the sea on the cl[illegible]ar[illegible]use the land to weake

9. The sea wall helps to preven[illegible]s [illegible]om eroding the coastline by physicall
wall has a curved ed[illegible] [illegible]t wave energy back towards the sea. The roc
buffer [illegible]wi[illegible]ea wall, dispersing the energy of the waves. Stone gro
to stop [illegible] from transporting too much sediment away, and creating a bu
and the land.
The ground has been stabilised using soil nails, buttresses and bored piles. T
drainage of the land more efficient as well as prevent landslides from destro
and the infrastructure of the town.

10. Lyme Regis coastal management was effective because:
- It helped to protect 480 homes and 900 metres of road by stabilising the
- The rock armour and sea wall mean that the sea is having less effect on
- It is also attracting more visitors, bringing in more money for the town.

Not as effective because:
- It cost a lot of money and the sea will continue to erode the area – was it
- The sea wall keeps needing to be repaired or extended and could only la

Practice Question

Case study: A UK coastal landscape

Name of chosen UK coastal landscape:

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Explain how the coastal landscape has been impacted by coastal m

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Level 3 (5–6 marks) An answer at this level demonstrates thorough knowledge of the coastal management strategies used (AO1) and a thorough understanding of how the management strategies have impacted the coastal landscape (AO2). This will be shown by including well-developed ideas about the management strategies used and the impact on the coastal landscape. The answer must also include place-specific details for the named UK coastal landscape. **Level 2 (3–4 marks)** An answer at this level demonstrates [illegible] knowledge of the coastal management strategies used (AO1) and a [illegible] understanding of how the management strategies have impacted the coastal landscape (AO2). This will be shown by including developed ideas about the management strategies used and the impact on the coastal landscape. Developed ideas but no place-specific details credited up to bottom of level. **Level 1 (1–2 marks)** An answer at this level demonstrates basic knowledge of the coastal management strategies used (AO1) and a basic understanding of how the management strategies have impacted the coastal landscape (AO2). This will be shown by including simple ideas about the management strategies used and the impact on the coastal landscape. Named example only, receives no place-specific detail credit. **0 marks** No response worthy of credit.	6	**Indicative conte** Geomorphic proc Hard and soft eng Weather Geology Climate change **Example of a we** Both hard engine sea wall, rock arm slope stabilisation strategies (beach mplemented at L of the less resista (which is vulnera winter during peri restore sand to th the seabed and i has resulted in a and mass movem impact on geomo erosion further al as Charmouth. **Example of a de** Hard and soft eng been implemente erosion, stabilise to slumping, and pumping it from t in a reduction of movement. **Example of a sim** Hard and soft eng of the cliff. Beach beach in place fo