

Oxford Revise | Geography | Answers

Chapter 10 Coastal landscapes

All exemplar answers given are worth full marks.

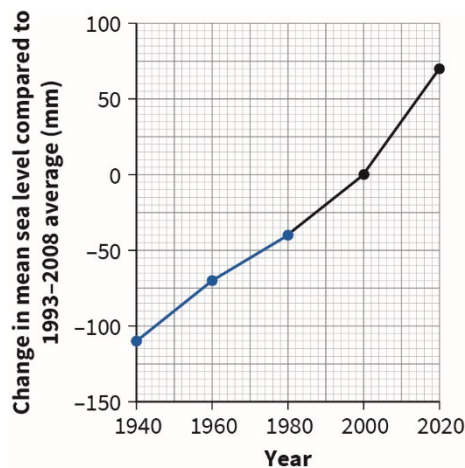
1

(a)

(i) 180 mm

(ii) 40 mmf

(iii) The graph should be completed as below:



(iv) Global mean sea levels, compared to the 1993–2008 average, have risen from -110 mm in 1940 to +70 mm in 2020. Furthermore, the rate of increase has increased marginally since the year 2000.

(b)

(i) Beach nourishment is the addition of sand or pebbles to an existing beach. Cliff regrading is reducing the angle of a cliff to improve its stability.

(ii) Beach nourishment is relatively cheap and easy to maintain, but it needs constant maintenance because of marine erosion.

(c) Sea walls are stone or concrete walls built at the cliff foot or at the beach top. They often have a curved face to reflect waves back to sea.

(d) This question is level-marked:

Level	Marks	Description
3	5–6	<ul style="list-style-type: none"> • Thorough knowledge, understanding or analysis of the issue, process or concept. • Uses well-developed ideas and line of reasoning is clear and logically structured. • Information presented is relevant and substantiated.
2	3–4	<ul style="list-style-type: none"> • Reasonable knowledge, understanding or analysis of the issue, process or concept. • Uses developed ideas and line of reasoning with some structure. • Information presented is mostly relevant and supported by some evidence.
1	1–2	<ul style="list-style-type: none"> • Basic knowledge, understanding or analysis of the issue, process or concept. • Uses simple ideas with no developed points made. • Information is basic, unstructured, and supported by limited evidence.
	0	No response or no response worth of credit.

Example answer: The rate of erosion of a coast will depend on its geology, its structure, and the type of wave approaching the coast. Variations in the resistance of the different rocks along the coast will result in the more resistant rocks forming headlands. The waves will bend around the headland and concentrate on attacking any weaknesses. Over time, the weakness will be enlarged by marine processes to form caves, arches, and eventually a stack and stump. In this way, the headland is worn away at the same time as the bays are filled in with deposits. Over geological time, a coastline will be worn away by cliff retreat as a wave-cut platform is created at the base. If the local geology is made up of unconsolidated glacial drift, then the rate of erosion can be very rapid. Parts of the east coast of England are being eroded by several metres a year. A concordant coast has the rock strata parallel to the coast. This results in a fairly straight coast. On a discordant coast, the rock strata are at an angle to the coast. This allows the less resistant rock to be eroded to form bays, leaving the more resistant rock sticking out as headlands. Destructive waves have a short wavelength and are high and steep. These waves have a strong backwash and a short swash and are found where the fetch is long, so they have travelled a long distance and there is a steep gradient offshore.

(e) Holderness, East Yorkshire

This soft rock coastline has one of the most rapid rates of erosion in Europe, with the loss of between 1 m and 10 m per year! Soft-engineering approaches have been trialled in the past, but such is the rate of erosion that expensive hard-engineering defences dominate in high-value locations such as Hornsea, Withernsea, Mappleton, and the Easington Gas Terminal. The tourist resort of Hornsea is defended by a curved-face concrete sea wall, wooden groynes, concrete revetments, gabions, and rock armour but, immediately south of the final defence, erosion of the boulder clay cliff has accelerated, threatening the static caravans and holiday homes on the cliff top. Rock armour protects the village of Mappleton and the main road south of Hornsea, but accelerated erosion further south has forced the abandonment of Cliff Top Farm. Such is the rapid rate of erosion and increasing threat from global warming-associated sea level rise that hard-engineering defence projects are still being built, such as recent further rock armour placements at both Withernsea and the nearby Easington Gas Terminal.

2

(a)

(i) 20 46

(ii) sports centre

(iii) 204 482

(iv) hotel 207 483 ; tourist information centre 202 476 ; caravan parks 21 46

(b)

(i) SW

(ii) D

(iii) NNW to SSE

(iv) The people owning the properties on the top of the cliff are likely to be in favour of the hard-engineering erosion measures. This is because without the protection the cliffs will be eroded, and their properties will fall into the sea.

(v) The groynes are stopping the natural movement of sediments along the coast and is maintaining the beach at Hornsea. Sand is a natural form of protection to the cliffs, reducing the effects of erosion by the sea. Beyond the last groyne, the shape of the coast shows the coast has been eroded further back compared with the coast further north next to Hornsea. This southern area is not receiving the sand, as it is stopped by the groynes. When waves cross a beach, they lose their energy due to friction. This means that they can attack the base of the cliff causing cliff recession.

(c) Coastal management will have positive and negative impacts, so a cost-benefit analysis is necessary to judge whether the strategy adopted is the most appropriate. Attempts to reduce coastal erosion can be beneficial for the development of tourism if groynes maintain the existence of a beach. On the other hand, locations further along the coast may be deprived of sand, with negative effects on the tourism industry and an increase in coastal erosion. Some hard-engineering strategies like sea walls may help protect an area from the sea, but they will have a negative visual impact. All coastal management strategies will cost money, but if the land away from the coast is not particularly valuable or productive, it may not be economically viable to undertake the work.

(d) An ICZM plan looks at a whole stretch of coastline rather than individual small stretches covering a particular beach or bay. This may reduce the possibility of a strategy put in place in one part of the coast having a negative impact on another. Where there is longshore drift, placing groynes on one part of the coast will deprive an area further along of a supply of sand, which could affect tourism and increase the rate of erosion. An ICZM may suggest that simpler, environmentally friendly soft-engineering strategies may prove as effective as a more expensive hard-engineering approach. This also means that it recognises there may be stretches of coast within the zone being considered where a do-nothing approach would be appropriate if the land inland is of limited economic value.

Questions referring to previous content

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(a)

(i) B

(ii) Abrasion; hydraulic action

(iii) Erosion will be concentrated on the weakest points where the caves have been formed. The erosion will be the result of the marine processes of hydraulic action, abrasion, and attrition. The caves will be enlarged until the sea breaks through to the other side of the headland, creating an arch. Eventually, the marine processes will result in the roof of the arch collapsing, leaving an isolated stack or stump. In time, the whole of the headland will be eroded away by the sea.