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EDEXCEL INTERNATIONAL GCSE GEOGRAPHY: QUESTIONS BY TOPIC

Coastal Environments (Topic 2)

International GCSE Geography Topic 2

32 questions · 688 marks · Mark schemes included

Pearson Edexcel International GCSE (9–1) Geography 4GE1, Papers 1, 1R, 2 & 2R, June 2019 - June 2025

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HOW TO USE THIS BOOKLET

Questions are grouped by sub-topic (exam questions, then fieldwork), oldest paper first.
Click any heading or question row below to jump straight to it.
On every question page, click ANSWER in the top-right corner to jump to its mark scheme.
Diagrams, graphs, tables and data are printed exactly as they appeared in the original papers.

	QUESTION	SOURCE	MARKS	PAGE
COASTAL ENVIRONMENTS: EXAM QUESTIONS		16 questions · 400 marks		3
1.	**Q2**	Paper 1 June 2019	25	4
2.	**Q2**	Paper 1R June 2019	25	10
3.	**Q2**	Paper 1 November 2020	25	17
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FIELDWORK: INVESTIGATING COASTAL ENVIRONMENTS		16 questions · 288 marks		98
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19.	**Q5**	Paper 1 November 2020	20	106
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22.	**Q5**	Paper 1 November 2021	12	116
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27.	**Q5**	Paper 1 November 2023	20	132
28.	**Q5**	Paper 1 June 2024	20	135
29.	**Q5**	Paper 1R June 2024	20	139
30.	**Q5**	Paper 1 November 2024	20	143
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QUESTIONS

32 questions · 688 marks · grouped by sub-topic

SUB-TOPIC

COASTAL ENVIRONMENTS: EXAM QUESTIONS

16 questions in this booklet

If you answer Question 2 put a cross in the box ☒

2 Coastal Environments.

(a) Identify the statement below that best describes the characteristics of a destructive wave.

(1)

☒	**A** long wavelength and weak backwash
☒	**B** short wavelength and strong backwash
☒	**C** long wavelength and strong backwash
☒	**D** short wavelength and weak backwash

(b) (i) Identify **one** erosional landform.

(1)

☒	**A** spit
☒	**B** cave
☒	**C** bar
☒	**D** beach

(ii) State **one** type of mass movement that affects coastal landscapes.

(1)

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(iii) Explain **one** type of mechanical weathering that occurs at the coast.

(2)

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(c) Study Figure 2a in the Resource Booklet.

Suggest **two** ways changes in sea level have created coastal landforms.

(4)

1 .....

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2 .....

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(d) Explain **one** physical factor that influences the distribution of mangrove ecosystems.

(3)

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(e) Study Figure 2b in the Resource Booklet.

Identify the coastal landform at X.

(1)

(f) Explain the formation of a headland.

(4)

(g) Study Figure 2c and Figure 2d in the Resource Booklet.

Analyse the reasons for the choice of different soft engineering strategies shown.

(8)

Raised beaches

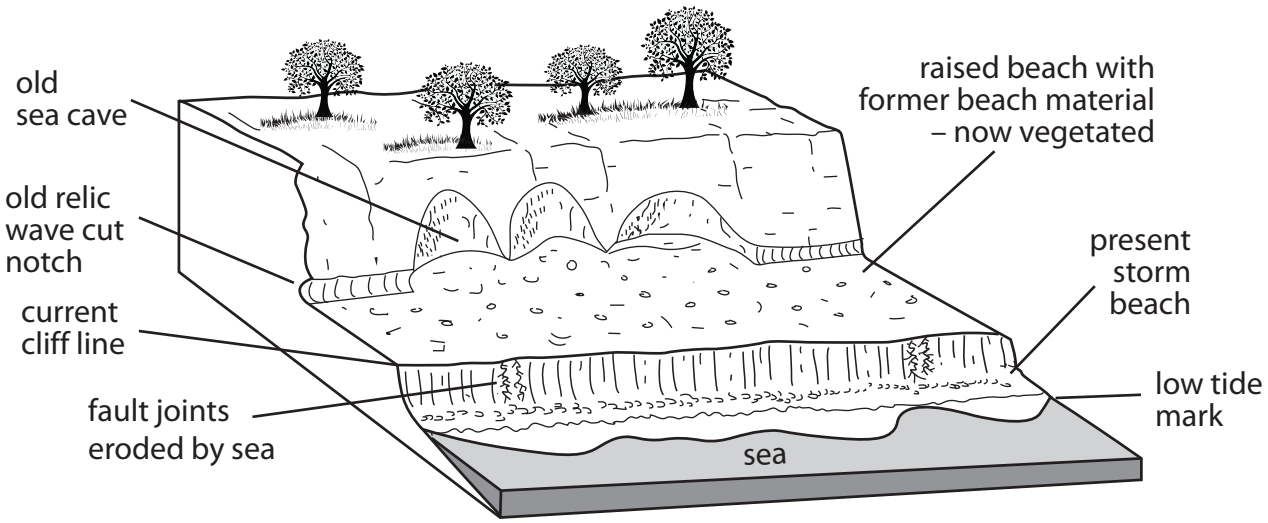


Figure 2a

An example of a coastal landscape in south west England



(Source: © De Agostini Picture Library / Contributor/Getty Images)

Figure 2b

A coastal landscape in St Lucia

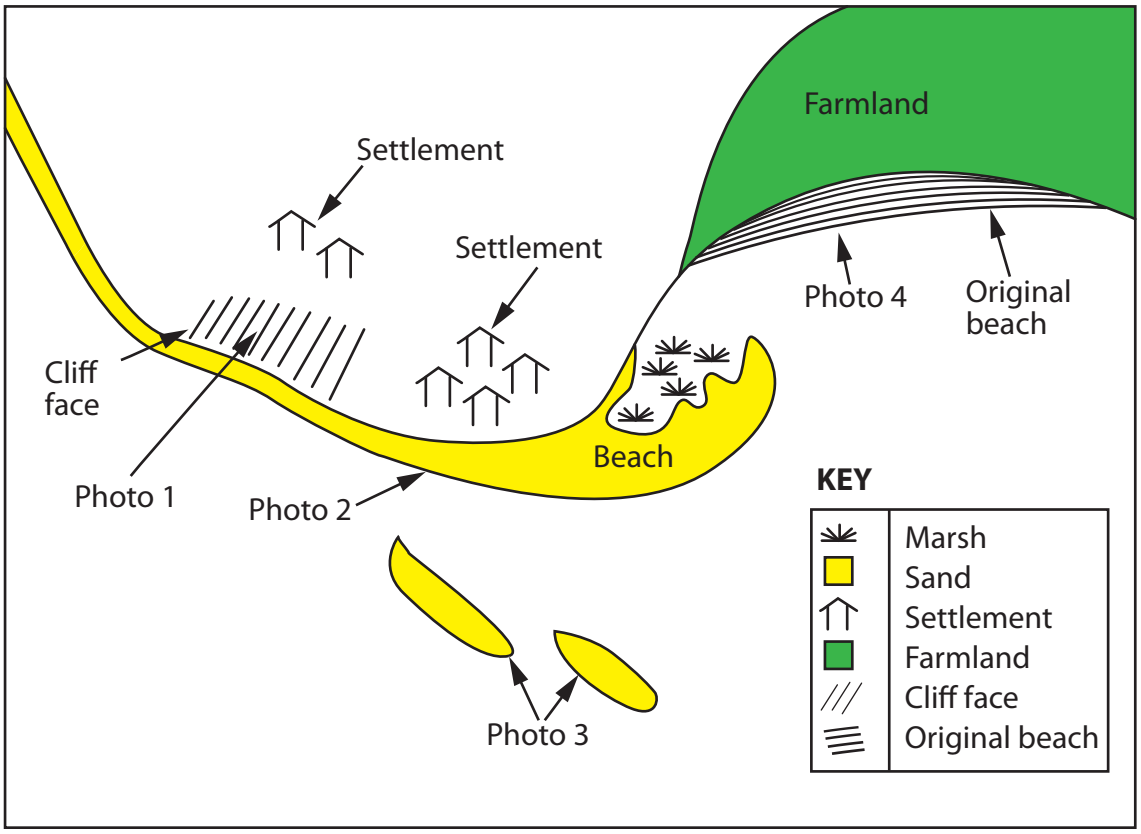


Figure 2c

Different approaches to shoreline management along a stretch of coastline

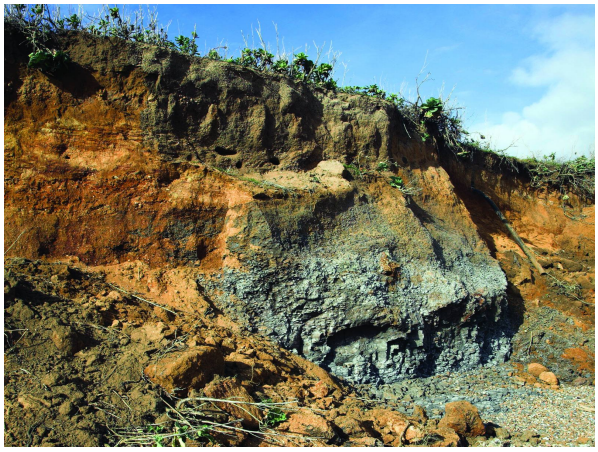


Photo 1 Cliff regrading high maintenance and high cost.



Photo 2 Beach replenishment high maintenance cost and £20 per cubic metre so could be quite expensive.



Photo 3 Development and extension of natural sandbars. This has a similar cost and maintenance as beach replenishment.



Photo 4 Managed retreat low maintenance and cost dependent on compensation due to people living in the area.

(Sources: Photo 1 - © Geography Photos / Contributor/Getty Images, Photo 2 - © Mick House / Alamy Stock Photo, Photo 4 - Crown Copyright, Photo 3 - © Thales Paiva/Art in All of Us / Contributor/Getty Images)

Figure 2d

Photographic evidence of beach management techniques referred to in Figure 2c

If you answer Question 2 put a cross in the box ☒.

2 Coastal Environments.

(a) Identify the statement below that best describes the characteristics of a constructive wave.

(1)

☒	**A** long wavelength and weak backwash
☒	**B** short wavelength and strong backwash
☒	**C** long wavelength and strong backwash
☒	**D** short wavelength and weak backwash

(b) (i) Identify **one** depositional landform.

(1)

☒	**A** headland
☒	**B** spit
☒	**C** cave
☒	**D** stack

(ii) State **one** type of weathering that affects coastal landscapes.

(1)

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(iii) Explain the process of longshore drift.

(2)

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(c) Study Figure 2a in the Resource Booklet.

Suggest **two** ways geology influences the shape of this coastline.

(4)

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(d) Explain **one** physical factor that influences the distribution of coral reef ecosystems.

(3)

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(e) Study Figure 2b in the Resource Booklet.

Identify the coastal landform X.

(1)

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(f) Explain the formation of a cliff.

(4)

(g) Study Figure 2c and Figure 2d in the Resource Booklet.

Analyse the reasons for the choice of the different hard engineering strategies shown.

(8)

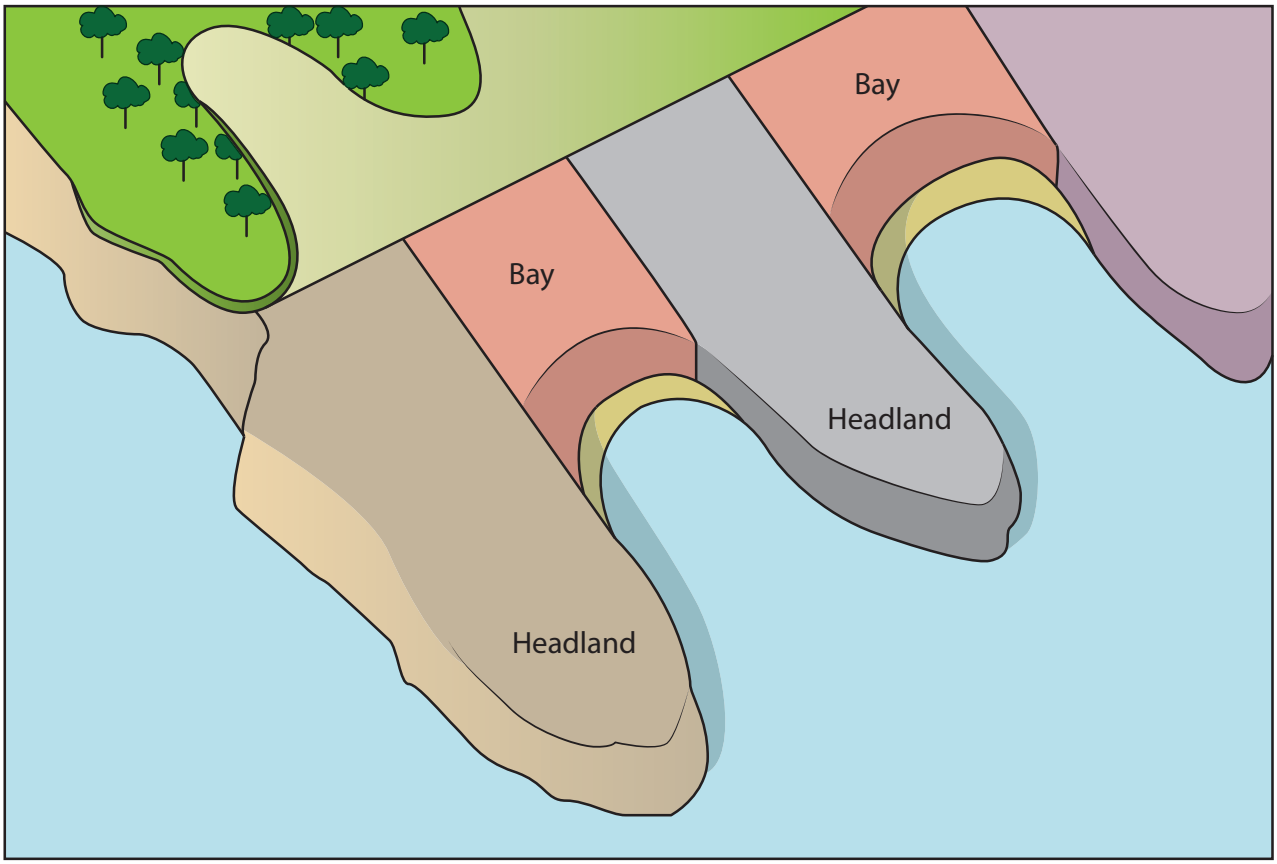


Figure 2a

An example of a coastal landscape



Figure 2b

A coastal landscape in the Republic of Ireland

(Source: © David Holmes)

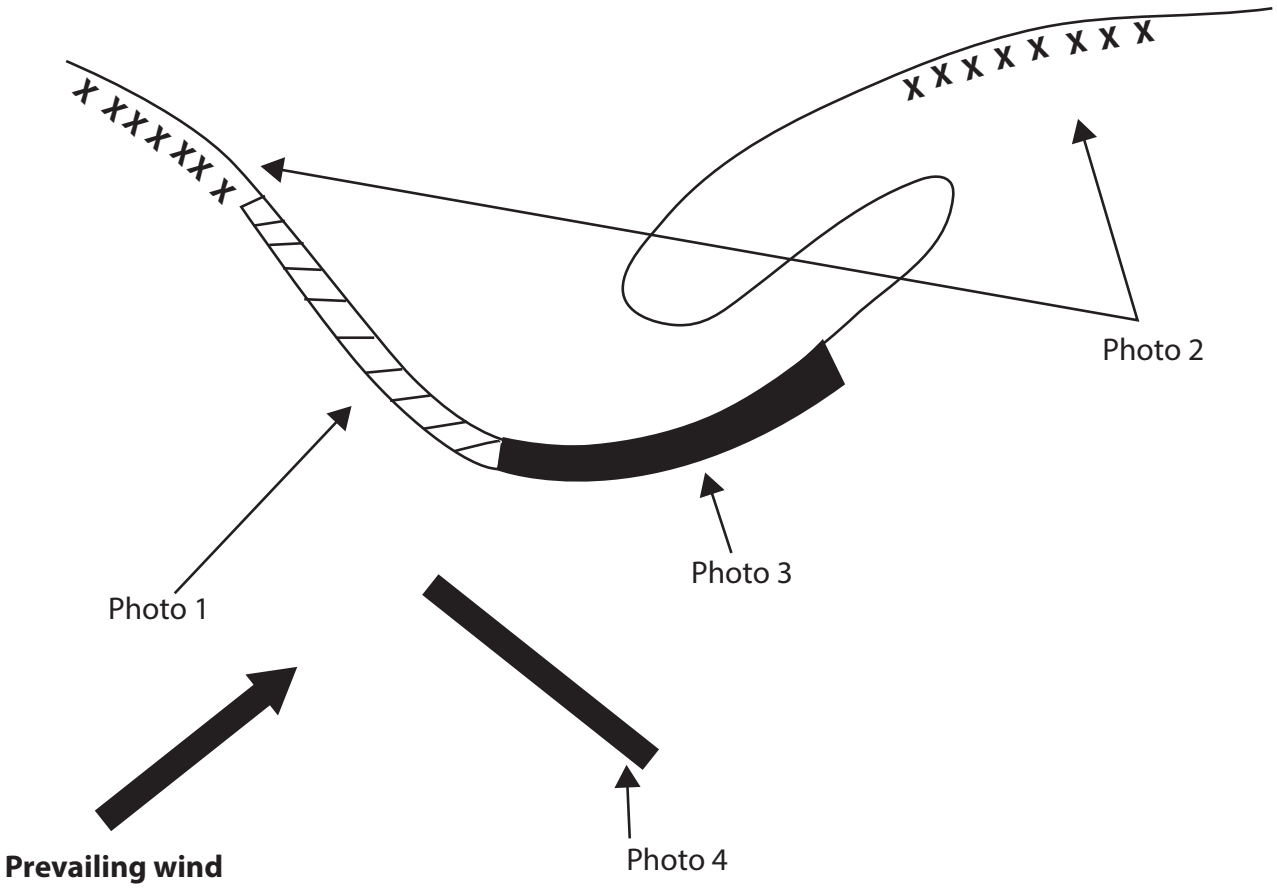


Figure 2c

Different approaches to shoreline management along a stretch of coastline

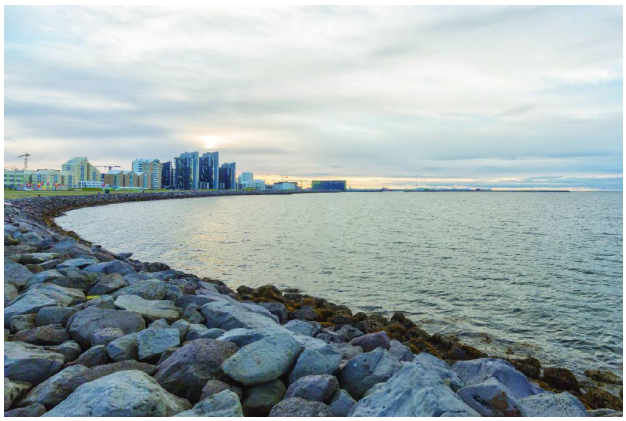


Photo 1.
Rock Armour.
Medium maintenance cost.
High cost per metre, £1,350 – £6,000.



Photo 2
Beach Groynes:
Medium maintenance cost.
High cost per metre, £1,600 – £4,700.



Photo 3.
Sea Wall.
Low maintenance cost.
High cost per metre, £700 – £5,400.



Photo 4.
Offshore Breakwater.
Medium maintenance cost.
High cost per metre, £2,500 – £7,000.

Figure 2d

Photographic evidence of beach management techniques referred to in Figure 2c

(Source: Photo 1: © Mark Godden/Shutterstock)

(Source: Photo 2: © Paul Wishart/Shutterstock)

(Source: Photo 3: © Sasha Samardzija/Shutterstock)

(Source: Photo 4: © Ondrej Huk/Getty Images)

2 Coastal environments

(a) Identify the biotic characteristic of a coastal ecosystem.

(1)

☒	**A** eroded rock
☒	**B** salt water
☒	**C** minerals and nutrients
☒	**D** marine plants

(b) (i) Identify the definition of the term **biomass**.

(1)

☒	**A** the amount of living matter in an ecosystem
☒	**B** the amount of non-living matter in an ecosystem
☒	**C** the amount of living and non-living matter in an ecosystem
☒	**D** the amount of leaf litter in an ecosystem

(ii) State **one** feature of a sand dune.

(1)

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(iii) Explain **one** factor affecting the distribution of coral reef ecosystems.

(2)

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(c) Study Figure 2a in the Resource Booklet.

Suggest **one** reason for each of these different approaches to coastal management.

(4)

Approach 1 .....

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Approach 2 .....

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(d) Explain **one** cause of coastal flooding.

(3)

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(e) Study Figure 2b in the Resource Booklet.

Identify the coastal landform at X.

(1)

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(f) Explain the formation of a spit.

(4)

(g) Study Figure 2c in the Resource Booklet.

Analyse the different benefits mangrove ecosystems bring to coastal communities in India.

(8)



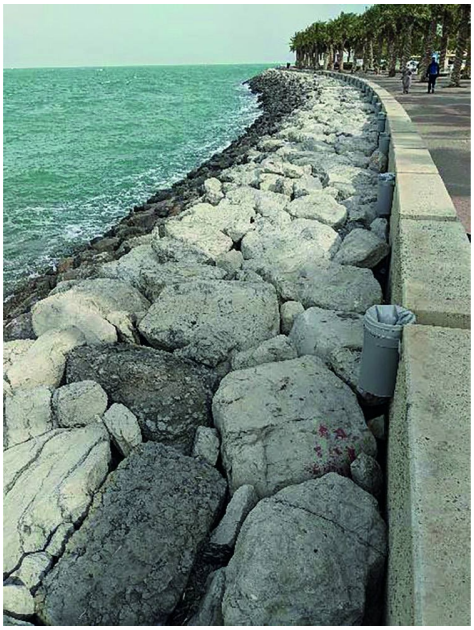


Figure 2a

Coastal management approaches

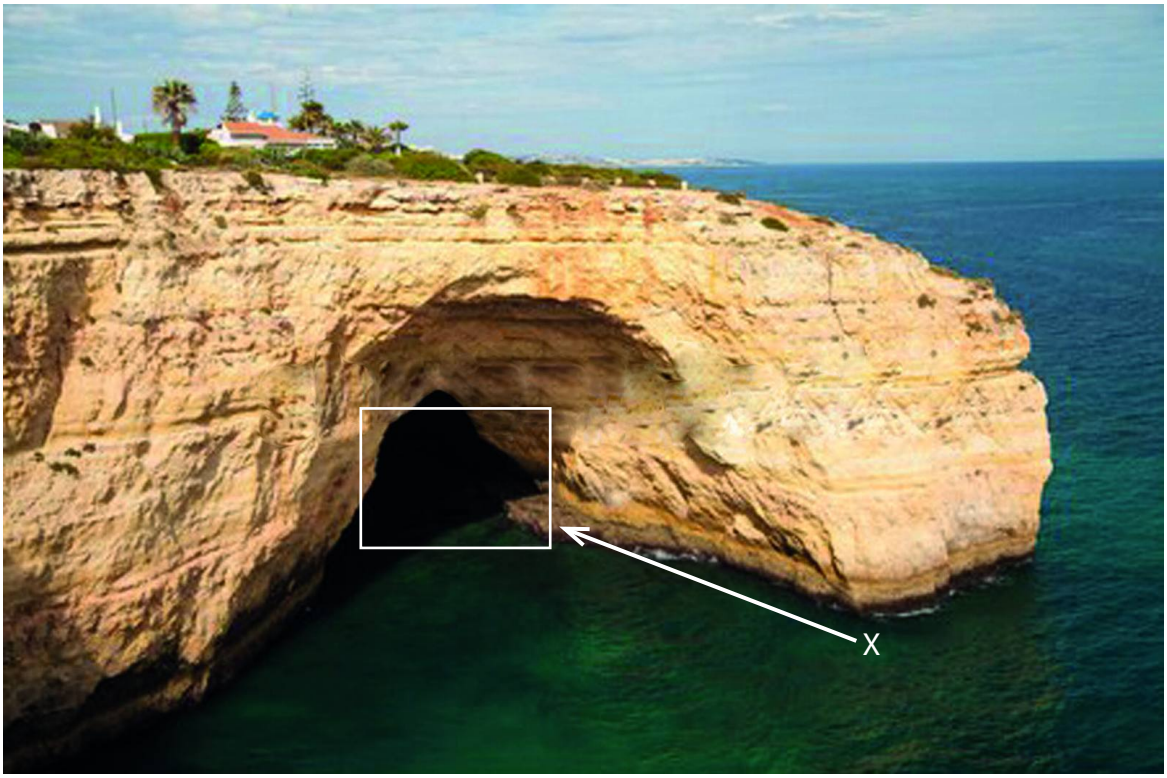
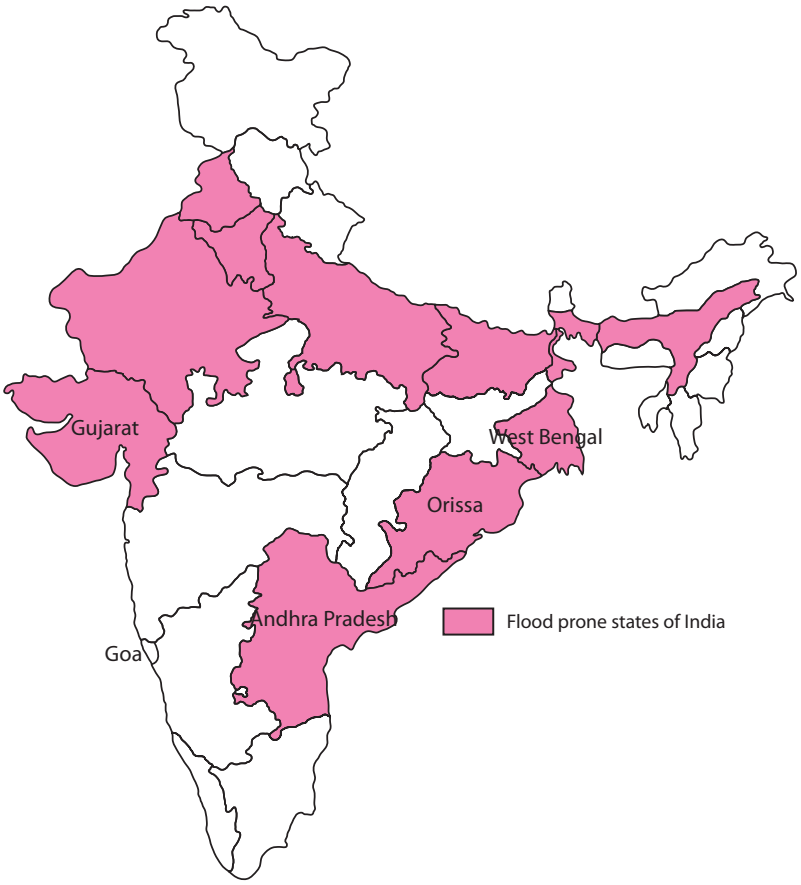


Figure 2b

A coastal landform in the Algarve, Portugal



Benefits of mangrove ecosystems in coastal areas
Income generation for shoreline communities
A varied habitat for many rare and endangered species
Acts as protection from storms
Helps water quality by filtering pollution
Provides timber for buildings
Provides fodder for animals

Coastal environments in India
250 million people live within 50 miles of the coast
3600 fishing villages provide a vital source of food
12 major ports to support trade
Certain areas such as Goa are important for tourism

Figure 2c

Mangrove developments and risk of flooding in India

If you answer Question 2 put a cross in the box ☒.

2 Coastal environments

(a) Identify the abiotic characteristic of a coastal ecosystem.

(1)

☒	**A** seaweed
☒	**B** zooplankton
☒	**C** rock type
☒	**D** marine fish

(b) (i) Identify the definition of a **saltmarsh**.

(1)

☒	**A** vegetation flooded by freshwater
☒	**B** vegetation on a sandy beach
☒	**C** vegetation on a stony beach
☒	**D** vegetation flooded and drained by tidal water

(ii) State **one** factor affecting the distribution of mangrove ecosystems.

(1)

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(iii) Explain **one** way constructive waves can affect beach gradient.

(2)

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(c) Study Figure 2a in the Resource Booklet.

Suggest **two** physical factors that influence coastal landforms.

(4)

1 .....

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(d) Explain **one** way coastal ecosystems are threatened by human activity.

(3)

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(e) Study Figure 2b in the Resource Booklet.

Identify the coastal feature at X.

(1)

(f) Explain the process of beach formation.

(4)

(g) Study Figure 2c in the Resource Booklet.

Analyse the benefits and threats in the development of coral reef ecosystems.

(8)



Figure 2a

Factors affecting coastal landforms

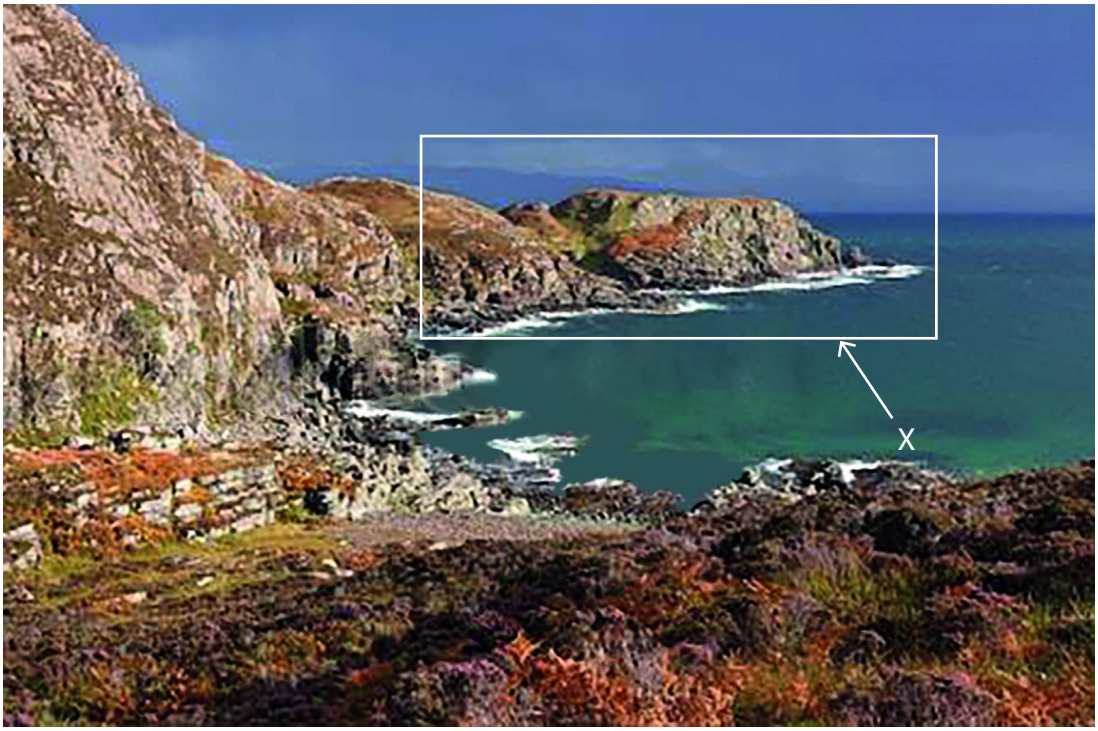


Figure 2b

A coastal feature in Scotland



Pressures

500 million people rely on food from coral reefs

Looked after by less than 100 countries

More than 25% of marine life supported

Benefits

850 million people live within 100 km

Provide food

Potential medicines

Protect from tsunamis

Provide jobs in fishing and tourism

Threats

85% of coral reefs are threatened

Destructive fishing

Pollution

Overdevelopment

Climate change

Tourism

Figure 2c

People and coral reefs

If you answer Question 2 put a cross in the box ☒

2 Coastal environments

(a) Identify the best definition of **mechanical weathering**.

(1)

☒	**A** Where rocks are broken down by physical factors in the environment.
☒	**B** Where rocks are eroded by activities of plants and animals.
☒	**C** Where rocks are protected from physical processes on a coastline.
☒	**D** Where the chemical composition of the rocks is changed.

(b) (i) Identify an **abiotic** factor that affects coastal ecosystems.

(1)

☒	**A** Animals
☒	**B** Climate
☒	**C** Plants
☒	**D** Fungi

(ii) Identify **one** feature of coral reef ecosystems.

(1)

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(iii) Explain **one** factor that controls the distribution of coral reef ecosystems.

(2)

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(c) Study Figure 2a in the Resource Booklet.

Suggest **two** marine processes forming these coastal landforms.

(4)

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(d) Explain **one** way industry can threaten coastal ecosystems.

(3)

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(e) Study Figure 2b in the Resource Booklet.

Identify the feature labelled **X**.

(1)

(f) Explain how prevention strategies can reduce the impact of coastal flooding.

(4)

(g) Study Figure 2c in the Resource Booklet.

Analyse the different viewpoints affecting the decisions on coastal management strategies.

(8)

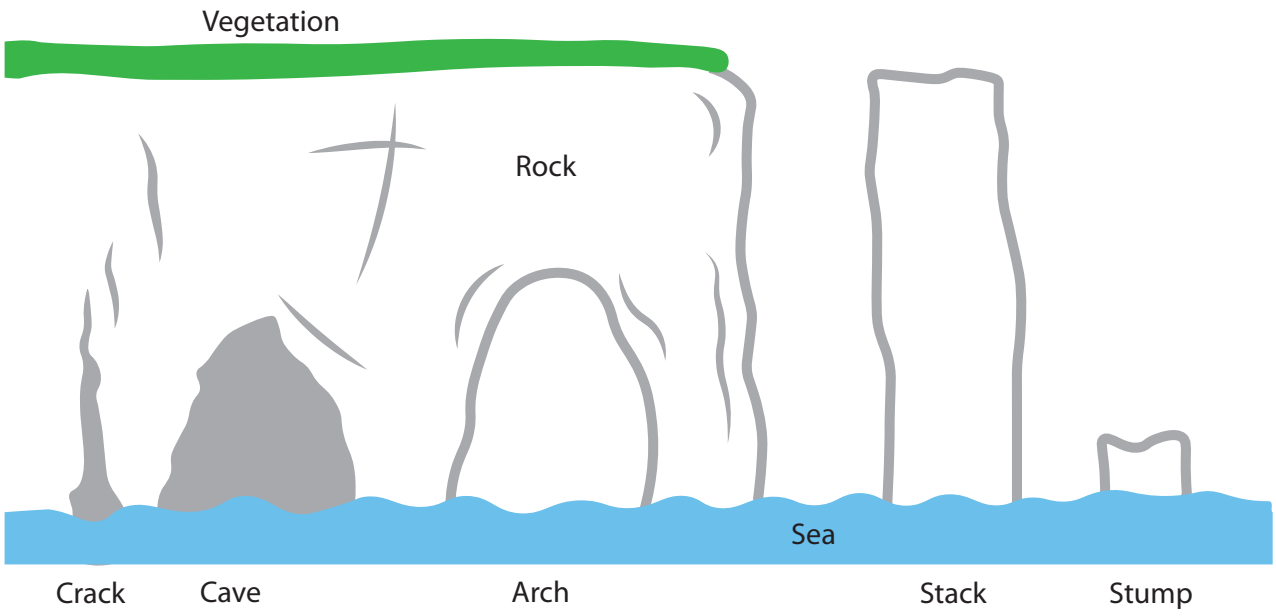


Figure 2a

Diagram of coastal landforms at a headland

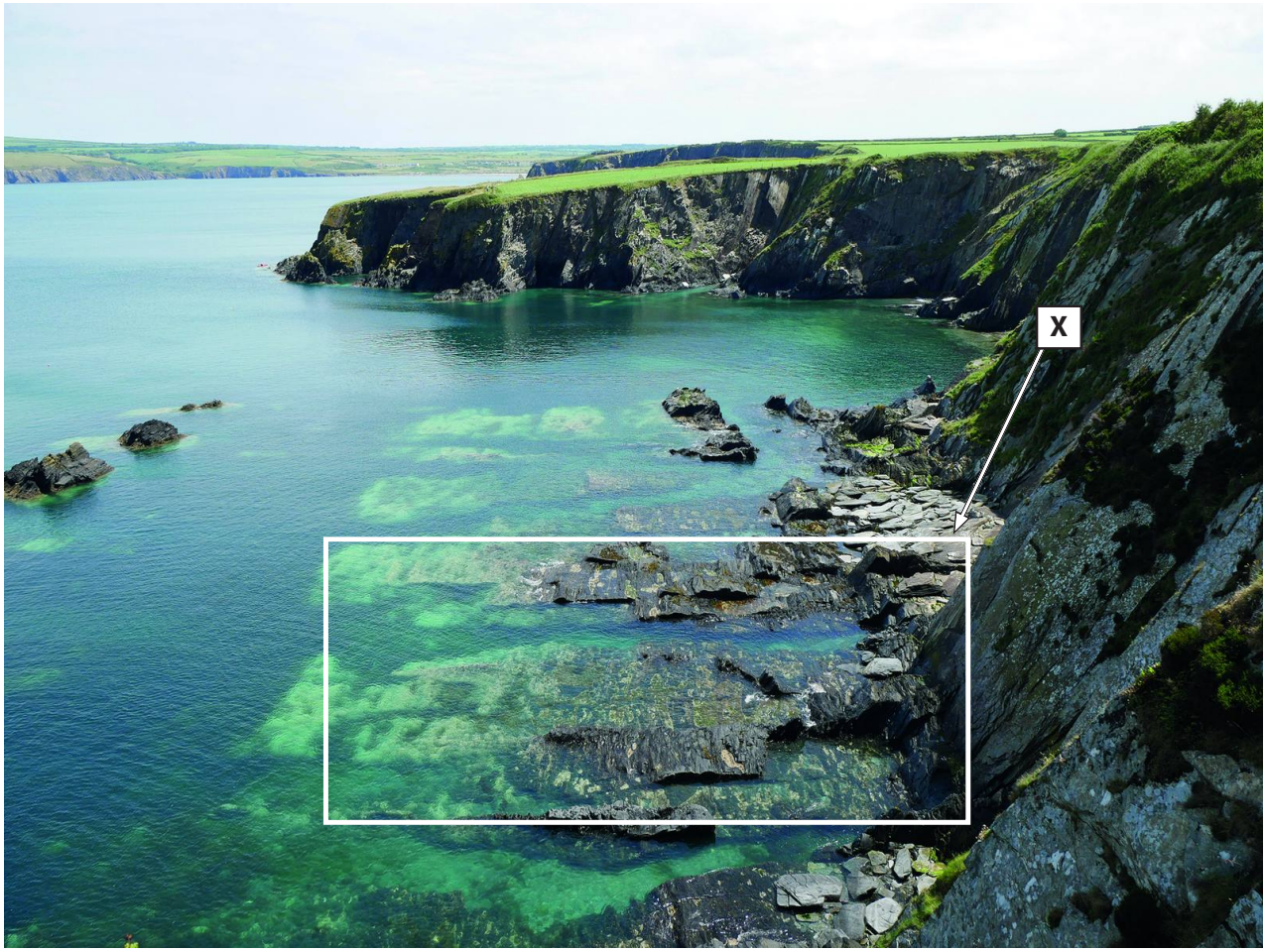


Figure 2b

Coastal landscape in Pembrokeshire, UK

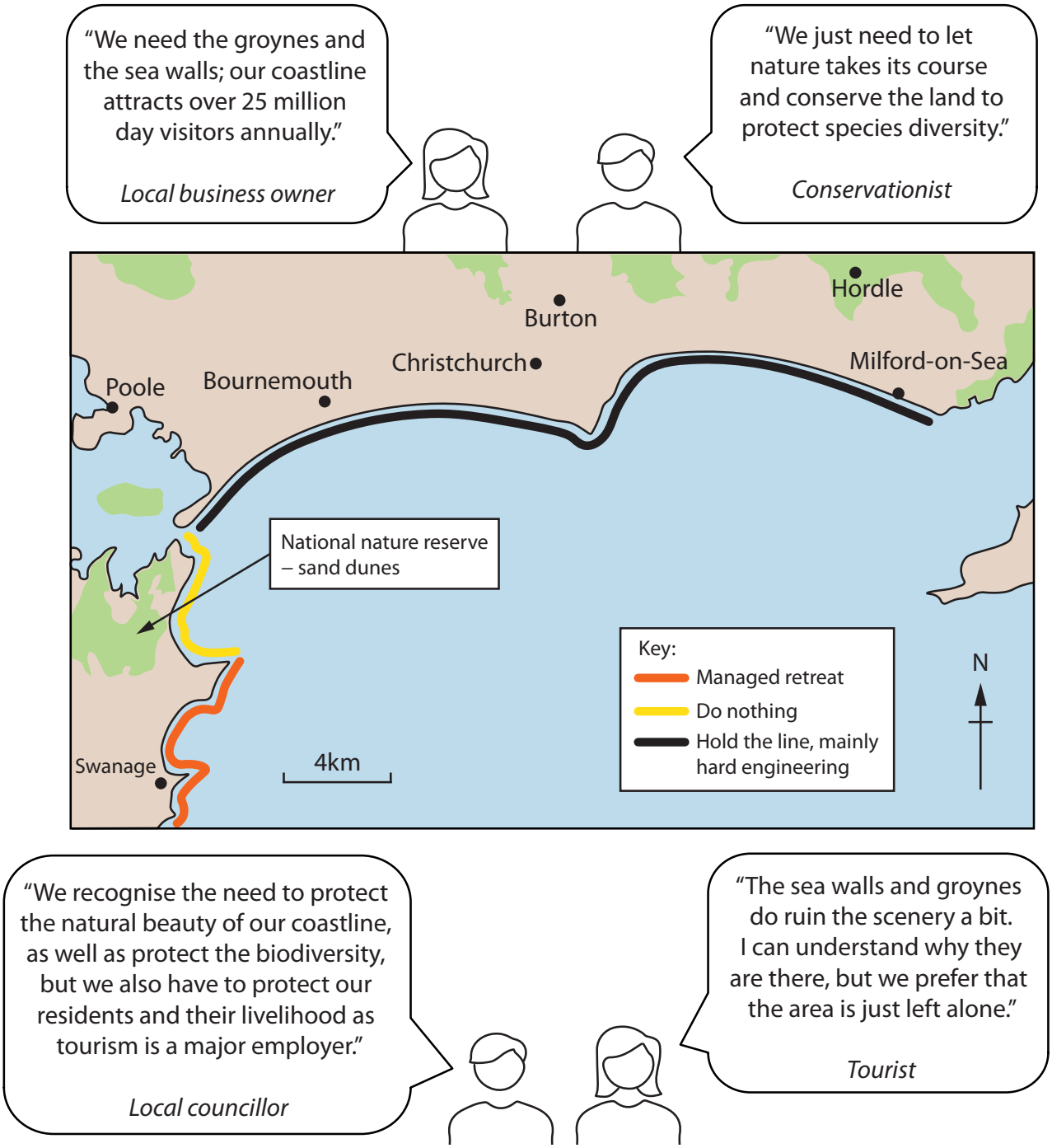


Figure 2c

Different views on coastal management strategies along the Dorset coast, UK

If you answer Question 2 put a cross in the box ☒

2 Coastal environments

(a) Identify a biotic factor that affects coastal ecosystems.

(1)

☒	**A** Wind
☒	**B** Plants
☒	**C** Interception
☒	**D** Temperature

(b) (i) Identify the best definition of **biological weathering**.

(1)

☒	**A** Where plant roots grow into cracks in the rocks.
☒	**B** Where plants take over the coastal landscape.
☒	**C** Where plant roots are damaged by rocks.
☒	**D** Where wind causes erosion of rock.

(ii) State **one** type of coastal mass movement.

(1)

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(iii) Explain **one** type of hard engineering that is used in coastal management.

(2)

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(c) Study Figure 2a in the Resource Booklet.

Suggest **two** physical factors that affect the distribution of coral reef ecosystems.

(4)

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2 .....

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(d) Explain **one** way tourism can threaten coastal ecosystems.

(3)

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(e) Study Figure 2b in the Resource Booklet.

Identify the landform labelled **X**.

(1)

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(f) Explain **two** ways the use of predictive techniques could reduce the impact of coastal flooding.

(4)

1 .....

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2 .....

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(g) Study Figure 2c in the Resource Booklet.

Analyse why there may be conflicts over management strategies in coastal environments.

(8)

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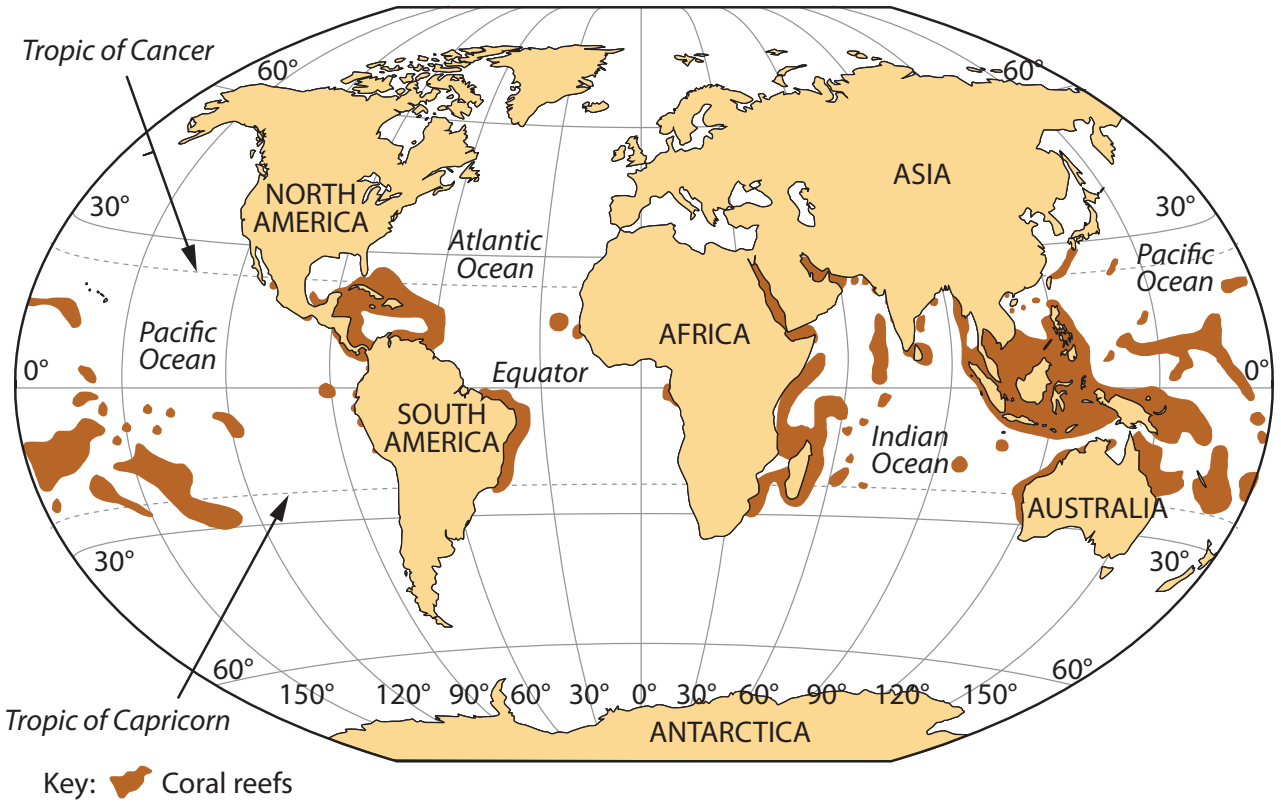


Figure 2a

A world map showing distribution of coral reefs

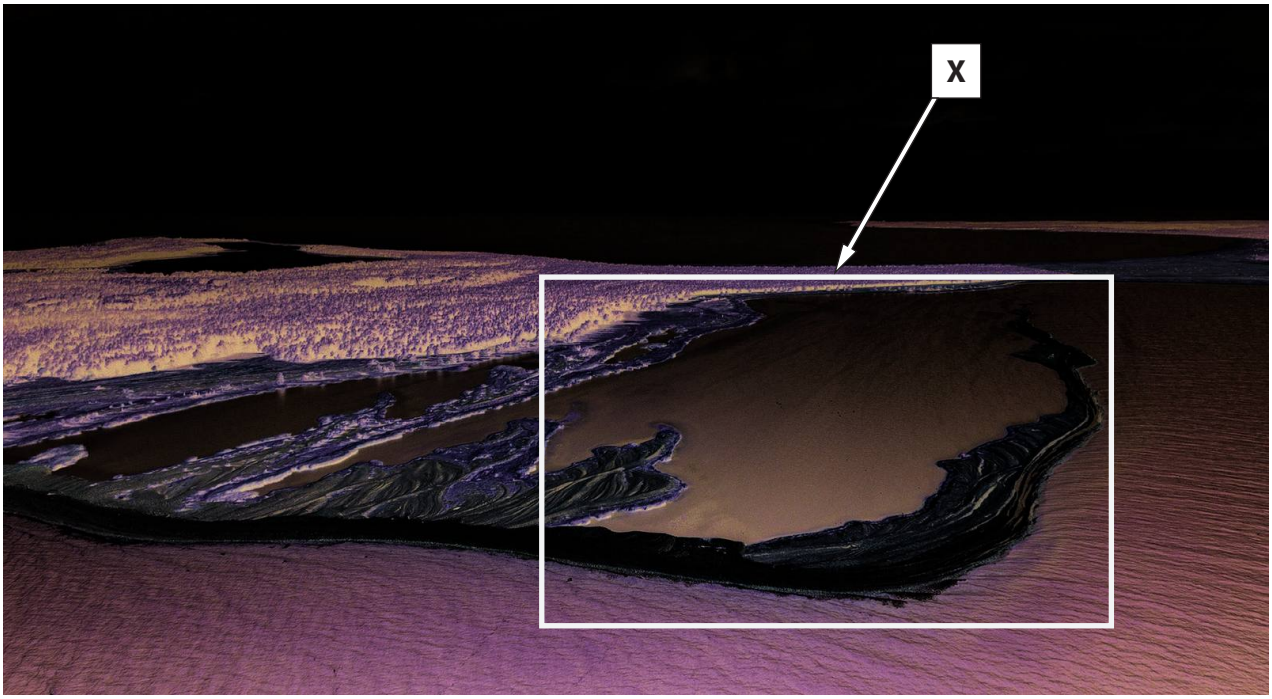


Figure 2b

Coastal landform Harilaid, Vilsandi in Estonia

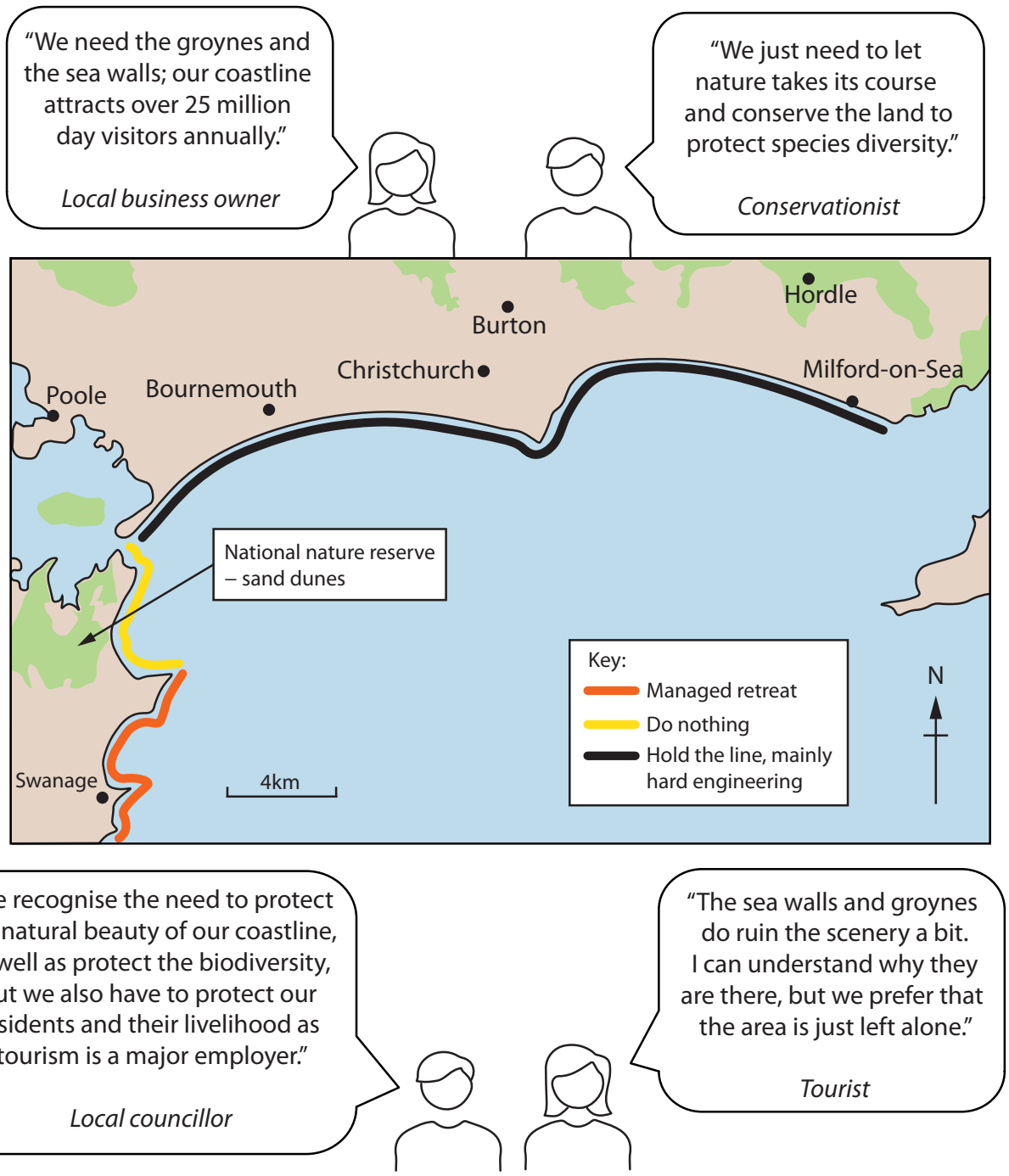


Figure 2c

Different views on coastal management strategies along the Dorset coast, UK

If you answer Question 2 put a cross in the box ☒.

2 Coastal environments

(a) Identify the feature of a mangrove ecosystem.

(1)

- ☒ **A** high altitude
- ☒ **B** steep land gradient
- ☒ **C** complex root system
- ☒ **D** cold temperatures

(b) (i) Identify a process of coastal erosion.

(1)

- ☒ **A** abrasion
- ☒ **B** beach
- ☒ **C** fetch
- ☒ **D** swash

(ii) State **one** transportation process that occurs along a coastline.

(1)

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(c) Explain **one** way to reduce the impact of coastal flooding.

(2)

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(d) Study Figure 2a in the Resource Booklet.

Explain **two** reasons why there may be conflicts over the coastal management strategies chosen.

(4)

1 .....

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2 .....

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(e) Explain **one** way climate change may affect coastal environments.

(3)

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(f) Study Figure 2b in the Resource Booklet.

Identify the type of wave shown.

(1)

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(g) Explain the formation of a cave.

(4)

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(h) Study Figure 2c in the Resource Booklet.

Analyse the importance of managing the threats to this coral reef ecosystem.

(8)

Location	Coastal management strategy
El Zabal: Industrial town	No action: Allow the coast to retreat
Puerto Banus: **Town popular with tourists**	Adaptation – managed retreat: Changing location of buildings Relocation of residents
Caleta de Vélez: **Fishing town**	Protection: Gabions Sea wall

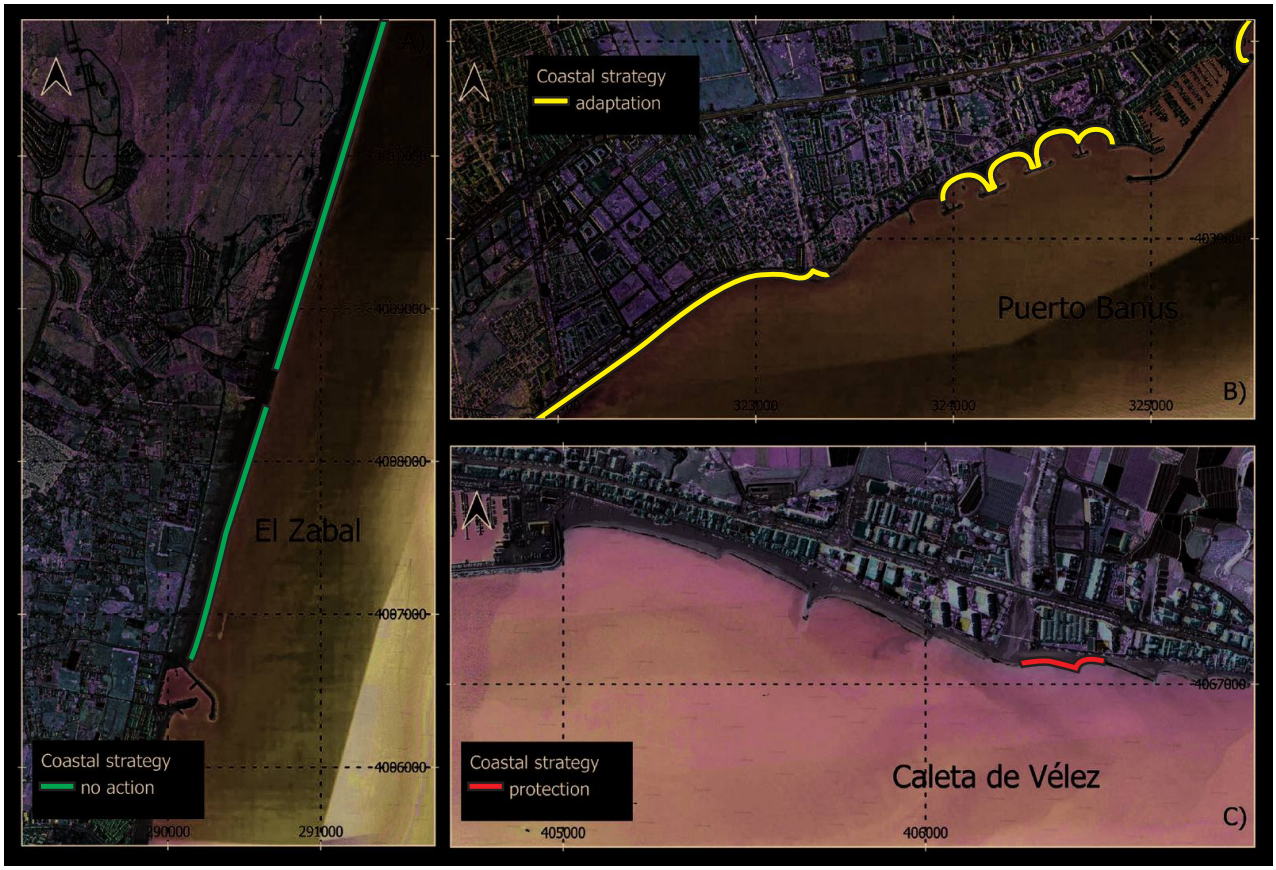


Figure 2a

Coastal management strategies for one coastline in South West Spain

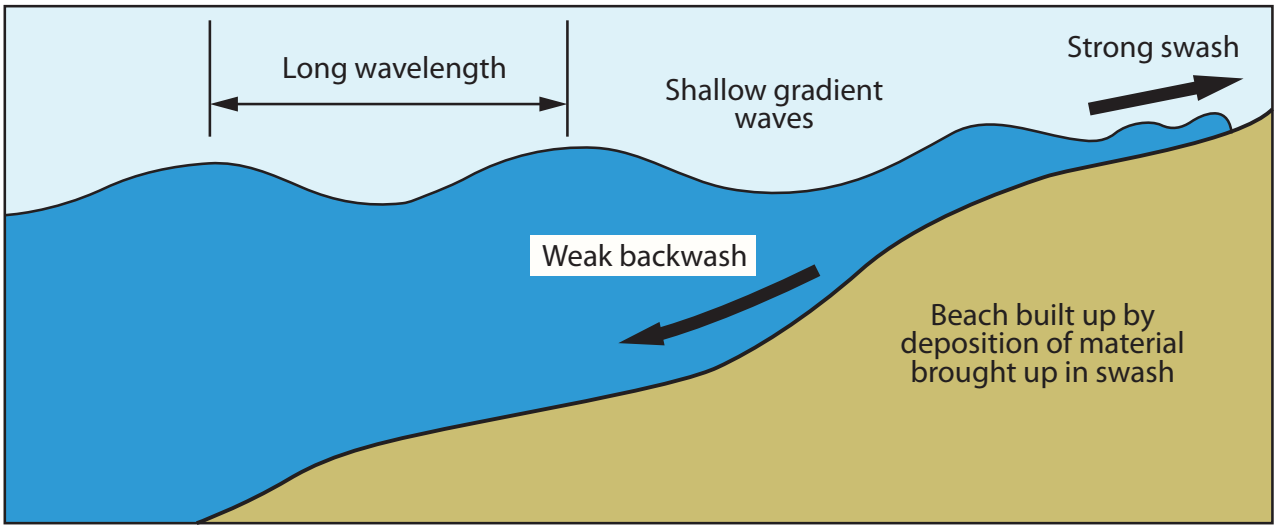


Figure 2b

Diagram of a wave

1	Failed sewage systems.
2	Some chemicals from sunscreens.
3	Building on coastal areas leads to sediments reaching the water.
4	Stormwater runoff leading to chemicals and sediments reaching the water.
5	Deforestation increasing sediments reaching the water.
6	Oil and chemical spills causing water pollution.
7	Road construction causing air and water pollution.
8	Agriculture causing chemicals to leak into the soil and reach the water.

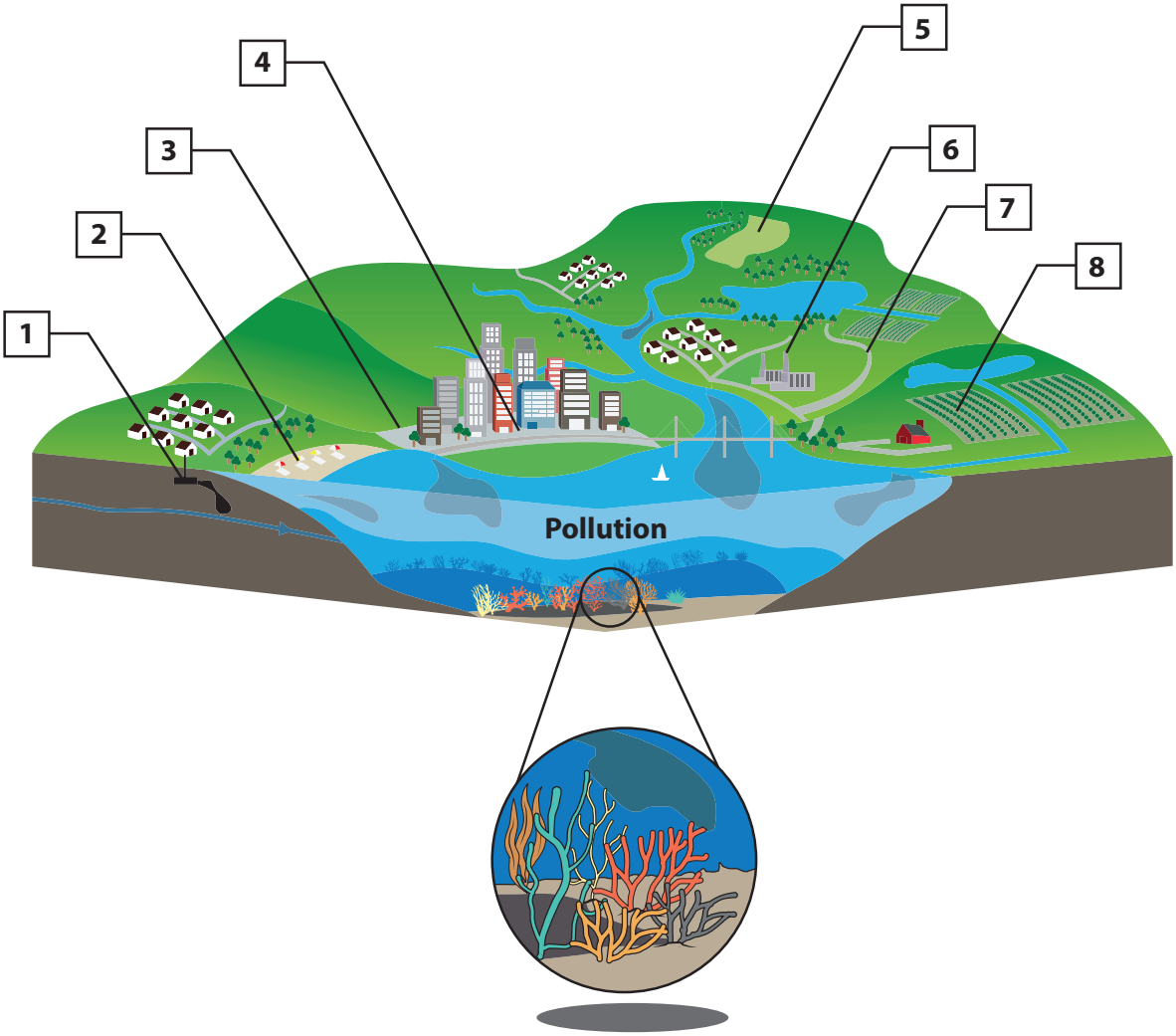


Figure 2c

Information on threats to a coral reef ecosystem

If you answer Question 2 put a cross in the box ☒.

2 Coastal environments

(a) Identify the erosional landform.

(1)

- ☒ **A** beach
- ☒ **B** cave
- ☒ **C** sea wall
- ☒ **D** spit

(b) (i) Identify the best definition of a sand bar found on a coast.

(1)

- ☒ **A** outcrop of chalk and limestone in a bay
- ☒ **B** a spit that has continued to grow across a bay
- ☒ **C** a spit that ends in a rock arch
- ☒ **D** a platform formed by waves eroding a cliff

(ii) State **one** factor that encourages salt marsh ecosystems to develop.

(1)

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(c) Explain **one** way mangrove ecosystems are affected by human activity.

(2)

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(d) Study Figure 2a in the Resource Booklet.

Explain **two** reasons why there may be conflict over the use of coral reef ecosystems.

(4)

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(e) Explain the difference between constructive and destructive waves.

(3)

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(f) Study Figure 2b in the Resource Booklet.

Identify the process shown.

(1)

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(g) Explain the causes of coastal flooding.

(4)

(h) Study Figure 2c in the Resource Booklet.

Analyse the advantages and disadvantages of the coastal management plan shown.

(8)

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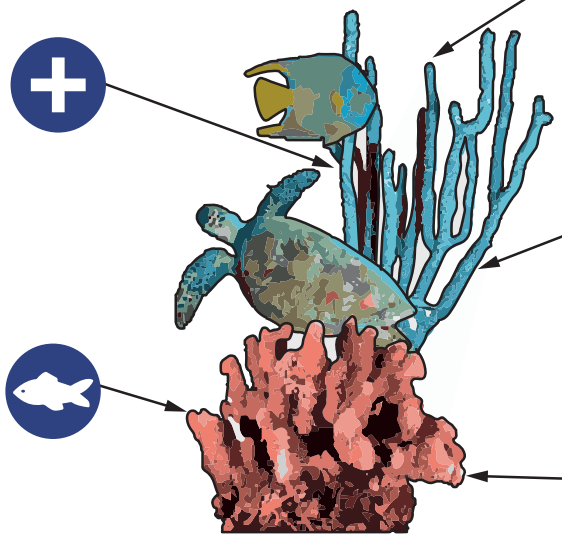
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The value of coral reefs
Coral reefs have a value of $9.9 trillion USD globally and are relied upon by at least 500 million people.

Coastal protection
Coral reefs reduce wave energy by 97% before hitting the shore.

Medicine
More than half of all new cancer drug research focuses on marine organisms.



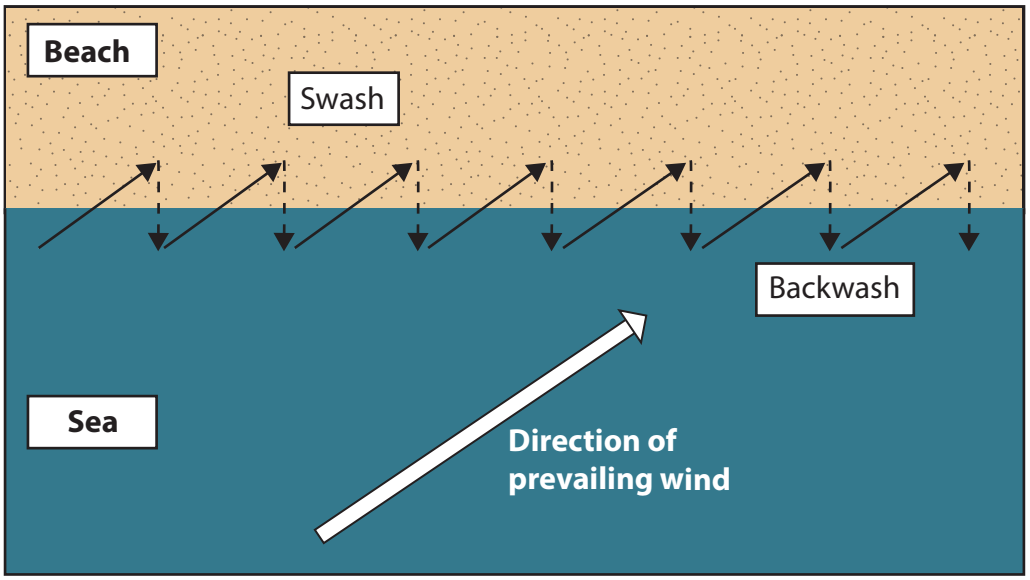
Tourism
70 million trips are supported by coral reefs annually.

Biodiversity
Though many are sensitive to pressure from tourist divers and the fishing industry.

Food production
Overfishing leads to reduced fish stocks for local fishermen.

Figure 2a

Information on uses of coral reefs



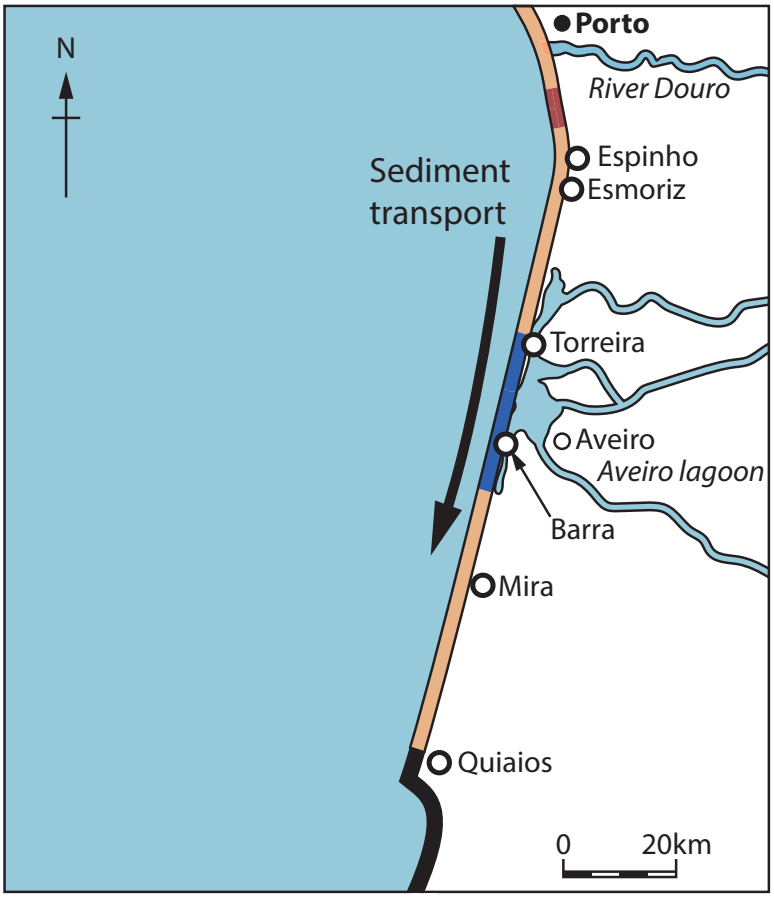
Key

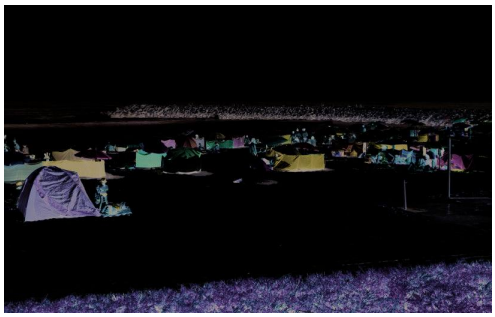
Beach

Sea

Figure 2b

Coastal transportation process





Hard engineering: rock groyne in Espinho



Soft engineering: area of beach replenishment north of Espinho

Coastal management type

Key

- Hard engineering: groynes and sea walls
- Soft engineering: beach replenishment
- Soft engineering: beach replenishment and sand dune

Figure 2c

Information about a coastline in Portugal

If you answer Question 2, put a cross in the box ☒.

2 Coastal environments

(a) Identify the coastal landform created by deposition.

(1)

- ☒ **A** cave
- ☒ **B** cliff
- ☒ **C** spit
- ☒ **D** wave-cut platform

(b) (i) Identify the best definition of hydraulic action.

(1)

- ☒ **A** where waves pick up stones and they hit the cliffs
- ☒ **B** waves hit the cliffs forcing pockets of air into cracks
- ☒ **C** waves carry material along the coast
- ☒ **D** where rocks are dissolved by sea water

(ii) State **one** type of weathering process.

(1)

.....

(c) Explain **one** way human activity can threaten coastal ecosystems.

(2)

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(d) Study Figure 2a in the Resource Booklet.

Explain **two** factors that could influence landforms on this coastline.

(4)

1 .....

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2 .....

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(e) Explain the process of longshore drift.

(3)

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(f) Study Figure 2b in the Resource Booklet.

Identify the coastal management strategy shown.

(1)

.....

(g) Explain **one** advantage and **one** disadvantage of soft engineering strategies.

(4)

Advantage

Disadvantage

(h) Study Figure 2c and Figure 2d in the Resource Booklet.

Analyse the effectiveness of the coastal flood prevention strategies shown.

Refer to the resources in your answer.

(8)

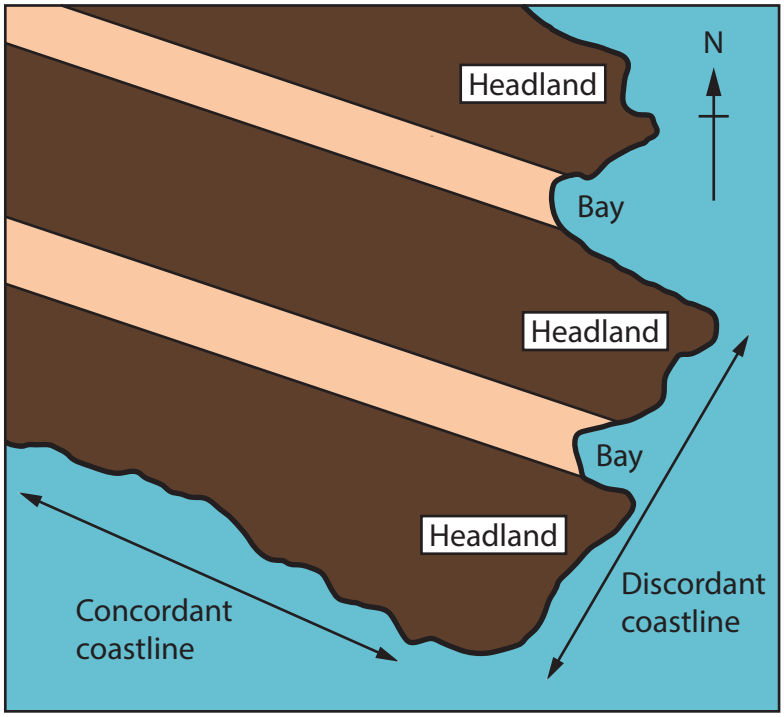


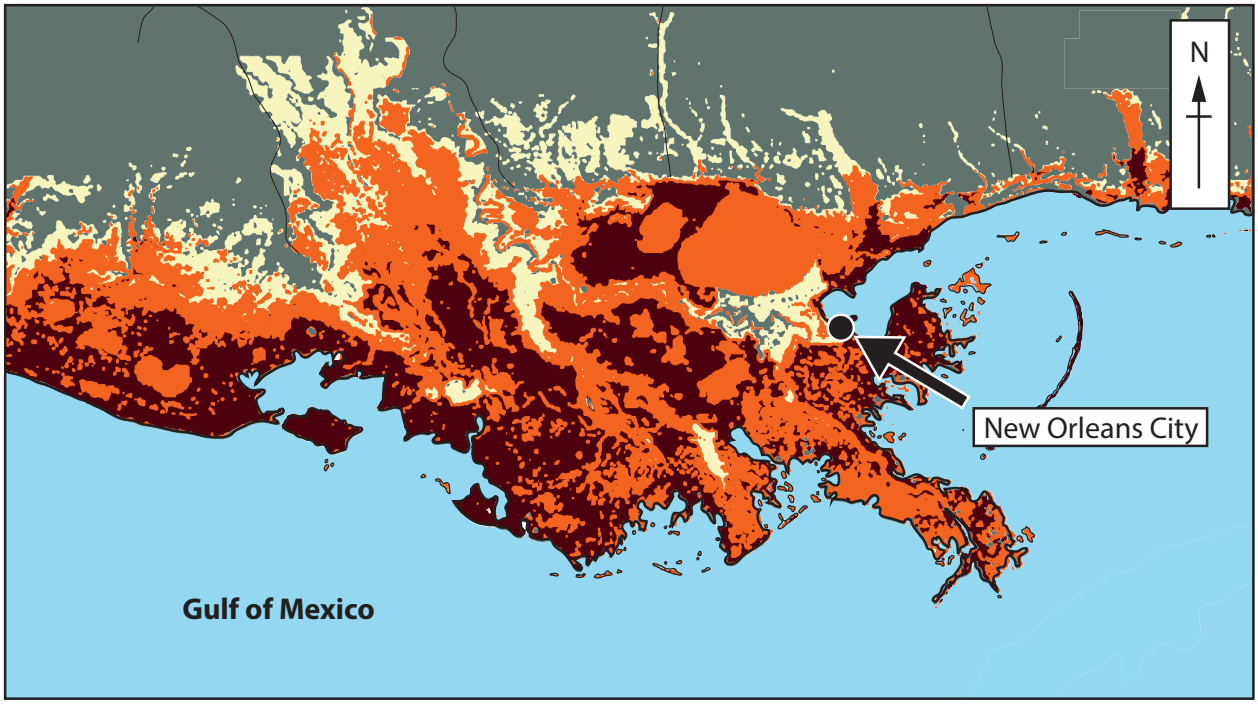
Figure 2a

Diagram of coastline



Figure 2b

Coastal management strategy



Key

- High risk
- Medium risk
- Low risk
- No data

Figure 2c

Coastal flood risk in New Orleans, USA



Flood walls
(new walls completed in 2018)



Water pump stations
(completed in 2017)



Flood gate
(completed in 2012)

Information about Hurricane Katrina, 2005:

- 1,000 people died.
- 200,000 homes and businesses destroyed.
- 800,000 people forced to leave.
- 50 flood walls and levees failed due to poor maintenance and lack of investment.

Information about flood prevention in 2021:

- After Hurricane Katrina US$14 billion network of levees and flood walls were built to protect New Orleans. There are reports that this protection may only last a few more years due to rising sea levels and shrinking levees.
- During Hurricane Ida in 2021 no levee or flood wall was broken or flooded.

Note: Water pump stations remove water from the area in a flood event

Figure 2d

Information about coastal flood protection in New Orleans, USA

If you answer Question 2, put a cross in the box ☒.

2 Coastal environments

(a) Identify the soft engineering technique used on coastlines.

(1)

- ☒ **A** rock armour
- ☒ **B** groynes
- ☒ **C** sea wall
- ☒ **D** beach replenishment

(b) (i) Identify the best definition of a coral reef ecosystem.

(1)

- ☒ **A** an ecosystem consisting of sandy deposits
- ☒ **B** an ecosystem made of small animals (polyps) living together in water with a temperature of 23–27°C
- ☒ **C** an ecosystem consisting of small shrubs and trees
- ☒ **D** an ecosystem where plants and animals are adapted to both salt and fresh water

(ii) State **one** abiotic feature of an ecosystem.

(1)

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(iii) Explain **one** factor that can affect the distribution of mangrove ecosystems.

(2)

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(c) Study Figure 2a in the Resource Booklet.

Suggest **two** ways deposition can affect coastal landforms.

(4)

1 .....

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(d) Explain **one** factor that affects the rate of coastal erosion.

(3)

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(e) Study Figure 2b in the Resource Booklet.

Name the type of weathering taking place at **X**.

(1)

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(f) Explain the formation of a coastal arch.

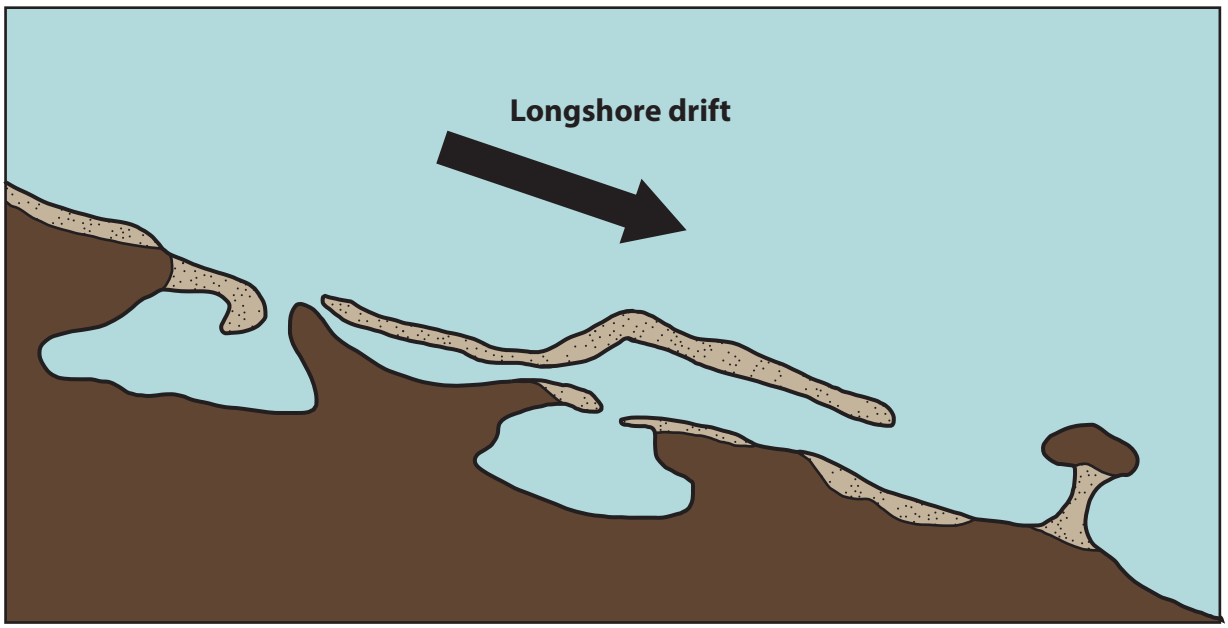
(4)

(g) Study Figure 2c and Figure 2d in the Resource Booklet.

Analyse why conflicts between development and conservation occur in coastal areas.

Refer to the resources in your answer.

(8)



Key

Sand

Rock

Figure 2a

Features caused by coastal deposition

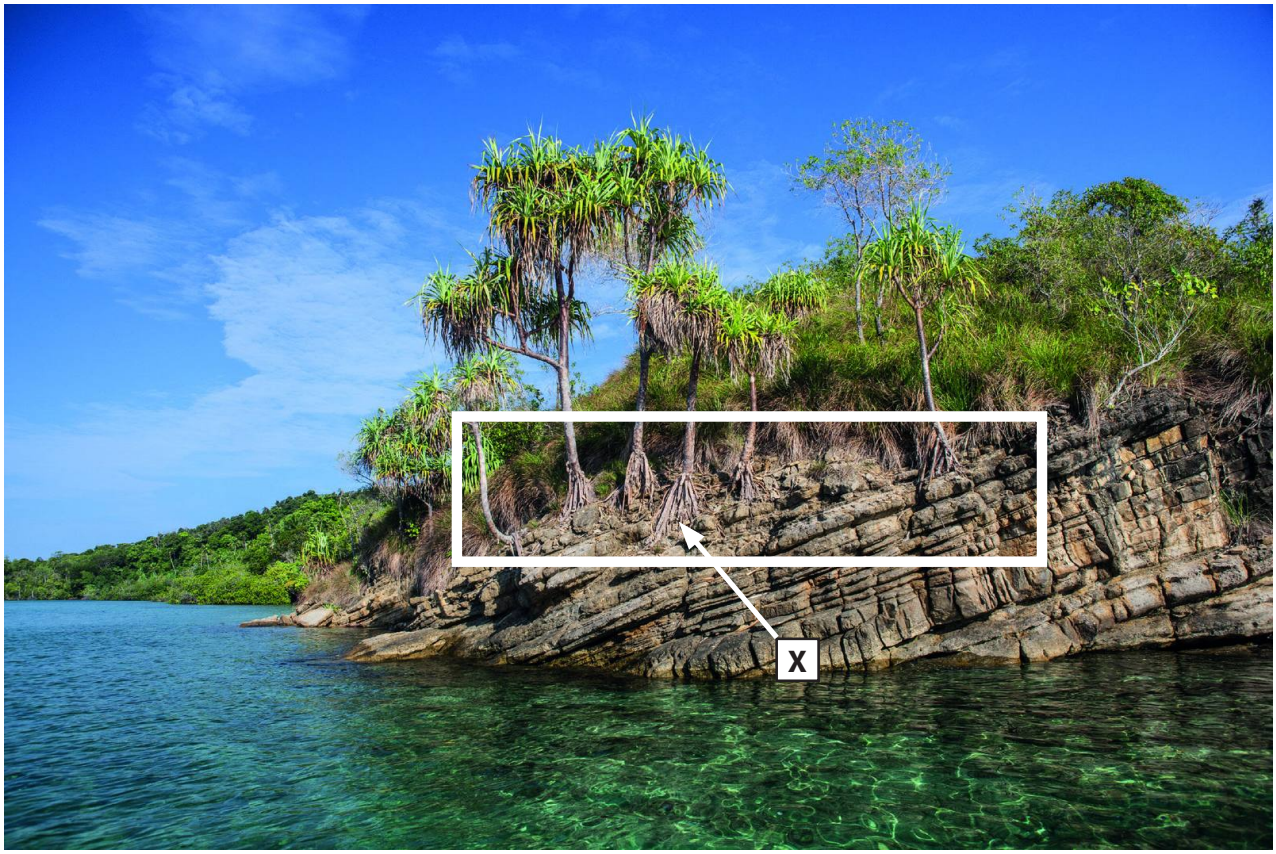


Figure 2b

A coastline in Raja Ampat, Indonesia

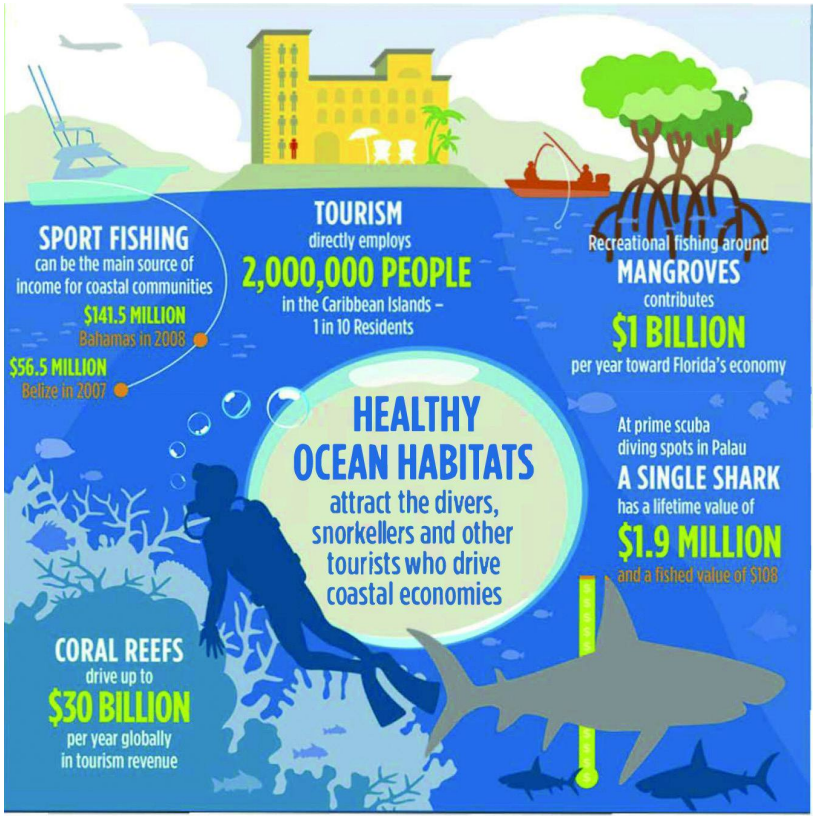


Figure 2c

Reasons for development of coastlines

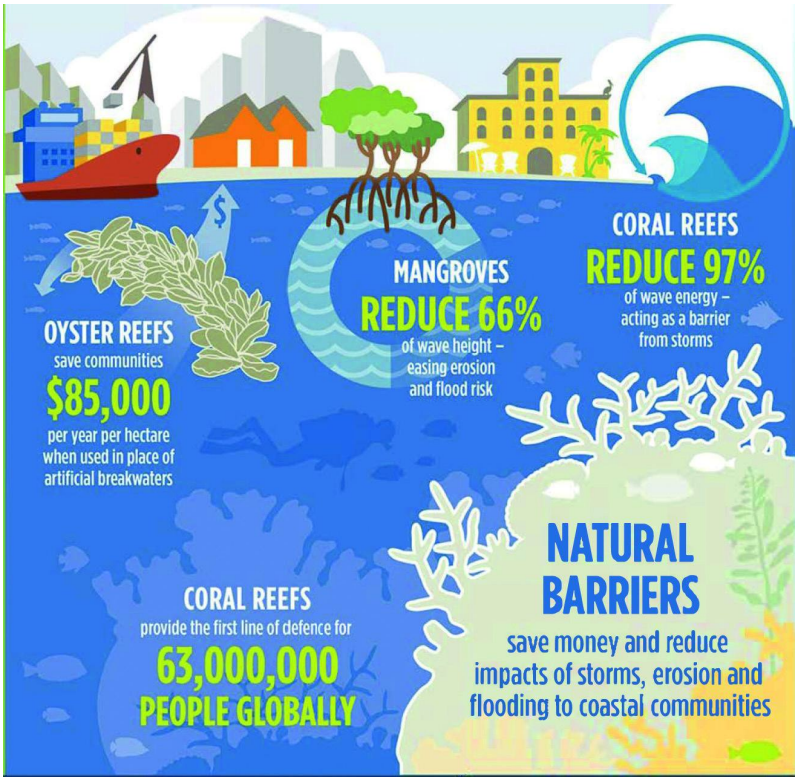


Figure 2d

Reasons for conservation of coastlines

If you answer Question 2, put a cross in the box ☒.

2 Coastal environments

(a) Identify the best definition of swash.

(1)

- ☒ **A** Distance between two wave crests
- ☒ **B** Friction between wind and water surface
- ☒ **C** Movement of water down the beach
- ☒ **D** Movement of water up the beach

(b) (i) Identify the best definition of mass movement.

(1)

- ☒ **A** The breakdown and decay of rocks by natural forces
- ☒ **B** The dropping of material being carried by waves
- ☒ **C** The movement of material along the shore by waves
- ☒ **D** The movement of material down a slope due to gravity

(ii) Name **one** landform created by coastal erosion.

(1)

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(iii) Explain **one** influence geology can have on rates of coastal erosion.

(2)

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(c) Study Figure 2a in the Resource Booklet.

Explain **one** advantage and **one** disadvantage of managed retreat as a form of coastal management.

(4)

Advantage

Disadvantage

(d) Explain **one** way education can reduce the impact of coastal flooding.

(3)

(e) Study Figure 2b in the Resource Booklet.

Identify the coastal ecosystem shown in Figure 2b.

(1)

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(f) Explain **two** reasons why coral reef ecosystems are under threat.

(4)

1 .....

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(g) Study Figure 2c in the Resource Booklet.

Analyse the impact of human activity on mangrove ecosystems.

Refer to the resource in your answer.

(8)

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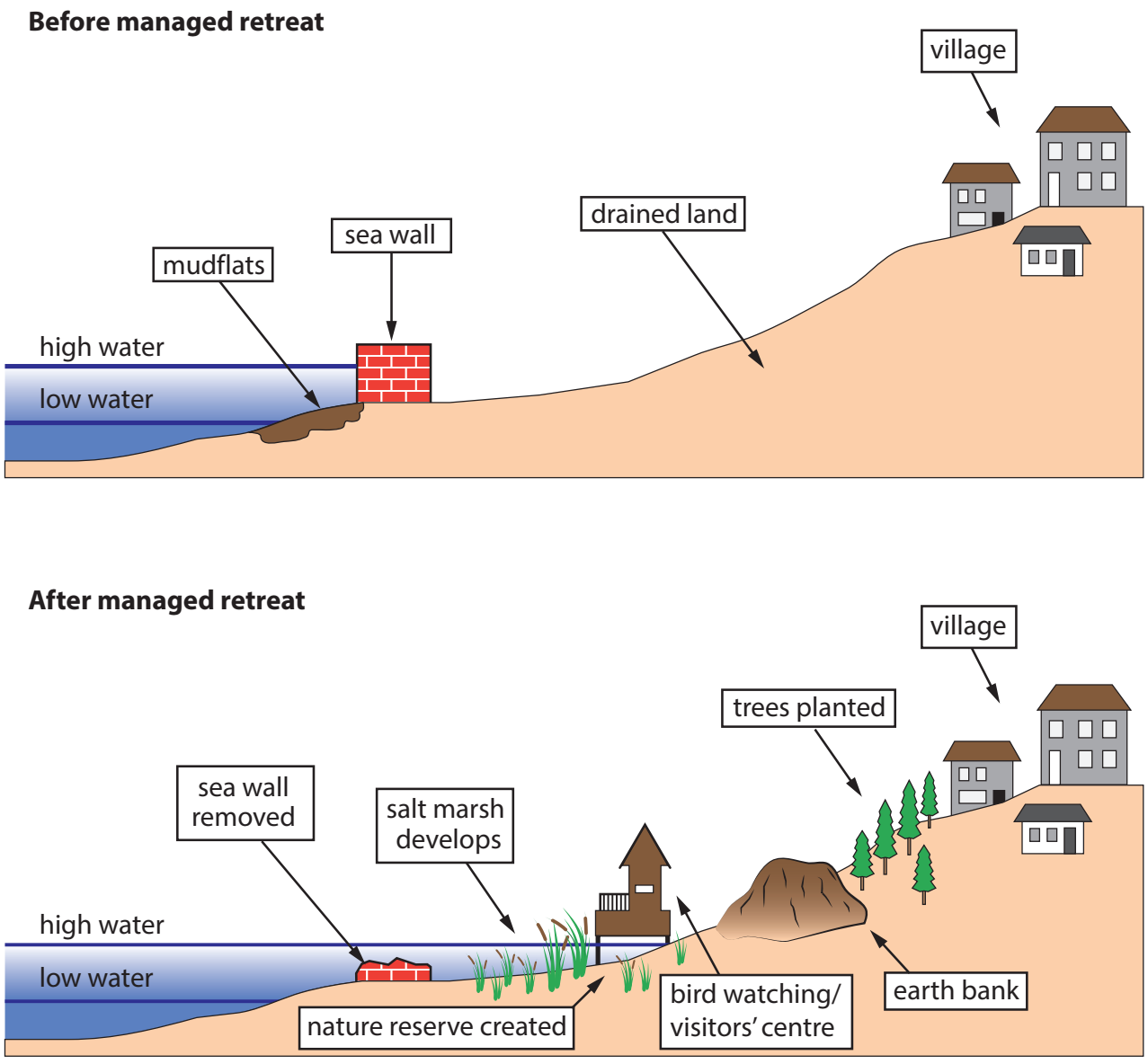


Figure 2a

A diagram showing coastal environment before and after managed retreat



Figure 2b

Coastal ecosystem

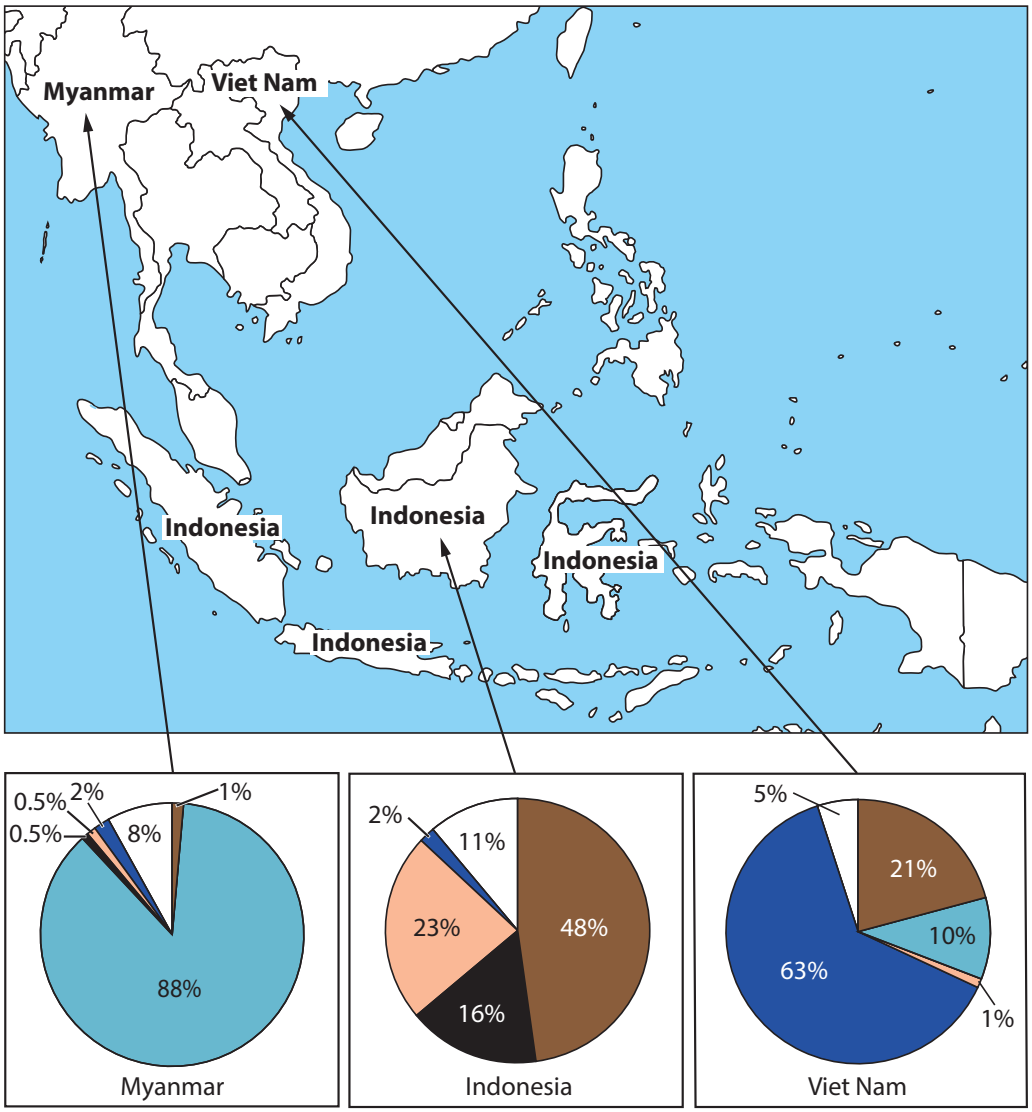


Figure 2c

Rates of mangrove destruction and regrowth (mainly planted), in south-east Asia

If you answer Question 2, put a cross in the box ☒.

2 Coastal environments

(a) Identify **one** abiotic characteristic of a coastal ecosystem.

(1)

- ☒ **A** coral
- ☒ **B** fungi
- ☒ **C** phytoplankton
- ☒ **D** temperature

(b) (i) Identify the best definition of backwash.

(1)

- ☒ **A** distance between two wave crests
- ☒ **B** friction between wind and water surface
- ☒ **C** movement of water down the beach
- ☒ **D** movement of water up the beach

(ii) State **one** characteristic of a constructive wave.

(1)

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(iii) Explain **one** type of coastal mass movement.

(2)

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(c) Study Figure 2a in the Resource Booklet.

Suggest **two** reasons hard engineering is suitable for this stretch of coastline.

(4)

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(d) Explain why **one** conflict might occur between different users of coastlines.

(3)

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(e) Study Figure 2b in the Resource Booklet.

Identify the landform labelled **X**.

(1)

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(f) Explain **two** physical factors that affect coastal deposition.

(4)

1 .....

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2 .....

(g) Study Figure 2c in the Resource Booklet.

Analyse the possible reasons why the populations of some countries are more at risk from coastal flooding than others.

You **must** refer to the resource in your answer.

(8)



Key

- Camp site or Caravan site
- Parking / Park and ride, all year / seasonal
- Recreational route
- Water; mud
- Sch School
- + Place of worship
- Current or former place of worship – with tower
- Current or former place of worship – with spire, minaret or dome
- Beacon

Figure 2a

OS map extract showing a coastal landscape

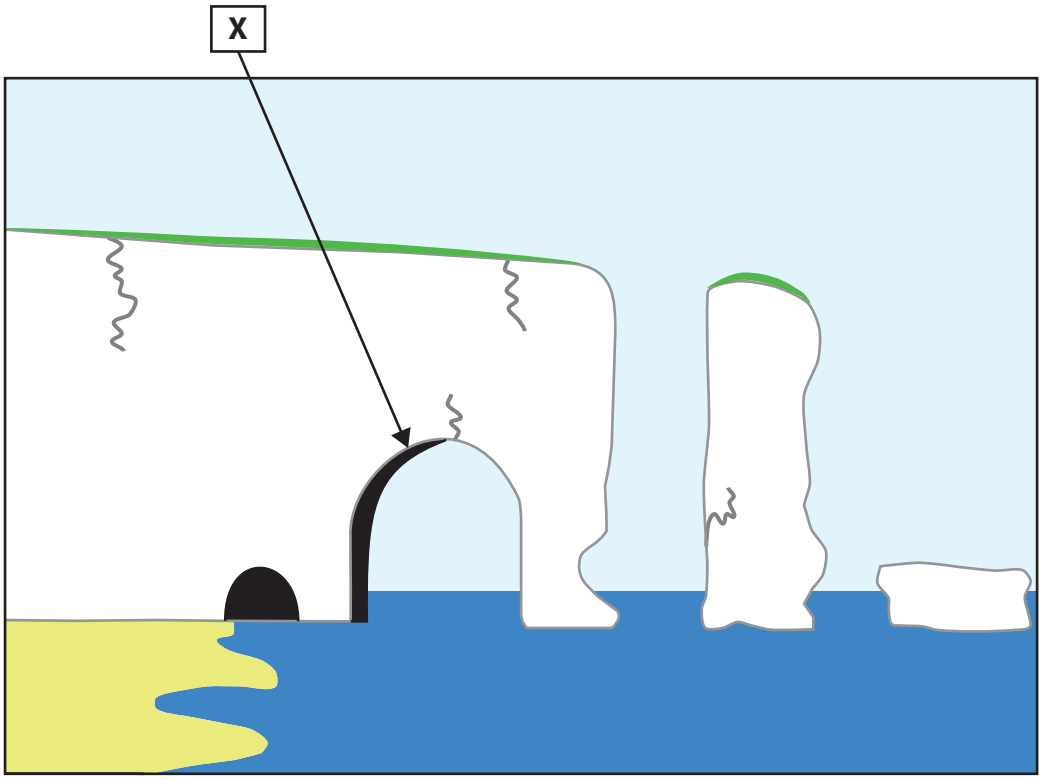
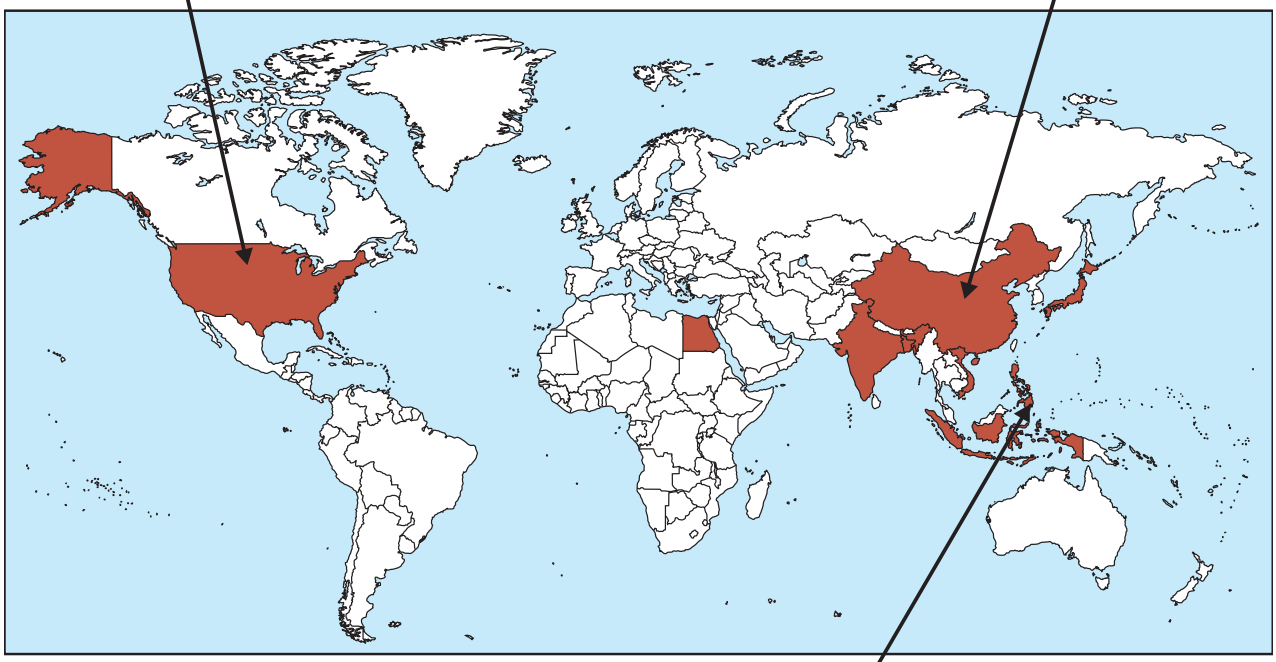


Figure 2b

Coastal landforms

USA
Total number of people living in low-lying coastal areas: 34 million
Percentage of total urban population living in low-lying urban areas: 61.4%
Recorded storm surges in 21st century: 21

China
Total number of people living in low-lying coastal areas: 204 million
Percentage of total urban population living in low-lying urban areas: 18.1%
Recorded storm surges in 21st century: 392



Key

Countries with large populations living in low-lying coastal areas

Philippines
Total number of people living in low-lying coastal areas: 23.8 million
Percentage of total urban population living in low-lying urban areas: 11.9%
Recorded storm surges in 21st century: 154

Figure 2c

Countries with a large population living in low-lying coastal areas and selected data

If you answer Question 2, put a cross in the box ☒.

2 Coastal environments

(a) Identify the best definition of chemical weathering.

(1)

- ☒ **A** acids in water dissolve rock
- ☒ **B** movement of rock from one place to another
- ☒ **C** plant roots burrow into cracks
- ☒ **D** water freezing and thawing breaks rocks

(b) (i) Identify **one** type of coastal mass movement.

(1)

- ☒ **A** saltation
- ☒ **B** slumping
- ☒ **C** suspension
- ☒ **D** traction

(ii) State **one** characteristic of a destructive wave.

(1)

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(iii) Explain **one** type of coastal erosion.

(2)

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(c) Explain **two** physical factors that can affect coastal erosion.

(4)

1 .....

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2 .....

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(d) Explain **one** characteristic of a sand dune ecosystem.

(3)

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(e) Study Figure 2a in the Resource Booklet.

Suggest **two** reasons soft engineering is suitable for this stretch of coastline.

(4)

1 .....

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2 .....

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(f) Study Figure 2b in the Resource Booklet.

Identify the landform labelled **X**.

(1)

.....

(g) Study Figure 2c in the Resource Booklet.

Analyse the possible reasons why the populations of some countries are less at risk from coastal flooding than others.

You **must** refer to the resource in your answer.

(8)

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0 1km

Key

- Recreational route
- Nature reserve
- Marsh, reeds or saltings
- Beacon
- Water; mud

Figure 2a

OS map showing a coastal landscape

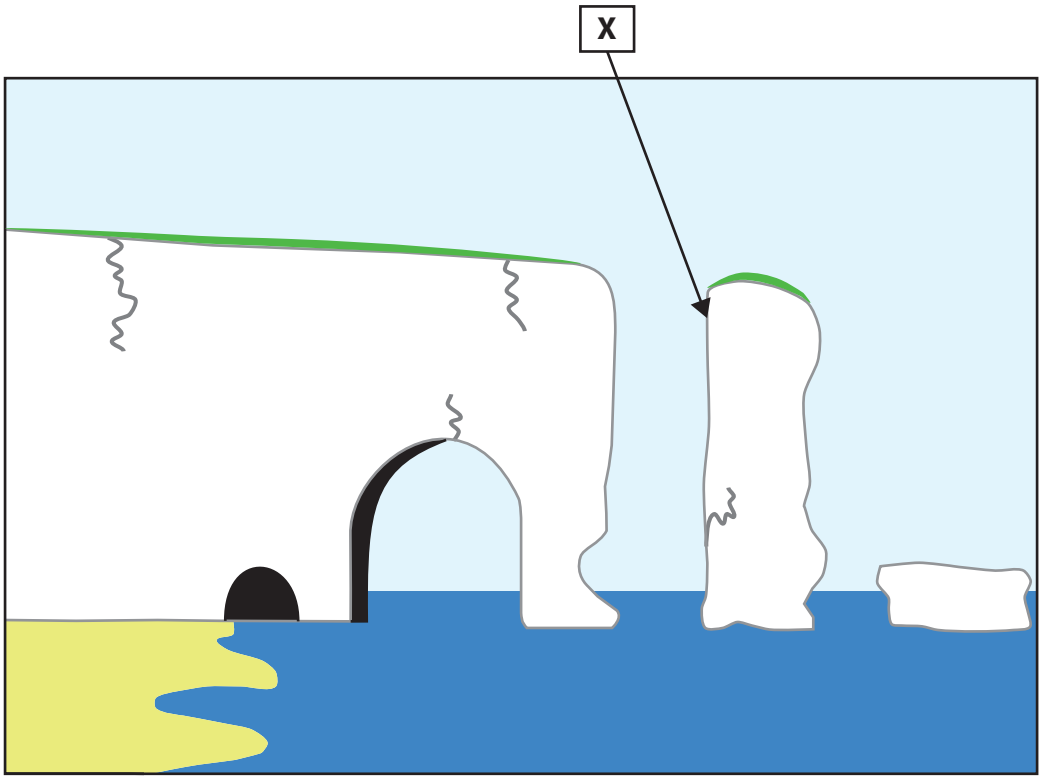
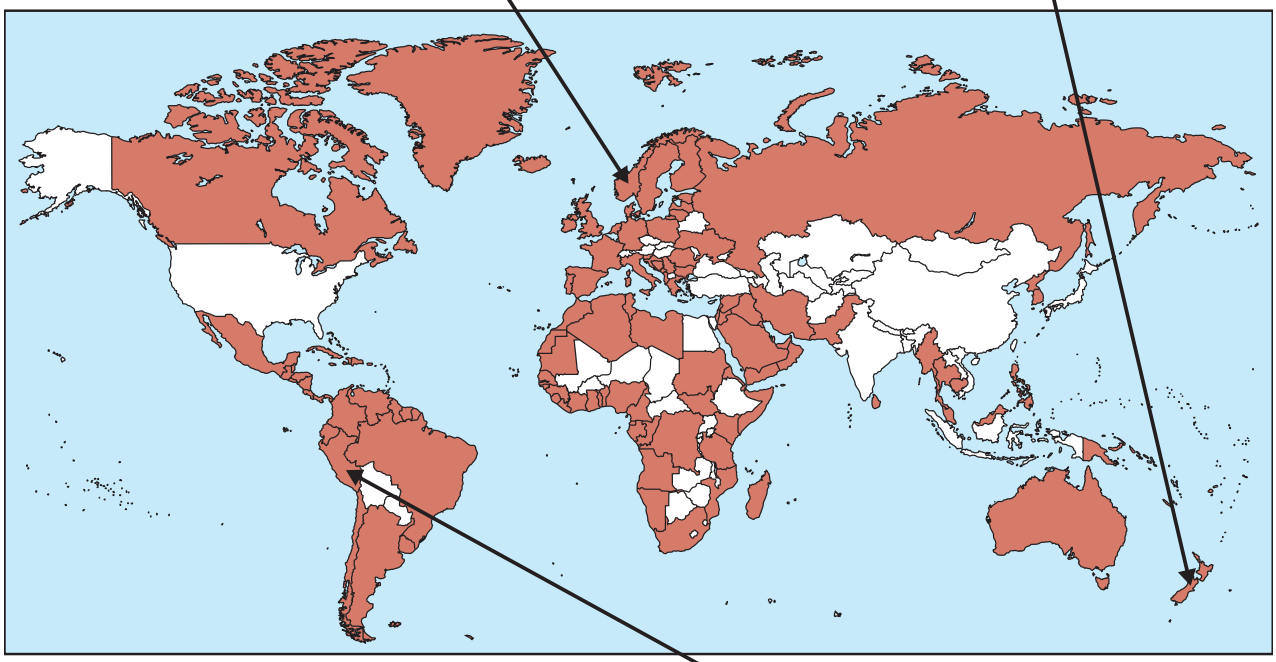


Figure 2b

Coastal landforms

Norway
Total number of people living in low-lying coastal areas: 389,000
Percentage of total urban population living in low-lying urban areas: 3%
Predicted sea level rise: 3 mm per year

New Zealand
Total number of people living in low-lying coastal areas: 169,000
Percentage of total urban population living in low-lying urban areas: 2%
Predicted sea level rise: 3.5 mm per year



Key

Countries with small populations living in low-lying coastal areas

Peru
Total number of people living in low-lying coastal areas: 24,000
Percentage of total urban population living in low-lying urban areas: 0%
Predicted sea level rise: 3 mm per year

Figure 2c

Countries with a small population living in low-lying coastal areas and selected data

If you answer Question 2, put a cross in the box ☒.

2 Coastal environments

(a) Identify the coastal landform created by deposition.

(1)

- ☒ **A** arch
- ☒ **B** cave
- ☒ **C** headland
- ☒ **D** spit

(b) (i) Identify the best definition of longshore drift.

(1)

- ☒ **A** fine sediment suspended in sea water
- ☒ **B** large sediment rolled along the seabed
- ☒ **C** medium sediment bounced along the seabed
- ☒ **D** zigzag movement of sediment along a coastline

(ii) Define the term **mass movement**.

(1)

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(c) Explain **two** processes of weathering in a coastal environment.

(4)

1 .....

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2 .....

(d) Study Figure 2a in the Resource Booklet.

Identify the abiotic factor shown in the food web.

(1)

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(e) Explain **one** characteristic of a mangrove ecosystem.

(2)

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(f) Study Figure 2b in the Resource Booklet.

Suggest **two** impacts sea level change may have had on this coastline.

You **must** refer to the resource in your answer.

(4)

1 .....

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2 .....

(g) Explain **one** way building design can reduce the impact of coastal flooding.

(3)

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(h) Study Figure 2c in the Resource Booklet.

Analyse the reasons soft engineering may lead to conflict between different users of the coast.

(8)

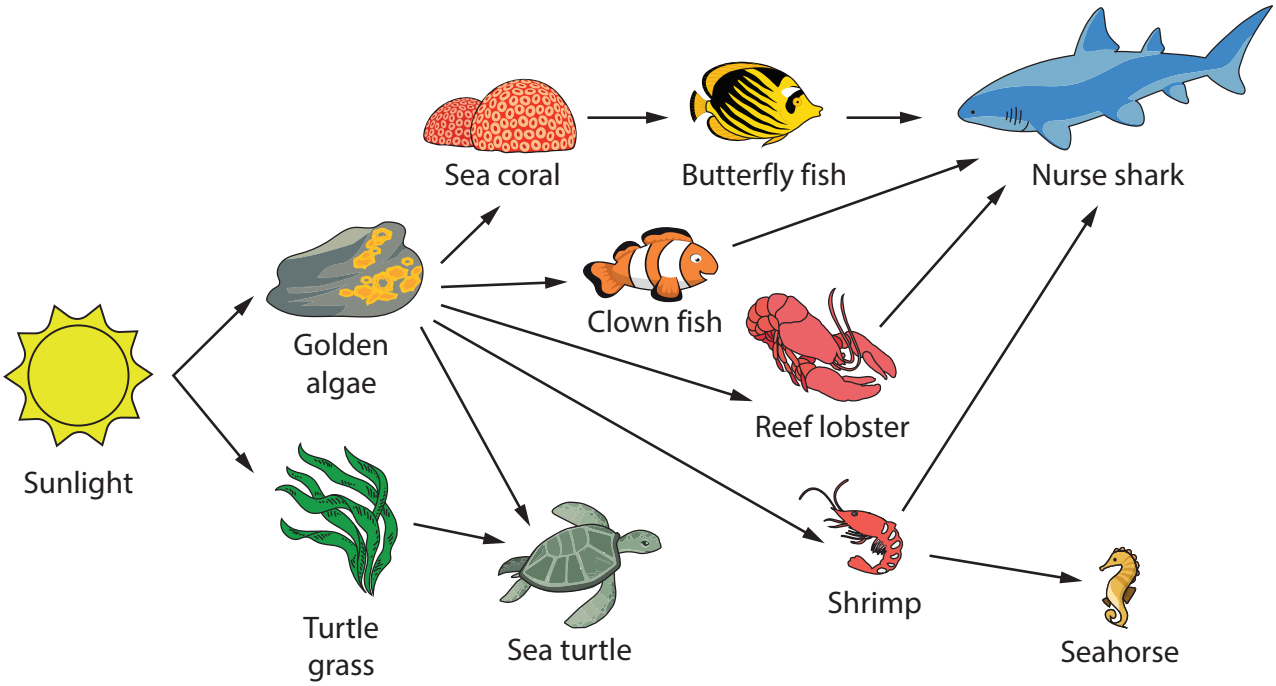


Figure 2a

Coral reef food web

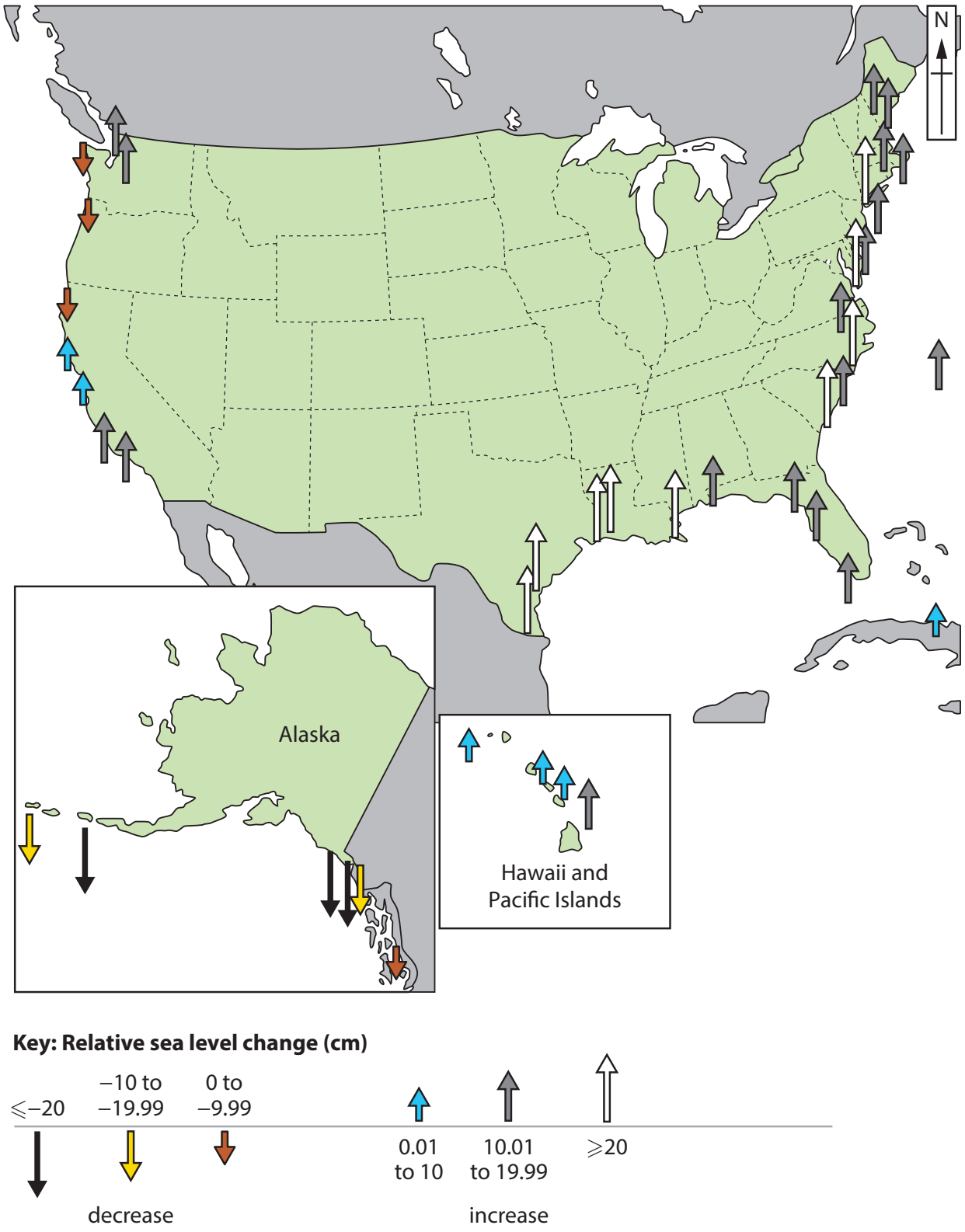


Figure 2b

Relative sea level change along USA coastlines, 1960 to 2021

Three quarters of the properties are protected by sand dunes.

Sand dune ecosystem created, costing US$16 billion.



Key

Area being eroded

There are US$23 billion worth of buildings within 50 m of this coastline.

One managed retreat scheme was completed in 2018, agreed by the local government – the sea wall was allowed to breach.

Figure 2c

Coastline managed using soft engineering and selected key facts

If you answer Question 2, put a cross in the box ☒.

2 Coastal environments

(a) Identify **one** way to prevent buildings being flooded.

(1)

- ☒ **A** buildings insurance
- ☒ **B** moving documents upstairs
- ☒ **C** planned evacuation routes
- ☒ **D** using sand bags

(b) (i) Identify the best definition of sea level change.

(1)

- ☒ **A** an alteration in the usual wind direction
- ☒ **B** an alteration in the water height of the ocean
- ☒ **C** the boundary between the land and the sea
- ☒ **D** the prediction of what the atmosphere will be like

(ii) State **one** cause of coastal flooding.

(1)

.....

(iii) Explain **one** type of hard engineering used in coastal management.

(2)

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(c) Study Figure 2a in the Resource Booklet.

Suggest **two** reasons why this coastal management strategy could cause conflict between different users.

You **must** refer to the resource in your answer.

(4)

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(d) Explain **one** reason for the distribution of coral reef ecosystems.

(3)

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(e) Study Figure 2b in the Resource Booklet.

Identify an abiotic characteristic in this ecosystem.

(1)

(f) Explain **one** industrial and **one** agricultural threat to a coastal ecosystem, such as salt marshes.

(4)

industrial

agricultural

(g) Study Figure 2c in the Resource Booklet.

Analyse the effect of physical processes on this coastline.

You **must** refer to the resource in your answer.

(8)



Figure 2a

Coastal management before and after soft engineering (managed retreat), Surfers Point, California

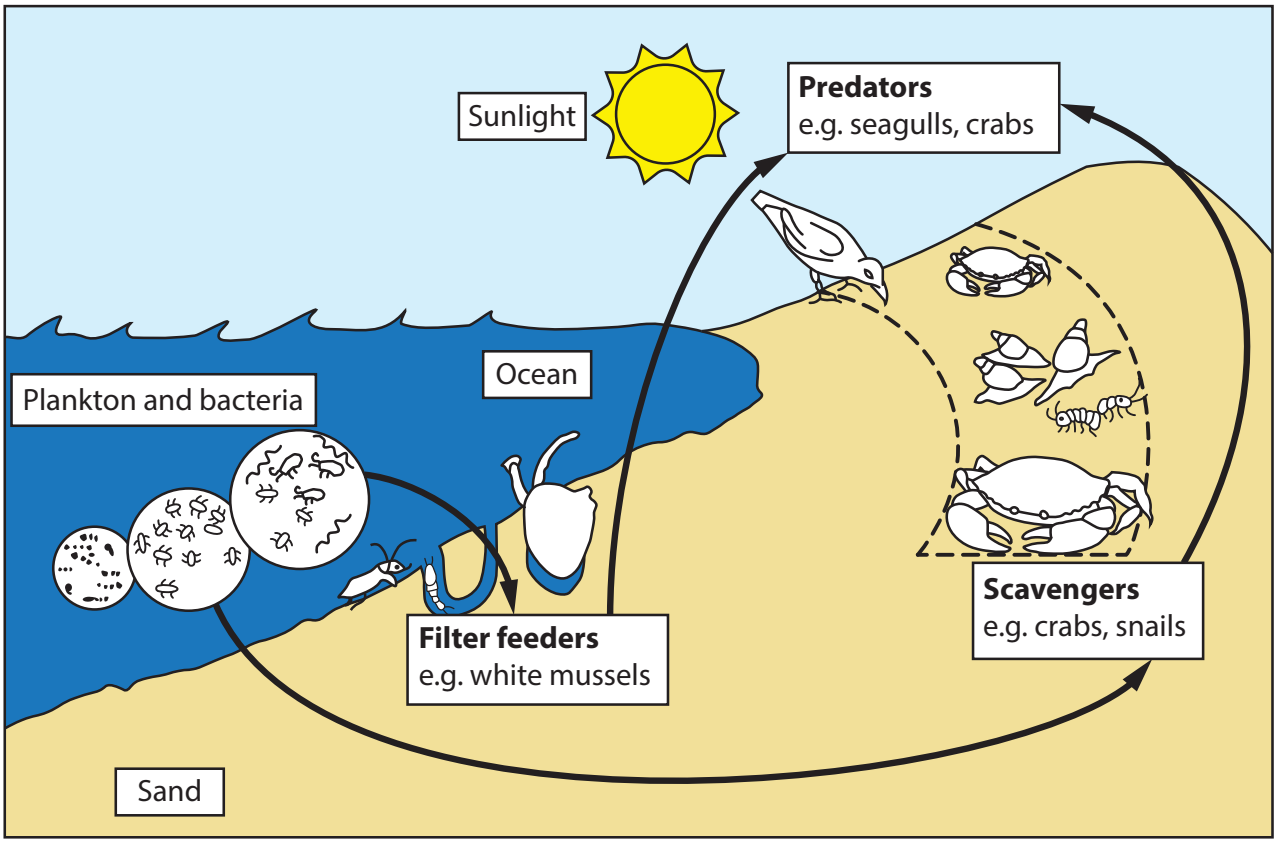
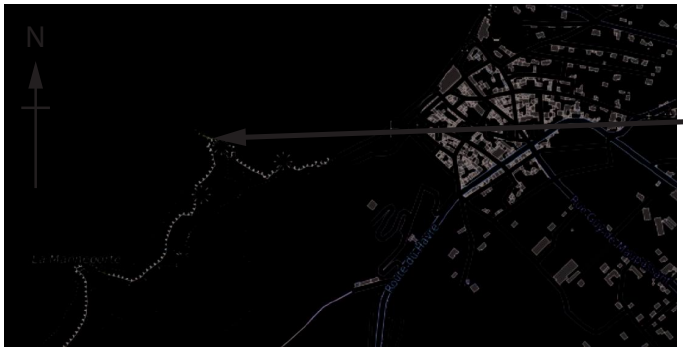
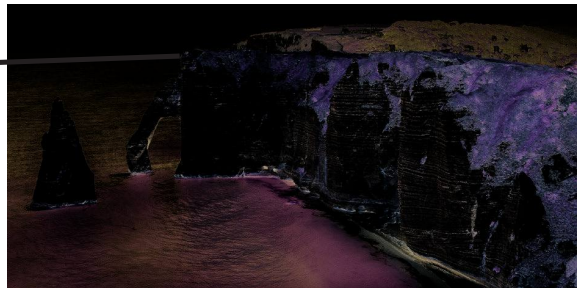


Figure 2b

Sandy coastal ecosystem food chain



Relief map of Étretat, Normandy, France coastline



Photograph of Étretat, Normandy, France coastline

Fact file:
Climate: temperate
Annual temperature range: 4°C to 22°C
Geology: chalk
Dominant wave type: destructive waves
Mean fetch: 95 km

Étretat coastline ecosystem:
The coastline is made of high chalk cliffs and valleys.

At Étretat, the base of the cliffs are made from hard chalk with a layer of softer chalk laying on top.

The Étretat Needle is a coastal stack showing the old cliff location. This shows the chalk is vulnerable to coastal processes.

Climate:
The temperature in Étretat varies during the year. The warmer months range from June to September (prevailing wind direction is from the west with an average annual wind speed of 23 kmph) with an average annual precipitation of 1,110 mm.

Figure 2c

Coastline characteristics of Étretat, Normandy, France

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Acknowledgements:

Pearson Education Ltd. gratefully acknowledges all the following sources used in the preparation of this paper:

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© geogphotos/Alamy Stock Photo
Figure 2a: NOAA Climate.gov
Figure 2c: © JefWodniack/Shutterstock
Figure 4: www.en-gb.topographic-map.com

If you answer Question 2, put a cross in the box ☒.

2 Coastal environments

(a) (i) Identify **one** cause of coastal flooding.

(1)

- ☒ **A** high evaporation
- ☒ **B** high temperatures
- ☒ **C** low humidity
- ☒ **D** storm surge

(ii) Coastal flooding is one impact of sea level change.

State **one other** impact of sea level change on coastal landforms.

(1)

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(b) Identify the best definition of a coastal headland.

(1)

- ☒ **A** a cliff surrounded by water on three sides
- ☒ **B** a gently sloping surface of rock at the base of a cliff
- ☒ **C** a large pillar of rock separated from the shoreline
- ☒ **D** a low-lying inlet of land on the coast

(c) Explain **one** type of soft engineering used in coastal management.

(2)

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(d) Study Figure 2a in the Resource Booklet.

Suggest **two** reasons the coastal management shown could cause conflict with different users of the coastline.

You **must** refer to the resource in your answer.

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(e) The non-living parts of an ecosystem are called abiotic characteristics.

Explain how **one** abiotic characteristic can affect a named coastal ecosystem.

(3)

Named coastal ecosystem

.....

.....

.....

.....

(f) Study Figure 2b in the Resource Booklet.

Identify the labelled country with the shortest length of saltmarsh ecosystems.

(1)

.....

(g) Explain **two** threats caused by tourism on coastal ecosystems such as coral reefs.

(4)

1 .....

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.....

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2 .....

.....

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(h) Study Figure 2c in the Resource Booklet.

Analyse the effect of physical processes on the coastline.

You **must** refer to the resource in your answer.

(8)

.....

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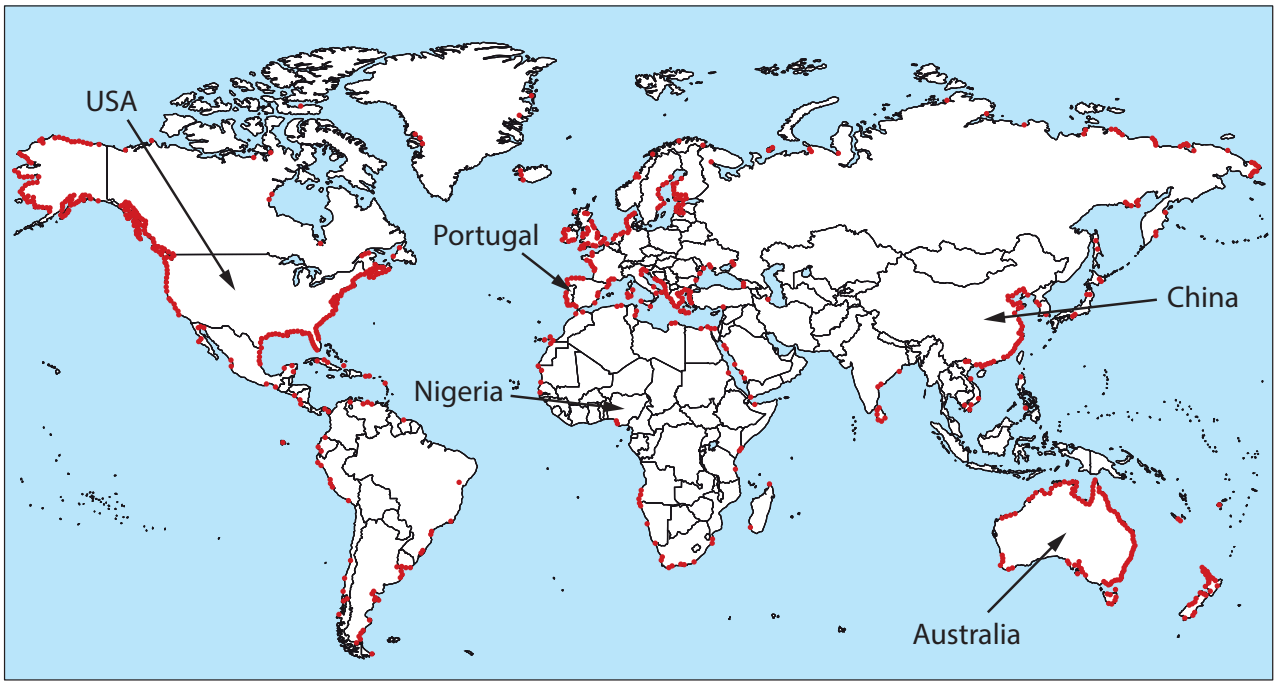
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Figure 2a

Managed (hard engineering) coastal environments



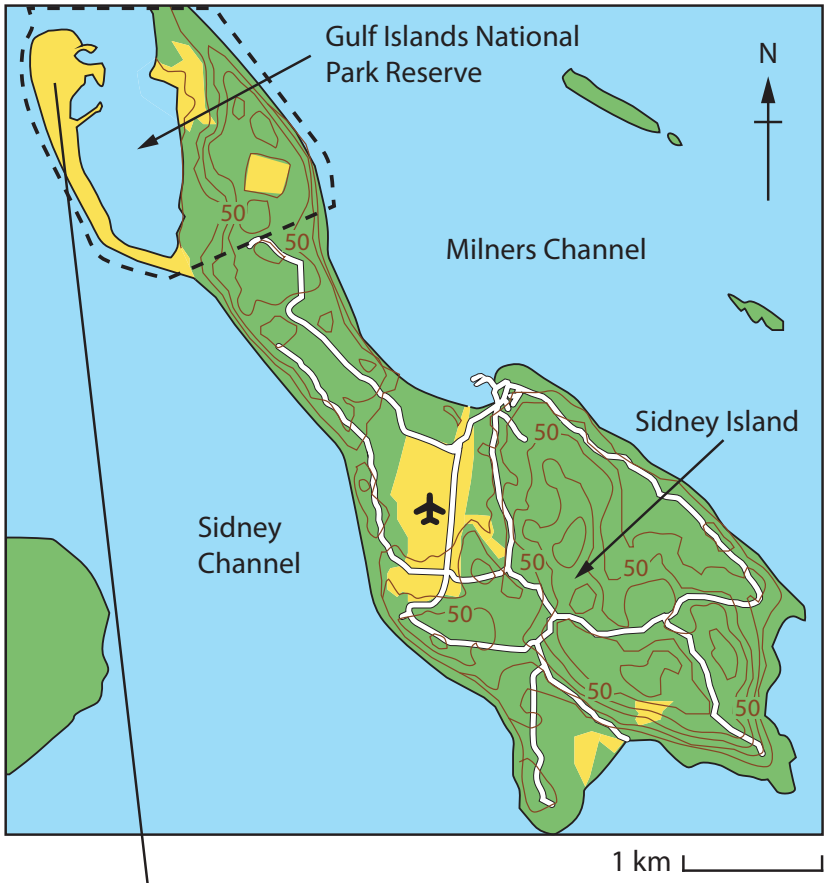
Key

- Saltmarsh

N

Figure 2b

Global distribution of saltmarsh ecosystems



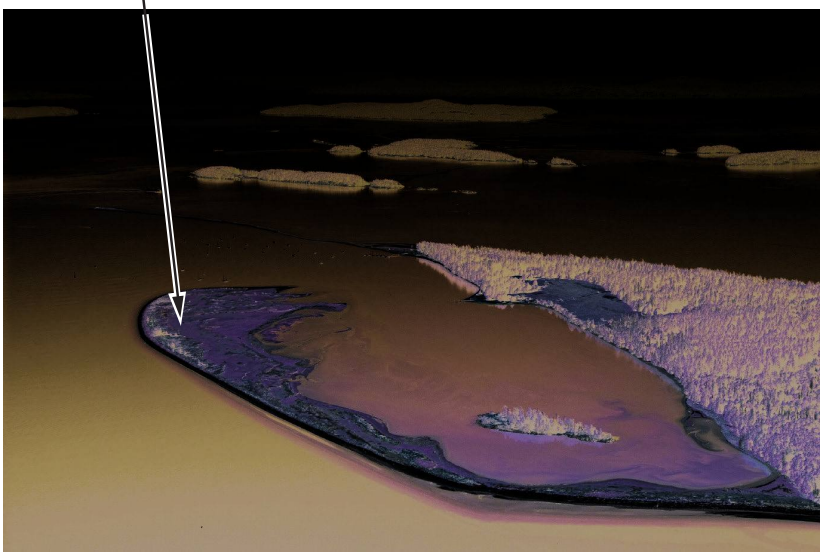
Relief map of Sidney Island, Canada

Fact file

Annual temperature range: 5°C to 18°C
Dominant wave type: constructive waves
Mean fetch: 6 km

Sidney Island habitat:
The island is made up primarily of sands and clays and its coastline is dominated by sand beach and sand dunes. A large hook spit, lagoon and long spit are found to the north of the island. Vegetation consists of fir forests and areas of oak woodlands.

Climate:
Mild wet winters and warm summers with little precipitation.



Photograph of Sidney Island, Canada coastline

Key

–50– Metres above sea level

Figure 2c

Coastline characteristics of Sidney Island, British Columbia, Canada

SUB-TOPIC

FIELDWORK: INVESTIGATING COASTAL ENVIRONMENTS

16 questions in this booklet

If you answer Question 5 put a cross in the box ☒

5 Investigating Coastal Environments.

A group of students have investigated changes in sediment size along a stretch of coast every 100 metres.

(a) (i) Identify the type of sampling method used.

(1)

☒	**A** systematic
☒	**B** random
☒	**C** stratified
☒	**D** opportunistic

(ii) State **one** disadvantage of using one of the sampling methods in the question above, a(i).

Sampling method .....

(1)

.....

.....

Study Figure 5a in the Resource Booklet. It shows sample data on shingle size collected at five sites along a stretch of coastline.

(iii) Calculate the mean shingle size for the five sites.

Give your answer to one decimal place.

You must show all your workings in the space below.

(2)

..... mm

(iv) Using the data in Figure 5a (in the Resource Booklet), complete Figure 5b below for sites 1 and 4.

(2)

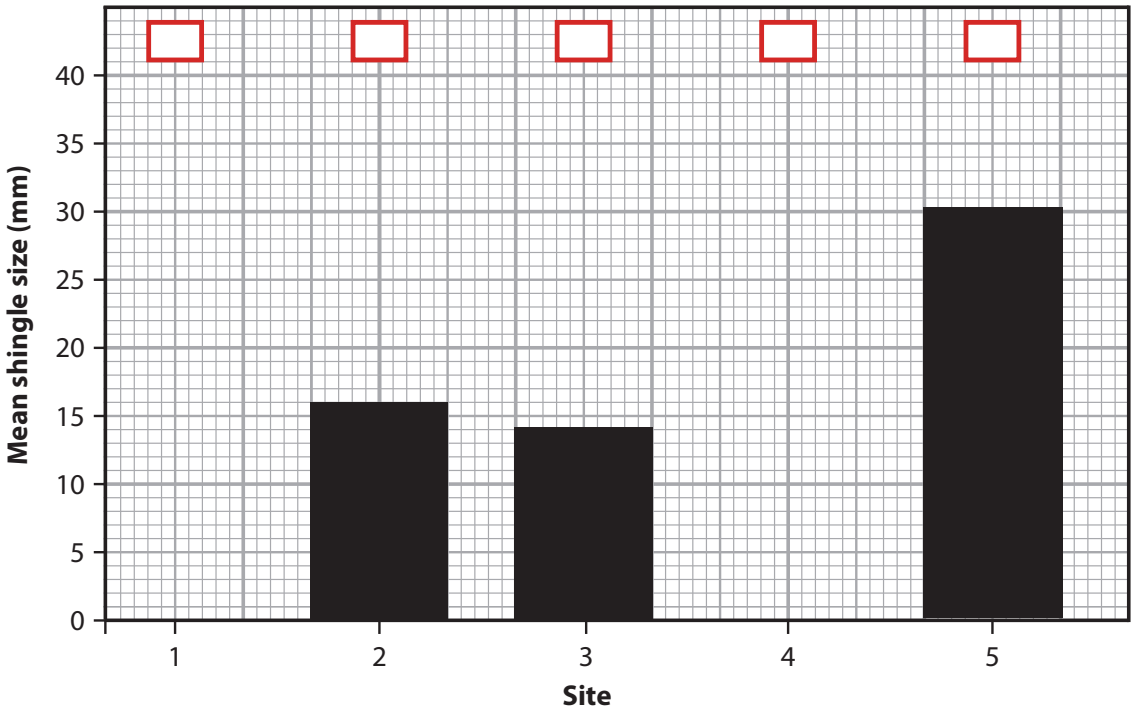


Figure 5b

Mean shingle size at each site

(v) Mark an x in the box on Figure 5b which represents the site with the anomalous result.

(1)

(vi) Suggest **one** possible explanation for this anomaly.

(2)

(b) To extend the coastal study, students were asked to use one other primary data method.

Explain **one** other primary data method they might have used.

(3)

You have studied coastal environments for your geographical enquiry.

(c) Evaluate how successful your chosen data analysis methods were in answering your geographical enquiry question.

(8)

Enquiry question

Site	Mean shingle size (mm)
1	21.1
2	16.0
3	14.1
4	10.0
5	30.1

Figure 5a

Coastal data collected by a group of students

If you answer Question 5 put a cross in the box ☐

5 Investigating Coastal Environments.

A group of students have investigated processes and landforms along a stretch of coastline.

(a) (i) Identify **one** risk that the students may identify when undertaking a risk assessment for this investigation.

(1)

.....

.....

(ii) State **one** way that this risk could be managed.

(1)

.....

Study Figure 5a in the Resource Booklet. It shows some sample data about shingle size along a stretch of coastline.

(iii) Calculate the mean shingle size across the five sites.

Give your answer to one decimal place.

You must show all your workings in the space below.

(2)

..... mm

(iv) Complete Figure 5b below for sites 1 and 4 using data in Figure 5a (in the Resource Booklet).

(2)

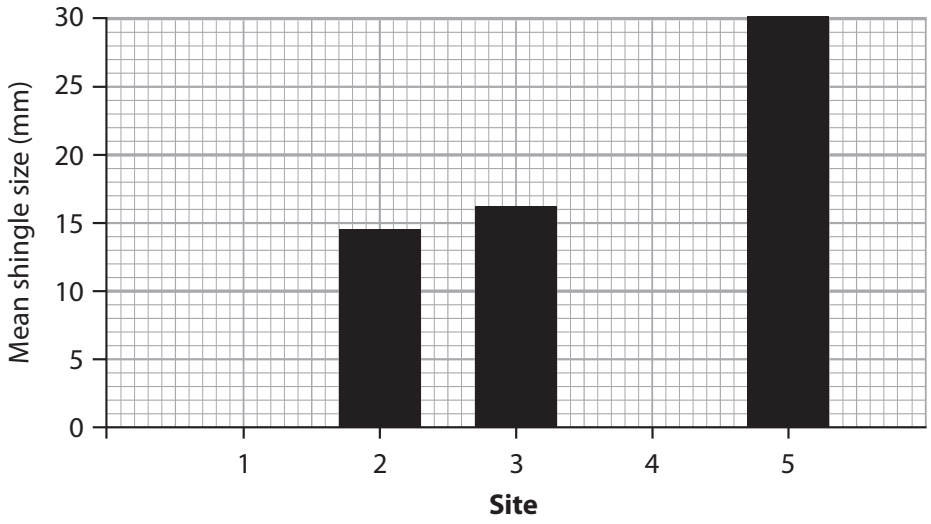


Figure 5b

Shingle size along a stretch of a coastline

(v) Site 5 shows an anomalous result.

Suggest **one** possible explanation for this.

(2)

.....

.....

.....

.....

(b) To extend the coastal study, students were asked to use one additional quantitative and one qualitative technique.

Describe the **two** additional fieldwork techniques the students may have selected.

(4)

Quantitative

Qualitative

You have studied a coastal environment as part of your own geographical enquiry.

(c) Evaluate the effectiveness of the data collection methods in responding to the purpose of the study.

(8)

Enquiry question

Site	Mean shingle size (mm)
1	8.1
2	14.5
3	16.1
4	15.0
5	30.0

Figure 5a

Coastal data collected by a group of students

If you answer Question 5 put a cross in the box ☒.

5 Investigating coastal environments

A group of students has undertaken a geographical enquiry exploring changes along a section of coastline.

(a) (i) State **one** secondary data source that the students might have used when undertaking this enquiry.

(1)

.....

.....

(ii) Identify **one** possible disadvantage of the secondary data source identified in 5(a)(i).

(1)

.....

.....

Study Figure 5a in the Resource Booklet. It shows the data collected for their investigation into beach sediment.

(iii) Use the data in Figure 5a to find the mean height of the sand accumulations on the **North** side of Groyne 3.

Give your answer to one decimal place.

You must show all your workings in the space below.

(2)

North side ..... cm

(iv) Use the data in Figure 5a to plot the data for Groyne 2 (both North and South) on Figure 5b.

(2)

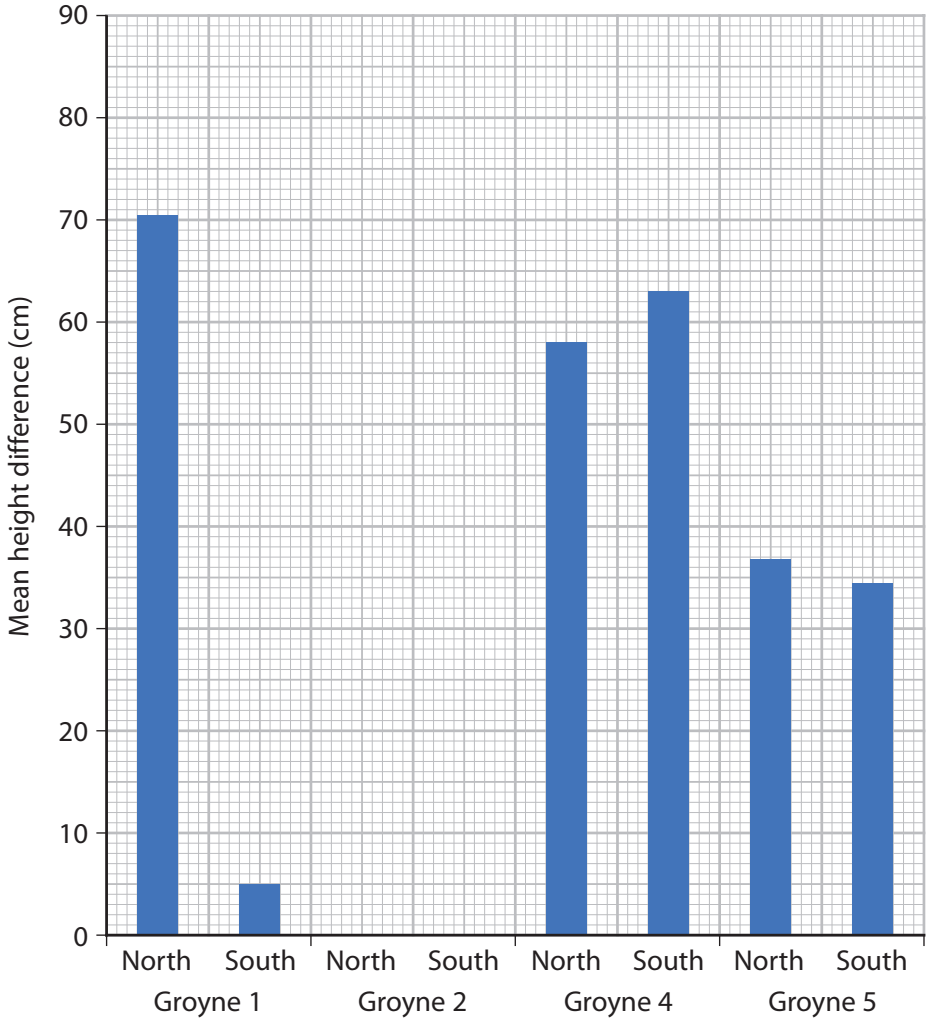


Figure 5b

Mean height difference between the top of selected groynes and the surface of the sand (cm)

(v) The groynes (Groynes 1–5) were selected randomly along the section of coast.

Suggest **one** reason why an alternative sampling method might be chosen to select the groynes.

(2)

Sampling method .....

.....

.....

.....

.....

(b) The students used annotated field sketches as part of their data collection.

Explain **one** advantage and **one** disadvantage of this type of technique.

(4)

Advantage

Disadvantage

You have studied a coastal environment as part of your own geographical enquiry.

(c) Evaluate the effectiveness of the data presentation methods you used.

(8)

Enquiry question

	Site 1 – furthest upstream		Site 2		Site 3 – furthest downstream	
Sampling point	**Channel width (cm)**	**Depth (cm)**	**Channel width (cm)**	**Depth (cm)**	**Channel width (cm)**	**Depth (cm)**
1	0	2.0	0	8.8	0	20.1
2	20	1.3	20	13.0	50	30.4
3	40	4.0	40	14.5	100	40.8
4	60	6.5	60	12.0	150	42.2
5	80	5.0	80	9.0	200	45.1
6	100	4.0	100	10.0	250	47.8
7	120	3.5	120	9.0	300	50.4
8	140	0.6	140	9.5	350	60.3
Mean depth		3.4		?		42.1

Figure 4a

River data collected by a group of students

	Height difference from top of groyne to surface of sand (cm)									
Distance from cliff line (m)	**Groyne 1**		**Groyne 2**		**Groyne 3**		**Groyne 4**		**Groyne 5**	
	North	**South**	**North**	**South**	**North**	**South**	**North**	**South**	**North**	**South**
0	0	0	0	0	0	0	0	0	0	0
10	93	5	120	15	44	81	102	74	50	43
20	94	1	113	10	40	70	80	45	80	40
30	94	14	93	96	51	45	50	122	17	54
Mean height (cm)	70.3	5.0	81.5	30.3	?	49.0	58.0	60.3	36.8	34.3

Figure 5a

Coastal data collected by a group of students

5 Investigating coastal environments

A group of students has undertaken a geographical enquiry exploring the effectiveness of coastal management techniques along a section of coastline.

(a) (i) State **one** risk that the students might identify when undertaking this enquiry.

(1)

.....

.....

(ii) State **one** way of managing the risk identified in 5(a)(i).

(1)

.....

.....

Study Figure 5a in the Resource Booklet. It shows the data collected for their investigation into beach sediment.

(iii) Use the data in Figure 5a to find the mean depth from the top of the groyne to the sand on the **South** side of Groyne 4.

Give your answer to one decimal place.

You must show all your workings in the space below.

(2)

South side ..... cm

(iv) Use the data in Figure 5a to plot the mean depth data for Groyne 2 (both North and South) to complete the graph.

(2)

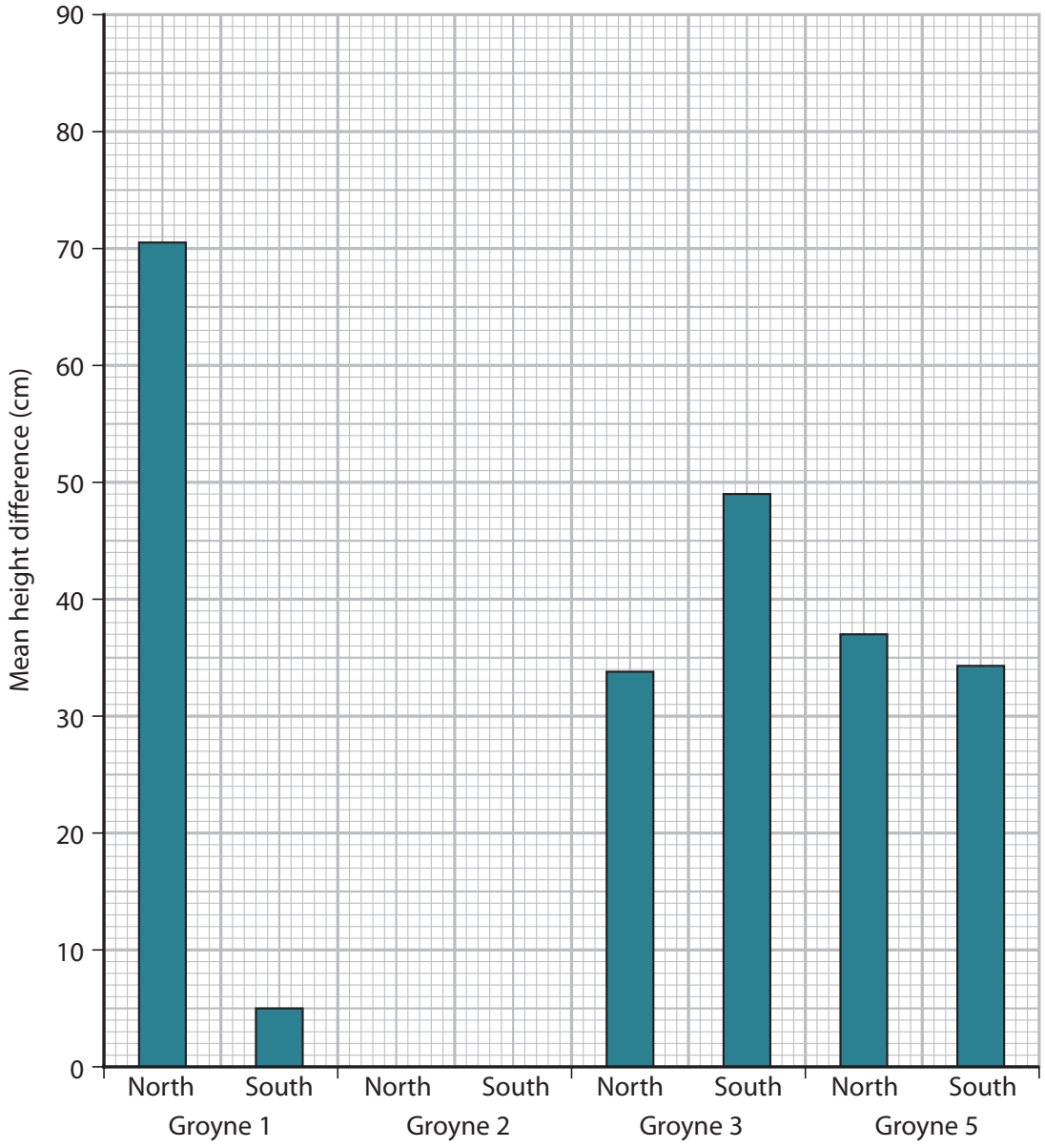


Figure 5b

Mean height difference between the top of selected groynes and the surface of the sand (cm)

(v) The groynes (1–5) were selected randomly along the section of coast.

Suggest **one** reason why the students chose random sampling for the selection of the five sites.

(2)

(b) The students used annotated field sketches as part of their data collection.

Suggest **one** advantage and **one** disadvantage of this technique.

(4)

Advantage

Disadvantage

You have studied a coastal environment as part of your own geographical enquiry.

(c) Evaluate the effectiveness of the data analysis techniques you used.

(8)

Enquiry question

	Site 1 – Furthest upstream		Site 2		Site 3 – Furthest downstream	
Sampling point	**Distance from bank (cm)**	**Depth (cm)**	**Distance from bank (cm)**	**Depth (cm)**	**Distance from bank (cm)**	**Depth (cm)**
1	0	2.0	0	8.8	0	41.1
2	20	1.3	20	13.0	50	60.5
3	40	4.0	40	14.5	100	78.5
4	60	6.5	60	12.0	150	85.1
5	80	5.0	80	9.0	200	92.3
6	100	4.0	100	10.0	250	95.6
7	120	3.5	120	9.0	300	60.4
8	140	0.6	140	9.5	350	45.3
Mean depth		3.36		10.7		?

Figure 4a

River data collected by a group of students

	Height difference from top of groyne to surface of sand (cm)									
Distance from cliff line (m)	**Groyne 1**		**Groyne 2**		**Groyne 3**		**Groyne 4**		**Groyne 5**	
	North	**South**	**North**	**South**	**North**	**South**	**North**	**South**	**North**	**South**
0	0	0	0	0	0	0	0	0	0	0
10	93	5	120	15	44	81	102	74	50	43
20	94	1	113	10	40	70	80	45	80	40
30	94	14	93	96	51	45	50	122	17	54
Mean depth	70.3	5.0	81.5	30.3	33.8	49.0	58.0	?	36.8	34.3

Figure 5a

Coastal data collected by a group of students measuring beach profile: the height difference from the top of the groyne to the surface of the sand

5 (a) (i) Identify the correct definition of systematic sampling.

(1)

☒	**A** Collecting data at random sites along a coastline.
☒	**B** Collecting data every 100m along a coastline.
☒	**C** Collecting data from two different coastline.
☒	**D** Collecting data from three sites along a coastline.

(ii) Name **one** piece of equipment you would use to measure beach gradient.

(1)

(iii) Describe **one** health and safety risk it is important to be aware of when carrying out fieldwork in a coastal environment.

(2)

(b) Study Figure 5 in the Resource Booklet. It shows information about some design, some data collection methods used, data presentation and a conclusion.

> The aim of the student's investigation was to examine change in beach characteristics along the stretch of coastline.

Evaluate how far the design and the data collection methods provided reliable evidence for the student's conclusions.

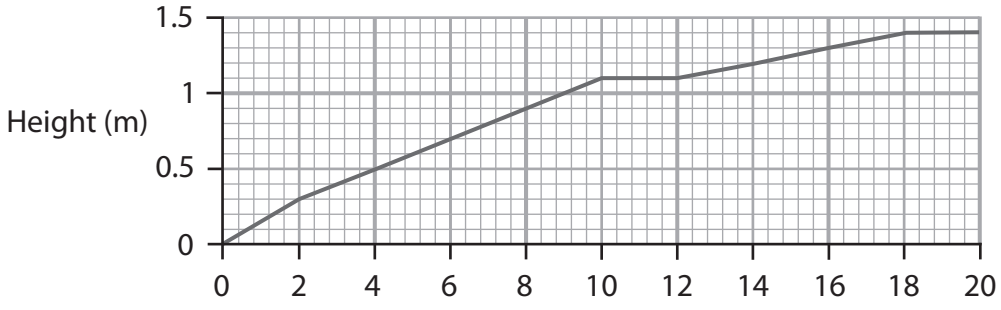
(8)

At two different sites along a beach chosen at random on a map:

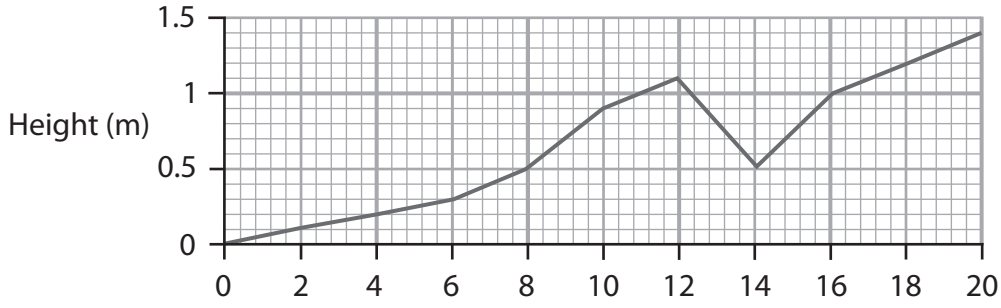
- Measure gradient of the beach at set distances
- Record sediment shape
- Measure sediment size

Figure 5a

Extract from data collection methods



Site 1



Site 2

	Conclusions
1	I found that the characteristics of the beach changed along the coastline.
2	Measuring the changes in the gradient of the beach allowed me to create a beach profile to show how characteristics changed along the coastline.
3	There was little difference between the sediment size along the stretch of the coastline.

Figure 5b

An extract from the student's data presentation and conclusion

5 (a) (i) Identify a suitable piece of equipment to measure beach gradient.

(1)

☒	**A** Anemometer
☒	**B** Quadrat
☒	**C** Clinometer
☒	**D** Stopwatch

(ii) Name **one** type of sampling method.

(1)

(iii) Describe **one** way GIS might be used for fieldwork in a coastal environment.

(2)

(b) Study Figure 5 in the Resource Booklet. It shows some information about methods used, data collected and a conclusion.

> The aim of the student's investigation was to examine change in beach characteristics along a stretch of coastline.

Evaluate how far the student's data presentation methods and analysis helped the student to make their conclusions.

(8)

If you answer Question 5 put a cross in the box ☒.

5 Investigating coastal environments

A group of students have undertaken an enquiry that explores how beach characteristics change due to coastal management.

(a) Study Figure 5a in the Resource Booklet.

(i) Identify **one** type of primary data used by the students.

(1)

☒ **A** local shoreline management plan

☒ **B** field sketches

☒ **C** local historical map

☒ **D** newspaper articles

(ii) Name **one** piece of equipment the students could have used in their enquiry.

(1)

.....

(b) Study Figure 5b which shows some data about beach characteristics at four sites where data was collected.

(i) Calculate the mean pebble size at Site 2.

Give your answer to one decimal place.

You must show all your workings in the space below.

(2)

..... mm

(ii) State **one** type of sampling students could have used to choose their data collection sites.

(1)

.....

(iii) Suggest **one** reason why the data for Site 1 may not be reliable.

(2)

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(c) (i) Complete the beach profile in Figure 5d below using data highlighted in Figure 5c in the Resource Booklet.

(2)

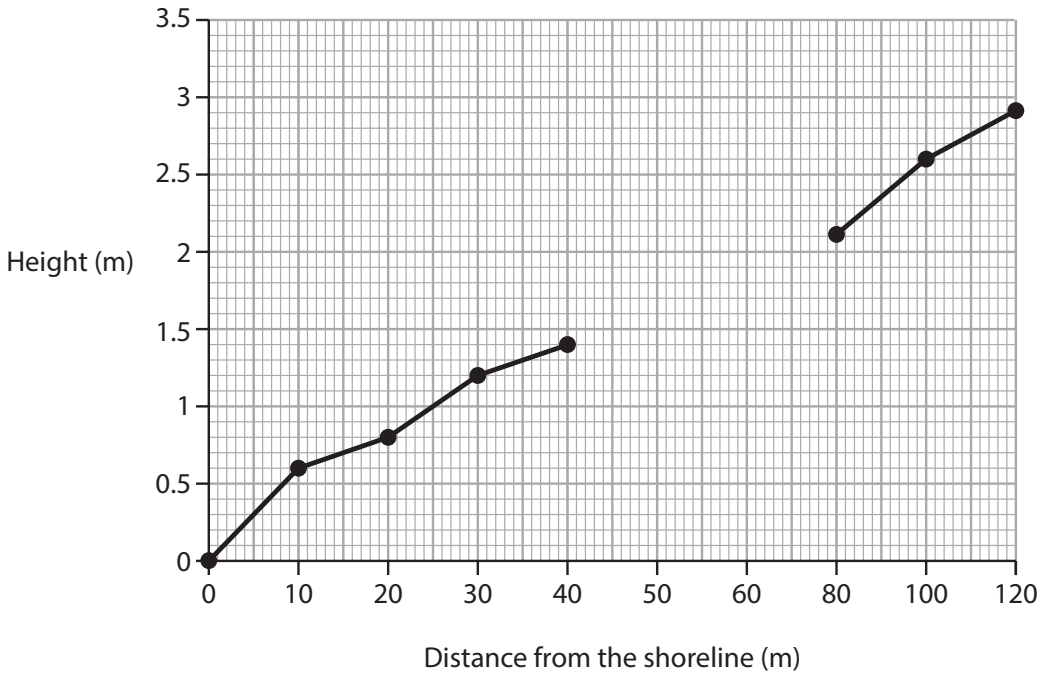


Figure 5d

Beach profile

(ii) Explain **one** advantage of using a line graph to present results.

(3)

Data/information used by the students:

- Local shoreline management plan
- Newspaper articles
- Local historical map
- Field sketches
- Measurements of: sediment size, beach gradient and beach height

Figure 5a

Selected types of data/information used by the students

	Site 1	Site 2	Site 3	Site 4
Pebble 1	20	25	22	52
Pebble 2	60	20	15	50
Pebble 3	82	22	17	39
Pebble 4	26	18	12	56
Mean size	47	**?**	17	49
Range in size	62	7	10	13

Figure 5b

Data collected on sediment characteristics (mm)

Height (m)	Distance from shoreline (m)
0	0
0.6	10
0.8	20
1.2	30
1.4	40
1.6	**50**
2	**60**
2.1	80
2.6	100
2.9	120

Figure 5c

Data collected on height and distance from shoreline

If you answer Question 5 put a cross in the box ☒

5 Investigating coastal environments

A group of students have undertaken an enquiry that explores the impact of coastal management at two sites.

(a) Study Figure 5a in the Resource Booklet.

(i) Identify **one** type of quantitative data used by the students.

(1)

☒ **A** annotated photographs

☒ **B** newspaper articles

☒ **C** beach gradient

☒ **D** coastal management plan

(ii) State **one** way maps could be used to support the enquiry.

(1)

.....

.....

(b) Study Figure 5b which shows some data about beach sediment.

(i) Calculate the mean size of the pebbles in centimetres.

Give your answer to one decimal place.

You must show all your workings in the space below.

(2)

..... cm

(ii) State **one** piece of equipment that could be used to measure the pebbles.

(1)

.....

(c) (i) Complete Figure 5d below, using data highlighted in Figure 5c in the Resource Booklet.

(2)

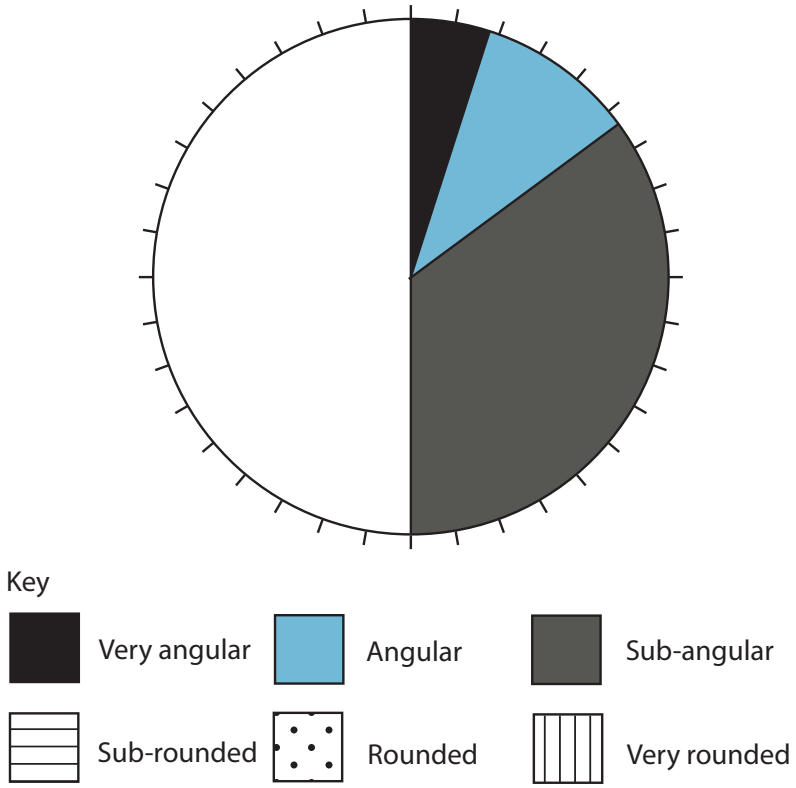


Figure 5d

Pie chart showing pebble shape

(ii) Identify **two** ways the students could have improved the reliability of the data collected.

(2)

1 .....

.....

2 .....

.....

(d) Explain **one other** fieldwork technique the students could have used to explore the impact of coastal management.

(3)

- Annotated photographs
- Newspaper articles
- Beach gradient
- Pebble size
- Interviews with local residents
- Coastal management plan

Figure 5a

Selected data collection methods

Pebble size (cm)	Pebble
8.1	1
6.5	2
7.6	3
12.3	4
8.6	5

Figure 5b

Extract of data on size of pebbles at Site 2 (of 2)

	Pebble shape	Percentage (%)
	Very angular	5
	Angular	10
	Sub-angular	35
	Sub-rounded	25
	Rounded	15
	Very-rounded	10

Figure 5c

Data collected on pebble shape

If you answer Question 5, put a cross in the box ☒.

5 Investigating coastal environments

You have carried out a geographical enquiry as part of your work on coastal environments.

Title of your geographical enquiry

(a) Describe **one** way you managed a risk that you identified during your enquiry.

(2)

(b) Explain **one** way you decided on the sites for your data collection.

(3)

(c) Describe **two** types of data collection method you used during your enquiry.

(4)

1 .....

.....

.....

.....

2 .....

.....

.....

.....

(d) Explain **one** technique you used to analyse your data.

(3)

.....

.....

.....

.....

.....

(e) Study Figure 5a and Figure 5b in the Resource Booklet. They show some information about data presentation from a student's enquiry.

> The aim of the student's enquiry was to investigate changes in coastal features. The student made field sketches of the data collection sites, and collected data on beach profiles and sediment size.

Evaluate the effectiveness of the data presentation techniques used by the student.

(8)

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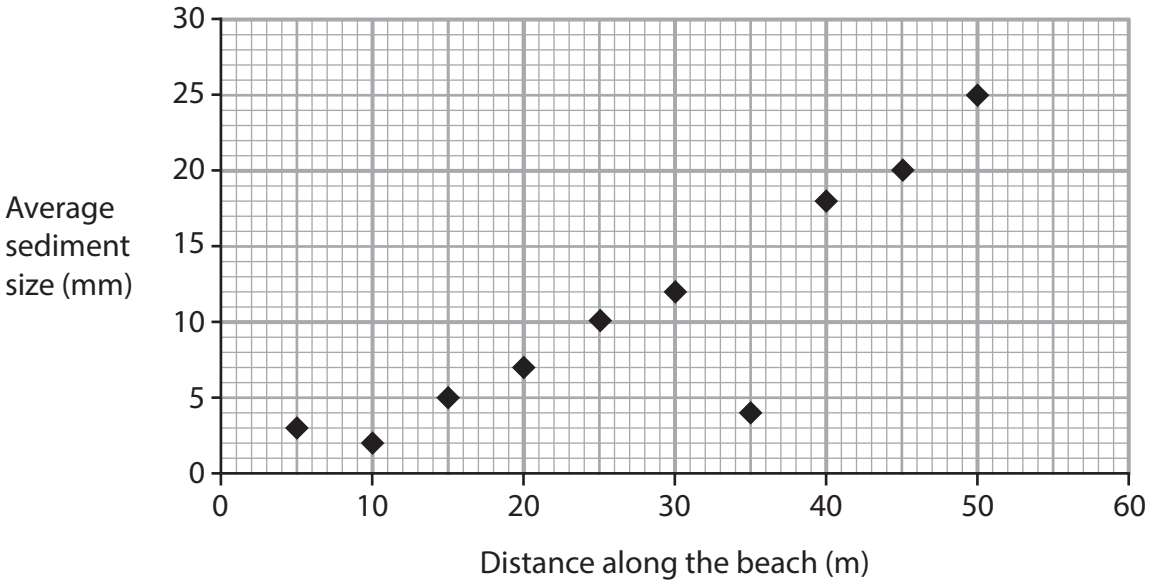


Figure 5a

Extract from student's data presentation

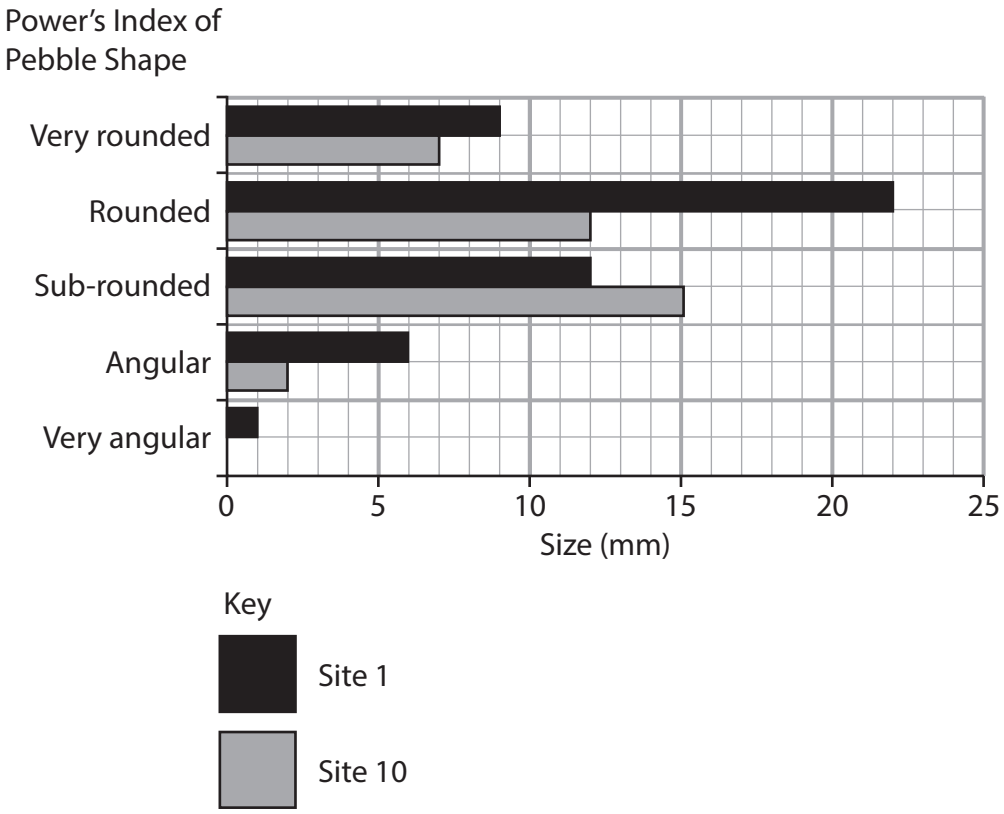


Figure 5b

Extract from student's data presentation

If you answer Question 5, put a cross in the box ☒.

5 Investigating coastal environments

You have studied a coastal environment as part of your own geographical enquiry.

Title of your geographical enquiry

(a) Explain why your fieldwork location was suitable for this enquiry.

(2)

(b) Explain **one** quantitative method you chose for data collection.

(3)

(c) Explain **one** advantage of a technique you used to present your fieldwork data.

(3)

(d) Explain **two** techniques you used to analyse your data.

(4)

1

2

(e) Study Figure 5a and Figure 5b in the Resource Booklet. They show some information about data collection methods from a student's enquiry.

> The aim of the student's enquiry was to determine the most important factor affecting a beach profile.

Evaluate how far the data collection methods used supported the student in achieving their aim.

(8)

- Choose 5 sites along a beach, at 300m intervals.
- Measure slope angle to make beach profiles.
- Record any coastal management techniques.
- Record sediment characteristics.

Figure 5a

Information on the student's data collection methods

Beach profile recording sheet

- Measure angle at every change in the gradient of the beach.

	Angle (°)	Distance between ranging poles (m)
1		
2		
3		
4		
5		

- Measure sediment size and roundness at each site.

Site	**1**	**2**	**3**	**4**
Pebble size (cm)				
Pebble roundness				

Figure 5b

Data collection sheet

5 Investigating Coastal Environments

You have carried out a geographical enquiry as part of your work on coastal environments.

Title of geographical enquiry

(a) Describe **one** of your data presentation techniques.

(2)

(b) Explain **one** limitation of a secondary data source used in your investigation.

(3)

Secondary data source

(c) Explain **two** ways you could have improved a primary data collection method to increase its accuracy.

(4)

1 .....

.....

.....

.....

2 .....

.....

.....

.....

(d) Explain **one** pattern you found in your primary data.

(3)

.....

.....

.....

.....

.....

(e) Study the data in Figure 5a in the Resource Booklet. It shows some information about the results and conclusion from the students' investigation.

> The aim was to investigate how the sediment size and shape change along a stretch of coastline.

Evaluate the reliability of the students' conclusions.

(8)

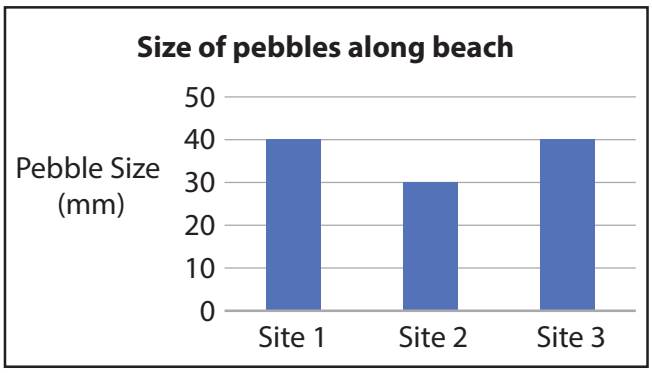
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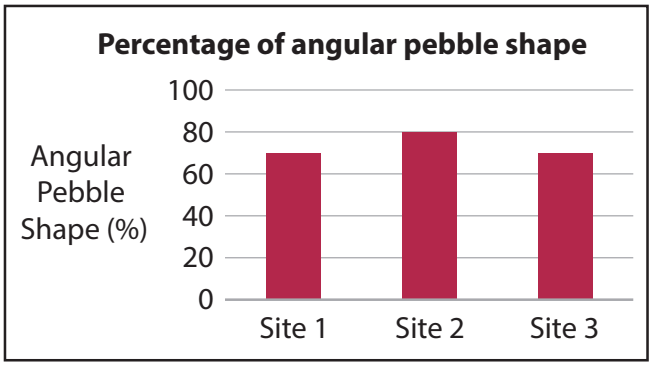
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A group of students carried out an investigation into how sediment size and shape change along a stretch of coastline.

Sampling strategy: They chose random sampling to select the three sites where data was collected.

Time of year: The data was collected during one morning in March.

Frequency: To collect their pebble size and shape data the students recorded one set of data at each site. Different students recorded the shape data at each site.

Conclusion: The students concluded that pebble size stays the same along a stretch of coastline and pebble shape is mainly angular.

Figure 5a

Details of the students' coastal investigation

If you answer Question 5, put a cross in the box ☒.

5 Investigating coastal environments

A group of students has undertaken an enquiry that investigated beach characteristics along a stretch of coastline.

(a) (i) Identify **one** piece of equipment used to measure gradient.

(1)

- ☒ **A** calliper
- ☒ **B** clinometer
- ☒ **C** compass
- ☒ **D** quadrat

(ii) State **one** risk the students should have prepared for when carrying out their coastal fieldwork.

(1)

.....

.....

(b) Study Figure 5a in the Resource Booklet. It shows some data about the pebble length for 10 pebbles measured at site 2.

Calculate the range in sediment size at site 2.

You **must** show all your working in the space below.

(2)

..... cm

(c) (i) Study Figure 5b in the Resource Booklet.

Plot the data for sites 1 and 3, from Figure 5b (shown in the Resource Booklet), on Figure 5c (below).

(2)

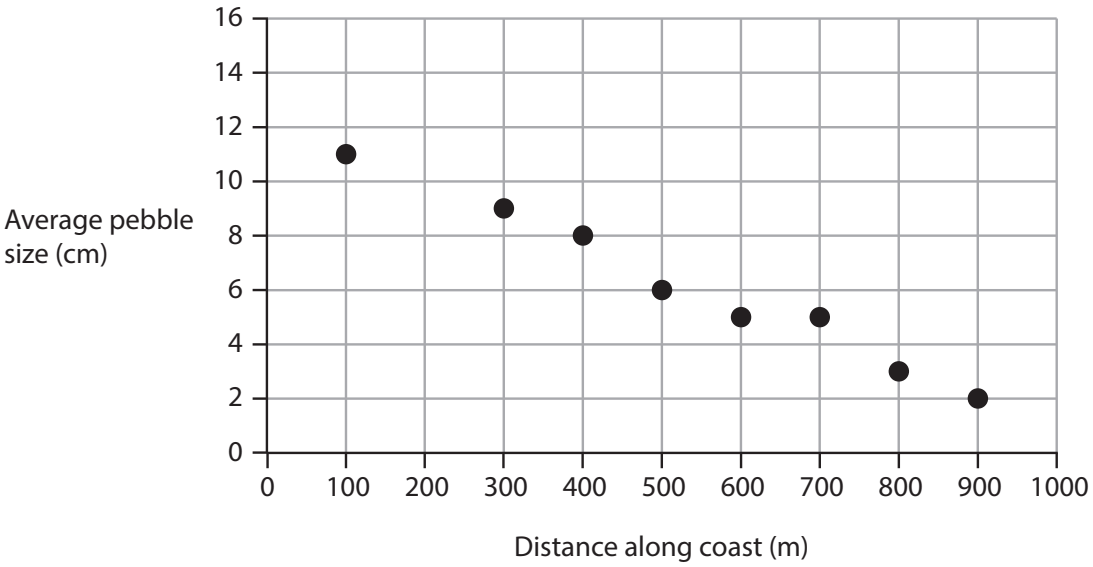


Figure 5c

Relationship between distance along the coast and average pebble size

(ii) Draw a line of best fit on Figure 5c.

(1)

(iii) Suggest **one** reason for the relationship shown on Figure 5c.

(2)

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(d) Explain **one other** primary data collection method students might have found useful in their coastal enquiry.

(3)

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(e) You have studied a coastal environment as part of your own geographical enquiry.

Evaluate the accuracy and reliability of your data collection methods.

(8)

Geographical enquiry title

Sample	Pebble length (cm)
1	6
2	11
3	16
4	9
5	15
6	12
7	17
8	4
9	8
10	13

Figure 5a

Pebble sizes for Site 2

Site	Distance along coast (m)	Average pebble length (cm)
1	**0**	**14**
2	100	11
3	**200**	**10**
4	300	9
5	400	8
6	500	6
7	600	5
8	700	5
9	800	3
10	900	2

Figure 5b

Average pebble length along 900 m stretch of coastline

5 Investigating coastal environments

A group of students has undertaken an enquiry to investigate changes in beach characteristics along a stretch of coastline.

(a) (i) Identify the best definition of secondary data.

(1)

- ☒ **A** direct collection of original data
- ☒ **B** information collected by other people
- ☒ **C** information collected by you
- ☒ **D** your own fieldwork data

(ii) State **one** type of qualitative data the students could have used in their enquiry.

(1)

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(b) Suggest **one** possible health and safety risk of measuring beach gradients.

(2)

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(c) Study Figure 5a in the Resource Booklet.

Calculate the median of the beach gradients.

You **must** show all your working in the space below.

(2)

.....°

(d) (i) Study Figure 5b in the Resource Booklet.

Plot the data for sites 3 and 5, from Figure 5b (shown in the Resource Booklet), on Figure 5c (below).

(2)

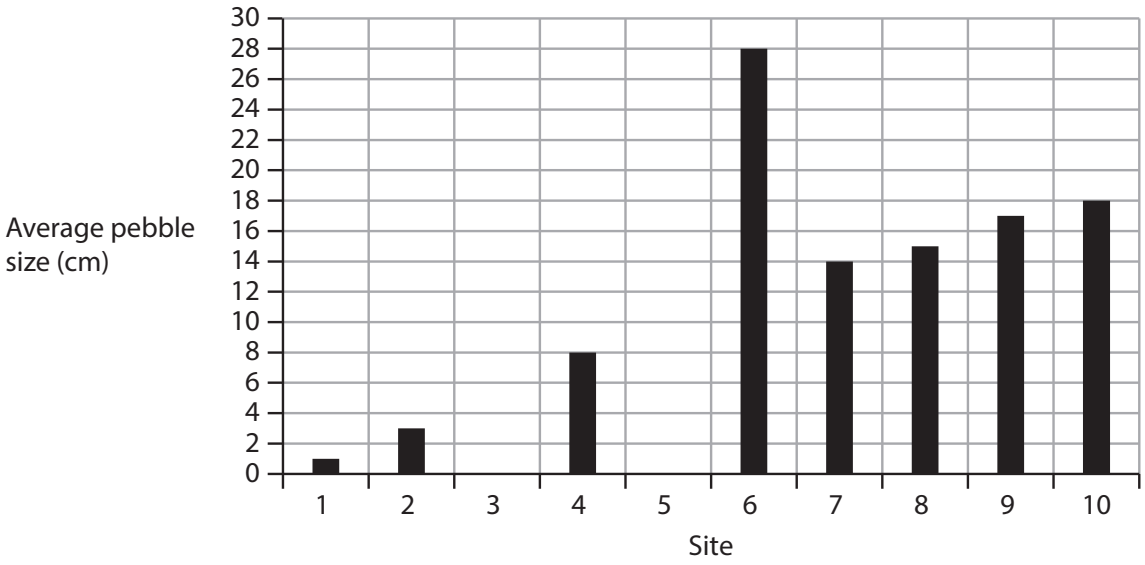


Figure 5c

Average pebble size at each site

(ii) Identify at which site there is an anomaly.

(1)

.....

(iii) Suggest **one** possible reason for the anomaly in average pebble size on Figure 5c.

(3)

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(e) You have studied a coastal environment as part of your own geographical enquiry.

State the title of your geographical enquiry.

Evaluate the accuracy and reliability of your conclusions.

(8)

Geographical enquiry title

Site	Distance up the beach (m)	Beach gradient (angle °)
1	0	2
2	5	2
3	10	3
4	15	4
5	20	8
6	25	15
7	30	12
8	35	15
9	40	15
10	45	20

Figure 5a

Distance from water up the beach and change in beach gradient data

Site	Average pebble size (cm)
1	1
2	3
3	**6**
4	8
5	**10**
6	28
7	14
8	15
9	17
10	18

Figure 5b

Average pebble size at each site

If you answer Question 5, put a cross in the box ☒.

5 Investigating coastal environments

A group of students has undertaken an enquiry to investigate the influence of coastal processes on beach characteristics.

(a) State **one** piece of equipment the students could have used in their coastal enquiry.

(1)

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(b) Explain **one** advantage and **one** disadvantage of using annotated field sketches.

(4)

advantage

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disadvantage

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(c) Study Figure 5a in the Resource Booklet.

Calculate the percentage increase in beach gradient from day 1 to day 6.

You **must** show all your working in the space below.

(2)

..... %

(d) (i) Study Figure 5b in the Resource Booklet.

Plot the data for site 4 from Figure 5b (shown in the Resource Booklet) to complete Figure 5c in the Question Paper.

(2)

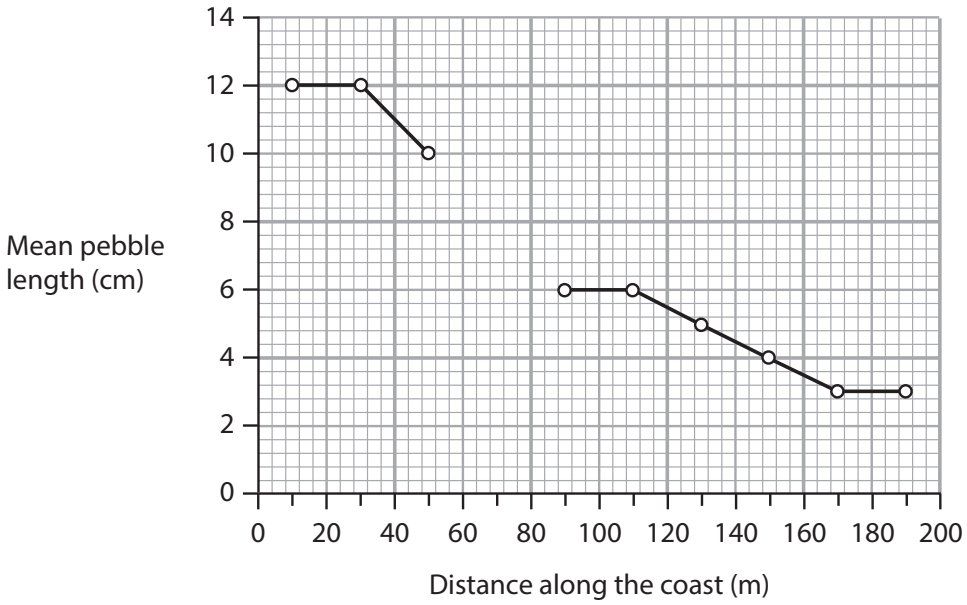


Figure 5c

Graph comparing distance along the coast and mean pebble length

(ii) Suggest **one** conclusion the students could reach based on the data shown in Figure 5c.

(2)

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(iii) Identify the best definition of the term anomaly.

(1)

- ☒ **A** data that can be counted in numbers
- ☒ **B** data that does not fit the pattern
- ☒ **C** the general pattern of data
- ☒ **D** the way data is spread out

(e) You have studied a coastal environment as part of your own geographical enquiry.

Evaluate how effective your site selection and sampling strategies were in helping you answer your enquiry title.

(8)

Geographical enquiry title

Day	Weather conditions	Mean beach angle (gradient) by shoreline (°)
1	Calm	1.0
2	Calm	2.5
3	Calm	2.0
4	Rough	5.0
5	Stormy	7.8
6	Stormy	8.0
7	Rough	7.4
8	Rough	7.6
9	Calm	7.0
10	Calm	6.0

Figure 5a

Mean beach angle (gradient) by shoreline and weather conditions for each day

Site	Distance along coast (m)	Mean pebble length (cm)
1	10	12
2	30	12
3	50	10
4	**70**	**8**
5	90	6
6	110	6
7	130	5
8	150	4
9	170	3
10	190	3

Figure 5b

Mean pebble length data going along the coast

If you answer Question 5, put a cross in the box ☒.

5 Investigating coastal environments

You have carried out a geographical enquiry as part of your work on coastal environments.

Title of geographical enquiry

(a) Describe **one** sampling strategy used to select your sites for data collection.

(2)

(b) Explain **one** quantitative method you chose for your data collection.

(3)

(c) Explain why **two** different named data presentation techniques were appropriate for the data being plotted.

(4)

Name of data presentation technique 1

technique 1

Name of data presentation technique 2

technique 2

(d) Explain **one** reason collecting more data can make your investigation more reliable.

(3)

(e) Study the data in Figure 5 in the Resource Booklet. It shows secondary data collected for background research to help produce a hypothesis.

Students' hypothesis: **Sediment size will decrease as you move from north to south along the beach**.

Note: A hypothesis is a prediction or guess about what is going to happen in the students' fieldwork.

Evaluate how suitable the hypothesis reached by the students is in helping to answer their enquiry question.

You **must** refer to the resource in your answer.

(8)

If you answer Question 5, put a cross in the box ☒.

5 Investigating coastal environments

You have carried out a geographical enquiry as part of your work on coastal environments.

Title of geographical enquiry

(a) Describe **one** health and safety risk included in your risk assessment.

(2)

(b) Explain **one** data collection method used to help answer your enquiry title.

(3)

(c) Explain **two** ways you ensured your data presentation was accurate.

(4)

1 .....

.....

.....

.....

2 .....

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(d) Explain **one** reason why there might be an anomaly in the data you collected.

(3)

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(e) Study the data in Figures 5a and 5b in the Resource Booklet. It shows some information about the secondary data the students used to support their enquiry.

Conclusion: **There is very little change in beach profile between calm and stormy years.**

Evaluate the extent to which the secondary data supported the students' conclusion.

You **must** refer to the resource in your answer.

(8)

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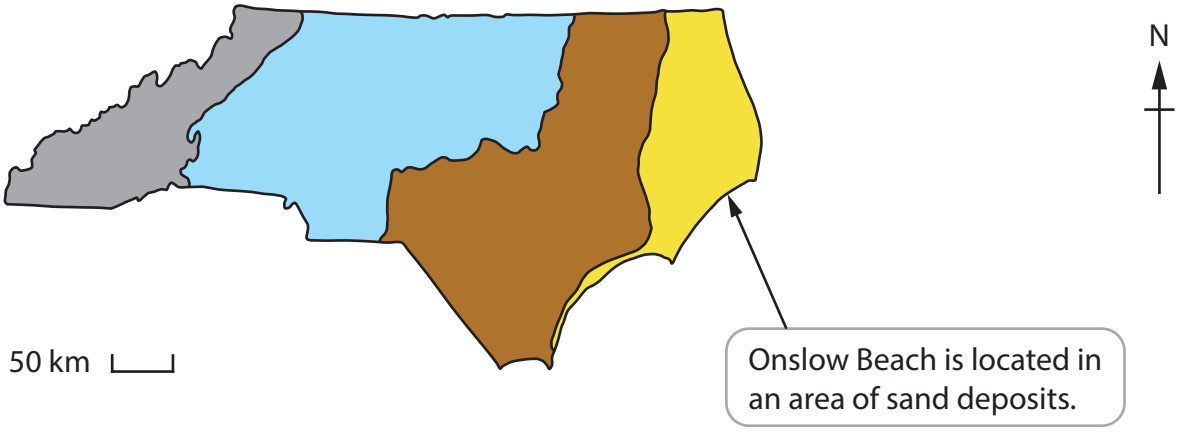
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A group of students analysed secondary data sources for their study location, Onslow Beach, North Carolina, to help them reach their conclusion.

They annotated a geology map and beach photographs taken in different years.

The conclusion they proposed was:
There is very little change in beach profile between calm and stormy years.

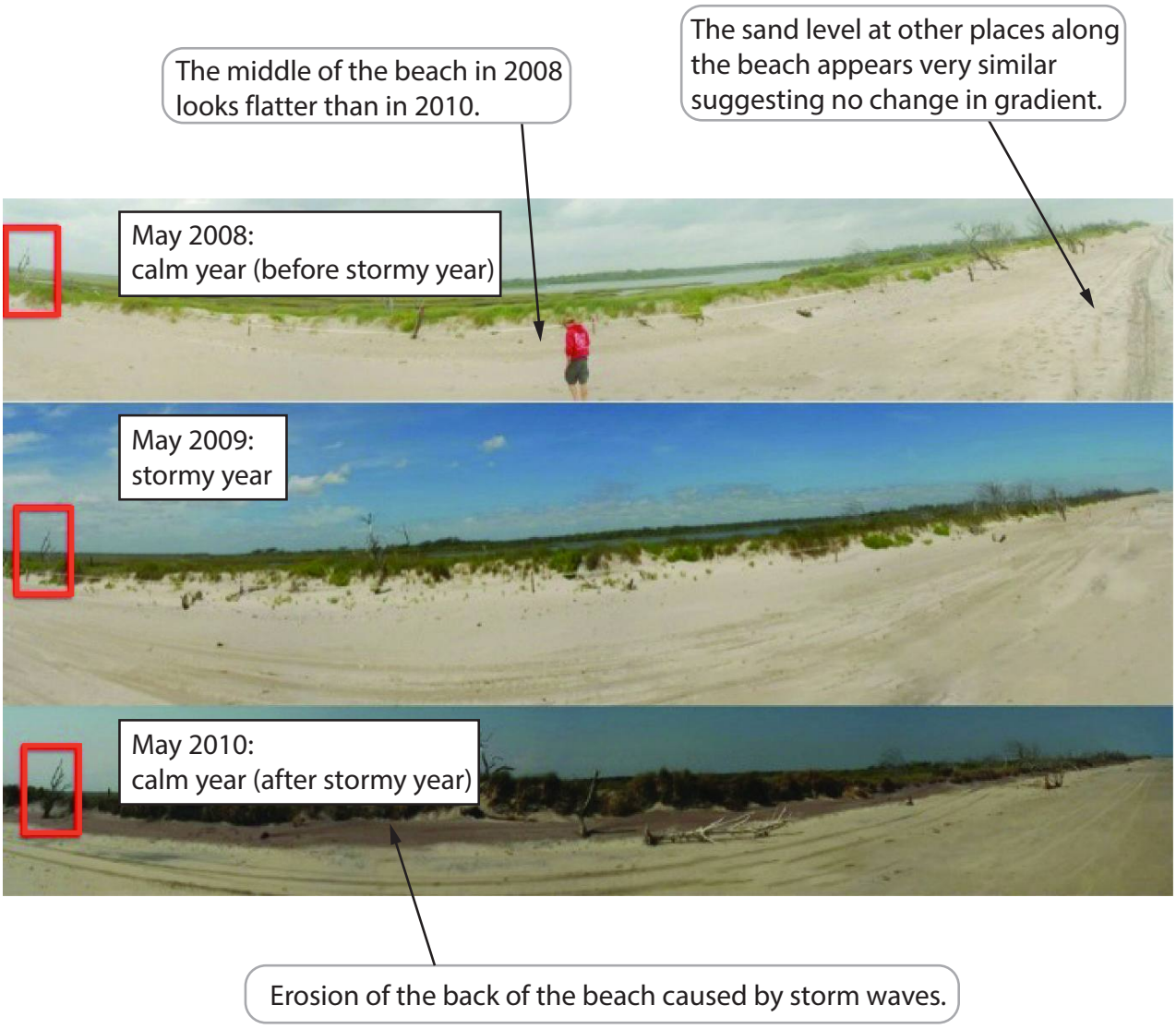


Key

- Igneous rocks (hard)
- Metamorphic rock (hard)
- Loose sediments (soft)
- Sands (soft)

Figure 5a

Secondary data geology map for Onslow Beach, North Carolina, USA



Key

reference point to confirm photograph is taken at the same site each year

Figure 5b

Analysis of secondary data in the form of historic photographs for Onslow Beach, North Carolina, USA

MARK SCHEMES

official Pearson Edexcel mark schemes

Question number	Answer	Mark
2(a)	**AO1 (1 mark)** B is the correct response short wavelength and strong backwash A is not correct as it describes a constructive wave C is not the correct answer as it describes only some elements of a destructive wave correctly D is not the correct answer as it describes only some elements of a destructive wave correctly	**(1)**

Question number	Answer	Mark
2(b)(i)	**AO1 (1 mark)** B is the correct answer - cave A,C and D are all depositional landforms	**(1)**

Question number	Answer	Mark
2(b)(ii)	**AO1 (1 mark)** Award 1 mark for any of the following. • landslides (1) • slumping (1) • rock fall (1) • rotational slip (1) • sliding (1) • mud slides (1) Accept any other appropriate response	**(1)**

Question number	Answer	Mark
2(b)(iii)	**AO1 (1 mark)/AO2 (1 mark)** Award 1 mark (AO1) for a point about physical weathering and 1 mark (AO2) for further explanation, up to a maximum of 2 marks. • Freeze thaw (1) moisture in rock surfaces freezes and expands causing rock to break off (1) • Onion-skin weathering / exfoliation (1) • Wetting and drying (1) Accept any other appropriate response	**(2)**

Question number	Answer	Mark
2(c)	**AO2 (2 mark)/AO3 (2 mark)** Award 1 mark (AO2) for a way changes in sea level could have created a coastal landform and a further mark (AO3) for further development, shown on Figure 2a, up to a maximum of 2 marks each. Through the reduction in sea level (1) a raised beach has been created (1). Changes in sea level have left behind raised beaches (1) and over time this new beach feature becomes vegetated. (1) Creation of wave cut notch (1) by marine erosion due to a reduction in sea level there is an Due to a fall in sea level (1) old sea caves caves have been created (1) Changes in sea level have left behind old sea caves (1) with fossilised remains of sea creatures (1) wave action from previous sea level has eroded cliff (1) to expose fossilised remains / left behind old relic wave cut notches (1) Due to an increase in sea level (1) landforms such as rias / fjords have been created (1) Accept any other appropriate response	**(4)**

Question number	Answer	Mark
2(d)	**AO2 (3 marks)** Award 1 mark for identification of a way and 2 marks for development and further explanation, up to a maximum of 3 marks. Temperature, light, water depth, salinity, wind direction, level of shelter. For example: Coastal mangroves need a high level of rainfall (1) of between 1500 and 3000 mm per annum (1) this can be obtained from rainfall or moisture in the air making tropical climates ideal (1) Mangroves need a high temperature (1) around 27 degrees (1) otherwise they will not grow (1) Mangroves need a shallow water (1) between 0.5 to 2.5 meters depth (1) but can survive where tidal ranges go slightly above or below this level (1) Mangroves need high levels of humidity (1) between 75 and 80% (1) to enable them to grow (1) Accept any other appropriate response	**(3)**

Question number	Answer	Mark
2(e)	**AO3 (1 mark)** Award 1 mark for the following. • arch (1)	**(1)**

Question number	Answer	Mark
2(f)	**AO1 (1 mark)/AO2 (3 mark)** Award 1 mark for initial point (AO1), and 3 further marks (AO2) for the extension of this point up to maximum of 4 marks. Headlands are formed along discordant coastlines (1) where there are bands of hard and soft rock at right angles to the coastline (1) which means that the soft rock gets eroded faster than hard rock (1) due to hydraulic action / creating a bay and a protruding headland (1) A Headland forms when waves attach a section of coastline (1) During the wave action soft rock erodes (1) more quickly than hard rock (1) over time this means that sections of hard rock are left protruding further out to see as the rest of the coastline retreats (1) Accept any other appropriate response	**(4)**

Question number	Answer indicative content
2(g)	**AO3 (4 marks) AO4 (4 marks)** **Marking instructions** Markers must apply the descriptors in line with the general marking guidance and the qualities outlined in the level based mark scheme below. **Indicative content guidance** The indicative content below is not prescriptive and candidates are not required to include all of it. Other relevant material not suggested below must also be credited. This question is about investigating the issue of why different soft engineering techniques have been used. Candidates should be exploring cost, maintenance and suitability based on the map/resource evidence and their own knowledge. To access level 3, both Figures 2c and 2d need to be used. **AO3** • Soft management techniques such as beach replenishment, building bars, cliff regrading • Managed retreat – abandoning certain areas of coastal defence and allowing nature to take its course • Candidates should be able to look at costs and benefits – this could be around cost/impact on the environment/local perception • Coastal defences create visual pollution in the area • Candidates may relate the type of technique used with the land use at the cost, they may also relate this to overall cost. **AO4** • Fig 2C shows different techniques have been used in different places • Fig 2C shows the offshore breakwater has been positioned to limit the effects of the prevailing wind and dissipate the effect of the prevailing wind • Fig 2C shows the positioning beach nourishment to help lessen the effects of erosion • Fig 2D shows the type of soft engineering methods • Fig 2D demonstrates that cost/maintenance of the method of soft engineering methods • Fig 2D shows the relationship between soft engineering techniques and different land use types on the coast

Question number	Answer	
Level	**Mark**	**Descriptor**
	0	No rewardable material.
Level 1	**1–3**	• Attempts to apply understanding to deconstruct information but understanding and connections are flawed. An unbalanced or incomplete argument that provides limited synthesis of understanding. Judgements that are supported by limited evidence. (AO3) • Uses some geographical skills to obtain information with limited relevance and accuracy, which supports few aspects of the argument. (AO4)
Level 2	**4–6**	• Applies understanding to deconstruct information and provide some logical connections between concepts. An imbalanced argument that synthesises mostly relevant understanding, but not entirely coherently, leading to judgements that are supported by evidence occasionally. (AO3) • Uses geographical skills to obtain accurate information that supports some aspects of the argument. (AO4)
Level 3	**7–8**	• Applies understanding to deconstruct information and provide logical connections between concepts throughout. A balanced, well-developed argument that synthesises relevant understanding coherently, leading to judgements that are supported by evidence throughout. (AO3) • Uses geographical skills to obtain accurate information that supports all aspects of the argument. (AO4)

Question 2

Question number	Answer	Mark
2(a)	**AO1 (1 mark)** **A is the correct response long wavelength and weak backwash** B is not correct as it describes a destructive wave. C is not the correct answer as it describes elements of a destructive wave. D is not the correct answer as it describes elements of a destructive wave.	**(1)**

Question number	Answer	Mark
2(b)(i)	**AO1 (1 mark)** **B is the correct answer - Spit** Options A,C and D are all erosional landforms.	**(1)**

Question number	Answer	Mark
2(b)(ii)	**AO1 (1 mark)** Award one mark for: • Biological (1) • Physical / Mechanical (1) • Chemical (1) Also allow named types of weathering that are linked to either physical, chemical or biological weathering, e.g. • Freeze thaw (1) • Plants and plat roots / burrowing animals (1) • Acid rain / solution / dissolving (1) • Onion-skin weathering / exfoliation (1)	

	Accept other appropriate responses. **Reject rain or wind.**	 **(1)**

Question number	Answer	Mark
2(b)(iii)	**AO1 (1 mark)/AO2 (1 mark)** Award 1 mark for accurately defining longshore drift (AO1) (1) and a second mark for an appropriate expansion (1) Longshore drift – this is the transportation of sediments along the coastline (1) in a zig zag pattern (1). Accept any other appropriate response.	 **(2)**

Question number	Answer	Mark
2(c)	**AO2 (2 marks)/AO3 (2 marks)** Award 1 mark (AO2) for identification of how geology could affect the landscape (1) and a second mark for a further development (1) (AO3). • Hard and soft rocks will be eroded at different rates (1) changing the shape of the coastline so that there is a series of headlands and bays (1) • Rock jointing Where there is an increased amount of rock joints (1) there will be increased rates of erosion (1) • Soft rocks are eroded more quickly (1) so the coastline recedes more quickly creating bays (1). • Hard rock erodes more slowly (1) resulting in the formation of Headlands and other erosional features (1). Reward candidates for comments about shape of coastline not necessarily on the resource – e.g. steepness of slope.	

	If candidates make hard and soft rock points as **one way** this only gains max two marks credit. Accept any other appropriate response.	**(4)**

Question number	Answer	Mark
2(d)	**AO3 (3 marks)** Award 1 mark for identification of a way and 2 marks for development and further explanation, up to a maximum of 3 marks. Temperature, light, water depth, salinity, wind direction, level of shelter. For example: • Coral reefs need a minimum water temperature to develop (1) of around 18 degrees (1) they grow best between 23 and 25 degrees (1). • Coral reefs need a large amount of light (1) so levels of pollution have a negative effect (1) as the coral doesn't have the correct nutrients to grow (1). • Coral reefs are sensitive to PH (1) they require a PH of 8 – 8.5 (1) to grow sufficiently, maintain health (1). Accept any other appropriate response.	**(3)**

Question number	Answer	Mark
2(e)	**AO3 (1 mark)** Award 1 mark for the following: Stack (1)	**(1)**

Question number	Answer	Mark
2(f)	**AO1 (1 mark)/AO2 (3 marks)** Award 1 mark for the initial point (AO1) and 3 further marks (AO2) for the extension of the point up to 4 marks. • Cliffs tend to be located on a headland due to erosion (1). • Destructive waves erode the base of the cliff due to repeated breaking (1). • Softer rock can erode more quickly than harder rock (1) leading to the formation of a wave cut notch (1). As further undercutting takes place the weight of the rock is to great and falls into the sea (1). • Cliffs are also shaped by surface weathering (1) the breaking down of rocks by subaerial processes (1). This include mechanical and biological weathering processes (1). accept freeze thaw, biological or chemical weathering • The rock type will affect cliff gradient or steepness (1). Cliffs which are gentle tend to be formed in areas where the geology is unconsolidated (1). • Cliff erosion can be by a number of methods (1) for example hydraulic action (1). Accept any other appropriate response.	**(4)**

Question number	Answer indicative content
2(g)	**AO3 (4 marks) AO4 (4 marks)** **Marking instructions** Markers must apply the descriptors in line with the general marking guidance and the qualities outlined in the level based mark scheme below. **Indicative content guidance** The indicative content below is not prescriptive and candidates are not required to include all of it. Other relevant material not suggested below must also be credited. Candidates should explore both soft and hard management techniques as outlined in the resource. To access level 3, **both** Figures 2c and 2d must to be used. **AO3** Note: Candidates may refer to soft management techniques in their response this should be credited. • Soft management techniques such as beach replenishment, building bars, fencing hedging and replanting, cliff regrading: • Hard management – groynes, wooden revetment, steel wall, gabion and rip rap. • Managed retreat – abandoning certain areas of coastal defence and allowing nature to take its course. • Candidates should be able to look at costs and benefits – this could be around cost/impact on the environment /local perception. • Coastal defence's create visual pollution in the area. **AO4** • Figure 2c shows different techniques have been used in different places. • Figure 2c shows that the techniques used in Photos 2 and 3 have been developed to protect the main headland this could be due to the positioning of a settlement, • Figure 2c shows the offshore breakwater has been positioned to limit the effects of the prevailing wind and dissipate the effect of the prevailing wind. • Figure 2c shows the positioning of groynes these are positioned in beach type areas and are more in keeping with the traditional approach to preventing longshore drift etc. • Figure 2d shows there is a range of costs of coastal management techniques. • Figure 2d shows that there are different maintenance costs.

	• Fig 2d suggests a relationship between the coastal management technique used and the type of coastal area.

Question number	Answer	
Level	**Mark**	**Descriptor**
	0	No rewardable material.
Level 1	**1–3**	• Attempts to apply understanding to deconstruct information but understanding and connections are flawed. An unbalanced or incomplete argument that provides limited synthesis of understanding. Judgements that are supported by limited evidence. (AO3) • Uses some geographical skills to obtain information with limited relevance and accuracy, which supports few aspects of the argument. (AO4)
Level 2	**4–6**	• Applies understanding to deconstruct information and provide some logical connections between concepts. An imbalanced argument that synthesises mostly relevant understanding, but not entirely coherently, leading to judgements that are supported by evidence occasionally. (AO3) • Uses geographical skills to obtain accurate information that supports some aspects of the argument. (AO4)
Level 3	**7–8**	• Applies understanding to deconstruct information and provide logical connections between concepts throughout. A balanced, well-developed argument that synthesises relevant understanding coherently, leading to judgements that are supported by evidence throughout. (AO3) • Uses geographical skills to obtain accurate information that supports all aspects of the argument. (AO4)

Question 2

Question number	Answer	Mark
2(a)	**AO1 (1 mark)** **D** Marine plants (1) is the correct response A, B, D are all biotic abiotic factors	**(1)**

Question number	Answer	Mark
2(b)(i)	**AO1 (1 mark)** **A** The amount of living matter in an ecosystem (1) is the correct response. B, C and D are all have elements of non-living elements of the ecosystem.	**(1)**

Question number	Answer	Mark
2(b)(ii)	**AO1 (1 mark)** • Made of blown sand (1) • Range of vegetation/Marram Grass (1) • Undulating shape (1) • Slip face of dune (1) • Fragile / easily eroded (1)	

	NB: Feature can be related to a stage in dune formation. Accept any other appropriate response.	**(1)**

Question number	Answer	Mark
2(b)(iii)	**A01 (1 mark)/AO2 (1 mark)** Award 1 mark (AO1) for identifying a factor (AO2) for further explanation up to a maximum of 2 marks. • Need temps of 26-28 degrees (1) so only found in the tropics (1). • Light is needed for coral to grow (1) as hey only grow in areas of shallow water where the light can penetrate (1). • Global warming (1) leading to sea level rise (1). • Human impact (1) for example climate change causing temperature of water to change/coral bleaching (1). • Pollution from tourist activity (1) damages coral (1). Accept any other appropriate response.	**(2)**

Question number	Answer	Mark
2(c)	**AO2 (2 mark)/AO3 (2 mark)** Award 1 mark (AO3) for identification of any idea from fig 2a and a further mark for explanation of the reason (AO2) up to a maximum of two marks each. • Hard engineering / sea walls (1) can limit the effect of coastal erosion (1). • Hard engineering / seawalls (1) can reduce damage to high value land (1). • Soft engineering / beach replenishment (1) can limit the effect of erosion at the coast (1). • Soft engineering / beach replenishment (1) is used as a more sustainable/aesthetically pleasing approach to coastal management (1). • Soft engineering / beach replenishment (1) creates a buffer zone in front of cliffs (1). Accept any other appropriate response.	**(4)**

Question	Answer	Mark

number		
2(d)	**AO2 (3 mark)** Award 1 mark for the identification of a cause and 2 marks for development through further explanation up to a maximum of 3 marks. • Lack of sea defenses (1) due to poor levels of economic development (1) means that coastal areas are more susceptible to flooding (1). • Polar ice melts (1) this is caused by global warming (1) resulting in increased sea levels (1). • Extreme weather events such as storm surges (1) create large waves (1) which result in increased tidal range resulting in exceptional high tides (1). • Tectonic movement (1) causes a tsunami which reaches the coast (1) and particularly damages low lying areas (1). Accept any other appropriate response.	**(3)**

Question number	Answer	Mark
2(e)	**AO3 (1 mark)** Award 1 mark for the following: • Cave (1)	**(1)**

Question number	Answer	Mark

2(f)	**AO1 (1 mark)/AO2 (3 mark)** Award 1 mark for initial point (AO1), and 3 further marks (AO2) for the extension of this point up to maximum of 4 marks. • Spits are created through a dominant longshore drift along a section of coastline (1) material is deposited and extends the coastline/beach (1) through constructive waves (1) the build-up of these materials over a long period of time results in spit formation (1). • Sediment moved along a coastline by longshore drift (1) in direction of prevailing wind (1). The coastline changes direction (1) but the deposition of sediment continues (1). Accept any other appropriate response.	**(4)**

Question number	Answer indicative content
2(g)	**AO3 (4 marks) AO4 (4 marks)** **Marking instructions** Markers must apply the descriptors in line with the general marking guidance and the qualities outlined in the level-based mark scheme below. **Indicative content guidance** The indicative content below is not prescriptive, and candidates are not required to include all of it. Other relevant material not suggested below must also be credited. This question is about analysing the positive impact of mangrove development of Coastal areas. The resource gives candidates an idea of a range of benefits. Candidates will be expected to make the link between the positive effects of coastal erosion reduction and the high amount of dependence that India has on coastal areas. For higher level response there is an expectation for both human and physical advantages to be identified. Candidates may make a statement of the idea of Mangroves being very important in the defence against flooding.

AO3

- Mangroves are a very beneficial ecosystem that can have a range of positive effects.
- India is very focused on development at the coast with 250 Million people living within 50miles – this means that there is a reliance of the coast to provide a way of life through fishing and tourism. This is supported by the high number of major and minor ports.
- Nursery areas for small fish and marine invertebrates – food source as well as sea defense.
- Many coastal communities depend on fish as a main food source.
- Coastal areas provide areas where trade can take place with other countries.

AO4

- Fig 2c shows that coastal areas in India are under threat from coastal erosion.
- Fig 2c demonstrates that a large amount of the (250 million) population lives near the coast working in the fishing industries.
- Fig 2c identifies that the mangrove acts as buffer to coastal erosion
- Fig 2c mangroves acts as a filter for pollutants.
- Fig 2c mangroves provide a range of habitats for different species and fodder for farm animals.
- Fig 2c mangroves can provide a managed source of timber if carefully controlled.
- Fig 2c mangroves benefit other coastal environments e.g. sea grass.

Question number	Answer	
Level	**Mark**	**Descriptor**
	0	No rewardable material.
Level 1	**1–3**	• Attempts to apply understanding to deconstruct information but understanding and connections are flawed. An unbalanced or incomplete argument that provides limited synthesis of understanding. Judgements that are supported by limited evidence. (AO3) • Uses some geographical skills to obtain information with limited relevance and accuracy, which supports few aspects of the argument. (AO4)
Level 2	**4–6**	• Applies understanding to deconstruct information and provide some logical connections between concepts. An imbalanced argument that synthesises mostly relevant understanding, but not entirely coherently, leading to judgements that are supported by evidence occasionally. (AO3) • Uses geographical skills to obtain accurate information that supports some aspects of the argument. (AO4)
Level 3	**7–8**	• Applies understanding to deconstruct information and provide logical connections between concepts throughout. A balanced, well-developed argument that synthesises relevant understanding coherently, leading to judgements that are supported by evidence throughout. (AO3) • Uses geographical skills to obtain accurate information that supports all aspects of the argument. (AO4)

Question 2

Question number	Answer	Mark
2(a)	**AO1 (1 mark)** C rock type (1) is the correct as it is the only abiotic factor A, B and D are incorrect as they are all biotic factors.	**(1)**

Question number	Answer	Mark
2(b)(i)	**AO1 (1 mark)** D vegetation flooded and drained by salt water (1) is the correct response. A is incorrect as it describes flooding by freshwater. B and C are incorrect as they describe vegetation.	**(1)**

Question number	Answer	Mark
2(b)(ii)	**AO1 (1 mark)** Award 1 mark for any of the following. • Tropical location (1) • Areas free from strong waves (1) • Brackish or saline water (1) • Large tidal range (1) • Pollution (1) • Water temperature (1) Accept any other appropriate response.	**(1)**

Question number	Answer	Mark
2(b)(iii)	**A01 (1 mark)/AO2 (1 mark)** Award 1 mark (AO1) for a point about how constructive waves can affect beach gradient and 1 mark (AO2) for further explanation up to a maximum of 2 marks. • Constructive waves can decrease the gradient of the beach (1) because they have a stronger swash and therefore move a large amount of material onto the beach (1). Accept any other appropriate response.	**(2)**

Question number	Answer	Mark
2(c)	**AO2 (2 mark)/AO3 (2 mark)** Award 1 mark (AO3) for identification of any idea from fig 3a and a further mark for explanation of the reason (AO2) up to a maximum of two marks each. • Rock type hard rock resistant to erosion (1) can lead to high coastlines and cliffs (1). • Soft engineering such as beach replenishment (1) can limit the effect of erosion at the coast (1). • Pollution from ships (1) can have a negative effect on coastal environments such as destroying coral reefs (1). • Rock type can have a impact on how much weathering takes place (1) this leads to the creation of different landforms (1). Accept any other appropriate response.	**(4)**

Question number	Answer	Mark
2(d)	**AO2 (3 mark)** Award 1 mark for the identification of the characteristic and 2 marks for development through further explanation up to a maximum of 3 marks. • Mass tourism (1) can lead to greater levels of pollution on the beach (1) which may enter the food chain endangering marine population (1). • Trampling of vegetation (1) may damage fragile ecosystems such as sand dunes (1) which may increase erosion rates as there is reduced vegetation to hold dunes together (1). • Global warming (1) can lead to sea level rise (1) which can destroy mangrove ecosystems due to increase in tidal range (1). Accept any other appropriate response.	**(3)**

Question number	Answer	Mark
2(e)	**AO3 (1 mark)** Award 1 mark for the following: • Headland (1)	**(1)**

Question number	Answer	Mark
2(f)	**AO1 (1 mark)/AO2 (3 mark)** Award 1 mark for initial point (AO1), and 3 further marks (AO2) for the extension of this point up to maximum of 4 marks.	

	• Low long constructive waves have a strong swash (1) this carries material up the beach (1) where it is deposited (1) because the backwash isn't as strong (1). • Material from eroded coasts/sand/shingle (1) carried by waves (1) deposited on a beach shore (1) and remains due to weak backwash (1). Candidates can be awarded marks for a diagram with appropriate annotations, which develop an explanation. Accept any other appropriate response.	**(4)**

Question number	Answer indicative content
2(g)	**AO3 (4 marks) AO4 (4 marks)** **Marking instructions** Markers must apply the descriptors in line with the general marking guidance and the qualities outlined in the level-based mark scheme below. **Indicative content guidance** The indicative content below is not prescriptive, and candidates are not required to include all of it. Other relevant material not suggested below must also be credited. This question is about analysing the importance of coral reef ecosystems. The resource gives candidates an idea of a range of benefits, threats and pressures. Candidates will be expected to make the link between the positive effects the ecosystem and the impact that its removal may have. For higher level response there is an expectation for both human and physical advantages to be identified. Candidates may make a judgement or express a personal view but a lack of this shouldn't be a barrier to higher marks. **AO3** • The coral reefs are a beneficial ecosystem that can have a range of positive effects. • There is an ongoing challenge between over development and managing the ecosystem sustainably. • There is pressure on the ecosystem because it provides more than just a natural wonder it is a food source and source of income for many people. • The over development of coral reefs can lead to its demise. **AO4** • Fig 2c gives a clear indication of the damage to coral reefs. • Fig 2c Outlines the key benefits of the system. • Fig 2c outlines some of the pressures on the ecosystem. • Fig 2c also gives a clear indication of the factors that put pressure on the ecosystem.

Question number	Answer	
Level	**Mark**	**Descriptor**
	0	No rewardable material.
Level 1	**1–3**	• Attempts to apply understanding to deconstruct information but understanding and connections are flawed. An unbalanced or incomplete argument that provides limited synthesis of understanding. Judgements that are supported by limited evidence. (AO3) • Uses some geographical skills to obtain information with limited relevance and accuracy, which supports few aspects of the argument. (AO4)
Level 2	**4–6**	• Applies understanding to deconstruct information and provide some logical connections between concepts. An imbalanced argument that synthesises mostly relevant understanding, but not entirely coherently, leading to judgements that are supported by evidence occasionally. (AO3) • Uses geographical skills to obtain accurate information that supports some aspects of the argument. (AO4)
Level 3	**7–8**	• Applies understanding to deconstruct information and provide logical connections between concepts throughout. A balanced, well-developed argument that synthesises relevant understanding coherently, leading to judgements that are supported by evidence throughout. (AO3) • Uses geographical skills to obtain accurate information that supports all aspects of the argument. (AO4)

2(a)	**AO1 (1 mark)** A (Where the rocks are broken down by physical factors in the environment) (1). The answer cannot be B (biological weathering), C (not a process), and D (chemical weathering).	**(1)**

Question number	Answer	Mark
2(b)(i)	**AO1 (1 mark)** B (Climate) (1) The answer cannot be A, C or D as these are all biotic features.	**(1)**

Question number	Answer	Mark
2(b)(ii)	**AO1 (1 mark)** Award 1 mark for any of the following. • Calcium carbonate (1) • High levels of biodiversity (1) • Made of living organisms (1) • Home for lots of small fish (1) • Ideas around presence of tourism (1). • Idea of damage to Coral/ reef under threat idea (1). Accept any other appropriate response.	**(1)**

Question number	Answer	Mark
2(b)(iii)	**AO1 (1 mark)/AO2 (1 mark)** Award 1 mark (AO1) for initial point and a further mark for explanation of the factor (AO2) up to a maximum of two marks. • Temperature of the water (1) (tropical) coral needs optimum temperature of 25°c (1). • Temperature of the water (1) coral needs a minimum of 18°c degrees for growth (1). • Water depth (1) as coral needs less than 25m to survive (1). • Water depth (1) affects light penetration from sunlight (1). • Salinity (1) as corals are marine life and can only survive in saltwater (1). Accept any other appropriate response.	**(2)**

Question number	Answer	Mark
2(c)	**AO2 (2 marks)/AO3 (2 marks)** Award 1 mark (AO3) for identification of any factor from Fig 2a and a further mark for explanation of the reason (AO2) up to a maximum of two marks each. • Hydraulic action (1) where the force of the waves hit the cliffs forcing air into cracks (1). • Abrasion (1) where waves pick up stones which hit the cliff (1). • Corrosion/solution (1) where sea water dissolves rocks (1). • Arch is widened by the waves and then the roof collapses (1) stack formed as a result (1). • Stack attacked by wave action (1) worn down over time to form stump (1).	

	Accept any other appropriate response.	**(4)**

Question number	Answer	Mark
2(d)	**AO2 (3 marks)** Award 1 mark for the identification of a way in which industry can threaten coastal ecosystems and 2 marks for further explanation up to a maximum of 3 marks. Candidates could identify: • Dumping of industrial waste in the sea can cause water pollution (1) which can affect the biodiversity (1) and disrupt food chains (1). • The need to protect industry against coastal erosion (1) means that hard engineering strategies might be used (1) which can damage the natural habitat (1). • Building ports/infrastructure (1) can result in destruction of coastal environments (1) resulting in the loss of biodiversity (1). • Land reclamation for coastal development (1) can result in the destruction of coastal ecosystems (1) resulting in loss of biodiversity (1). • Tourist industry results in tourist scaring wildlife (1) which may have a negative impact on the coastal ecosystem (1).	

	Accept any other appropriate response.	**(3)**

Question number	Answer	Mark
2(e)	**AO3 (1 mark)** Award 1 mark for the following: • Wave-cut platform (1)	**(1)**

Question number	Answer	Mark
2(f)	**AO1 (1 mark) AO2 (3 marks)** Award 1 mark for initial point (AO1), and 3 further marks (AO2) for the extension of this point up to maximum of 4 marks. Candidates may approach answering the question in different ways credit can be given for 2 developed. 1+1+1+1 Or 1+1 and 1+1 • Prevention strategies such as flood defences built along to coastline (1) help to reduce the severity of flooding (1). Alternative strategies such as building emergency centres for people to shelter (1) reduce the amount of people who might be killed (1) • Prevention strategies such as restricting where buildings can be built/ building design (1) reduces the amount, of buildings that may be damaged in a flood event (1). This reduces the potential economic impact of a flood (1) and damaging less livelihoods (1). • Early warning systems (1) give messages through the coastguard/Environment agency (1) will help people prepare for the flood event/evacuate if necessary, to shelter spaces (1) preventing potential loss of life (1). Accept any other appropriate response.	**(4)**

Question number	Answer indicative content
2(g)	**AO3 (4 marks) AO4 (4 marks)** **Marking instructions** Markers must apply the descriptors in line with the general marking guidance and the qualities outlined in the level-based mark scheme below. **Indicative content guidance** The indicative content below is not prescriptive, and candidates are not required to include all of it. Other relevant material not suggested below must also be credited. The question is about analysing the different coastal management strategies used on the coastline and how different groups of people have different priorities. **AO3** • The coastline is used by many different groups of people who can have conflicting views. • Residents and local businesses are likely to favour protecting the coastline where there are economic assets at stake. • There is a need to manage the different needs of the coastline. Where there are assets that need protecting implementing hard engineering strategies can be important. • Where there is important wildlife species or habitats, it is important to let nature proceed without intervention (soft engineering) to avoid disruption to natural processes, such as salt marsh formation. • There will be a difference of opinion between local residents and people who are visiting the area. Visitors are less likely to appreciate the value of hard engineering techniques in ensuring coastal erosion is minimised. Local people are likely to have positive view of hard engineering as it helps protect homes and businesses. **AO4** • Fig 2c shows how there are different coastal management strategies in place along the Dorset coastline.

	• Figure 2c demonstrates how urban areas e.g. Bournemouth need hard engineering strategies to protect the buildings that are located there. • Figure 2c shows how some areas of land have been allowed to retreat to allow natural processes to take over, creating a salt marsh. • Figure 2c demonstrates a range of conflicting views on the protection of the coastline based on the views of different groups of people. • Figure 2c shows a National nature reserve which will be focus for conservationists. Candidates may use compass bearings and scale to support their response.

Question number	Answer	
Level	**Mark**	**Descriptor**
	0	No rewardable material.
Level 1	**1–3**	• Attempts to apply understanding to deconstruct information but understanding and connections are flawed. An unbalanced or incomplete argument that provides limited synthesis of understanding. Judgements that are supported by limited evidence. (AO3) • Uses some geographical skills to obtain information with limited relevance and accuracy, which supports few aspects of the argument. (AO4)
Level 2	**4–6**	• Applies understanding to deconstruct information and provide some logical connections between concepts. An imbalanced argument that synthesises mostly relevant understanding, but not entirely coherently, leading to judgements that are supported by evidence occasionally. (AO3) • Uses geographical skills to obtain accurate information that supports some aspects of the argument. (AO4)
Level 3	**7–8**	• Applies understanding to deconstruct information and provide logical connections between concepts throughout. A balanced, well-developed argument that synthesises relevant understanding coherently, leading to judgements that are supported by evidence throughout. (AO3) • Uses geographical skills to obtain accurate information that supports all aspects of the argument. (AO4)

Question number	Answer	Mark

2(a)	**AO1 (1 mark)** B (Plants) (1) The answer cannot be A, C or D as these are abiotic factors.	**(1)**

Question number	Answer	Mark
2(b)(i)	**AO1 (1 mark)** A (Where plant roots grow into cracks in the rocks). The answer cannot be B, C or D as these are all incorrect.	**(1)**

Question number	Answer	Mark
2(b)(ii)	**AO1 (1 mark)** Award 1 mark for any of the following. • Landslide (1) • Soil creep (1) • Rotational slumping (1) • Rock fall (1) Accept any other appropriate response.	**(1)**

Question number	Answer	Mark
2(b)(iii)	**AO1 (1 mark)/AO2 (1 mark)** Award 1 mark (AO1) for initial point and a further mark for explanation of the reason (AO2) up to a maximum of two marks. • Groynes (1) to prevent movement of sand down the coastline (1). • Sea walls (1) to reduce energy of the waves hitting the coastline (1). • Gabions (1) to protect the base of a cliff (1). Accept any other appropriate response.	**(2)**

Question number	Answer	Mark
2(c)	**AO2 (2 marks)/AO3 (2 marks)** Award 1 mark (AO3) for identification of any factor from Fig 1a and a further mark for explanation of the reason (AO2) up to a maximum of two marks each. • Temperature (1) as coral needs a minimum water temperature of 18oC (1) • Intensity of sunlight (1) as coral needs light to grow (1). • Water depth (1) as coral needs shallow (depth of less than 25m) (1). • Salinity (1) as coral can only survive in salty water (1). • Latitude (1) increased amount of light/ temperature (1). Accept any other appropriate response.	**(4)**

Question number	Answer	Mark
2(d)	**AO2 (3 marks)** Award 1 mark for the identification of a way in which tourism can threaten coastal ecosystems and 2 marks for further explanation up to a maximum of 3 marks. Candidates could identify: • Increased number of tourists walking on sand dunes (1) can damage structure (1) and prevent succession (1). • Tourists can leave litter behind (1) which can damage natural habitats (1) and discourage wildlife (1). • Tourist boats visiting coral reefs cause water pollution (1) which can kill some wildlife (1) and reduce biodiversity (1). Accept any other appropriate response.	**(3)**

Question number	Answer	Mark
2(e)	**AO3 (1 mark)** Award 1 mark for the following: • Spit (1).	**(1)**

Question number	Answer	Mark
2(f)	**AO1 (2 mark) AO2 (2 marks)** Award 1 mark for initial point (AO1), and 1 further marks (AO2) for the extension of this point up to maximum of 2 marks for each point. • Prediction techniques can be used to develop evacuation plans (1) which will enable people to move to areas of lower risk (1). • Prediction techniques can be used to plan where to build flood defense's (1) which can reduce damage to buildings (1). • Prediction techniques can be used to plan land use zones (1) enable lower value land uses is higher risk areas (1). Accept any other appropriate response.	**(4)**

Question number	Answer indicative content	Mark (8)
2(g)	**AO3 (4 marks) AO4 (4 marks)** **Marking instructions** Markers must apply the descriptors in line with the general marking guidance and the qualities outlined in the level-based mark scheme below. **Indicative content guidance** The indicative content below is not prescriptive, and candidates are not required to include all of it. Other relevant material not suggested below must also be credited. The question is about analysing the different coastal management strategies used on the coastline and how different groups of people have different priorities. **AO3** • Conflicts can arise over which management strategies are used based on the different ways groups want to use the coastline. • Different groups have their own agendas which can lead to conflict as they may not be compatible, for example allowing natural retreat in area that affects a lot of residents' homes. • Residents and local businesses are likely to favour protecting the coastline where there are economic assets at stake. • Local councillors need to manage the conflicts of the different people in the area, balancing any potential economic, social and environmental impacts of measures taken. **AO4** • Fig 2c shows how there are different coastal management strategies in place around the Isle of Wight. • Figure 2c demonstrates how some settlements and other urban areas need hard engineering strategies to protect the buildings that are located there. • Figure 2c shows how some areas of land have been allowed to retreat to allow natural processes to take over, creating a salt marsh. • Figure 2 c demonstrates a range of conflicting views on the protection of the coastline based on the views from different groups of people.	

Question number	Answer	
Level	**Mark**	**Descriptor**
	0	No rewardable material.
Level 1	**1–3**	• Attempts to apply understanding to deconstruct information but understanding and connections are flawed. An unbalanced or incomplete argument that provides limited synthesis of understanding. Judgements that are supported by limited evidence. (AO3) • Uses some geographical skills to obtain information with limited relevance and accuracy, which supports few aspects of the argument. (AO4)
Level 2	**4–6**	• Applies understanding to deconstruct information and provide some logical connections between concepts. An imbalanced argument that synthesises mostly relevant understanding, but not entirely coherently, leading to judgements that are supported by evidence occasionally. (AO3) • Uses geographical skills to obtain accurate information that supports some aspects of the argument. (AO4)
Level 3	**7–8**	• Applies understanding to deconstruct information and provide logical connections between concepts throughout. A balanced, well-developed argument that synthesises relevant understanding coherently, leading to judgements that are supported by evidence throughout. (AO3) • Uses geographical skills to obtain accurate information that supports all aspects of the argument. (AO4)

Question number	Answer	Mark

2(a)	**AO1 (1 mark)** C (complex root system) The answer cannot be A (sand dune), B (shallow gradient at the coastline) or D (requires warm temperatures to grow)	**(1)**

Question number	Answer	Mark
2(b)(i)	**AO1 (1 mark)** A Abrasion (1) The answer cannot be B (coastal landform), C or D (features of waves).	**(1)**

Question number	Answer	Mark
2(b)(ii)	**AO1 (1 mark)** Award 1 mark for any of the following. • Longshore drift (1) • Traction (1) • Saltation (1) • Solution (1) • Suspension (1) Accept any other appropriate response.	**(1)**

Question number	Answer	Mark
2(c)	**AO1 (1 mark)/AO2 (1 mark)** Award 1 mark (AO1) for initial point and a further mark for explanation of the reason (AO2) up to a maximum of two marks. • Building designs such as being built on raised stilts (1) so they are above the level floods usually reach (1). • City and town planning that recognises which areas most at risk (1) and limits new building activity in these areas (1). • Including strategies for responding to coastal flood events in education programs (1) so people know how to respond, for example evacuation routes and shelters (1). • Using forecasting technologies (1) to be able to predict when coastal flooding will happen and evacuate before the event hits (1). • Building hard engineering strategies (sea walls) can reduce the energy/power of the waves (1) which can prevent damage to buildings (1). Accept any other appropriate response.	**(2)**

Question number	Answer	Mark
2(d)	**AO2 (2 marks)/AO3 (2 marks)** Award 1 mark (AO3) for identification of any reason and a further mark for explanation of the reason (AO2) up to a maximum of two marks each. • Some areas of the coast are not being provided with any protection (1), so they are likely to experience faster rates of coastal erosion (1). • Those in Puerto Banus may resent people in Caleta de Velez (1) because they have a range of hard engineering strategies being used to protect the coastline (1). • Industry owners in El Zabal may feel their livelihood is more important to protect than fishing (1) and may not understand why there is not protection strategy there (1). • Building a sea wall is expensive (1) which means less money is spent on other services (1). Accept any other appropriate response.	**(4)**

Question number	Answer	Mark
2(e)	**AO2 (3 marks)** Award 1 mark for initial point and 2 marks for further explanation up to a maximum of 3 marks. • Climate change can cause the melting of ice caps (1) so global sea levels will rise (1) and so coastal settlements may become flooded or abandoned (1). • Climate change may cause increased coastal erosion (1) because sea levels are higher (1) and may be accompanied by more extreme weather events so more erosion (1). • Climate change could destroy coral reefs (1) because sea temperature rises (1) which leads to coral bleaching (1). • Climate change could increase severity of storms (1) which will increase erosion of mangroves (1) leading to loss of biodiversity (1). Accept any other appropriate response.	**(3)**

Question number	Answer	Mark
2(f)	**AO3 (1 mark)** Award 1 mark for the following: • Constructive wave (1).	**(1)**

Question number	Answer	Mark
2(g)	**AO1 (1 mark) AO2 (3 marks)** Award 1 mark for initial point (AO1) a further 3 marks for development of explanation (AO2) for each. Credit annotated diagrams where provided, but do not double credit ideas if repeated in the written text. • Cave forms along a headland (1). Wave action begins to erode the headland (1) especially where there are lines of weakness (1) repetition of this process leads to this line if weakness widening creating a cave (1). Accept any other appropriate response.	**(4)**

Question number	Indicative Content
2(h)	**AO3 (4 marks) AO4 (4 marks)** **Marking instructions** Markers must apply the descriptors in line with the general marking guidance and the qualities outlined in the level-based mark scheme below. **Indicative content guidance** The indicative content below is not prescriptive, and candidates are not required to include all of it. Other relevant material not suggested below must also be credited. The question is about analysing why the multiple threats to coral reef ecosystems is important. **AO3** • Coral reefs are delicate ecosystems that are subject to a range of physical and human threats. • For coral reefs to grow they need optimal conditions including lots of sunlight, and clear and shallow water around 21-29^{oC} temperature. Climate change has the potential to increase

water temperatures which could threaten coral growth, but there are a much wider range of threats from human activity.

- Coral reefs are important for maintaining biodiversity in the ocean, and represent some of the most biologically diverse marine ecosystems on Earth. For example, the Great Barrier Reef contains over 400 coral species, 1,500 fish species, 4,000 mollusc species.
- Coral reefs act as an important natural barrier for the coastline, which can reduce the power of waves hitting the coast.
- Coral reefs are often popular sites for tourists to visit, and as such create jobs for many people in the tourist and hospitality industries which means it is important for economies that threats to them are reduced.

AO4

- Fig 2c shows how there are various threats to coral reef ecosystems.
- Figure 2c indicates how human activities can threaten coral reef ecosystems through agriculture leading to increased pollution in the water which can affect coral growth.
- Figure 2c indicates that pollution can reach water where corals are growing through groundwater flow.
- Figure 2c indicates threats can include agriculture, road construction, oil and chemical spills, deforestation, stormwater runoff, coastal developments, chemicals from sunscreens as well leakages from septic tanks.
- Figure 2c indicates how there are a range of stakeholders that are involved in the threats to coral reefs from tourists using sunscreens, up to city planners through plans for road construction.

Level	Mark	Descriptor
	0	No rewardable material.
Level 1	1–3	• Attempts to apply understanding to deconstruct information but understanding and connections are flawed. An unbalanced or incomplete argument that provides limited synthesis of understanding. Judgements that are supported by limited evidence. (AO3) • Uses some geographical skills to obtain information with limited relevance and accuracy, which supports few aspects of the argument. (AO4)

Level 2	4–6	• Applies understanding to deconstruct information and provide some logical connections between concepts. An imbalanced argument that synthesises mostly relevant understanding, but not entirely coherently, leading to judgements that are supported by evidence occasionally. (AO3) • Uses geographical skills to obtain accurate information that supports some aspects of the argument. (AO4)
Level 3	7–8	• Applies understanding to deconstruct information and provide logical connections between concepts throughout. A balanced, well-developed argument that synthesises relevant understanding coherently, leading to judgements that are supported by evidence throughout. (AO3) • Uses geographical skills to obtain accurate information that supports all aspects of the argument. (AO4)

Question number	Answer	Mark

2(a)	**AO1 (1 mark)** B Cave (1) The answer cannot be A or D (depositional landforms) or C (coastal management strategy)	**(1)**

Question number	Answer	Mark
2(b)(i)	**AO1 (1 mark)** B a spit that has continued to grow across a bay (1) The answer cannot be A (headland), C (tombolo), or D (wave cut platform).	**(1)**

Question number	Answer	Mark
2(b)(ii)	**AO1 (1 mark)** Award 1 mark for any of the following. • Shelter from the sea / protected from wind (1) • Brackish water / partly salty water / salinity (1) • Water regularly flooded by tides (1) • Large expanse of mudflat (1). Accept any other appropriate response.	**(1)**

Question number	Answer	Mark
2(c)	**AO1 (1 mark)/AO2 (1 mark)** Award 1 mark (AO1) for initial point and a further mark for explanation of the reason (AO2) up to a maximum of two marks. • Deforestation (1) for timber and building material (1). • Deforestation (1) for buildings / infrastructure (1). • Mangroves are often removed (1) to make space for aquaculture / shrimp farming (1).	

	• Overfishing (1) leads to mangrove ecosystems being damaged (1). • Agriculture can lead to pesticides reaching the river (1) which can lead to mangroves being damaged (1). Accept any other appropriate response.	**(2)**

Question number	Answer	Mark
2(d)	**AO2 (2 marks)/AO3 (2 marks)** Award 1 mark (AO3) for identification of any reason and a further mark for explanation of the reason (AO2) up to a maximum of two marks each. • Business involved in tourism are likely to want to continue to increase the number of tourist (1), but this could upset conservationists who highlight damage being done to the reef (1). • Conservationists are likely to want to preserve the coral reef (1) which may cause conflict with local fisherman who want to use it as a resource (1). Accept any other appropriate response.	**(4)**

Question number	Answer	Mark
2(e)	**AO2 (3 marks)** Award 1 mark for initial point and 2 marks for further explanation up to a maximum of 3 marks. • Constructive waves have a long wavelength / shallow gradient waves (1) which means that they have a strong swash and weak backwash (1) compared to destructive waves, so they help to build up the beach (1). • Destructive waves have a short wavelength / steeper gradient waves (1) which means they have a weak swash, but a stronger backwash (1) compared to constructive waves, so they lead to erosion of the beach (1). Accept any other appropriate response.	**(3)**

Question number	Answer	Mark
2(f)	**AO3 (1 mark)** Award 1 mark for the following: • Longshore drift (1).	**(1)**

Question number	Answer	Mark
2(g)	**AO1 (1 mark) AO2 (3 marks)** Award 1 mark for initial point (AO1) for identification of suitable cause and further marks for development or explanation (AO2). • Where coastline is low lying land it is susceptible to coastal flooding (1). Monsoon can lead to strong storms over the Bay of Bengal for example (1) which can cause storm surges (1) which cause coastlines to be overwhelmed (1). • Strong winds over the sea creates powerful waves (1) which can overcome any defences (1). This is made worse by sea level rise caused by climate change (1) which can lead to increased frequency of strong winds (1). • Earthquakes can cause tsunami waves (1) which grow in height near the shore (1) which can breach defences (1) overwhelming large areas (1). Accept any other appropriate response.	**(4)**

Question number	Indicative Content
2(h)	**AO3 (4 marks) AO4 (4 marks)** **Marking instructions** Markers must apply the descriptors in line with the general marking guidance and the qualities outlined in the level-based mark scheme below. **Indicative content guidance** The indicative content below is not prescriptive, and candidates are not required to include all of it. Other relevant material not suggested below must also be credited. The question is about analysing the advantages of the coastal management plan for the coastline in Portugal. **AO3** • Coastlines at risk of erosion need an adequate coastal management strategy in order to protect different assets along their coastline. • There are a range of methods which can be used as part of a coastal management strategy including hard engineering (groynes, sea walls, rock armour, gabions etc.), as well as soft engineering (beach replenishment), and in some cases managed retreat. • The advantages of hard engineering strategies such as groynes are that they are effective at breaking the waves, absorbing their energy, and therefore protecting the coast. They also allow the beach to build up which can be an attraction for tourists. However, by trapping the sand they starve areas of the coastline further down which can lead to increased erosion in other areas. • Soft engineering strategy such as beach replenishment or sand dune nourishment are viewed as more sustainable approaches to managing the coast. Creating larger beaches will be popular with tourists, but the area would need constant replenishment, and the sand has to be physically transported to the site. **AO4** • Fig 2c shows how the coastline management strategy for a stretch of coastline in Portugal is comprised of different

	strategies. • Figure 2c indicates how there are a mix of methods being used as part of this strategy including hard engineering (groynes and sea walls), soft engineering (beach and sand dune replenishment). • Figure 2c indicates how hard engineering dominates much of the coastline, particularly where towns and cities are located e. Porto, Espinho. • Figure 2c shows how around the lagoons of Aveiro beach replenishment is the dominant method used. • Figure 2c shows how some of the groynes used are made of rocks, and how some sand dune areas are protected by walkways.

Level	Mark	Descriptor
	0	No rewardable material.
Level 1	1–3	• Attempts to apply understanding to deconstruct information but understanding and connections are flawed. An unbalanced or incomplete argument that provides limited synthesis of understanding. Judgements that are supported by limited evidence. (AO3) • Uses some geographical skills to obtain information with limited relevance and accuracy, which supports few aspects of the argument. (AO4)
Level 2	4–6	• Applies understanding to deconstruct information and provide some logical connections between concepts. An imbalanced argument that synthesises mostly relevant understanding, but not entirely coherently, leading to judgements that are supported by evidence occasionally. (AO3) • Uses geographical skills to obtain accurate information that supports some aspects of the argument. (AO4)
Level 3	7–8	• Applies understanding to deconstruct information and provide logical connections between concepts throughout. A balanced, well-developed argument that synthesises relevant understanding coherently, leading to judgements that are supported by evidence throughout. (AO3) • Uses geographical skills to obtain accurate information that

		supports all aspects of the argument. (AO4)

Question number	Answer	Mark

2(a)	**AO1 (1 mark)** C Spit The answer cannot be A, B or D as these are all coastal landforms created by erosion.	**(1)**

Question number	Answer	Mark
2(b)(i)	**AO1 (1 mark)** B Waves hit the cliffs forcing pockets of air into cracks. The answer cannot be A (attrition), C (transportation/longshore drift) or D (solution).	**(1)**

Question number	Answer	Mark
2(b)(ii)	**AO1 (1 mark)** Award 1 mark for any of the following. • Physical weathering / mechanical weathering (1). • Freeze-thaw weathering (1). • Onion-skin weathering (1). • Biological weathering (1). • Chemical weathering (1). Accept any other appropriate response. **No credit for 'acid rain'**	**(1)**

Question number	Answer	Mark
2(c)	**AO1 (1 mark)/AO2 (1 mark)** Award 1 mark (AO1) for initial point and a further mark for explanation of the reason (AO2) up to a maximum of two marks. • Pollution of (from tourist boats can pollute) the water (1) can damage coral reef ecosystems (1). • Deforestation of mangrove trees (1) can increase vulnerability during storm surges (1). • Overfishing/fishing (1) can reduce biodiversity in coastal ecosystems (1). • Climate change/greenhouse effect (1) can lead to coral bleaching (1).	

	• Pollutes the sea (1) which can kill animals (1). Accept any other appropriate response.	**(2)**

Question number	Answer	Mark
2(d)	**AO2 (2 marks)/AO3 (2 marks)** Award 1 mark (AO3) for identification of any factor and a further mark for explanation of the reason (AO2) up to a maximum of two marks each. • Geology (1) as areas of soft rocks such as limestone are more easily eroded than hard rock areas (1). • Strength of prevailing winds (1) which can causes waves to erode more material from the coast (1). • Presence or absence of coastal management (1) to protect the coastal environment from erosion (1). • Vegetation present on the coastline (1) can cause erosion of cliffs through biological weathering (1). • Change in the direction of the coastline (1) can lead to spit formation 1). Accept any other appropriate response.	**(4)**

Question number	Answer	Mark
2e	**AO2 (3 marks)** Award 1 mark for initial point and 2 marks for further explanation up to a maximum of 3 marks. • Prevailing wind blows waves to the beach at angle (1), the backwash then drags the sediment back to the sea (1) and the sediment is moved along the beach (1). • Swash carried materials up the beach at an angle to the coast (1) backwash carries it back down at rights angles to the coast (1) which carries material along the beach in a zig-zag pattern. Accept any other appropriate response.	**(3)**

Question number	Answer	Mark
2(f)	**AO3 (1 mark)** Award 1 mark for the following: • Groynes (1).	**(1)**

Question number	Answer	Mark
2(g)	**AO1 (2 marks) AO2 (2 marks)** Award 1 mark for initial point (AO1) for advantage and disadvantage and a further mark (AO2) for each. Only award marks for one advantage and one disadvantage up to maximum of 4 marks. • Advantages: ○ Strategies such as managed retreat are cheaper than alternatives (1) because they do not involve building any new structures (1). ○ Soft engineering protects the coast from erosion (1) as sand dune regeneration reduces the power of the waves (1). ○ Beach replenishment which involves adding more sand to the beach (1) creates a natural defence against erosion. ○ They look natural (1) which makes them more aesthetically pleasing (1). • Disadvantages: ○ Strategies such as beach replenishment need to constantly be replaced (1) which can be expensive (1). ○ Strategies such as beach reprofiling which involves moving sand towards the upper part of the beach (1) is not very effective against strong waves (1). ○ Not as effective as hard engineering (1) as works with nature to reduce rather then prevent erosion (1). ○ They can be considered ugly (1) when old sea defences are left to breakdown with managed retreat (1). Accept any other appropriate response.	**(4)**

Question number	Answer indicative content
2(h)	**AO3 (4 marks) AO4 (4 marks)** **Marking instructions** Markers must apply the descriptors in line with the general marking guidance and the qualities outlined in the level-based mark scheme below. **Indicative content guidance** The indicative content below is not prescriptive, and candidates are not required to include all of it. Other relevant material not suggested below must also be credited. The question is about analysing the different coastal management strategies used and how effective they were at reducing risk from tropical cyclones in the region. **AO3** • Flood prevention often involves a mixture of hard (e.g., dams/levees/flood relief channels) and soft engineering strategies (e.g., flood warnings and preparation/ floodplain zoning/ecological flooding). • It is important that flood protection involves a mix of both soft and hard engineering in order to not only have structures to physically protect coast, but also mechanisms to ensure minimal risk to losing lives such as effective early warning systems which can allow people time to evacuate. • Coastlines are vulnerable to flooding due to tropical cyclones, storm surges and the impact of climate change. • Low lying coastlines are particularly at risk and so require hard engineering to protect them. **AO4** • Figure 2c shows how the whole coastline is at high risk of coastal flooding which justifies a mixture of different coastal prevention strategies. • Figure 2c indicates how coastlines are vulnerable to coastal floods (due to rain from Hurricane Katrina) which caused high levels of destruction which justifies high levels of investment in flood prevention strategies. • Figure 2d shows how flood prevention strategies have included flood walls, water pump stations and levees. • Figure 2d suggests that levees have been very expensive (US$14 billion after Hurricane Katrina) but may not provide long term protection.

Question number	Answer	
Level	**Mark**	**Descriptor**
	0	No rewardable material.
Level 1	**1–3**	• Attempts to apply understanding to deconstruct information but understanding and connections are flawed. An unbalanced or incomplete argument that provides limited synthesis of understanding. Judgements that are supported by limited evidence. (AO3) • Uses some geographical skills to obtain information with limited relevance and accuracy, which supports few aspects of the argument. (AO4)
Level 2	**4–6**	• Applies understanding to deconstruct information and provide some logical connections between concepts. An imbalanced argument that synthesises mostly relevant understanding, but not entirely coherently, leading to judgements that are supported by evidence occasionally. (AO3) • Uses geographical skills to obtain accurate information that supports some aspects of the argument. (AO4)
Level 3	**7–8**	• Applies understanding to deconstruct information and provide logical connections between concepts throughout. A balanced, well-developed argument that synthesises relevant understanding coherently, leading to judgements that are supported by evidence throughout. (AO3) • Uses geographical skills to obtain accurate information that supports all aspects of the argument. (AO4)

Question number	Answer	Mark

Question 2

Question number	Answer	Mark
2(a)	**AO1 (1 mark)** **D** is the correct response Beach replenishment is the only soft engineering technique. The answer cannot be A, B or C as these are all hard engineering techniques.	**(1)**

Question number	Answer	Mark
2(b)(i)	**AO1 (1 mark)** **B** is the correct answer – this is the accurate definition of a coral reef ecosystem The answer cannot be A (sand dune ecosystem), C (mangrove ecosystem), or D (salt marsh ecosystem).	**(1)**

Question number	Answer	Mark
2(b)(ii)	**AO1 (1 mark)** Award 1 mark for a correct feature including: • light (1) • water levels (1) • salinity (1) • pH (1) • temperature (1) • soil (1) • rock type / geology (1) The response is specifically about non-living elements of an ecosystem.	**(1)**

Question number	Answer	Mark
2(b)(iii)	**AO1 (1 mark)/AO2 (1 mark)** Award 1 mark for identifying factor (AO1) and a second mark for an appropriate development (AO2). • Salinity of water (1) as mangrove trees can grow in salty water (1). • Warm temperatures (1) as mangroves need water around 19oC (1). • Inter-tidal / shallow water / water depth (1) which allows the mangrove roots to grow above the water (1). Accept any other appropriate response.	**(2)**

Question number	Answer	Mark
2(c)	**AO2 (2 mark)/AO3 (2 mark)** Award 1 mark (AO2) for identification of how deposition affects the coastline (1) and a second mark for a further development (1) (AO3). • Beaches can increase in size (1) which creates greater protection against coastal erosion (1). • Deposition of sediment can cause a bar to form across a bay (1) which can lead to salt marsh formation behind the bar (1). • Deposition to form a beach / curved spit / tombolo (1) can protect coastlines absorbing the energy from the waves (1). • Deposition of sediment through longshore drift (1) can lead to the creation of a spit if the coastline changes direction (1). Accept any other appropriate response.	**(4)**

Question number	Answer	Mark
2(d)	**AO2 (3 marks)** Award 1 mark for identification of a way and 2 marks for development and further explanation, up to a maximum of 3 marks. For example: • Geology of rocks will vary the hardness of the rock (1) this means that rocks will erode at different rates (1) resulting in variation in landforms in coastal areas (1). • Hard rock erodes more slowly (1) resulting in the formation in headlands or bays (or variation in coastal landforms) (1) as the surrounding rock is eroded more quickly (1). • Coastal protection (1) like a sea wall will decrease erosion (1) as it deflects the waves energy (1). • Sea level rise (1) can lead to waves attacking the cliff face more regularly (1) increasing rates of erosion (1). • Climate change (1) can increase the number of intense storms increasing frequency of destructive waves (1) which can increase erosion rates (1). Accept any other appropriate response.	**(3)**

Question number	Answer	Mark
2(e)	**AO3 (1 mark)** Award 1 mark for the following: Biological (weathering) (1)	**(1)**

Question number	Answer	Mark
2(f)	**AO1 (1 mark) / AO2 (3 marks)** Award 1 mark for the initial point (AO1) and 3 further marks (AO2) for the extension of the point up to 4 marks. • Arches form at headlands (1) • Waves erode the base of the cliff either side of the headland (1) • This forms a cave on each side of the headland (1) • As the erosion continues caves become wider until the water breaks through the other side (1) • As further undercutting takes place the arch becomes wider and more developed (1) Candidates may develop further ideas around types of erosion acting on the headland. Accept any other appropriate response. Credit annotated diagrams.	**(4)**

Question number	Answer indicative content
2(g)	**AO3 (4 marks) AO4 (4 marks)** **Marking instructions** Markers must apply the descriptors in line with the general marking guidance and the qualities outlined in the level based mark scheme below. **Indicative content guidance** The indicative content below is not prescriptive and candidates are not required to include all of it. Other relevant material not suggested below must also be credited. In this question the candidates will need to make the distinction between development and conservation. The resources identify the benefits of specifically developing tourism against the needs of conservationists. Candidates should explore both elements this would be expected in level 2 responses but maybe unbalanced. **AO3** • Development of tourism can work in partnership with conservation, but it is a delicate balance. • When coastal areas are badly managed conflict can result. • Coastal areas provide a clear opportunity for countries to develop their economies. • Commercialised fishing may have a negative effect on the coastal environment. **AO4** • Figure 2c suggests that tourism employs a large number of people in the Caribbean islands. • Figure 2c states that healthy oceans attract divers. • Figure 2c suggests that the development of Mangroves can also provide income through fishing to generate food and income for the local community. • Figure 2d suggests that coral reefs act as a barrier to storm surges protecting people and buildings. • Figure 2d suggests that mangroves reduce flood risk.

Question number	Answer	
Level	**Mark**	**Descriptor**
	0	No rewardable material.
Level 1	**1–3**	• Attempts to apply understanding to deconstruct information but understanding and connections are flawed. An unbalanced or incomplete argument that provides limited synthesis of understanding. Judgements that are supported by limited evidence. (AO3) • Uses some geographical skills to obtain information with limited relevance and accuracy, which supports few aspects of the argument. (AO4)
Level 2	**4–6**	• Applies understanding to deconstruct information and provide some logical connections between concepts. An imbalanced argument that synthesises mostly relevant understanding, but not entirely coherently, leading to judgements that are supported by evidence occasionally. (AO3) • Uses geographical skills to obtain accurate information that supports some aspects of the argument. (AO4)
Level 3	**7–8**	• Applies understanding to deconstruct information and provide logical connections between concepts throughout. A balanced, well-developed argument that synthesises relevant understanding coherently, leading to judgements that are supported by evidence throughout. (AO3) • Uses geographical skills to obtain accurate information that supports all aspects of the argument. (AO4)

2(a)	**AO1 (1 mark)** D The answer cannot be A (wavelength), B (cause of wave), C (backwash).	**(1)**

Question number	Answer	Mark
2(b)(i)	**AO1 (1 mark)** D The answer cannot be A (weathering), B (deposition), C (longshore drift).	**(1)**

Question number	Answer	Mark
2(b)(ii)	**AO1 (1 mark)** Award one mark for any of the following: • Cave (1) • Arch (1) • Bay (1) • Stack (1) Accept any other appropriate response.	**(1)**

Question number	Answer	Mark
2(b)(iii)	**AO1 (1 mark)/AO2 (1 mark)** Award 1 mark (AO1) for initial point and a further mark for development (AO2) up to a maximum of two marks. • Coastlines with hard rocks are more resistant to erosion (1) and will erode more slowly (1) • Coastlines with hard rocks erode more slowly (1) leading to the creation of headlands (1) • Coastlines with soft rocks are less resistant to erosion (1) and will have fast erosion rates (1) • Coastlines with soft rocks erode faster (1) leading to the creation of bays (1). Accept any other appropriate response.	**(2)**

Question number	Answer	Mark
2(c)	**AO2 (2 mark)/AO3 (2 mark)** Award 1 mark (AO3) for the identification of an advantage and disadvantage and a further mark for explanation (AO2) up to a maximum of two marks each. **Advantage:** Managed retreat is often cheaper (1) as hard sea defences (like sea walls) do not need to be maintained (1) Trees have been planted (1) which can increase biodiversity (1) Managed retreat encourages the development of salt marsh (1) these ecosystems provide a habitat for birds (1) A bird reserve has been built (1) which can increase tourism/recreation/visitors (1) **Disadvantage:** Managed retreat can reduce availability of farmland (1) which can put pressure on food supplies (1) Managed retreat can upset landowners (farmers) (1) and require compensation to be paid increasing costs (1)	

	The village could be at increased flood risk (1) which can increase damage to buildings (1) The trees might block the (sea) view (1) leading to decrease in house prices (1) Accept any other appropriate response.	**(4)**

Question number	Answer	Mark
2(d)	**AO2 (3 mark)** Award 1 mark for the initial explanation and 2 marks for further explanation up to a maximum of 3 marks. • People will know what to do in the event of a flood (1) meaning they go to emergency centres (1) which reduce the social impacts (1). • People keep important documents upstairs (1) to ensure they are not damaged by flood water (1) increasing the ability to make insurance claims (1) • People are aware of the dangerous currents in fast flowing flood water (1) this means they do not cross (1) reducing the risk of being swept away (1). • Architects use knowledge to improve building design (1) reducing the risk of infrastructure damage (1). Accept any other appropriate response.	**(3)**

Question number	Answer	Mark
2(e)	**AO3 (1 mark)** Award one mark for the following: • Sand dunes (1)	**(1)**

Question number	Answer	Mark
2(f)	**AO1 (2 mark)/AO2 (2 mark)** Award 1 mark (AO1) for the identification of a reason and a further mark for explanation (AO2) up to a maximum of two marks each. • Overfishing in coral reefs (1) disrupts the food chain of the ecosystem (1). • Tourists often touch the coral (1) which kills the coral (1).	

	• Pollution from agricultural runoff (1) can reduce water quality (affecting coral growth) (1). • Climate change (1) can lead to coral bleaching (1). Accept any other appropriate response.	**(4)**
Question number	Answer	**Mark**
2(g)	**AO3 (4 mark)/AO4 (4 mark)** **Marking instructions** Markers must apply the descriptors in line with the general marking guidance and the qualities outlined in the level-based mark scheme below. **Indicative content guidance** The indicative content below is not prescriptive, and candidates are not required to include all of it. Other relevant material not suggested below must also be credited. This question is about analysing the significance of different types of human activity on the destruction of mangrove environments. Candidates will need to be able to identify the different causes of destruction and consider which human activity is most destructive for these environments. **AO3** • Mangroves are most commonly found in SE Asia, they are valuable nurseries for fish and have high biodiversity. • They trap sediment and help to create new land. • Mangroves help reduce the impact of tropical cyclones on human populations. • Destruction of mangroves is caused due to aquaculture (of fish and shrimps) to provide a source of food for people. • Destruction of mangroves is caused by land reclamation to build hotels and amenities for tourists. • Destruction of mangroves is caused by agriculture as they add herbicides to increase crop yields. • Destruction of mangroves is caused by the demand for wood to building and as a source of fuel. • Not all destruction is caused by humans as erosion is a contributing factor caused by increasing severity of tropical cyclones and rising sea levels. • Mangroves are being protected in some areas as they can be an effective flood defence. **AO4** • In Vietnam the biggest cause of mangrove deforestation is for urban development. • In Myanmar the biggest cause for mangrove deforestation is rice farming. • In Indonesia the biggest cause for mangrove	

	deforestation is aquaculture. • Indonesia has a high percentage of mangrove regrowth. • It is clear that most mangrove deforestation is caused by human activity rather than erosion.	
		(8)

Question number	**Answer**	
Level	**Mark**	**Descriptor**
	0	No rewardable material.
Level 1	**1–3**	• Attempts to apply understanding to deconstruct information but understanding and connections are flawed. An unbalanced or incomplete argument that provides limited synthesis of understanding. Judgements that are supported by limited evidence. (AO3) • Uses some geographical skills to obtain information with limited relevance and accuracy, which supports few aspects of the argument. (AO4)
Level 2	**4–6**	• Applies understanding to deconstruct information and provide some logical connections between concepts. An imbalanced argument that synthesises mostly relevant understanding, but not entirely coherently, leading to judgements that are supported by evidence occasionally. (AO3) • Uses geographical skills to obtain accurate information that supports some aspects of the argument. (AO4)
Level 3	**7–8**	• Applies understanding to deconstruct information and provide logical connections between concepts throughout. A balanced, well-developed argument that synthesises relevant understanding coherently, leading to judgements that are supported by evidence throughout. (AO3) • Uses geographical skills to obtain accurate information that supports all aspects of the argument. (AO4)

Question number	**Answer**	**Mark**

2(a)	**AO1 (1 mark)** **D** (temperature) The answer cannot be A, B or C as all biotic factors.	**(1)**

Question number	Answer	Mark
2(b)(i)	**AO1 (1 mark)** **C** (movement of water down the beach) The answer cannot be A (wavelength), B (cause of wave), D (swash).	**(1)**

Question number	Answer	Mark
2(b)(ii)	**AO1 (1 mark)** Award one mark for any of the following: • Long wavelength (1) • Short in height / shallow gradient (1) • Less frequent (1) • Gentle (1) • Deposition / low energy (1) • Strong(er) swash / weak(er) backwash (1) Accept any other appropriate response.	**(1)**

Question number	Answer	Mark
2(b)(iii)	**AO2 (2 marks)** Award 1 mark for identifying a type of mass movement and a further mark for further explanation up to a maximum of two marks. • Landslides / are large amounts of soil and rock (1) move down a slope due to gravity (1). • Rockfalls / when pieces of rock fall off a cliff face (1) often due to mechanical weathering (1). • Slumping occurs when saturated soil (1) flows down a curved surface (1). • Rotational slip (1) caused by erosion undercutting cliff (1). Accept any other appropriate response.	**(2)**

Question number	Answer	Mark
2(c)	**AO2 (2 marks)/AO3 (2 marks)** Award 1 mark (AO3) for the identification of a reason why hard engineering is suitable based on evidence from resources and a further mark for explanation (AO2) up to a maximum of two marks each. • There is a large urban area which has a high economic value (1) which would cost too much in compensation to not protect (1). • Claremont Pier suggests a tourist industry (1) this creates jobs for people living in the area (1). • In square 5594 there is a camping/caravan site (1) supporting the local economy (1). • There is a river mouth which is often used for trade (1) which needs to be kept clear to ensure boats can access (1). • A sea wall may be needed near Ness Point (1) to protect the buildings from flooding (1). • The beach is much narrower in 5594 (1) offering little coastal protection to the buildings without hard engineering (1). • There is a school in 5491 (1) which will negatively affect pupils education if erosion is allowed to take place (1). Accept any other appropriate response.	(4)

Question number	Answer	Mark
2(d)	**AO2 (3 marks)** Award 1 mark for the identification of a conflict and 2 marks for further explanation up to a maximum of 3 marks. • Tourists are often in conflict with bird watchers (1) as they make a lot of noise (1) which can interrupt breeding grounds for coastal birds (1). • Governments are often in conflict with local residents (1) over the best type of coastal management strategy (1) as some are very expensive (1). • Hotel owners are often in conflict with fishing industry (1) as they leave broken fishing equipment causing pollution (1) which reduces tourist numbers (1). • Some users want to conserve the habitat (1) to increase tourism (1) and others want to develop ports for economic gain (1). Accept any other appropriate response.	(3)

Question number	Answer	Mark
2(e)	**AO3 (1 mark)** Award one mark for the following: • Arch (1)	(1)

Question number	Answer	Mark
2(f)	**AO1 (2 marks)/AO2 (2 marks)** Award 1 mark (AO1) for the identification of a reason and a further mark for explanation (AO2) up to a maximum of two marks each. • Coasts with a low sediment supply (1) do not carry enough sediment to build up beaches (1). • Coastlines with deep water often have less deposition (1) as there is less friction with seabed (1). • Coastlines with mainly constructive waves increase deposition (1) because the swash is stronger than backwash (1). • Coastlines with sedimentary rocks often have high sediment supply (1) making depositional landforms more likely as waves have a high sediment load (1). • Sheltered areas of coastline / bays (1) often have constructive waves (1). **Responses with reference to prevailing wind / longshore drift need to be linked to the depositional factor.** **Do not double credit direct mirrors.** Accept any other appropriate response.	(4)

Question number	Answer	Mark
2(g)	**AO3 (4 mark)/AO4 (4 mark)** **Marking instructions** Markers must apply the descriptors in line with the general marking guidance and the qualities outlined in the level-based mark scheme below. **Indicative content guidance** The indicative content below is not prescriptive, and candidates are not required to include all of it. Other relevant material not suggested below must also be credited. This question is about analysing the different reasons why some areas of coastline are more at risk from coastal flooding. Candidates will need to be able to identify the areas at more risk and make judgements about why this is the case.	(8)

AO3

- Coastal flooding is when dry low-lying land is submerged by seawater.
- Storm surges are likely to rise as a result of increased numbers of severe storm events due to more energy being in the atmosphere due to climate change.
- Higher frequency of storm surges is likely to increase erosion rates which will make more areas vulnerable to coastal flooding.
- Sea levels are predicted to rise due to melting ice sheets caused by increases in global temperatures.
- Depositional landforms, such as spits and beaches, act as natural sea defences but can be destroyed by storms making areas more prone to flooding.
- Coastal environments, such as mangroves and coral reefs, act as offshore barriers to storms but are both threatened by climate change and people increasing flood risk further.
- Global population is still increasing which increases density of people living in coastal regions.
- Coastal areas are often important for trade which is why populations can be high.
- Asia is at greatest risk and this is significantly due to their population densities and tropical locations exposing them to more tropical storms.

AO4

- Figure 2c shows SE Asia is the area with the biggest population vulnerable to coastal flooding.
- Figure 2c shows the USA has a large proportion of its population living in urban coastal areas.
- Figure 2c shows China has experienced the biggest number of storm surges.
- Figure 2c shows China has the biggest number of people at risk of coastal flooding.
- Figure 2c shows the Philippines are an island nation exposing them to risk from multiple locations.
- Figure 2c shows Egypt has a high population at risk of coastal flooding.

Level	Mark	Descriptor
	0	No rewardable material.
Level 1	**1–3**	• Attempts to apply understanding to deconstruct information but understanding and connections are flawed. An unbalanced or incomplete argument that provides limited synthesis of understanding. Judgements that are supported by limited evidence. (AO3) • Uses some geographical skills to obtain information with limited relevance and accuracy, which supports few aspects of the argument. (AO4)

Level 2	**4–6**	• Applies understanding to deconstruct information and provide some logical connections between concepts. An imbalanced argument that synthesises mostly relevant understanding, but not entirely coherently, leading to judgements that are supported by evidence occasionally. (AO3) • Uses geographical skills to obtain accurate information that supports some aspects of the argument. (AO4)
Level 3	**7–8**	• Applies understanding to deconstruct information and provide logical connections between concepts throughout. A balanced, well-developed argument that synthesises relevant understanding coherently, leading to judgements that are supported by evidence throughout. (AO3) • Uses geographical skills to obtain accurate information that supports all aspects of the argument. (AO4)

Question number	Answer	Mark

2(a)	**AO1 (1 mark)** **A** (acids in water dissolve rock) The answer cannot be B (transportation), C (biological weathering), D (mechanical weathering).	**(1)**

Question number	Answer	Mark
2(b)(i)	**AO1 (1 mark)** **B** (slumping) The answer cannot be A, C and D are all examples of sediment transport.	**(1)**

Question number	Answer	Mark
2(b)(ii)	**AO1 (1 mark)** Award one mark for any of the following: • Short wavelength (1) • Tall in height / steeper gradient / big amplitude (1) • More frequent (1) • Powerful / strong (1) • Erosion / removes sediment (1) • Strong(er) backwash / Weak(er) swash (1) Accept any other appropriate response.	**(1)**

Question number	Answer	Mark
2(b)(iii)	**AO1 (1 mark)/AO2 (1 mark)** Award 1 mark (AO1) for identify a type of erosion and a further mark for development (AO2) up to a maximum of two marks. • Hydraulic action / is when the sheer force of water (1) pushing air into cracks in the cliff making them bigger (1). • Sediment carried in the waves (1) are thrown at the cliff face (1). • Abrasion (1) causes pebbles to scrape down cliff face / wearing the rock away (1) • Attrition / is when sediment carried in the waves bump	**(2)**

	into each other (1) and knock pieces off to become rounder and smaller (1). • Solution/corrosion / is when weak acids in the seawater (1) dissolve soluble particles (1). Accept any other appropriate response.	

Question number	Answer	Mark
2(c)	**AO1 (2 mark)/AO2 (2 mark)** Award 1 mark (AO1) for the identification of a factor and a further mark for explanation (AO2) up to a maximum of two marks each. • Weaker wind (1) leads to more constructive waves (1). • A long fetch (can increase the rate of erosion) (1) because waves that have travelled further are more likely to be destructive (1). • Stronger wind (increases erosion) (1) as the wave have more energy / more destructive waves (1). • Hard/soft rock (rock type) (1) will erode more slowly/quickly than soft/hard rock (1). • The presence of a beach (can reduce erosion rates) (1) causes the wave energy to weaken/dissipate (as it travels up the beach) (1). • Destructive waves (1) have a stronger backwash (and so increase erosion) (1). **Do not double credit direct mirrors.** Accept any other appropriate response.	**(4)**

Question number	Answer	Mark
2(d)	**AO2 (3 mark)** Award 1 mark for stating a characteristic and 2 marks for further explanation up to a maximum of 3 marks. • Sand dunes occur where there is a wide beach (1) as this provides large quantities of sand (1) which are needed for net accumulation to occur (1). • A pioneer species / Marram grass (1) can survive the harsh conditions (1) creating better quality soil (1). • Sand dune ecosystems often show plant succession (1) as pioneer species survive the harsh conditions nearest the shore (1) helping to create more fertile soil (allowing more complex plants to grow) (1). • Sand dunes occur where there is a prevailing onshore wind (1) which is needed to blow sand from offshore bars (onto the shore) (1) as a source of sediment	**(3)**

	supply (1). • Xerophytes (1) survive arid conditions stabilising the sand (1) allowing better quality soil to develop (1). • Pioneer species / Marram grass (1) bind sand/soil together (1) which helps to stabilise the dune (1). • Sand dunes require an obstacle (1) to allow some sand to accumulate (1) which allows the sand dune to grow/stabilise (1). • Sand dunes run parallel to the coast (1) when there is a large supply of sand available (on an offshore bar) (1) and an onshore prevailing wind (1). Accept any other appropriate response.	

Question number	Answer	Mark
2(e)	**AO2 (2 mark)/AO3 (2 mark)** Award 1 mark (AO3) for the identification of a reason why soft engineering is suitable based on evidence from resource and a further mark for explanation (AO2) up to a maximum of two marks each. • There is a rural area which has a low economic value (1) which would cost more to protect than it is worth (1). • There is an area of saltmarsh which will be destroyed (1) if it is no longer covered by high tides. • There are not many buildings which mean little compensation needed (1) meaning local people will not oppose the strategy (1). • Lots of the buildings are farms (1) which have a lower economic value (1). • This area is a very natural environment and soft engineering works with natural processes (1) which is more sustainable. Accept any other appropriate response.	**(4)**

Question number	Answer	Mark
2(f)	**AO3 (1 mark)** Award one mark for the following: • Stack (1)	**(1)**

Question number	Answer	Mark
2(g)	**AO3 (4 mark)/AO4 (4 mark)** **Marking instructions** Markers must apply the descriptors in line with the general marking guidance and the qualities outlined in the level-based mark scheme below. **Indicative content guidance** The indicative content below is not prescriptive, and candidates are not required to include all of it. Other relevant material not suggested below must also be credited. This question is about analysing the difference reasons why some areas of coastline are less at risk from coastal flooding. Candidates will need to be able to identify the areas at lower risk and make judgements about why this is the case. **AO3** • Coastal flooding is when dry low-lying land is submerged by seawater. • Although severity of storm surges is likely to increase this is not going to impact every coastline. Coastlines outside tropical areas with short fetches are likely to have less increase in severe storm surges. • Sea levels are predicted to rise due to melting ice sheets caused by increases in global temperatures, but this is not equal for all coastlines as some are relatively high above sea level compared to other areas. • Coastlines with tall cliff faces made from resistant rock are less at risk of coastal flooding. • Coastal environments, such as mangroves and coral reefs, act as offshore barriers to storms which can reduce the risk of coastal flooding. • Some areas have slow growing populations which means the number of people at risk is not increasing. • Peru in South America is likely to be at little risk due to the Andes Mountain range. **AO4** • Figure 2c shows Peru is the country with the smallest population at risk from coastal flooding based on the data. • Figure 2c shows Norway and Peru have the same predicted amount of sea level rise based on the data. • Figure 2c shows all countries in Europe (with a coastline) have small populations living in low-lying areas at risk of coastal flooding. • Figure 2c shows all (but 1) country in Africa with a coastline have small populations at risk of coastal flooding. • Figure 2c shows all countries in South America with a coastline have small populations living in low-lying areas at risk of coastal flooding.	**(8)**

Level	Mark	Descriptor
	0	No rewardable material.
Level 1	**1–3**	• Attempts to apply understanding to deconstruct information but understanding and connections are flawed. An unbalanced or incomplete argument that provides limited synthesis of understanding. Judgements that are supported by limited evidence. (AO3) • Uses some geographical skills to obtain information with limited relevance and accuracy, which supports few aspects of the argument. (AO4)
Level 2	**4–6**	• Applies understanding to deconstruct information and provide some logical connections between concepts. An imbalanced argument that synthesises mostly relevant understanding, but not entirely coherently, leading to judgements that are supported by evidence occasionally. (AO3) • Uses geographical skills to obtain accurate information that supports some aspects of the argument. (AO4)
Level 3	**7–8**	• Applies understanding to deconstruct information and provide logical connections between concepts throughout. A balanced, well-developed argument that synthesises relevant understanding coherently, leading to judgements that are supported by evidence throughout. (AO3) • Uses geographical skills to obtain accurate information that supports all aspects of the argument. (AO4)

Question number	Answer	Mark

Question 2

Question number	Answer	Mark
2(a)	**AO1 (1 mark)** **D** (spit) The answer cannot be A, B, C (as all erosional landforms)	**(1)**

Question number	Answer	Mark
2(b)(i)	**AO1 (1 mark)** **D** (zigzag movement of sediment along a coastline) The answer cannot be A (suspension), B (traction), C (saltation).	**(1)**

Question number	Answer	Mark
2(b)(ii)	**AO1 (1 mark)** Award one mark for a suitable definition of mass movement: • The downslope movement of material under the force of gravity (1). • The movement of large amounts of sediment caused by gravity (1). • Movement of weathered material down a slope (1). Accept any other appropriate response.	**(1)**

Question number	Answer	Mark
2(c)	**AO1 (2 marks)/AO2 (2 marks)** Award 1 mark (AO1) for the identification of a process and a further mark for explanation (AO2) up to a maximum of two marks each. • Physical weathering / Freeze-thaw weathering (1) causes cracks to grow in size as water freezes and melts (1). • Mechanical weathering / Exfoliation weathering (1) causes rocks to crack as a result of expanding and contracting due changes in temperature (1). • Chemical weathering/acidity (1) causes rocks to dissolve (1). • Biological weathering (1) causes rocks to crack as plant roots burrow into them (1). Accept any other appropriate response.	**(4)**

Question number	Answer	Mark
2(d)	**AO3 (1 mark)** Award one mark for the following: • Sunlight (1)	**(1)**

Question number	Answer	Mark
2(e)	**AO2 (2 marks)** Award 1 mark for initial point and a further mark for development up to a maximum of two marks. • Trees have above ground roots (1) so they can absorb oxygen (as the soils contains very little) (1). • Trees have prop roots (1) which create a stable support system (as the sediment is very soft) (1). • Plants are halophytic (salt tolerant) (1) which allows them to survive in coastal conditions (1). • Leaves have specially adapted glands (1) which help to get rid of salt absorbed (1). • They act as a nursery for young fish (1) as the root systems protect them from predators (1). **Do not credit factors that affect distribution.** Accept any other appropriate response.	**(2)**

Question number	Answer	Mark
2(f)	**AO2 (2 marks)/AO3 (2 marks)** Award 1 mark (AO3) for the identification of a specific reason based on evidence from resource and a further mark for explanation (AO2) up to a maximum of two marks each. • Areas on the NE coast of the USA will experience over 8 inches of sea level rise (1) this could lead to flooding of urban areas (1). • Areas on the east coast of the USA will see rises in sea level (1) this could lead to the destruction of mangroves as they will not survive if their roots aren't exposed (1). • Areas on the south coasts of the USA will experience over 8 inches of sea level rise (1) this could lead to larger storm surges during hurricane season (1). • Areas in the east with a rise in sea level (1) could lead to the formation of rias/fjords/dalmation landforms (1). • Areas in the east with a significant rise in sea level (1) flood homes leading to displacement of people (1). • Alaska has a sea level decrease (1) which could leave behind raised beaches (1).	

	• Alaska has a falling sea level of more than 8 inches (1) (in places) this could mean harbours/roads need to be rebuilt (1). Accept any other appropriate response.	**(4)**

Question number	Answer	Mark
2(g)	**AO2 (3 marks)** Award 1 mark for the identification of a suitable building design feature/building strategy and 2 marks for further explanation up to a maximum of 3 marks. • Elevate the property off the ground / building on stilts (1) will allow water to flow under the building (1) reducing damage to lower floors (1). • Avoid using timber/wood window/door frames (1) as they can rot when wet (1) increasing costs for repair (1). • Avoid fitted carpets on lower floor (1) as they are permeable (1) and will absorb more water increasing drying out time (1). • Use a waterproof lining/cladding (1) as this reduces the amount of water able to enter the building (1) which reduces damage (1). • Install foundation pumps (1) to reduce the pressure of water around the building (1) to reduce damage to building structure (1). Accept any other appropriate response.	**(3)**

Question number	Answer	Mark
2(h)	**AO3 (4 marks)/AO4 (4 marks)** **Marking instructions** Markers must apply the descriptors in line with the general marking guidance and the qualities outlined in the level-based mark scheme below. **Indicative content guidance** The indicative content below is not prescriptive, and candidates are not required to include all of it. Other relevant material not suggested below must also be credited. This question is about analysing the different ways coastlines can be managed and recognise that users can have conflicting opinions. **AO3** • Soft engineering works with nature to reduce the impacts of flooding/erosion. • Hard engineering are man-made barriers built to prevent flooding/erosion. • Types of soft engineering include: managed retreat, beach replenishment, sand dune rejuvenation, cliff regrading. • Types of hard engineering include: sea walls, groynes, gabions, revetments, rock armour. • Conservationists are often in favour of soft engineering as it works with nature and protects ecosystems. • Bird watchers are often in favour of soft engineering as it keeps saltmarsh habitats which attract wildlife. • Governments/councils can be in favour of soft engineering as it cost less money. • Local residents/business owners/farmers are often against soft engineering as they risk their house/business being flooded. • Tourists may be against soft engineering as it may lead to beaches being removed. **AO4** • Figure 2c shows the high tide line has moved over 100m inland compared to 1902. • Figure 2c shows there are 3 areas of erosion. • Figure 2c shows that despite the sand dune regeneration the coastline is still retreating. • Figure 2c shows an urban area close to the coastline. • Figure 2c shows roads that run very close to the coastline. • Figure 2c shows a golf course could be at risk in the future. • Figure 2c shows the rate of erosion has increased as the gap between 1902 and 1982 is very small but is big between 1982 to 2011 despite being a much shorted time period. • Figure 2c shows a large area of beach. • Figure 2c shows there is £18 billion worth of buildings within 50m of the coastline. • Figure 2c shows it cost £13 billion to create the sand dunes.	**(8)**

Question number	Answer	
Level	**Mark**	**Descriptor**
	0	No rewardable material.
Level 1	**1–3**	• Attempts to apply understanding to deconstruct information but understanding and connections are flawed. An unbalanced or incomplete argument that provides limited synthesis of understanding. Judgements that are supported by limited evidence. (AO3) • Uses some geographical skills to obtain information with limited relevance and accuracy, which supports few aspects of the argument. (AO4)
Level 2	**4–6**	• Applies understanding to deconstruct information and provide some logical connections between concepts. An imbalanced argument that synthesises mostly relevant understanding, but not entirely coherently, leading to judgements that are supported by evidence occasionally. (AO3) • Uses geographical skills to obtain accurate information that supports some aspects of the argument. (AO4)
Level 3	**7–8**	• Applies understanding to deconstruct information and provide logical connections between concepts throughout. A balanced, well-developed argument that synthesises relevant understanding coherently, leading to judgements that are supported by evidence throughout. (AO3) • Uses geographical skills to obtain accurate information that supports all aspects of the argument. (AO4)

2(a)	**AO1 (1 mark)** **D** (sand bags) The answer cannot be A, C or C as all reduce impact but do not prevent flooding of a building.	**(1)**

Question number	Answer	Mark
2(b)(i)	**AO1 (1 mark)** **B** (an alteration in water height of the ocean The answer cannot be A (prevailing wind), C (weather forecast), D (coast).	**(1)**

Question number	Answer	Mark
2(b)(ii)	**AO1 (1 mark)** Award one mark for any of the following: • Tsunami (1) • Storm surge (1) • Climate change (1) • Lack of coastal management / no hard/soft engineering (1) Accept any other appropriate response.	**(1)**

Question number	Answer	Mark
2(b)(iii)	**AO2 (2 marks)** Award 1 mark for identification of a hard engineering strategy and a further mark for development up to a maximum of two marks. • Groynes (1) (are barriers that stick out into the sea) they prevent longshore drift (building up the beach) (1). • Sea walls (1) (are built at the back of the beach) and prevent waves from reaching the land (1). • Rip rap/rock armour (1) (are large boulders placed at the base of a cliff) and dissipate the waves energy to (reduce erosion) (1).	

	• Revetments (1) (act as a fence at the base of the cliff) and allows material to build up (between the gaps in the wooden slates) (1). Accept any other appropriate response.	**(2)**

Question number	Answer	Mark
2(c)	**AO2 (2 marks)/AO3 (2 marks)** Award 1 mark (AO3) for the identification of a reason based on evidence from resource and a further mark for explanation (AO2) up to a maximum of two marks each. • The beach in the centre is much wider in 2013 (1) which has led to a car park being lost to the sea/making the area more difficult to access (1). • The road has been destroyed (1) making the area less attractive to businesses (1). • The road being destroyed (1) making it more difficult for companies to transport goods/make deliveries (1). • This scheme has only been in place for 3 years (1) making the large car park behind vulnerable to erosion and flooding putting off new investment (1). • The expanded beach (1) may appeal to tourists but residents will not be in favour as it increases noise pollution (1). Accept any other appropriate response.	**(4)**

Question number	Answer	Mark
2(d)	**AO2 (3 marks)** Award 1 mark for the initial explanation and 2 marks for further explanation up to a maximum of 3 marks. • Coral reefs only survive in shallow water depths (usually below 25 m) (1) this is because the algae need access to sunlight (1) to photosynthesise (1). • Coral reefs only live within the tropics (1) as they require water between 20-27° (1) to prevent algae/Zooxanthellae being expelled (1). • Coral reefs require salty water (salinity levels of 32-42 parts per thousand) (1) as this helps coral to absorb some nutrients (1) required for cell functions (1). Accept any other appropriate response.	**(3)**

Question number	Answer	Mark
2(e)	**AO3 (1 mark)** Award one mark for the following: • Sunlight (1) • Water (1) • Sand (1)	**(1)**

Question number	Answer	Mark
2(f)	**AO1 (2 marks)/AO2 (2 marks)** Award 1 mark (AO1) for the identification of a reason and a further mark for explanation (AO2) up to a maximum of two marks each. Industrial: • Factories release heavy metals (1) which are toxic to wildlife (1). • Docks and ports (near river estuaries) cause oil leaks (1) preventing sunlight from penetrating the water (1). Agricultural: • Fertilisers used on fields wash off into water (1) causing eutrophication (1). • Grazing can trample species (1) and alter species diversity (1). Accept any other appropriate response.	**(4)**

Question number	Answer	Mark
2(g)	**AO3 (4 marks)/AO4 (4 marks)** **Marking instructions** Markers must apply the descriptors in line with the general marking guidance and the qualities outlined in the level-based mark scheme below. **Indicative content guidance** The indicative content below is not prescriptive, and candidates are not required to include all of it. Other relevant material not suggested below must also be credited. This question is about analysing the role physical processes have on the coastline and requires some judgement about which processes will be more influential. **AO3** • Rocky/cliff coastlines are often high energy coastlines exposed to destructive waves. • Cliff coastlines often have resistant geology. • Resistant coastlines often have erosional landforms. • Cliff coastlines often have higher relief. • Erosion is often dominant along hard rock coastlines. • Deposition is less influential in the creation of landforms. • Coastlines in mid latitudes are unlikely to experience freeze-thaw/exfoliation weathering. • Hard rock coastlines are more prone to rock falls and less prone to slumping. **AO4** • Figure 2c shows this stretch of coastline is 10 m above sea level. • Figure 2c shows the coastline is made from chalk. • Figure 2c shows an arch. • Figure 2c shows a stack. • Figure 2c shows the contour lines are close together meaning the cliff is steep. • Figure 2c shows the average temperature is 12.9°C. • Figure 2c shows there is a short fetch	
		(8)

Question number	Answer	
Level	**Mark**	**Descriptor**
	0	No rewardable material.
Level 1	**1–3**	• Attempts to apply understanding to deconstruct information but understanding and connections are flawed. An unbalanced or incomplete argument that provides limited synthesis of understanding. Judgements that are supported by limited evidence. (AO3) • Uses some geographical skills to obtain information with limited relevance and accuracy, which supports few aspects of the argument. (AO4)
Level 2	**4–6**	• Applies understanding to deconstruct information and provide some logical connections between concepts. An imbalanced argument that synthesises mostly relevant understanding, but not entirely coherently, leading to judgements that are supported by evidence occasionally. (AO3) • Uses geographical skills to obtain accurate information that supports some aspects of the argument. (AO4)
Level 3	**7–8**	• Applies understanding to deconstruct information and provide logical connections between concepts throughout. A balanced, well-developed argument that synthesises relevant understanding coherently, leading to judgements that are supported by evidence throughout. (AO3) • Uses geographical skills to obtain accurate information that supports all aspects of the argument. (AO4)

QUESTION 3

Question number	Answer	Mark

2(a)(i)	**AO1 (1 mark)** **D** (storm surge) The answer cannot be A (cause of river flooding), B (weather characteristic), C (weather characteristic).	**(1)**

Question number	Answer	Mark
2(a)(ii)	**AO1 (1 mark)** Award one mark for any of the following: • Coastal recession/retreat (1) • Erosion of cliff/increased erosion (1) • Destruction/loss of saltmarsh / mudflat / coral reef / mangroves / beaches / spits / bars (1) • (Creation of) fjords / rias / fjards (1) • Raised beaches (1) • Relic cliffs (1) • Dalmation coasts (1) Accept any other appropriate response. **No credit for stating causes for sea level rise e.g. melting ice sheets, climate change**	**(1)**

Question number	Answer	Mark
2(b)	**AO1 (1 mark)** **A** (a cliff surrounded by water on three sides) The answer cannot be B (wavecut platform), C (stack). D (bay)	**(1)**

Question number	Answer	Mark
2(c)	**AO2 (2 marks)** Award 1 mark for initial point and a further mark for development up to a maximum of two marks. • Beach replenishment/realignment (involved adding sediment) (1) to the beach to make it wider/steeper to absorb the power of the waves (1).	

	• Cliff regrading (involves the gradient of the cliff being altered) (1) so waves travel up the cliff and back again reducing scouring of base (1). • Ecosystem rehabilitation (involves planting to build up sand dune / saltmarsh / mangrove) (1) to stabilise and encourage deposition to slow erosion (1). • Managed retreat/realignment (involves allowing the coastline to erode in some areas) (1) to allow flooding which helps to protect other areas from flooding (1). Accept any other appropriate response.	**(2)**

Question number	Answer	Mark
2(d)	**AO2 (2 marks)/AO3 (2 marks)** Award 1 mark (AO3) for the identification of a type of hard engineering based on evidence from resource and a further mark for explanation (AO2) up to a maximum of two marks each. • There is a sea wall (1) which prevent access to the coast for some groups of people (1). • There are groynes all along the beach (1) which interfere with natural processes / longshore drift (1). • The hard engineering prevents the formation of sand dunes (1) reducing biodiversity of the coastline (1). • The hard engineering interferes with coastal processes (1) which work against nature (1). • The groynes prevent longshore drift (1) which will upset residents further along the coast (1). • Revetments (1) make the beach look ugly (1). Accept any other appropriate response. **No credit for rip rap/rock armour/gabions as no evidence from the resource.**	**(4)**

Question number	Answer	Mark
2(e)	**AO2 (3 marks)** Award 1 mark for the identification of an abiotic characteristic and 2 marks for further explanation up to a maximum of 3 marks. **Mangrove:** • Increased salinity (1) can increase the rate of leaf death in mangrove vegetation (1) leading to lack of photosynthesis (1).	

	• Increase in nutrients (to mangroves) (1) increases growth rates (1) making them more resistant to surviving in waterlogged soils (1). • (Mangroves survive best in) 50% freshwater and 50% saltwater (1) this means they have adapted to filter salt out of the roots (1) and have glands that excrete salt (1). **Coral reefs:** • Decreased salinity (1) causes the algae to die (1) leading to coral bleaching (1). • Temperature changes (1) as temperatures over 29°C kill the algae (zooxanthellae) (1) leading to coral bleaching (1). Accept any other appropriate response. Credit any type of coastal ecosystem e.g. beach, mudflat, saltmarsh, sand dune. **No credit for naming a coastal ecosystem** **No credit for pollution on its own too vague for credit**	**(3)**

Question number	Answer	Mark
2(f)	**AO3 (1 mark)** Award one mark for: • Nigeria (1)	**(1)**

Question number	Answer	Mark
2(g)	**AO1 (2 marks)/AO2 (2 marks)** Award 1 mark (AO1) for the identification of a threat and a further mark for explanation (AO2) up to a maximum of two marks each. • Diving/snorkelling tourists often break pieces of coral off (1) which causes damage and stress to coral (1). • Propeller's from (tourist) boats (1) can hit the coral and damage areas of reef (1). • Suncream washes off (when swimming) (1) the chemicals can cause coral bleaching (1). • Plastic/litter (can be dropped by tourists) (1) can suffocate the coral (1). • Plastic in the ocean (1) increases risk of disease to corals (1).	

	Accept any other appropriate response.	**(4)**

Question number	Answer	Mark
2(h)	**AO3 (4 marks)/AO4 (4 marks)** **Marking instructions** Markers must apply the descriptors in line with the general marking guidance and the qualities outlined in the level-based mark scheme below. **Indicative content guidance** The indicative content below is not prescriptive, and candidates are not required to include all of it. Other relevant material not suggested below must also be credited. This question is about analysing the role physical processes have on the coastline and requires some judgement about which processes will be more influential. **AO3** • Sandy/flat coastlines are often low energy coastlines experiencing constructive (swell) waves. • Low energy coastlines often have less resistant geology. • Low energy coastlines often have depositional landforms. • Sandy coastlines often have lower relief. • Deposition is often dominant along soft rock coastlines. • Erosion is less influential in the creation of landforms. • Longshore drift is often influential along sandy coastlines. • Soft rock coastlines are prone to slumping and less prone to rock falls. **AO4** • Figure 2c shows this stretch of coastline is very low lying. • Figure 2c shows the coastline has a spit. • Figure 2c shows an area of sandy beach. • Figure 2c shows an area of saltmarsh. • Figure 2c shows the spit is very flat. • Figure 2c shows the average temperature is 13°C. • Figure 2c shows there is a short fetch of 6 km. • Figure 2c shows the dominant wave type is constructive.	
		(8)

Question number	Answer	
Level	**Mark**	**Descriptor**
	0	No rewardable material.
Level 1	**1–3**	• Attempts to apply understanding to deconstruct information but understanding and connections are flawed. An unbalanced or incomplete argument that provides limited synthesis of understanding. Judgements that are supported by limited evidence. (AO3) • Uses some geographical skills to obtain information with limited relevance and accuracy, which supports few aspects of the argument. (AO4)
Level 2	**4–6**	• Applies understanding to deconstruct information and provide some logical connections between concepts. An imbalanced argument that synthesises mostly relevant understanding, but not entirely coherently, leading to judgements that are supported by evidence occasionally. (AO3) • Uses geographical skills to obtain accurate information that supports some aspects of the argument. (AO4)
Level 3	**7–8**	• Applies understanding to deconstruct information and provide logical connections between concepts throughout. A balanced, well-developed argument that synthesises relevant understanding coherently, leading to judgements that are supported by evidence throughout. (AO3) • Uses geographical skills to obtain accurate information that supports all aspects of the argument. (AO4)

QUESTION 3

Question number	Answer	Mark

5(a)(i)	**AO3 (1 mark)** A systematic (1) B,C and D are all incorrect	**(1)**

Question number	Answer	Mark
5(a)(ii)	**AO3 (1 mark)** This will depend on the sampling method identified e.g. systematic Poor representation of overall investigation (1) Time constraints (1) Can be biased (1) Can be under representative (1) Unreliable (1) Inaccurate (1) Accept any other appropriate response	**(1)**

Question number	Answer	Mark
5(a)(iii)	**AO4 (2 mark)** Correct method of working, showing addition, and then division by 5 (1) and one mark for the correct mean, written to one decimal place, 18.3 (1)	**(2)**

Question number	Answer	Mark
5(a)(iv)	**AO4 (2 mark)** Award 1 mark for each correct bar. To be awarded the mark for the first bar, line must be drawn between 21-22. The second bar needs to be right on the line. Shading is not required.	**(2)**

Question number	Answer	Mark
5(a)(v)	**AO4 (1 mark)** One mark for an 'x' in box 5	**(1)**

Question number	Answer	Mark
5(a)(vi)	**AO3 (2 mark)** Award 1 mark for an initial reason, and a further mark for extension of this point. E.g. Human error with the equipment used to measure sediment /calculation of the mean / selection of the sample to be measured (1) which meant that the sediment appeared bigger than it really was (1) The sample could have been taken from an area that is protected from the action of the waves / near groynes (1) which means that less would have taken place at this site (1) Site 5 may have experienced a recent rockfall (1) which meant that the sample was larger / less eroded than the other sites (1) Accept any other appropriate response	**(2)**

Question number	Answer	Mark
5(b)	**AO3 (3 mark)** Award 1 mark for identification of primary data method and award 2 further marks for development of explanation Candidates could identify a number of sources of primary data to help them extend their study including: Annotated field sketches (1) candidates can draw and annotate field sketches (1) to help establish landforms and features on the coast (1) Beach profile (1) candidates can use a ranging pole and a clinometer (1) to measure the changes in gradient of the beach (1) Sediment shape at each sample point candidates could take a random sample (1) and measure the longest axis of the pebble (1) they could use a roundness index or chart to categorise their findings Accept any other appropriate response	**(3)**

Question number	Answer indicative content
5(c)	**AO3 (4 marks) AO4 (4 marks)** **Marking instructions** Markers must apply the descriptors in line with the general marking guidance and the qualities outlined in the level based mark scheme below. **AO3** • Accuracy is about making judgements about how close conclusions are to the actual changes occurring in the coastal environment where the fieldwork was carried out. • Recognition of the extent to which there were equipment errors, e.g. faulty or uncalibrated equipment, and/or operator errors, e.g. misinterpreting the data being recorded, and how this might have affected that might have affected whether they were able to answer their enquiry questions. • Recognition of whether there were issues with the design of the data collection and/or sampling methodologies, which may be flawed in terms of the location/number of sites (spatial), the time of year (temporal), or the equipment chosen. **AO4** • There is evidence of using different skills and techniques to measure changes in coastal environments. • There is evidence of using different skills and techniques to reach conclusions about changes occurring in coastal environment. • There is evidence of using different skills and techniques to evaluate conclusions about changes occurring in a coastal environment. • There is evidence of own fieldwork conclusions, i.e. reference to field data collected by the student. This question is about the candidates making a judgement of the success of their data analysis techniques. Candidates are expected to make a judgement. Candidates should identify strengths, weaknesses, alternatives ways of analysing the data In this response there would be an expectation for the candidates to evaluate a number of different data analysis techniques. Candidates should look to identify the appropriateness of data analysis techniques.

	A view should be given on how successful or unsuccessful the data analysis techniques were and how they could be improved to help candidates understand the data collected more effectively For level 2 responses the candidate response will need to link to the evaluation to their study directly. For level 3 response there should be a greater depth of evaluation. Recognition of whether or not the data analysis was less successful because of the way it was designed/technique used. How far data analysis helped draw a significant conclusion for the study An evaluation of how far the outcomes can be trusted (or repeated to obtain the same results).

Question number	**Answer**	
Level	**Mark**	**Descriptor**
	0	No rewardable material.
Level 1	**1–3**	• Attempts to apply understanding to deconstruct information but understanding and connections are flawed. An unbalanced or incomplete argument that provides limited synthesis of understanding. Judgements that are supported by limited evidence. (AO3) • Uses some geographical skills to obtain information with limited relevance and accuracy, which supports few aspects of the argument. (AO4)
Level 2	**4–6**	• Applies understanding to deconstruct information and provide some logical connections between concepts. An imbalanced argument that synthesises mostly relevant understanding, but not entirely coherently, leading to judgements that are supported by evidence occasionally. (AO3) • Uses geographical skills to obtain accurate information that supports some aspects of the argument. (AO4)
Level 3	**7–8**	• Applies understanding to deconstruct information and provide logical connections between concepts throughout. A balanced, well-developed argument that synthesises relevant understanding coherently, leading to judgements that are supported by evidence throughout. (AO3) • Uses geographical skills to obtain accurate information that supports all aspects of the argument. (AO4)

Question number	Answer	Mark

5(a)(i)	**AO3 (1 mark)** Award 1 mark for any reasonable risk in the context of this environment: • Falling in the sea / drowning (1) • Exposure / sunburn (1) • Slips / trips / bumps (1) • Fast flowing currents / powerful tides (1) • Infection from water / diseases / polluted water (1) • Animals in the water (1) • Steep ground / cliffs / cliff / rock falls (1) • Deep water (1) • Getting lost (1) Accept any other appropriate response. **Reject inaccurate measurements as not part of risk assessment.**	**(1)**

Question number	Answer	Mark
5(a)(ii)	**AO3 (1 mark)** Award 1 mark for any reasonable risk in the context of what was identified in (5ai): • Wearing strong shoes / walking boots (1) • Wear lots of layers to keep warm (1) • Check the weather forecast (1) • Checking local requirements / plans etc (1) • Waking with care (1) • Working in groups (1) • Wearing lifejacket / life vest (1) • Use a shallower / slower part of sea (1) • Wearing a helmet / void working too close to the cliffs (1) • Stay away from waves (1) • Choose a safer location to work in (1).	

	• Accept any other appropriate response. **Reject approaches that do not match (5ai).**	**(1)**
Question number	**Answer**	**Mark**
5(a)(iii)	**AO4 (2 marks)** Award 1 mark for: Correct method of working, showing addition, e.g. 83.7 **or** 8.1+14.5+16.1+15.0+30.0 (1) Correct mean, written to one decimal place, 16.7 (1). **Reject answer to 2dp, i.e. 16.74**	**(2)**

Question number	**Answer**	**Mark**
5(a)(iv)	**AO4 (2 marks)** Award 1 mark for each correct bar. To be awarded the mark for the first bar, line must be drawn between 8-9. The second bar needs to be right on the line. **Site 1=8.4** **Site 4=15.0** Note width of bars doesn't matter. There is no need for bars to be shaded.	**(2)**

Question number	Answer	Mark
5(a)(v)	**AO3 (2 mark)** Award 1 mark for an initial reason, and a further mark for extension of this point. E.g. • Human error with the equipment used to measure shingle /calculation of the mean / selection of the sample to be measured (1) which meant that the sediment appeared bigger than it really was (1). • The sample could have been taken from an area that is protected from the action of the waves / near groynes (1) which means that a different energy profile would have affected this site (1). • Site 5 may have experienced a recent rockfall (1) which meant that the sample was larger / less eroded than the other sites (1). • A change in the direction of coast (1) causing different sizes of sediment to be deposited created the anomaly (1). • Human activities at the coast, e.g. tourism / beach management / replenishment (1) may have resulted on the sediment being moved from one location to another (1). Accept any other appropriate response.	**(2)**

Question number	Answer	Mark
5(b)	**AO4 (4 mark)** Award marks for a description of the technique (1) and a further mark for a developed description (1) Quantitative: • A beach profile would be completed at each site (1) at each site ranging poles are placed at the top and bottom of the beach (1) Qualitative: • Field sketches can be used to record the main features of the beach profile at different sites (1) this will help the students identify differences (1) Accept any other appropriate response.	**(4)**

Question number	Answer indicative content
5(c)	**AO3 (4 marks) AO4 (4 marks)** **Marking instructions** Markers must apply the descriptors in line with the general marking guidance and the qualities outlined in the level based mark scheme below. **Indicative content guidance** The indicative content below is not prescriptive and candidates are not required to include all of it. Other relevant material not suggested below must also be credited. **AO3** • Recognition of the extent to which there were equipment errors, e.g. faulty or uncalibrated equipment, and/or operator errors, e.g. misinterpreting the data being recorded, and how this might have affected that might have affected whether they were able to answer their enquiry questions. • Recognition of whether there were issues with the design of the data collection and/or sampling methodologies, which may be flawed in terms of

the location/number of sites (spatial), the time of year (temporal), or the equipment chosen.

- Accuracy is about making judgements about how close conclusions are to the actual changes occurring in the river environment where the fieldwork was carried out.

AO4

- There is evidence of using different skills and techniques to measure changes in a coastal environment – both design and techniques.
- There is evidence of using different skills and techniques to reach conclusions about changes occurring in a coastal environment.
- There is evidence of own fieldwork conclusions, i.e. reference to field data collected by the student.

If the enquiry question isn't present do not penalise.

- In this response there would be an expectation for the students to evaluate a number of different data collection techniques.
- This should an evaluation of primary and secondary data as appropriate.
- Students should look to identify the appropriateness of data collection techniques.
- A view should be given on how successful or unsuccessful the data collection techniques were and how they could be improved to help students gather more effective results.
- For level 2 responses the student response will need to link to the evaluation to their study directly.
- For level 3 response there should be a greater range or depth of techniques evaluated.
- Recognition of whether or not the data collection was less successful because of the way it was designed.
- Recognition of any faults in equipment or human error.
- How far data-collection methods used produced reliable results
- An evaluation of how far the outcomes can be trusted (or repeated to obtain the same results).

Level	Mark	Descriptor
	0	No rewardable material.
Level 1	**1–3**	• Attempts to apply understanding to deconstruct information but understanding and connections are flawed. An unbalanced or incomplete argument that provides limited synthesis of understanding. Judgements that are supported by limited evidence. (AO3) • Uses some geographical skills to obtain information with limited relevance and accuracy, which supports few aspects of the argument. (AO4)
Level 2	**4–6**	• Applies understanding to deconstruct information and provide some logical connections between concepts. An imbalanced argument that synthesises mostly relevant understanding, but not entirely coherently, leading to judgements that are supported by evidence occasionally. (AO3) • Uses geographical skills to obtain accurate information that supports some aspects of the argument. (AO4)
Level 3	**7–8**	• Applies understanding to deconstruct information and provide logical connections between concepts throughout. A balanced, well-developed argument that synthesises relevant understanding coherently, leading to judgements that are supported by evidence throughout. (AO3) • Uses geographical skills to obtain accurate information that supports all aspects of the argument. (AO4)

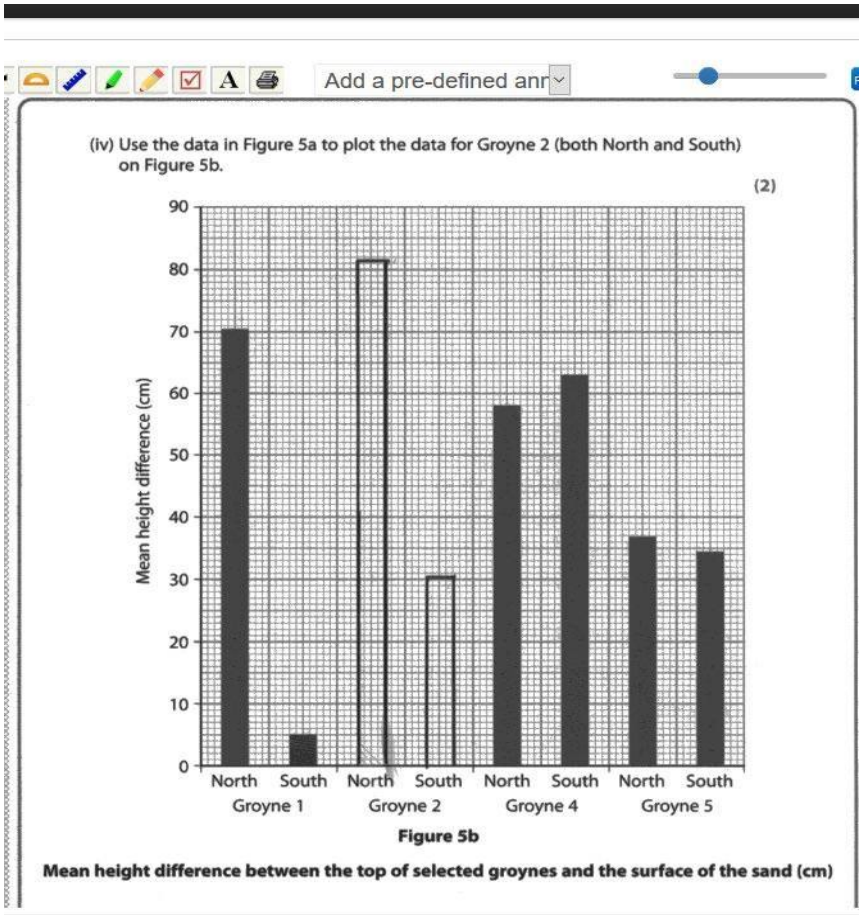
Question number	Answer	Mark

5(ai)	**AO3 (1 mark)** Students could use data from a previous study in the same area (1). Alternatives may include: • (Geology) maps • (GIS) maps • Archive photographs/sketches • Old maps • Historical records • Photos taken by others • Collecting data from the internet Accept any other appropriate response.	**(1)**

Question number	Answer	Mark
5(aii)	**AO3 (1 mark)** Award one mark for a suitable disadvantage. • The data could be inaccurate/bias (1). • The data could be from a different location (1). • They may not have collected the data over the same time period (1). In this response candidates must relate the answer for 5aii to the response given in 5ai. If candidates do not put in a response for 5ai and then state a generic disadvantage allow mark.	

	Accept any other appropriate response.	**(1)**

Question number	Answer	Mark
5(aiii)	**AO4 (2 marks)** Award 1 mark for each correct value to 1 decimal place Award 1 mark for correct method 0+44+40+51 = 135/4 = 33.75 cm Correct to 1 decimal place 33.8cm	**(2)**

Question number	Answer	Mark
5(aiv)	**AO4 (2 marks)** Candidates will need to plot bars correctly. 1 mark for each correctly plotted bar. There is no requirement for width or shading. Plot points are 81.5 and 30.3  **Figure 5b** **Mean height difference between the top of selected groynes and the surface of the sand (cm)**	**(2)**

Question number	Answer	Mark
5(av)	**AO3 (2 marks)** Award 1 mark for describing an alternative sampling method (1) and 1 mark for further development (1). • Stratified – students could use a stratified sampling technique where a proportionate number of observations are taken from each part of an area (1) to reduce the amount of samples needed (1) more likely reflective of the total population (1). • Systematic - students could pick the first site at random then pick subsequent sites at a set defined distance (1) this would help ensure that the sampling covered a whole range of sediment changes along coast (1). Accept any other appropriate response.	**(2)**

Question number	Answer	Mark
5(b)	**AO3 (4 marks)** Award 1 mark for the initial point (1) and a further mark for further development (1). • Advantage: By using field sketches students can get a quick view of the areas they are working recording key features (1) to support recall later (1). • Advantage: By using field sketches students can highlight features (1) that they want to focus on as part of their study (1). • Disadvantage: Because students are often making sketches quickly, they may not record key features correctly (1) leading to inaccuracies later on (1). • Disadvantage: Because students have different perceptions (1) they may over-exaggerate features (1).	

	Accept any other appropriate response.	**(4)**

Question number	Answer indicative content
5(c)	**AO3 (4 marks) AO4 (4 marks)** **Marking instructions** Markers must apply the descriptors in line with the general marking guidance and the qualities outlined in the level-based mark scheme below. **Indicative content guidance** The indicative content below is not prescriptive, and candidates are not required to include all of it. Other relevant material not suggested below must also be credited. This question is about the candidates making a judgement of the value of their data presentation techniques in achieving the overall aims of their study. This will depend on what data presentation techniques they used. Candidates are expected to make a judgement on more than one technique. Candidates should identify strengths, weaknesses, and alternative resources which would support them in planning the enquiry.

	For level 2 responses candidates will need to link the evaluation to the purpose of the study directly. For level 3 responses there should be a greater depth of evaluation.

Question number	Answer	
Level	**Mark**	**Descriptor**
	0	No rewardable material.
Level 1	**1–3**	• Attempts to apply understanding to deconstruct information but understanding and connections are flawed. An unbalanced or incomplete argument that provides limited synthesis of understanding. Judgements that are supported by limited evidence. (AO3) • Uses some geographical skills to obtain information with limited relevance and accuracy, which supports few aspects of the argument. (AO4)
Level 2	**4–6**	• Applies understanding to deconstruct information and provide some logical connections between concepts. An imbalanced argument that synthesises mostly relevant understanding, but not entirely coherently, leading to judgements that are supported by evidence occasionally. (AO3) • Uses geographical skills to obtain accurate information that supports some aspects of the argument. (AO4)
Level 3	**7–8**	• Applies understanding to deconstruct information and provide logical connections between concepts throughout. A balanced, well-developed argument that synthesises relevant understanding coherently, leading to judgements that are supported by evidence throughout. (AO3) • Uses geographical skills to obtain accurate information that supports all aspects of the argument. (AO4)

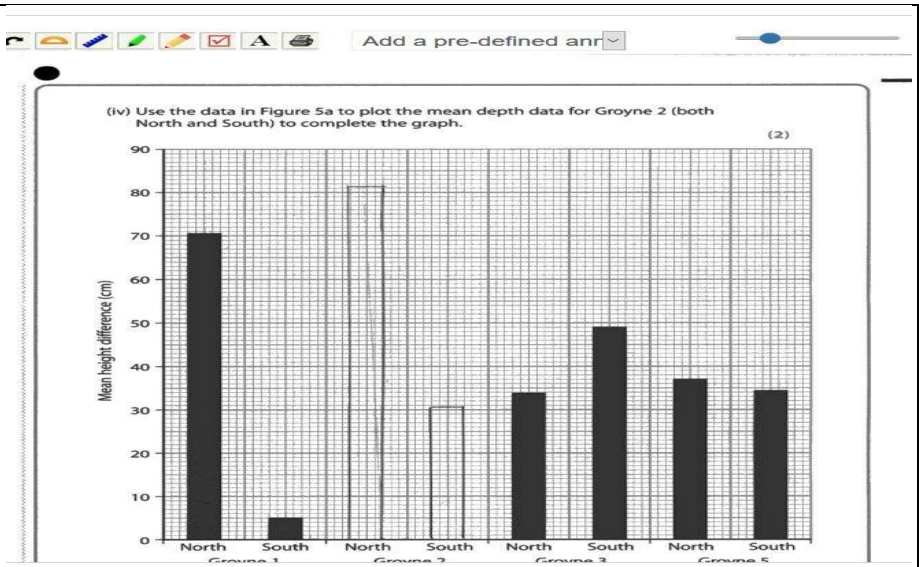
Question number	Answer	Mark

5(ai)	**AO3 (1 mark)** Award 1 mark for a suitable risk identified. • Students could be trapped by the incoming tide (1). • Students could get lost/separated from group (1). Accept any other appropriate response.	**(1)**

Question number	Answer	Mark
5(aii)	**AO3 (1 mark)** Award 1 mark for each suitable way to manage risk identified. • Students could work in pairs (1). • Teachers could brief the students about the risks before they undertake the enquiry (1). Accept any other appropriate response.	**(1)**

Question number	Answer	Mark
5(aiii)	**AO4 (2 marks)** Award 1 mark for working and 1 mark for correct answer to one decimal place. • 0+74+45+122= 241/4 = 60.25 • Correct to 1 decimal place 60.3	**(2)**

Question number	Answer	Mark
5(aiv)	**AO4 (2 marks)** Candidates will need to plot all points correctly 1 mark for correctly plotted 81.5 bar 1 mark for correctly plotted 30.3 bar	

		**(2)**
Question number	**Answer**	**Mark**
5(av)	**AO3 (2 marks)** Award 1 mark for the initial point (1) and a further mark for further development (1). • Random - students could pick the first site and random to ensure that they reduce bias (1) and therefore don't confirm predetermined theories (1). • Random sampling will ensure choices are not biased (1) so each site had an equal chance of being selected (1). Accept any other appropriate response.	**(2)**

Question number	Answer	Mark
5(b)	**AO3 (4 marks)** Award 1 mark for advantage or disadvantage identified a further mark for development of each point. Max 2 marks for advantage and 2 marks for disadvantage. • Advantage: By using annotated sketches students can get a quick view of the areas they are working recording key features (1) to support recall later (1). • Advantage: By using field sketches students can highlight features (1) that they want to focus on as part of their study (1).	

	• Disadvantage: Because students have different perceptions (1) they may over-exaggerate features (1). • Disadvantage: Students are only taking a view of their area as they see it (1) candidates sketches may not record everything accurately (1). Accept any other appropriate response.	**(4)**

Question number	Answer indicative content
5(c)	**AO3 (4 marks) AO4 (4 marks)** **Marking instructions** Markers must apply the descriptors in line with the general marking guidance and the qualities outlined in the level-based mark scheme below. **Indicative content guidance** The indicative content below is not prescriptive, and candidates are not required to include all of it. Other relevant material not suggested below must also be credited. This question is about the candidates making a judgement of the value of their data analysis techniques in achieving the overall aims of their study. This will depend on what data analysis techniques they used. Candidates are expected to make a judgement on more than one technique. Candidates should identify strengths, weaknesses, and alternative techniques which could have been used in their study. For level 2 responses candidates will need to link the evaluation to the purpose of the study directly. For level 3 responses there should be a greater depth of evaluation.

Question number	Answer	
Level	**Mark**	**Descriptor**
	0	No rewardable material.
Level 1	**1–3**	• Attempts to apply understanding to deconstruct information but understanding and connections are flawed. An unbalanced or incomplete argument that provides limited synthesis of understanding. Judgements that are supported by limited evidence. (AO3) • Uses some geographical skills to obtain information with limited relevance and accuracy, which supports few aspects of the argument. (AO4)
Level 2	**4–6**	• Applies understanding to deconstruct information and provide some logical connections between concepts. An imbalanced argument that synthesises mostly relevant understanding, but not entirely coherently, leading to judgements that are supported by evidence occasionally. (AO3) • Uses geographical skills to obtain accurate information that supports some aspects of the argument. (AO4)
Level 3	**7–8**	• Applies understanding to deconstruct information and provide logical connections between concepts throughout. A balanced, well-developed argument that synthesises relevant understanding coherently, leading to judgements that are supported by evidence throughout. (AO3) • Uses geographical skills to obtain accurate information that supports all aspects of the argument. (AO4)

Question number	Answer	Mark

5(a)(i)	**AO3 (1 mark)** B Collecting data every 100m along a coastline. The answer cannot be A (random sampling), C and D (doesn't state how sampled).	**(1)**

Question number	Answer	Mark
5(a)(ii)	**AO3 (1 mark)** Award 1 mark for a suitable piece of equipment. • Clinometer (1) • Ranging pole (1) • Tape measure (1) • Meter ruler (1) Accept any other appropriate response.	**(1)**

Question number	Answer	Mark
5(a)(iii)	**AO3 (2 marks)** Award 1 mark for identification of a suitable risk and a further mark for description of why this was important. For example: • Slipping on rocks (1) as it could lead to injury (1). • Getting lost (1) as this could lead to being separated from group (1). • Falling in the sea (1) as this could lead to damaged equipment (1). • Entering sea with open cuts (1) leading to infection. (1). • Lack of awareness of tides (1) leading to being cut off from the beach (1). • Danger from falling rocks (1) leading to injuries (1). • Variable weather conditions (1) leading to exposure/heat stroke/hypothermia (1). • Accessibility to sampling site (1) difficulty getting to site (1) This point could be developed in a number of ways. • Large waves (1) knocking people down (1). • Awareness of members of the public (1) safeguarding (1).	

	Accept any other appropriate response.	**(2)**

Question number	Answer indicative content
5(b)	**AO3 (4 marks) AO4 (4 marks)** **Marking instructions** Markers must apply the descriptors in line with the general marking guidance and the qualities outlined in the level-based mark scheme below. **Indicative content guidance** The indicative content below is not prescriptive, and candidates are not required to include all of it. Other relevant material not suggested below must also be credited. This question is about candidates making a judgement of the data collection methods that have been used and the conclusions made. Candidates may note the strengths or weaknesses of the fieldwork presented in Figures 5a and b. Responses could include: • Comments on the design regarding sampling method used. (Random sampling used which could lead to anomalies) • Comments on the number of data collection sites, relevance of data collected, and the conclusions drawn. • Comments could address if the student has met their aim. (Vague comments in conclusions) • Comments on the how the conclusions could have been supported by data. (Conclusions are vague) • Comments on how anomalies could have affected the results and therefore the conclusion. (Don't know how data was collected)

	• Comments on other data that could have been collected. (Only 2 sites/size of data set) • There is no method or detail around the measurement of river velocity so how reliable are the techniques. For level 2 responses candidates will need to link the evaluation to both data collection methods and conclusions. For level 3 responses there should be a greater depth of evaluation recognising the impacts of the design and the data collection methods on the conclusions made. Candidates may refer to data presentation methods to link the data collection and conclusions this should be credited. Candidates working at this level must provide an evidenced judgment.

Question number	**Answer**	
Level	**Mark**	**Descriptor**
	0	No rewardable material.
Level 1	**1–3**	• Attempts to apply understanding to deconstruct information but understanding and connections are flawed. An unbalanced or incomplete argument that provides limited synthesis of understanding. Judgements that are supported by limited evidence. (AO3) • Uses some geographical skills to obtain information with limited relevance and accuracy, which supports few aspects of the argument. (AO4)
Level 2	**4–6**	• Applies understanding to deconstruct information and provide some logical connections between concepts. An imbalanced argument that synthesises mostly relevant understanding, but not entirely coherently, leading to judgements that are supported by evidence occasionally. (AO3) • Uses geographical skills to obtain accurate information that supports some aspects of the argument. (AO4)

Level 3	**7–8**	• Applies understanding to deconstruct information and provide logical connections between concepts throughout. A balanced, well-developed argument that synthesises relevant understanding coherently, leading to judgements that are supported by evidence throughout. (AO3) • Uses geographical skills to obtain accurate information that supports all aspects of the argument. (AO4)

Question number	Answer	Mark

5(a)(i)	**AO3 (1 mark)** C Clinometer The answer cannot be A (measures wind speed), B (measures coverage) or D (used for timing phenomena).	**(1)**

Question number	Answer	Mark
5(a)(ii)	**AO3 (1 mark)** Award one mark for a sampling method identified: • Random sampling (1) • Stratified sampling (1) • Systematic sampling (1) • Pragmatic sampling (1) Accept any other appropriate response.	**(1)**

Question number	Answer	Mark
5(a)(iii)	**AO3 (2 marks)** Award 1 mark for identification of way GIS might be used in a fieldwork environment, and a further mark for description of how it is used. For example: • To look at historical data (1) to be able to compare with primary data (1). • To plot data (1) to be able to analyse changes along a coastline (1). Accept any other reasonable response.	**(2)**

Question number	Answer indicative content
5(b)	**AO3 (4 marks) AO4 (4 marks)** **Marking instructions** Markers must apply the descriptors in line with the general marking guidance and the qualities outlined in the level based mark scheme below. **Indicative content guidance** The indicative content below is not prescriptive, and candidates are not required to include all of it. Other relevant material not suggested below must also be credited. This question is about candidates making a judgement of the data presentation methods and analysis that have been used to help students draw conclusions. Candidates may note the extent to which the fieldwork presentation and analysis support the conclusions in Figures 5. Responses could include: • Comments could be made on how relevant the conclusions are based on the presentation and analysis methods. • Comments could address the suitability of the data presentation method to help draw conclusions. • Comments could address the suitability of the data table to help draw conclusions. • Comments on how anomalies could have affected the results and therefore the conclusion. • Comments on the accuracy of students recording the data and the effect on conclusions. • Comment on the distribution of site selection for data collection and the impact this could have on conclusions. • Comments on other data that could have been collected. • Comments on the value of the methods in relation to the aim of the investigation. For level 2 responses candidates will need to link the conclusion to both data presentation methods and analysis. For level 3 responses there should be a greater depth of evaluation recognising the impact of the data collection presentation and analysis on the conclusions made.

Question number	Answer	
Level	**Mark**	**Descriptor**
	0	No rewardable material.
Level 1	**1–3**	• Attempts to apply understanding to deconstruct information but understanding and connections are flawed. An unbalanced or incomplete argument that provides limited synthesis of understanding. Judgements that are supported by limited evidence. (AO3) • Uses some geographical skills to obtain information with limited relevance and accuracy, which supports few aspects of the argument. (AO4)
Level 2	**4–6**	• Applies understanding to deconstruct information and provide some logical connections between concepts. An imbalanced argument that synthesises mostly relevant understanding, but not entirely coherently, leading to judgements that are supported by evidence occasionally. (AO3) • Uses geographical skills to obtain accurate information that supports some aspects of the argument. (AO4)
Level 3	**7–8**	• Applies understanding to deconstruct information and provide logical connections between concepts throughout. A balanced, well-developed argument that synthesises relevant understanding coherently, leading to judgements that are supported by evidence throughout. (AO3) • Uses geographical skills to obtain accurate information that supports all aspects of the argument. (AO4)

Question number	Answer	Mark

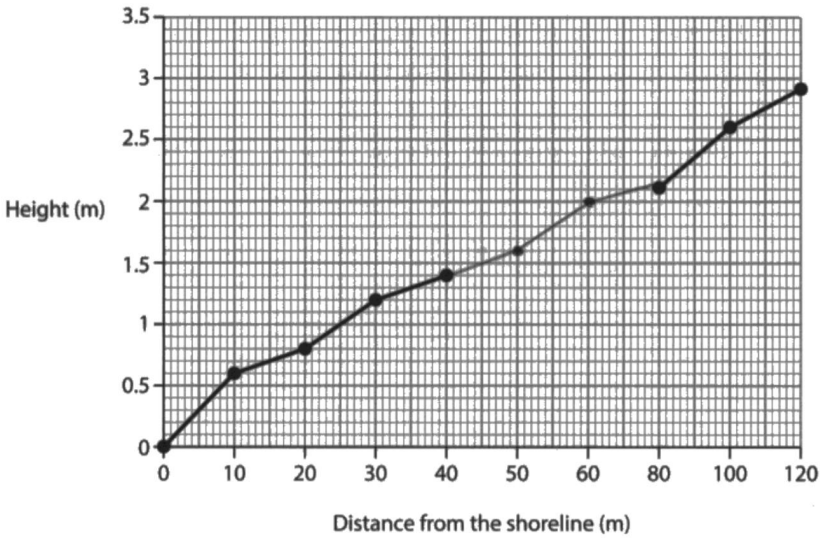
5(a)(i)	**AO3 (1 mark)** B field sketch (1) It cannot be A, C or D as these are all secondary data sources.	**(1)**

Question number	Answer	Mark
5(a)(ii)	**AO3 (1 mark)** Award one mark for suitable piece of equipment. • Tape measure (1) • Clinometer (1) • Ranging pole / measuring pole (1) • Ruler (1) • Camera (1) • Phone / tablet (1) **Do not credit pen / paper.** Accept any other appropriate response.	**(1)**

Question number	Answer	Mark
5(b)(i)	**AO4 (2 marks)** Award one mark for correct working, and one mark for correct answer. (25+20+22+18)/4 (1) OR 85/4 (1) 21.3 (1)	**(2)**

Question number	Answer	Mark
5(b)(ii)	**AO3 (1 mark)** Award one mark for suitable sampling strategy named. • Random (1) • Stratified (1) • Systematic (1) • Opportunistic (1)	**(1)**

Question number	Answer	Mark
5(b)(iii)	**AO3 (2 marks)** Award one mark for suitable reason and a further mark for explanation, up to a maximum of two marks. • Data has a much larger range than other sites (1) which suggest an error may have taken place (in data collection) (1). • As there are only four pieces of data (1) it would have been better to take more readings to reduce the effect of anomalies (1). • The ruler might not be held straight (1) meaning pebble size is recorded incorrectly (1). Accept any other appropriate response.	**(2)**

Question number	Answer	Mark
5(c)(i)	**AO4 (2 marks)** Award one mark for plotting one data point correctly, and a further mark for plotting second data point and the line. Two correct data points plotted with no line drawn award one mark. Completed version:  	**(2)**

Question number	Answer	Mark
5(c)(ii)	**AO3 (3 marks)** Award 1 mark for identification of a suitable advantage, and a further 2 marks for explanation. • (Line diagrams) allow patterns to visualized easily (1) and therefore compared to other sites (1) to check if they fit with hypothesis (1). • (Beach profiles) are easy to construct (1) using Excel / by hand (1) to be able to spot any anomalies in the data (1). • (Line graphs) are easy to understand (1) which means connections are easily spotted (1) and anomalies can be identified (1). Accept any other reasonable response.	**(3)**

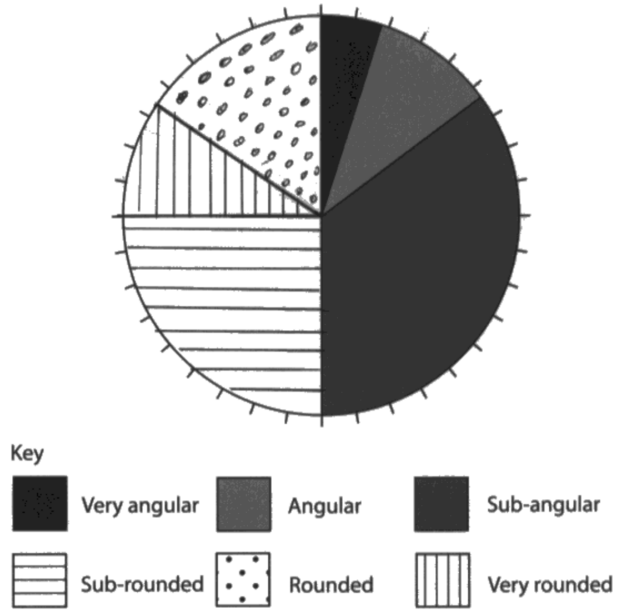
Question number	Answer	Mark

5(a)(i)	**AO3 (1 mark)** C – beach gradient (1) It cannot be A, B or D as these are all qualitative sources of data.	**(1)**

Question number	Answer	Mark
5(a)(ii)	**AO3 (1 mark)** Award one mark for suitable ways could be used to support the enquiry. • To plan sites for data collection. (1) • To plot data on to explore patterns. (1) • To understand features of the local environment. (1) Accept any other appropriate response.	**(1)**

Question number	Answer	Mark
5(b)(i)	**AO4 (2 marks)** Award one mark for correct working, and one mark for correct answer. (8.1+6.5+7.6+12.3+8.6) / 5 (1) OR 43.1 / 5 = 8.6 (1)	**(2)**

Question number	Answer	Mark
5(b)(ii)	**AO3 (1 mark)** Award one mark for suitable piece of equipment. • Tape measure (1) • Ruler (1) • Measuring app on a mobile phone (1) • Calipers (1) **Do not credit pen / paper.** Accept any other appropriate response.	**(1)**

Question number	Answer	Mark
5(c)(i)	**AO4 (2 marks)** Award one mark for correct plotting of data (in any order), and a further mark for correct labelling.  	**(2)**

Question number	Answer	Mark
5(c)(ii)	**AO3 (2 marks)** Award one mark each for two suitable ways to improve reliability of the data collected. • Take more measurements. (1) • Compare results to another group. (1) • Ensure one person in the group is responsible for measurements. (1) Accept any other reasonable response.	**(2)**

Question number	Answer	Mark
5(d)	**AO3 (3 marks)** Award 1 mark for identification of a suitable fieldwork technique, and a further two marks for explanation. • They could have used created beach profiles either side of the groyne (1) to measure height of the beach (1) to see how they restrict longshore drift (1). • They could take photographs of the different coastal management strategies (1) to compare which looks like a more natural coastline (1) and get people's views on them (1). • They could have drawn a field sketch (1) at set distances (1) to compare the features of different sites (1). Accept any other reasonable response.	**(3)**

Question number	Answer	Mark

5(a)	**AO4 (2 marks)** Award 1 mark for a suitable risk identified and 1 further mark for description of how this was managed. • Falling in the sea (1) was managed by not getting to close the sea with strong tides (1). • To reduce the risk of exposure (1) I made sure that I had suitable footwear and clothing (1). • There is a risk of slipping over (1) which can be reduced by wearing appropriate footwear (1). • There is a risk of getting lost (1) so we went around in groups (1). Accept any other appropriate response.	**(2)**

Question number	Answer	Mark
5(b)	**AO4 (3 marks)** Award 1 mark for initial point, and a further 2 marks for explanation or development. Candidates may refer to how the choices were made on a practical basis, but also in term of sampling strategy. • We chose two sites to conduct our fieldwork (1) one which was just after a groyne, and one that was on a section of coastline with no management (1) to see if we could find a difference in beach characteristics (1). • We selected three sites along the coastline (1) that were in walking distance (1) as this allowed us time to collect the data one day (1). • We used stratified sampling (1) to collect readings from contrasting locations (1) to see how coastal management affects beach characteristics (1). Accept any other appropriate response.	**(3)**

Question number	Answer	Mark
5(c)	**AO3 (2 marks) /AO4 (2 marks)** Award 1 mark for identification of a primary or secondary data collection method used and a further mark for development through further description or exemplification. Candidates can describe any two methods (primary and/or secondary) of data collection that are appropriate to their enquiry. • I collected data to look at the profile of the beach (1) by using a ranging pole and clinometer to measure changes in angle from shoreline to top of beach (1). • I collected data on sediment size (1) by measuring pebbles at different points along the beach (1). • I measured longshore drift (1) by throwing an orange into the sea and measuring distance travelled in 5 minutes (1). • I drew field sketches (1) to record the landforms/characteristics of each site (1). Accept any other appropriate response.	**(4)**

Question number	Answer	Mark
5(d)	**AO4 (3 marks)** Award 1 mark for identification of data analysis technique used, and a further mark for development through further description or exemplification. • I calculated the mean (1) by adding up each of the pebble size measurements and dividing by 5 (the number of times I recorded data) (1) to try and smooth out any variations in the data (1). • Used Spearman's rank (1) to compare sediment size and shape (1) to determine if the correlation is significant (1). • Calculated a percentage (1) as they are relative (1) which means different sets of data can be compared (1). • Calculated the interquartile range (1) to remove the outliers in the data (1) in case they caused by human	

	error in data collection (1). **No credit awarded for identifying a data presentation technique.** Accept any other appropriate response.	**(3**

Question number	Answer indicative content
5(e)	**AO3 (4 marks) AO4 (4 marks)** **Marking instructions** Markers must apply the descriptors in line with the general marking guidance and the qualities outlined in the level based mark scheme below. **Indicative content guidance** The indicative content below is not prescriptive and candidates are not required to include all of it. Other relevant material not suggested below must also be credited. This question is about the candidates being able to evaluate whether the data presentation techniques used are effective in helping them analyse and identify patterns in the data. The data presentation techniques may be regarded as not appropriate for the data being presented leading to a judgement being made on how helpful they would be in analysis. • At level 1 candidates will likely describe the data presentation methods that are used and may make simple statements about how they can be used for analysis at the top of the level. • At level 2 candidates may describe all of the techniques used as well as making simple statements about how they demonstrate patterns. • For level 3 candidates would be expected to make a judgement on the suitability of the presentation techniques and how they establish patterns or not. **AO3** • Recognition that the data presentation techniques used are appropriate to the data that is being presented – and can help to identify trends and anomalies. • Recognition of the importance of having accurate/specific axis labels on the data presentation techniques. • Recognition that there are improvements/alternatives which could increase the usefulness of the data presentation techniques provided. • Recognition that there are limitations to the data presentation techniques used. • An evaluation of how far the student's data presentation methods can be trusted may be provided.

	AO4 • Figure 5a shows a scatter graph comparing distance along the beach and average sediment size. • Figure 5a does not make it clear whether 'distance along beach' is from shoreline to back of beach (top to bottom) or from one side of the beach to the other (west to east). • Figure 5a shows average sediment size but does not give detail about how many data points this is based on. • Figure 5b shows a bar graph showing pebble shape and size at site 1 and 10 site. • Figure 5b only has site 1 and 10 presented which means 8 sites are not shown on the graph.

Question number	**Answer**	
Level	**Mark**	**Descriptor**
	0	No rewardable material.
Level 1	**1–3**	• Attempts to apply understanding to deconstruct information but understanding and connections are flawed. An unbalanced or incomplete argument that provides limited synthesis of understanding. Judgements that are supported by limited evidence. (AO3) • Uses some geographical skills to obtain information with limited relevance and accuracy, which supports few aspects of the argument. (AO4)
Level 2	**4–6**	• Applies understanding to deconstruct information and provide some logical connections between concepts. An imbalanced argument that synthesises mostly relevant understanding, but not entirely coherently, leading to judgements that are supported by evidence occasionally. (AO3) • Uses geographical skills to obtain accurate information that supports some aspects of the argument. (AO4)
Level 3	**7–8**	• Applies understanding to deconstruct information and provide logical connections between concepts throughout. A balanced, well-developed argument that synthesises relevant understanding coherently, leading to judgements that are supported by evidence throughout. (AO3) • Uses geographical skills to obtain accurate information that supports all aspects of the argument. (AO4)

Question number	**Answer**	**Mark**

Question 5

Question number	Answer	Mark
5(a)	**AO4 (2 marks)** Award 1 mark for a suitable reason and 1 further mark for explanation or development. • There was a coastline which had different coastal management techniques in different sections (1) which meant that I could compare characteristics (1). • I wanted to investigate changes in beach profiles (1) and this was the closest beach to our school (1). • Access to this beach was possible (1) it was not private land (1). Accept any other appropriate response.	**(2)**

Question number	Answer	Mark
5(b)	**AO4 (3 marks)** Award 1 mark for identification of suitable method, and a further 2 marks for explanation or development. • Measuring beach features (1) which meant we had to collect quantitative data on beach height and angles of the beach (1) which we could then use to create the beach profile graph (1). • Measuring pebble size (1) we had to use a ruler (1) and then record the sizes so they could be used to create a graph showing size of pebbles on different sections of the beach (1). Accept any other appropriate response.	**(3)**

Question number	Answer	Mark
5(c)	**AO4 (3 marks)** Award 1 mark for identification of a suitable advantage, and a further mark for development through further description or exemplification. • I used a scattergraph (1) which allowed me to see a correlation between factors (1) which meant I could produce a clear conclusion (1). • I used graphs to create beach profiles (1) which meant I could easily compare across different sites (1) and recognise any differences (1). Accept any other appropriate response.	**(3**

Question number	Answer	Mark
5(d)	**AO3 (2 marks) /AO4 (2 marks)** Award 1 mark for identification of data analysis technique used and a further mark for development through further description or exemplification. • I calculated the mean (1) to try and smooth out any variations in the data (1). • I created a scattergraph of sediment size and distance from the sea to analyse the data for any correlations (1) and identify anomalies/outliers (1). • I used Spearman's rank correlation (1) to be able to indicate any strong or weak correlations between my data on beach distance and bedload (1). • Calculated a percentage (1) which means different sets of data can be compared (1). • Calculated the interquartile range (1) to remove the outliers in the data (1). Accept any other appropriate response.	**(4)**

Question number	Answer indicative content
5(e)	**AO3 (4 marks) AO4 (4 marks)** **Marking instructions** Markers must apply the descriptors in line with the general marking guidance and the qualities outlined in the level based mark scheme below. **Indicative content guidance** The indicative content below is not prescriptive and candidates are not required to include all of it. Other relevant material not suggested below must also be credited. This question is about the candidates being able to evaluate whether the data collection methods used were effective in helping the student achieve their aim. • At level 1 candidates will likely describe the data collection methods that are used and may make simple statements about how they can be used for analysis at the top of the level. • At level 2 candidates may describe all of the techniques used as well as making simple statements about how they could be used to by the candidate to reach their aim. • For level 3 candidates would be expected to make a judgement on the suitability of the collection methods and how they would support the analysis for the student to be able to achieve their aim. **AO3** • Recognition of limitations in the data collection/sampling techniques may be flawed in terms of the number of sites and the time of year. • Recognition that the data collection methods used are appropriate to support a range of data presentation methods. • Reliability and accuracy of the student's methods may be evaluated with reference to the potential evaluation, including equipment errors and operator errors. • Recognition of sampling strategy e.g. random, stratified and/or systematic is important, and could have affected data collected. • An evaluation of how far the student's data collection methods would also depend on the accuracy of how they were carried out could also be included.

	AO4 • In this response there would be an expectation for the students to evaluate the different data collection methods and how they relate to later stages of the enquiry (data analysis and reaching conclusions). • Students should look to identify the appropriateness of data collection methods. • There could be an evaluation of the lack of secondary data to support primary data. • A view could be given on how successful or unsuccessful the data collection methods were and how they could be improved to help students gather more effective results.

Question number	**Answer**	
Level	**Mark**	**Descriptor**
	0	No rewardable material.
Level 1	**1–3**	• Attempts to apply understanding to deconstruct information but understanding and connections are flawed. An unbalanced or incomplete argument that provides limited synthesis of understanding. Judgements that are supported by limited evidence. (AO3) • Uses some geographical skills to obtain information with limited relevance and accuracy, which supports few aspects of the argument. (AO4)
Level 2	**4–6**	• Applies understanding to deconstruct information and provide some logical connections between concepts. An imbalanced argument that synthesises mostly relevant understanding, but not entirely coherently, leading to judgements that are supported by evidence occasionally. (AO3) • Uses geographical skills to obtain accurate information that supports some aspects of the argument. (AO4)
Level 3	**7–8**	• Applies understanding to deconstruct information and provide logical connections between concepts throughout. A balanced, well-developed argument that synthesises relevant understanding coherently, leading to judgements that are supported by evidence throughout. (AO3)

		• Uses geographical skills to obtain accurate information that supports all aspects of the argument. (AO4)

5(a)	**AO4 (2 mark)** Award 1 mark for identifying a relevant data presentation type and a further mark for development up to a maximum of two marks. • Used pie charts (1) to show sediment shape data (1) • Used bar graphs (1) to show sediment size data (1) • Used land use map (1) to show different geology (1) Accept any other appropriate response.	**(2)**

Question number	Answer	Mark
5(b)	**AO3 (2 marks) / AO4 (1 mark)** Award 1 mark for the initial explanation and 2 marks for further explanation up to a maximum of 3 marks. • Using data from other investigations carried out along the same stretch of coastline could be unreliable (1) as we do not know how accurately the previous groups collected the data (1) making comparisons to own data inaccurate (1). • Using geology maps of the coastline could be difficult to identify the exact location of the study sites (1) meaning the incorrect geology could be identified (1) making comparing data sets unreliable (1). Accept any other appropriate response.	**(3)**

Question number	Answer	Mark
5(c)	**AO3 (2 marks) / AO4 (2 marks)** Award 1 mark for the identification of an improvement and a further mark for explanation up to a maximum of two marks each. • Use a calliper (1) to measure the size of pebbles to avoid errors (1). • Ensure the tape measure is pulled straight (1) when measuring the distance between ranging polls to ensure distance recorded is correct (1). • Ensure the same person uses the clinometer (1) at every site to reduce errors in angle recorded (1). • Ensure a group of students agree the shape of pebbles (1) as judgement is subjective (1).	

	• Take more measurements (1) to reduce the influence of anomalies (1) Accept any other appropriate response.	**(4)**

Question number	Answer	Mark
5(d)	**AO3 (2 marks) / AO4 (1 mark)** Award 1 mark for the initial explanation and 2 marks for further explanation up to a maximum of 3 marks. • The pebbles were more rounded at one end of the beach (1) as they were more exposed to attrition (1) when being carried along the coast by longshore drift (1) • The largest sediment was nearest the cliff (1) because it falls from the cliff (1) and is not exposed to erosion during high tide (1) • The sediment at one end of the beach was largest (1) getting smaller due to erosion (1) as sediment has been transported along the beach by longshore drift (1). Accept any other appropriate response.	**(3)**

Question number	Answer	Mark
5(e)	**AO3 (4 mark)/AO4 (4 mark)** **Marking instructions** Markers must apply the descriptors in line with the general marking guidance and the qualities outlined in the level-based mark scheme below. **Indicative content guidance** The indicative content below is not prescriptive, and candidates are not required to include all of it. Other relevant material not suggested below must also be credited. This question is about evaluating the reliability of the students conclusions. Candidates will need to be able to identify the limitations in the methods and conclusion reached in the investigation and decide how this affects the validity of the conclusion reached. **AO3** • Pebble size gets smaller from one end of the beach to the other in the direction of longshore drift due to attrition. • Pebble shape should get rounder from one end of the beach to the other in the direction of longshore drift due to increased time spent in the water leading to	

	more attrition. • Random sampling may not ensure that there is enough variation in sites chosen to fully represent changes along the stretch of coastline. • The data was collected during spring which could impact reliability as the beach may have experienced beach replenishment before the tourist season. • Different students could have categorised the shape of the sediment which could have lead to variation in what was classed as angular. • There is no detail about how many pebbles were measured at each site or how they were chosen. • Students should have visited the beach at different times of year as winter storms and beach replenishment can influence sediment data. • The students conclusion does not show the expected relationship between processes and sediment size/shape. **AO4** • The three sites along the Italian coastline are all very close to one end of the sediment cell. • Site 2 has the smallest sediment size and 80% of pebbles are angular but is not closest to the start of the sediment cell. • Site 1 has the joint biggest sediment size and 70% of pebbles as angular. • Site 3 has the same sediment size as site 1 but this site has the same percentage of angular pebbles (70%) as site 1.	
		(8)

Question number	**Answer**	
Level	**Mark**	**Descriptor**
	0	No rewardable material.
Level 1	**1–3**	• Attempts to apply understanding to deconstruct information but understanding and connections are flawed. An unbalanced or incomplete argument that provides limited synthesis of understanding. Judgements that are supported by limited evidence. (AO3) • Uses some geographical skills to obtain information with limited relevance and accuracy, which supports few aspects of the argument. (AO4)

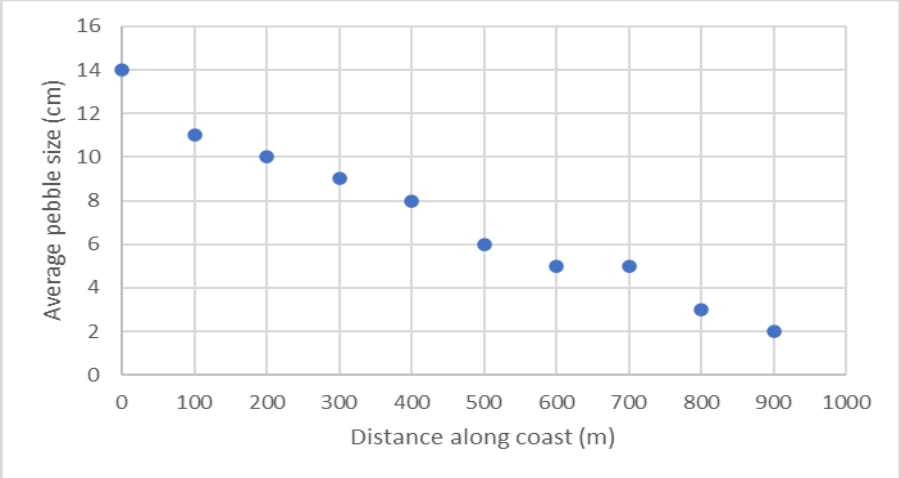
Level 2	**4–6**	• Applies understanding to deconstruct information and provide some logical connections between concepts. An imbalanced argument that synthesises mostly relevant understanding, but not entirely coherently, leading to judgements that are supported by evidence occasionally. (AO3) • Uses geographical skills to obtain accurate information that supports some aspects of the argument. (AO4)
Level 3	**7–8**	• Applies understanding to deconstruct information and provide logical connections between concepts throughout. A balanced, well-developed argument that synthesises relevant understanding coherently, leading to judgements that are supported by evidence throughout. (AO3) • Uses geographical skills to obtain accurate information that supports all aspects of the argument. (AO4)

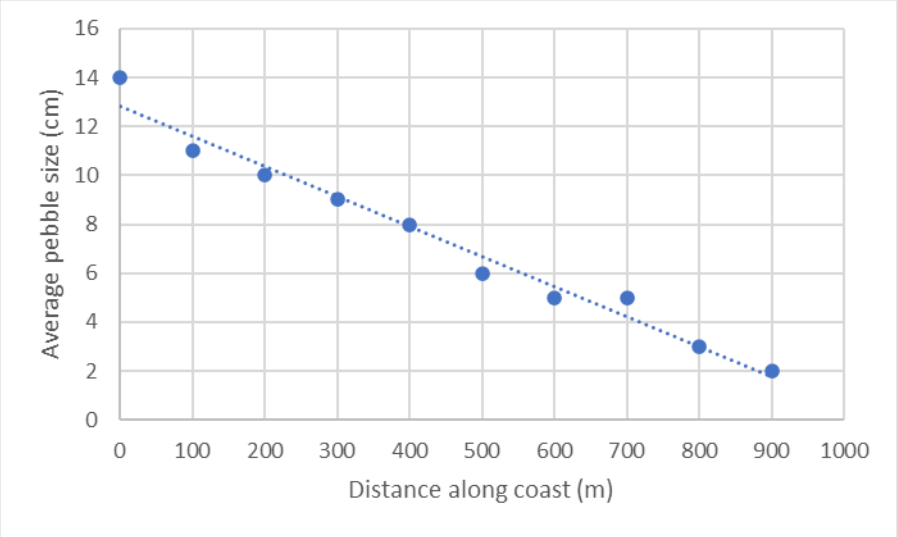
Question number	Answer	Mark

5(a)(i)	**AO3 (1 mark)** **B** (Clinometer) Cannot be A (shape), C (direction) or D (distribution).	**(1)**

Question number	Answer	Mark
5(a)(ii)	**AO3 (1 mark)** • Slipping (1) • Falling into water (1) • Coming into contact with dirty water (1) • Getting cold (1) • Getting lost (1) • Heavy rain / strong winds (1) • Sea too deep / waves too strong (1) • Tide coming in (1) **No credit for just stating 'weather'.** Accept any other acceptable response.	**(1)**

Question number	Answer	Mark
5(b)	**AO4 (2 marks)** Award 1 mark for correct method of working with correct figures and 1 mark for correct answer. 17-4 = 13cm	**(2)**

Question number	Answer	Mark
5(c)(i)	**AO4 (2 marks)** Award 1 mark for each correct plot.  	**(2)**

Question number	Answer	Mark
5(c)(ii)	**AO4 (1 mark)** Award 1 mark for correct line of best fit drawn. The line drawn needs to have at least 2 plots above the line of best fit and 3 plots below the line of best fit drawn OR be drawn through 4 data plots for credit.  **No credit for curved line of best fit**	**(1)**

Question number	Answer	Mark
5(c)(iii)	**AO3 (1 mark)/AO4 (1 mark)** Award 1 mark (AO4) for initial point and a further mark for development (AO3) up to a maximum of two marks. • There is a negative correlation between distance along the coast and pebble size (1) because the longer the pebbles have been in the water the smaller they get (1). • Pebble size decreases as you go along the coastline (1) because they have experienced more erosion (1). • As one increases the other decreases because there has been more erosion (1) as the pebbles have travelled in the water for longer (1). Accept any other acceptable response.	**(2)**

Question number	Answer	Mark
5(d)	**AO3 (3 marks)** Award 1 mark for initial point and a further mark for development up to a maximum of two marks. • Students may find it useful to collect data on beach gradient (1) as this is likely to influence sediment size (1) as smaller sediment will be close to the shoreline and larger sediment near the cliffs (1). • Students could collect data on sediment shape (1) as you would expect sediment to become more rounded (1) further along the coastline as it has been exposed to more erosion (1). • Students could do a field sketch at each site (1) as it can be useful to have qualitative data collection (1) which will help them to remember the features of the coastal landscape (1). Accept any other acceptable response.	(3)

Question number	Answer	Mark
5(e)	**AO3 (4 marks)/AO4 (4 marks)** **Marking instructions** Markers must apply the descriptors in line with the general marking guidance and the qualities outlined in the level-based mark scheme below. **Indicative content guidance** The indicative content below is not prescriptive, and candidates are not required to include all of it. Other relevant material not suggested below must also be credited. This question is about evaluating the accuracy and reliability of the student's own data collection methods. The candidate needs to evaluate the strengths and weaknesses of several different data collection techniques they used in their enquiry and reach a judgement on how effective their data collection was overall. **AO3** • Accuracy is about how correct or incorrect the data written down is. • Reliability is about how dependable the data collected is and often relates to having a big enough sample size to make a judgement. • Data collection techniques are the methods adopted when collecting data. • There are different sampling strategies which have a range of advantages and disadvantages that need to be considered to increase reliability. • Consideration of different equipment errors and the	(8)

	impact these might have had on accuracy of data. • Consideration of the number of sites and samples taken and the impact these might have on reliability. • A judgement about which techniques were reliable and/or accurate. • A judgement about overall accuracy and reliability of data collection techniques. **AO4** • Detail about the specific sampling strategies used of their own data collection techniques. • Detail about the site selection for enquiry. • Detail about the sample size for each set of data collected. • Detail about the equipment used for each technique. • Detail about rationale for taking more than one reading for a data type.	

Level	Mark	Descriptor
	0	No rewardable material.
Level 1	**1–3**	• Attempts to apply understanding to deconstruct information but understanding and connections are flawed. An unbalanced or incomplete argument that provides limited synthesis of understanding. Judgements that are supported by limited evidence. (AO3) • Uses some geographical skills to obtain information with limited relevance and accuracy, which supports few aspects of the argument. (AO4)
Level 2	**4–6**	• Applies understanding to deconstruct information and provide some logical connections between concepts. An imbalanced argument that synthesises mostly relevant understanding, but not entirely coherently, leading to judgements that are supported by evidence occasionally. (AO3) • Uses geographical skills to obtain accurate information that supports some aspects of the argument. (AO4)
Level 3	**7–8**	• Applies understanding to deconstruct information and provide logical connections between concepts throughout. A balanced, well-developed argument that synthesises relevant understanding coherently, leading to judgements that are supported by evidence throughout. (AO3) • Uses geographical skills to obtain accurate information that supports all aspects of the argument. (AO4)

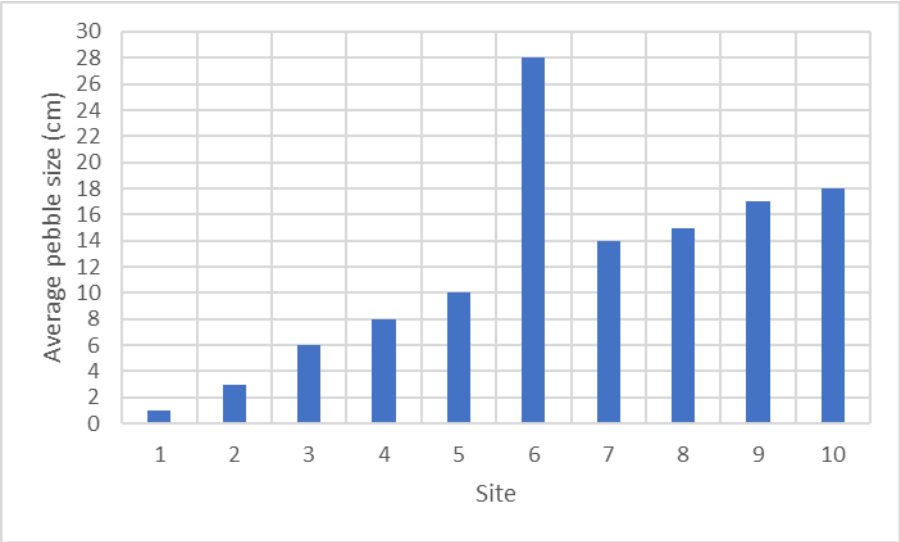
Question number	Answer	Mark

5(a)(i)	**AO1 (1 mark)** **B** (information collected by other people) Cannot be A, C or D (primary data)	**(1)**

Question number	Answer	Mark
5(a)(ii)	**AO1 (1 mark)** Award one mark for any of the following: • Field sketch (1) • Photograph (1) • Open question survey/questionnaire (1) • Interviews/focus groups (1) Accept any other acceptable response.	**(1)**

Question number	Answer	Mark
5(b)	**AO3 (1 mark)/AO4 (1 mark)** Award 1 mark (AO4) for initial point and a further mark for development (AO3) up to a maximum of two marks. • There is a risk of slipping (on rocks) (1) which can cause injury (1). • There is a risk cutting hand (on rocks) (1) which can cause infection (1). • Big / powerful / destructive waves (1) could cause you to be swept away / knocked over (1). • Rising tide (1) increases risk of being cutoff/stranded (1). Accept any other acceptable response.	**(2)**

Question number	Answer	Mark
5(c)	**AO4 (2 marks)** Award 1 mark for correct method of working with correct figures and 1 mark for correct answer. 2 , 2 , 3 , 4 , 8 , 12 , 15 , 15 , 15 , 20 8+12 = 20 / 2 = 10 Answer = 10°	**(2)**

Question number	Answer	Mark
5(d)(i)	**AO4 (2 marks)** Award 1 mark for each correct plot. 	(2)

Question number	Answer	Mark
5(d) (ii)	**AO4 (1 mark)** Award one mark for any of the following: • (Site) 6 (1)	(1)

Question number	Answer	Mark
5(d)(iii)	**AO4 (3 marks)** Award 1 mark (AO4) for initial point and further marks for evidence (AO4) up to a maximum of three marks. • The student may have been inconsistent with which pebble axis was measured (1) this could have meant it was not always the longest side measured (1) leading to incorrect data (1). • The student may not have been accurate when placing the 0 on the ruler against the pebble (1) this would have caused a bigger number to be recorded (1) in error (1). • The student may have chosen pebbles which were easiest to measure (1) this would have reduced the reliability of the sample (1) leading to inconsistent data being recorded (1). Accept any other acceptable response.	(3)

Question number	Answer	Mark
5(e)	**AO3 (4 mark)/AO4 (4 mark)** **Marking instructions** Markers must apply the descriptors in line with the general marking guidance and the qualities outlined in the level-based mark scheme below. **Indicative content guidance** The indicative content below is not prescriptive, and candidates are not required to include all of it. Other relevant material not suggested below must also be credited. This question is about evaluating the reliability of the students own conclusions. The candidate needs to evaluate the strengths and weaknesses of several sets of data in order to determine the reliability and accuracy of their conclusion. This should include judgement on influence of anomalies and the extent to which data fits known theories or trends. **AO3** • Accuracy is about how correct or incorrect the data written down is. • Reliability is about how dependable the data is and often relates to having a big enough sample size to reach a conclusion. • Conclusions can determine the extent to which the results fit a theory. • Data collection techniques are very important in determining accuracy of conclusions. • There are different sampling strategies which have a range of advantages and disadvantages that need to be considered when reaching a conclusion. • Consideration of different equipment errors and the impact these might have had on accuracy of data. • Consideration of ways the accuracy of the conclusions could have been improved. • Conclusions should make a judgement about the presence of anomalies and whether they be included or excluded from the analysis. • A judgement about which techniques were reliable and/or accurate. • A judgement about overall accuracy of conclusion drawn. **AO4** • Detail about overall conclusions drawn from own enquiry. • Detail about the specific sampling strategies used of their own data collection techniques. • Detail about the site selection for enquiry. • Detail about the sample size for each set of data collected. • Detail about the equipment used for each technique. • Detail about rationale for taking more than one reading for a data type. • Detail about anomalies in own results.	**(8)**

Level	Mark	Descriptor
	0	No rewardable material.
Level 1	**1–3**	• Attempts to apply understanding to deconstruct information but understanding and connections are flawed. An unbalanced or incomplete argument that provides limited synthesis of understanding. Judgements that are supported by limited evidence. (AO3) • Uses some geographical skills to obtain information with limited relevance and accuracy, which supports few aspects of the argument. (AO4)
Level 2	**4–6**	• Applies understanding to deconstruct information and provide some logical connections between concepts. An imbalanced argument that synthesises mostly relevant understanding, but not entirely coherently, leading to judgements that are supported by evidence occasionally. (AO3) • Uses geographical skills to obtain accurate information that supports some aspects of the argument. (AO4)
Level 3	**7–8**	• Applies understanding to deconstruct information and provide logical connections between concepts throughout. A balanced, well-developed argument that synthesises relevant understanding coherently, leading to judgements that are supported by evidence throughout. (AO3) • Uses geographical skills to obtain accurate information that supports all aspects of the argument. (AO4)

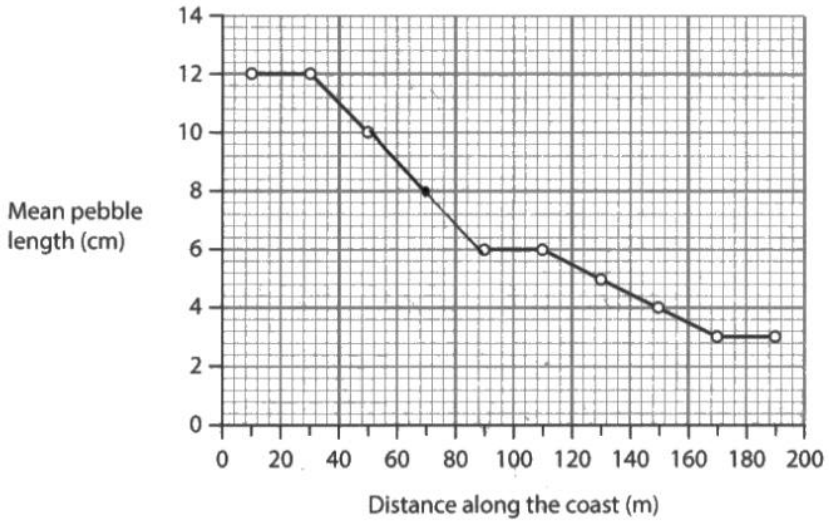
Question number	Answer	Mark

Question 5

Question number	Answer	Mark
5(a)	**AO3 (1 mark)** Award 1 mark for a suitable piece of equipment for investigating coastal environments. • Stopwatch (1) • Ruler / tape measure (1) • Quadrat (1) • Ranging pole (1) • Clinometer / angle measurer (1) • Calliper / Power's Index Scale / roundness scale (1) • Compass (1) Accept any other acceptable response. **No credit for stationery e.g. pen/paper**	**(1)**

Question number	Answer	Mark
5(b)	**AO3 (2 marks)/AO4 (2 marks)** Award 1 mark (AO1) for initial point and a further mark for development (AO2) up to a maximum of two marks. Advantage: • Field sketches help us remember the place (1) which can help to interpret data (1). • Field sketches allow for key features to be highlighted (1) which helps to explain data (1). • Field sketches allow notes to be added at the time of drawing (1) which helps to understand the environment being sketched (1). • Field sketches can be used to visualise the landscape before visiting (1) to help plan where to collect the data (1). Disadvantage: • Field sketches take more time than photographs (1) which can be a challenge if in a rush (1). • Field sketched cannot show change over time (1) which can bias your findings if it is completed at a certain time of year (1). • Field sketches are not drawn to scale (1) making it less accurate (1). • Field sketches are subjective (1) so may miss key details compared to someone else drawing it (1). Accept any other acceptable response.	**(4)**

Question number	Answer	Mark
5(c)	**AO4 (2 marks)** Award 1 mark for correct method of working with correct figures and 1 mark for correct answer. • (8-1 = 7) 7/1 x 100 (1) • = 700% (1) **Note**: figures in brackets as first part of method are not required for first mark.	**(2)**

Question number	Answer	Mark
5(d) (i)	**AO4 (2 marks)** Award 1 mark for correct plot and second mark for joining points.  	**(2)**

Question number	Answer	Mark
5(d)(ii)	**AO3 (1 mark)/AO4 (1 mark)** Award 1 mark (AO4) for initial point and a further mark for development (AO3) up to a maximum of two marks. • Pebble size decreases along the coastline (1) as they have been exposed to more attrition (1). • Pebble size decreases along the coastline (1) at 10m pebble length is 12cm and 150m pebble length is 4cm. Accept any two correct pairs of data to demonstrate the relationship. • Pebble size is largest at the start (1) as they have been in water for less time (1). • Pebbles are exposed to erosion (1) meaning they get smaller from one end of the beach to the other (1). Accept any other acceptable response.	**(2)**

Question number	Answer	Mark
5(d)(iii)	**AO3 (1 mark)** **B** (data that does not fit the pattern) Cannot be A (quantitative), C (distribution) or D (trend).	**(1)**

Question number	Answer	Mark
5(e)	**AO3 (4 marks)/AO4 (4 marks)** **Marking instructions** Markers must apply the descriptors in line with the general marking guidance and the qualities outlined in the level-based mark scheme below. **Indicative content guidance** The indicative content below is not prescriptive, and candidates are not required to include all of it. Other relevant material not suggested below must also be credited. This question is about evaluating the effectiveness of planning their sampling for data collection. The candidate needs to evaluate the strengths and weaknesses of their site selection and sampling strategies to reflect on the reliability of their conclusion. **AO3** • Consideration to location and number of sites chosen for data collection. • It may be important to ensure key features of the area are represented in data collected. • Sites need to be easily accessible. • There are three main sampling strategies – systematic, random, stratified. • Random sampling removes bias from data collected.	**(8)**

	• Random sampling can lead to poor representation in data. • Systematic sampling ensures good coverage of sample area. • Systematic sampling is more biased as not all areas have equal chance of being selected. • Stratified sampling can be more representative. • Stratified sampling is difficult if sub-sets are not accurate/known. • A judgement about how site selection and sampling strategies helped to answer their enquiry title. **AO4** • Detail about the specific way they chose their sites in relation to collecting accurate/reliable data. • Detail about how many sites were selected and why this number of sites was chosen. • Detail about the sampling strategies used for each type of data collected and why this strategy was chosen. • Detail about any limitations in their chosen site and sampling strategies. • Detail about whether they could answer their hypothesis/predictions/enquiry questions. • Detail about specific mitigation strategies used to ensure data collected was reliable and accurate. • Detail about what conclusion were reached.	

Question number	**Answer**	
Level	**Mark**	**Descriptor**
	0	No rewardable material.
Level 1	**1–3**	• Attempts to apply understanding to deconstruct information but understanding and connections are flawed. An unbalanced or incomplete argument that provides limited synthesis of understanding. Judgements that are supported by limited evidence. (AO3) • Uses some geographical skills to obtain information with limited relevance and accuracy, which supports few aspects of the argument. (AO4)
Level 2	**4–6**	• Applies understanding to deconstruct information and provide some logical connections between concepts. An imbalanced argument that synthesises mostly relevant understanding, but not entirely coherently, leading to judgements that are supported by evidence occasionally. (AO3) • Uses geographical skills to obtain accurate information that supports some aspects of the argument. (AO4)
Level 3	**7–8**	• Applies understanding to deconstruct information and provide logical connections between concepts throughout. A balanced, well-developed argument that synthesises relevant understanding coherently, leading to judgements that are supported by evidence throughout. (AO3) • Uses geographical skills to obtain accurate information that supports all aspects of the argument. (AO4)

5(a)	**AO4 (2 marks)** Award 1 mark for identifying a relevant sampling technique and a further mark for development up to a maximum of two marks. • Random sampling (1) using a random number generator to select our sites (1). • Systematic sampling (1) to measure every 20 m (1). • To measure at equal intervals (1) by measuring the beach and dividing by 10 (1). • Opportunistic sampling (1) to pick sites which can be accessed (1). • Stratified sampling (1) to choose sites at different ends of the beach (1). Accept any other acceptable response.	**(2)**

Question number	Answer	Mark
5(b)	**AO3 (2 marks) / AO4 (1 mark)** Award 1 mark for the initial variable identified and 2 marks for further explanation up to a maximum of 3 marks. • I measured sediment size (1) of beach material by measuring 10 pebbles at each site (1) to work out the average pebble size (1). • I measured the gradient of the beach (1) at three sites along the beach (1) to determine if the beach became more gently sloping at one end (1). • I completed sediment shape analysis (1) using the Power's index scale (1) to identify where the rounded pebbles were found along the beach (1). Accept any other acceptable response.	**(3)**

Question number	Answer	Mark
5(c)	**AO3 (2 marks) / AO4 (2 marks)** Award 1 mark for the identification of a variable used to present data and a further mark for explanation up to a maximum of two marks each. • Presented gradient data (as a line graph) (1) as this is continuous data (1).	

	• Presented pebble shape (as pie charts) (1) this made it easy to compare differences at different sites (1). • Presented pebble size (as a stacked/compound/divided bar graph) (1) to present both total number of pebbles measured and number each size for each site (1). • Presented pebble size (as a bar graph) (1) as sites could be plotted along the x axis as they are discrete data (1).	**(4)**

Question number	Answer	Mark
5(d)	**AO3 (2 marks) / AO4 (1 mark)** Award 1 mark for the initial explanation and 2 marks for further explanation up to a maximum of 3 marks. • The bigger your data sample the more representative it will be (1) this means you are more likely to get the same results (1) if you repeat the investigation (1). • More data means you reduce the influence of outliers (1) but working out interquartile range (1) giving a more reliable dispersion of data (1). • Having more data means you are less likely to miss a key characteristic of the environment (1) as your samples are collected close enough together (1) to ensure small changes are recorded (1). • Have more pebbles sampled will avoid anomalies (1) from pebbles thrown/moved by animals/people (1) affecting your central tendency values (1).	**(3)**

Question number	Answer	Mark
5(e)	**AO3 (4 marks)/AO4 (4 marks)** **Marking instructions** Markers must apply the descriptors in line with the general marking guidance and the qualities outlined in the level-based mark scheme below. **Indicative content guidance** The indicative content below is not prescriptive, and candidates are not required to include all of it. Other relevant material not suggested below must also be credited. This question is about evaluating the validity of the hypothesis proposed. The candidate needs to evaluate the strengths and weaknesses of the information shown in the secondary data source and make a judgement about feasibility of the hypothesis proposed. **AO3** • Geology maps show rock types of the landscape.	**(8)**

	• Secondary sources can be out of date making information less reliable. • Secondary sources will not show the exact sites the primary data is collected from. • Time of year can affect the environment making primary and secondary sources very different. • It is difficult to determine if secondary data was collected accurately. • Hard rock coastlines are likely to show cliffs, headlands, arches. • Soft rock coastlines are likely to show beaches, spits and lower lying coastlines. • Urbanised coastlines are likely to be managed by hard engineering which alters natural processes. • The hypothesis mentions how sediment size will change but this is not evidenced in the secondary data meaning the hypothesis is less valid. • The bay is 167 km wide which is long enough to see a change in sediment size suggesting the hypothesis could be valid. • The secondary data doesn't show the direction of longshore drift which is required to determine the direction the sediment will move making the hypothesis very unreliable. • The hypothesis is less suitable as the prevailing wind is from the south. **AO4** • Figure 5 shows an area of discordant coastline. • Figure 5 shows the headland to the north of the coastline. • Figure 5 shows the beach width decreases by 45 m in the south. • Figure 5 shows the wider beach in the north suggesting longshore drift travels south to north. • Figure 5 shows the bay is made from alluvium. • Figure 5 shows the headland is made from igneous rock. • Figure 5 shows the prevailing wind direction is from the south.	

Question number	**Answer**	
Level	**Mark**	**Descriptor**
	0	No rewardable material.
Level 1	**1–3**	• Attempts to apply understanding to deconstruct information but understanding and connections are flawed. An unbalanced or incomplete argument that provides limited synthesis of understanding. Judgements that are supported by limited evidence. (AO3)

		• Uses some geographical skills to obtain information with limited relevance and accuracy, which supports few aspects of the argument. (AO4)
Level 2	**4–6**	• Applies understanding to deconstruct information and provide some logical connections between concepts. An imbalanced argument that synthesises mostly relevant understanding, but not entirely coherently, leading to judgements that are supported by evidence occasionally. (AO3) • Uses geographical skills to obtain accurate information that supports some aspects of the argument. (AO4)
Level 3	**7–8**	• Applies understanding to deconstruct information and provide logical connections between concepts throughout. A balanced, well-developed argument that synthesises relevant understanding coherently, leading to judgements that are supported by evidence throughout. (AO3) • Uses geographical skills to obtain accurate information that supports all aspects of the argument. (AO4)

QUESTION 6

Question number	Answer	Mark

5(a)	**AO4 (2 marks)** Award 1 mark for identifying a relevant risk and a further mark for development up to a maximum of two marks. • Slipping on wet/uneven ground (1) causing injury (1). • Water entering cuts (1) causing infection (1). • Getting lost (1) leading to distress/anxiety (1). • Getting wet and cold (1) causing hyperthermia (1). • Getting lost (1) so stayed in groups (1). • Slipping on rocks (1) so wore appropriate footwear/trainers/shoes with good grip (1). Accept any other acceptable response.	**(2)**

Question number	Answer	Mark
5(b)	**AO3 (2 marks) / AO4 (1 mark)** Award 1 mark for the initial data collection method and 2 marks for further explanation up to a maximum of 3 marks. • I measured gradient from waterline to top of beach (1) using a clinometer to measure the angle of slope (1) on both sides of a groyne to see how groynes affect the shape of the beach (1). • I selected 10 pebbles at each site randomly (1) and measured their longest axis (1) to see how size of pebbles changes from one end of the beach to the other (to see the impact of longshore drift/attrition/erosion) (1). • I selected 10 pebbles at each site (1) and recorded their shape (1) to see the difference between managed and unmanaged beaches (1). • I took photographs (1) to create a visual record of the changes from one end of the beach to the other (1) to remember the features of the landscape (1). Accept any other acceptable response.	**(3)**

Question number	Answer	Mark
5(c)	**AO3 (2 marks) / AO4 (2 marks)** Award 1 mark for the identification of a factor that increases	

	accuracy and a further mark for explanation up to a maximum of two marks each. • Used a protractor to draw the proportions on pie charts (1) to ensure the degrees equaled 360 (1). • Used a ruler to draw bars (1) to ensure each bar was the same width (1). • Used a consistent scale on the y axis (1) to ensure height/size was not distorted (1). • Ensured axis begun at zero (1) to avoid distorting the pattern on the graph (1). • Used a computer / Excel to plot data (1) to ensure points on the line graph were placed accurately (1).	**(4)**

Question number	Answer	Mark
5(d)	**AO3 (2 marks) / AO4 (1 mark)** Award 1 mark for the initial explanation and 2 marks for further explanation up to a maximum of 3 marks. • Not ensuring the measuring tape is pulled tight (1) results in the incorrect distance being measured (1) making it longer or shorter (1). • Placing the zero on the ruler inaccurately (1) can result in a smaller pebble length being recorded (1) which is not representative (1). • Not calibrating equipment (1) could mean it produces incorrect readings (1) which are not noticed (1). • Not lining the clinometer up accurately (1) with the correct boundary on the ranging poles (1) resulting in incorrect angles being recorded (1). • There were no anomalies in my data (1) because I used calibrated equipment (1) ensuring accuracy of my data (1). • Starting the stopwatch late (1) due to human error (1) meant the first seconds (of the orange moving) were missed (1). Accept any other acceptable response.	**(3)**

Question number	Answer	Mark
5(e)	**AO3 (4 marks)/AO4 (4 marks)** **Marking instructions** Markers must apply the descriptors in line with the general marking guidance and the qualities outlined in the level-based mark scheme below. **Indicative content guidance**	**(8)**

The indicative content below is not prescriptive, and candidates are not required to include all of it. Other relevant material not suggested below must also be credited.

This question is about evaluating the how well the secondary data supported the students' conclusion. The candidate needs to evaluate the strengths and weaknesses of the information shown in the secondary data source and make a judgement about the validity of the conclusion drawn.

AO3

- Geology maps show rock types of the landscape.
- Secondary sources can be out of date making information less reliable.
- Secondary sources will not show the exact sites the primary data is collected from.
- Time of year can affect the environment making primary and secondary sources very different.
- It is difficult to determine if secondary data was collected accurately.
- Hard rock coastlines are likely to show cliffs, headlands, arches.
- Soft rock coastlines are likely to show beaches, spits and lower lying coastlines.
- Depositional coastlines are likely to be managed using soft engineering.
- The conclusion reached states very little change but there is a clear dip in the middle of the beach making the conclusion less valid.
- There is no angle data making it hard to determine the validity of the conclusion.

AO4

- Figure 5 shows this coastline is located in an area of soft rock / unconsolidated sediments.
- Figure 5 shows a sandy beach environment.
- Figure 5 shows a comparison of the beach over a 3 year period.
- Figure 5 shows a small area is affected by erosion, areas either side look very similar.
- Figure 5 does not show angle data.
- Figure 5 shows less green vegetation in the 2010 image.
- Figure 5 shows the highlighted plant is much more exposed in the 2010 image.

Question number	Answer	
Level	**Mark**	**Descriptor**
	0	No rewardable material.

Level 1	**1–3**	• Attempts to apply understanding to deconstruct information but understanding and connections are flawed. An unbalanced or incomplete argument that provides limited synthesis of understanding. Judgements that are supported by limited evidence. (AO3) • Uses some geographical skills to obtain information with limited relevance and accuracy, which supports few aspects of the argument. (AO4)
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QUESTION 6

Question number	Answer	Mark