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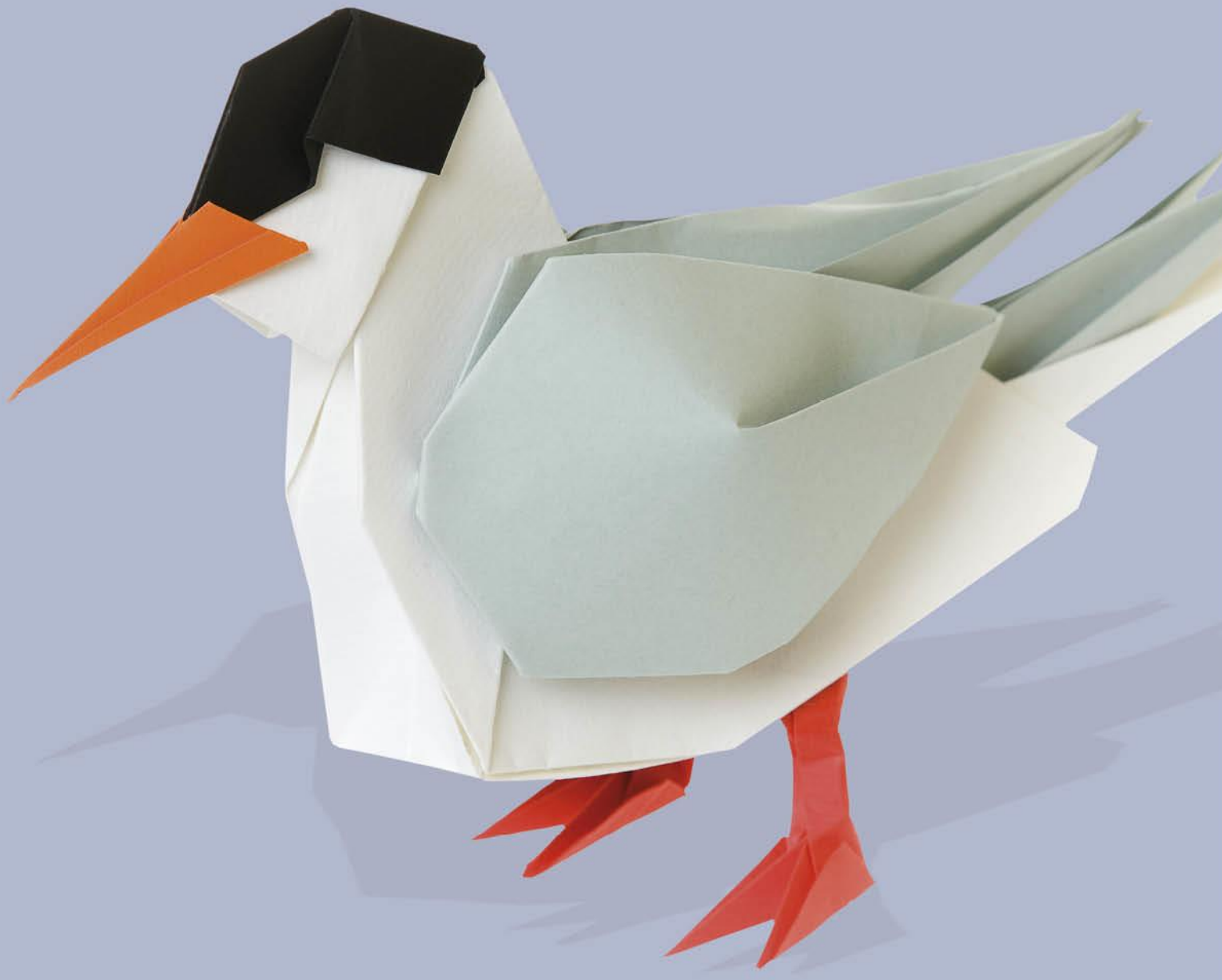
AS Geography Examiner Marked Student Responses

Paper 1: Dynamic Landscapes



Pearson Edexcel Level 3 Advanced Subsidiary GCE in Geography (8GE0)

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Examiner Marked Student Responses for Paper 1: Dynamic Landscapes

Contents

Introduction

This guide has been put together using student responses to our sample assessment materials in AS Geography Paper 1: Dynamic Landscapes (8GEO/01). The answers and examiner commentaries in this guide can be used to show the standards in the AS Geography assessment.

We use a mixture of question types throughout our exam papers, including:

- Multiple choice questions (MCQ)
- Short open response
- Calculation
- Open response
- Extended open response

Each question will always begin with accessible question items requiring lower order thinking skills that students can answer with confidence. Questions then ramp in demand, finishing with extended open response questions.

Our command words are defined in on page 57 of the AS Geography specification and will remain the same for the lifetime of the specification. Questions will only ever use a single command word and command words are used consistently across our question types and mark tariffs. Please see page 19 of our GCSE (9-1), AS and A level Geography assessments guide, which shows how our command words are linked to mark tariffs.

Our mark schemes show the marks available for each assessment objective (AO) tested by a question. There's a consistent approach across questions that test the same AOs so you and your students can focus on the geographical skills and understanding rather than the mechanics of individual questions. Indicative mark schemes are written for students so that they understand what's required for each assessment objective.

Levels-based mark schemes are used for extended-writing questions. Each level of descriptors articulates the AO skill characteristics that must be demonstrated in the response to achieve marks. The level descriptors will not change during the lifetime of the qualification. For each type of extended-writing question, there is a distinct set of levels-based mark schemes:

- 6-mark Explain
- 9-mark Fieldwork Assess
- 12-mark Assess
- 16-mark Synoptic Evaluate

Question 1: Tectonic Processes and Hazards

Example 1 – Question 1 (b) (i) & (ii)

(b) Study Figure 1 in the Resource Booklet.

Magnitude of earthquake	Region	Gross Domestic Product (GDP) per capita in $	Confirmed number of deaths
8.6	Coastal Northern Sumatra, Indonesia	3551	10
7.6	Costa Rica	9442	2
7.4	Oaxaca, Mexico	9817	1
6.4	North west Iran	6578	306
5.7	Hindu Kush, Afghanistan	664	75
5.5	Sichun-Yunnan, China	6092	81

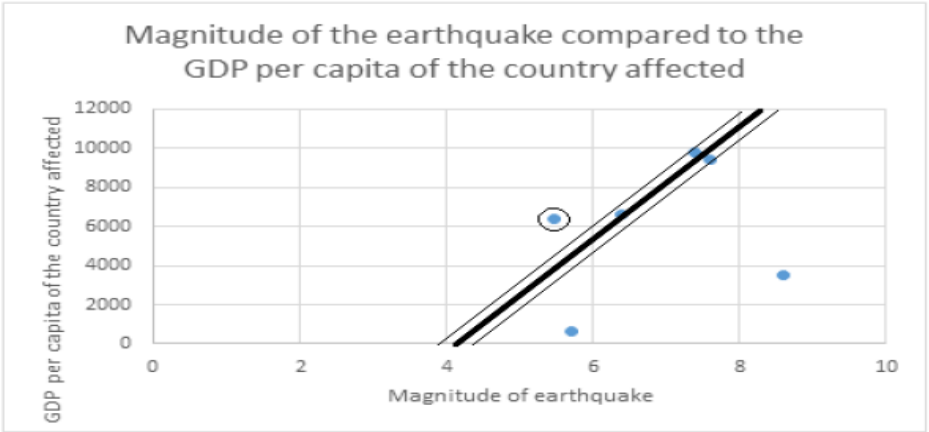
(Source: earthquake.usg.gov/earthquakes/eqarchives/year/2012/2012_deaths.php)

Figure 1: A table giving worldwide deaths from selected earthquakes in 2012

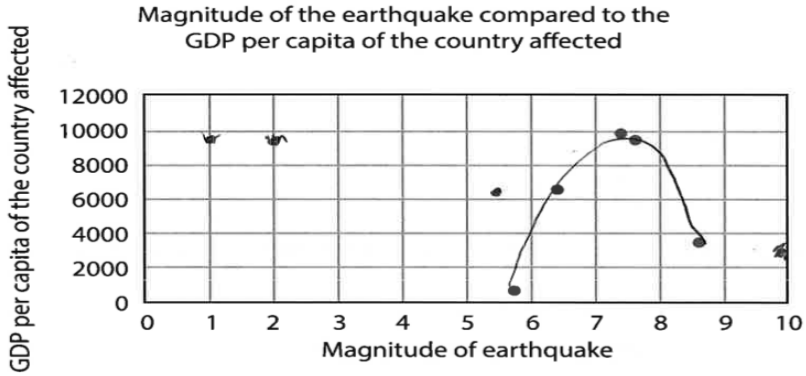
(i) Complete the scatter graph by adding the data for the earthquake of Sichun-Yunnan in China and then add a line of best fit.

(2)

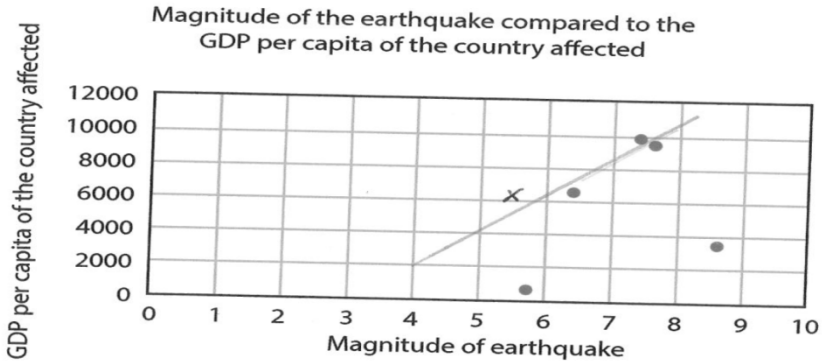
Mark scheme

Question number	Answer	Mark
1(b)(i)	**AO3 (2 marks)** Award **1** mark for the correctly plotted point and **1** mark for a correctly drawn line of best fit (allow within range shown). 	**(2)**

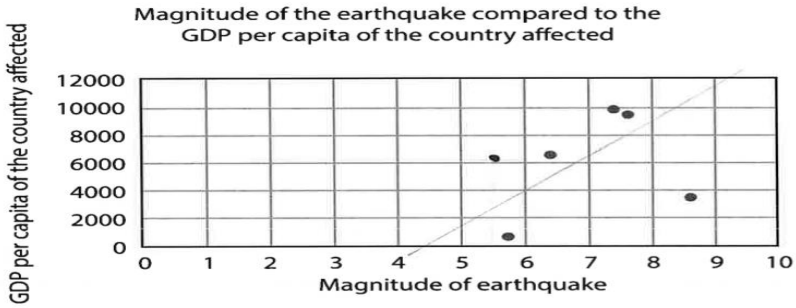
Student answers to 1 (b) (i)



Examiner´s comments
This response is awarded 1 mark (1 mark for the data entry and 0 for the line of best fit).



Examiner´s comments
This response is awarded 2 marks.



Examiner´s comments
This response is awarded 2 marks.

(ii) Suggest **one** reason why the more powerful earthquakes shown in Figure 1 did not cause the most deaths.

(3)

Mark scheme

Question number	Answer	Mark
1(b)(ii)	**AO1 (2 marks)/AO2 (1 mark)** Award **1** mark for analysing the resource to identify a possible reason for the death toll death and a further **2** marks for justifying the possible reason, for example: • some regions where most powerful earthquakes occur might have better transport links (1) and so aid/help takes little time to arrive (1), decreasing the likelihood that injured people become fatalities (1) • some regions might be richer and more developed than average for country (1) so possibly good infrastructure because of development (1) as well as aseismic buildings decreasing fatalities (1) • some regions might have a lower population density (1) so fewer people are exposed to the primary and secondary hazards of an earthquake (1) and less chance of being trapped by landslides (1) or collapsing buildings. Accept any other appropriate response.	(3)

Student answers to 1 (b) (ii)

Because the more powerful earthquakes hit in MEDCs which means they are more resiliant and are abele to cope better against disasters. They have stratagies put in place such as cross bracing on buildings

Examiner´s comments

This response is awarded 3 marks.

A 3 mark 'suggest' question can be awarded 1 AO2 mark (for a sensible reaction to the resource) and then 2 further AO1 marks for justifying the idea.

In this response the AO2 mark is awarded for noticing that the figure 1 shows that MEDCs are the most resilient. This is further developed by explaining that this means they can spend money on strategies, with an example of aseismic design (cross bracing), which constitute the two AO1 marks.

The reason some most powerful earthquakes would ~~dimet~~ cause the most deaths is because of their level of vulnerability. This can be effected by the infrastructure, building regulations and scientific knowledge e.g. early Warning Systems. If these are poor and there is no ~~for~~ by ~~these~~ then there will be more deaths.

Examiner´s comments

This response is awarded 2 marks.

Our definition of 'suggest' requires students to react to an unfamiliar scenario (in this case a dataset), and provide a reasoned explanation of why something might occur. It does not necessarily require data to be quoted. The dataset suggests that some of the most powerful earthquakes can occur in countries with high GDP, and one implication of a high GDP is the level of scientific knowledge and infrastructure. So the comment about level of vulnerability, together with building regulations and scientific knowledge represents a sensible suggestion, and this is awarded the one AO2 mark.

The answer is then justified by adding an example of the kind of infrastructure (early warning systems), and this piece of recalled understanding is awarded one of the AO1 marks, whilst the final sentence does not add further explanation. Further recalled knowledge would be needed for the other AO1 mark. In addition, some time could be gained by the candidate by leaving out the first few lines.

The more powerful earthquakes don't always cause the most deaths as it depends on ~~where~~ ~~it~~ ~~was~~ the area it has occured in, in terms of how prepared a place may be in withstanding the impact of an Earthquake. This is supported by the fact that Afganistan with a lower GDP than Mexico, experienced 75 deaths at a lower magnitude of 5.7 than Mexico which had a magnitude of 7.4, perhaps due to Mexico being able to afford better infrastructure than Afganistan.

Examiner´s comments
This response is awarded 2 marks.
The AO2 mark was awarded for the reaction to the resource that identified the level of preparation as a reason for the data in figure 1. The additional data quoted about Afghanistan cannot be awarded under the mark-scheme. However the explanation about better infrastructure is a correct justification for their idea about level of preparation. This explanation needed to be extended further to get the second AO1 mark. Alternatively, the candidate could have extended the idea about better preparation. Only 1 development of the idea is allowed.

Example 2 – Question 1 (c)

(c) Explain **two** reasons why the number of reported earthquakes has risen since 1960.

(4)

Mark scheme

Question number	Answer	Mark
1(c)	**AO1 (4 marks)** For each reason, award **1** mark for identifying a reason for the increase in the number of reported earthquakes, and a further mark for an appropriate expansion. For example: • increase in the number of recording stations (1) which means more earthquakes are detected which previously might have been missed in remote areas (1) • higher population densities (1), which leads to more reporting because areas are better 'covered' (1) • better (more reliable and accurate) detection equipment (1) so smaller magnitude earthquakes are detected which previously might have been missed (1). Accept any other appropriate response.	**(4)**

Student answers to 1 (c)

1 because they can now measure seismic activity is constantly being measured

2 It is much easier to communicate and report the earthquakes due to the improvement in technology.

Examiner´s comments
This response is awarded 2 marks.
This question is marked entirely based on knowledge recall (AO1), and requires two separate reasons to be firstly identified and then explained. However they do not necessarily have to be provided in the two separate spaces (1 and 2). In the space for the first reason, it is unclear what has changed, so no marks were awarded. In the space for the second reason, two ideas have been identified (communication, and improvements in technology), so the response is worth at least two marks. However neither idea has been extended to explain what they mean, so the mark is limited to 2. In addition, the idea about change in technology could also be more specific.

1 more advanced technology improves monitoring quality, which would recognise plate movement equating to a low-magnitude earthquake that could go unnoticed otherwise.
2 Broader/greater access to ICT provides 'coverage' when an event occurs, providing data for areas that were remote in terms of communication.

Examiner´s comments
This response is awarded 4 marks.
This response was much clearer. Technology and more access have been correctly identified. The explanation about the role of technology is much clearer. Centres should note that it is not possible to get 3 marks from 1 idea when the question begins 'Explain two reasons'.

1 There is more access to technology allowing earthquakes to be easily documented and uploaded to the internet for the world to see instantaneously

2 There is a higher population in general resulting in more people being affected by the earthquake so more reporting is taking place

Examiner´s comments
This response is awarded 3 marks.
In the first reason, the comment about technology is extended to explain that earthquake occurrence can be documented and shared. The second reason is distinctly different (higher population), but the extension is weaker because it does not clarify why more people are affected. For example, they could be choosing (or forced) to live in risky locations, or live in cheap / non-reinforced housing which means they are more likely to be affected by an earthquake and therefore report less strong earthquakes. Note that 'more reporting' is a repeated idea from the first part of the answer.

Example 3 – Question 1 (d)

(d) Explain the causes of tsunamis.

(6)

Mark scheme

Question number	Answer
1(d)	**AO1 (6 marks)** **Marking instructions** Markers must apply the descriptors in line with the general marking guidance and the qualities outlined in the levels-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. Relevant points may include: • tsunami waves are caused by the displacement of large quantities (columns) of water • earthquakes displace water when movement causes the seabed to thrust upwards undersea landslides displace water when material falls from a continental shelf on to the seabed • volcanic eruptions displace water when material ejected from the volcano falls into the sea • landslides displace water when large quantities of water are displaced by land falling into the sea • the displaced water becomes tsunami waves and as the waves reach shallower water in coastal areas (as the topography of the seabed changes) the waves become higher • in shallower water the friction between the tsunami wave and the seabed increases and the tsunami wave slows down, decreasing wavelength but increasing wave height.

Level	Mark	Descriptor
	0	No rewardable material.
Level 1	**1–2**	• Demonstrates isolated elements of geographical knowledge and understanding, some of which may be inaccurate or irrelevant. (AO1) • Understanding addresses a narrow range of geographical ideas, which lack detail. (AO1)
Level 2	**3–4**	• Demonstrates geographical knowledge and understanding, which is mostly relevant and may include some inaccuracies. (AO1) • Understanding addresses a range of geographical ideas, which are not fully detailed and/or developed. (AO1)
Level 3	**5–6**	• Demonstrates accurate and relevant geographical knowledge and understanding throughout. (AO1) • Understanding addresses a broad range of geographical ideas, which are detailed and fully developed. (AO1)

Student answers to 1 (d)

~~The most~~ Tsuanis are caused directly by the plate tectonic movement or indirectly by a disaster that has already happened due to plate tectonics. Tsuanis can occur on constructive plate boundrys as the 2 plates move away from each other causing the seabed floor to move and consequently causing water displacement that creates a tsuani due to the big energy released. An Tsuani can occur after an earthquake as the tremors and seismic waves can loosen up rock that can come loose and cause a landslide. The landslide can be so big that when it falls into the sea it creates a wave.

Examiner´s comments
This response is awarded 4 marks.
6-mark explain answers are based on recall of knowledge and understanding (AO1), but are marked using levels to distinguish between responses based on the range of concepts that make up that explanation, how well they are linked and the amount of specific detail and keywords used.
The response here has a number of conceptual errors but gets better as it goes on by talking about multiple causes of tsunami events (plate boundary movement and landslides). This means that is more than just a narrow range of ideas, but because ideas need further development (e.g. how wave shape changes because of sea bed shelving) and inaccuracies checked, the response definitely fits the criteria for Level 2.

A tsunami is cause by a displacement in the sea bed due to either a volcanic eruption, earthquake, or underwater landslide. This displacement in the seabed cause the water level to rise in the area of the ocean. Therefore the water displacement disperses away from the location of the event in a series of waves which go into the ocean.
A volcanic eruption can cause a tsunami event if the crater falls into the ocean such as in the case of mount Etna. This will displace the water away from the volcano due to sea bed displacement. Large earthquakes (over a magnitude of 6/7) can also cause tsunami such as the Indian ocean tsunami 2004 by disrupting the sea bed which can rise and fall due to the dispersion of pressure. Finally, landslides work in a similar method to the volcanic eruption.

Examiner´s comments
This response is awarded 4 marks.
It correctly identifies the role of displaced seawater in the formation of tsunamis, however it tends to repeat this idea. By talking about a displacement series of waves and reference to landslide, the response has enough range of ideas to justify being Level 2. The response could be improved by extending the ideas about waves to show how they change as they start to reach land.

A tsunami can either be caused by a volcanic eruption, an underwater landslide or an earthquake on the ocean floor. A tsunami is formed at a plate boundary where the dense oceanic crust subducts under the less dense continental crust. Melting temperatures are lowered in the asthenosphere because of the addition of sea water into the ocean trench. Earthquakes cause the seabed to thrust upwards. The hypocentre is located in the Benioff zone. The tsunami waves are caused by the displacement of the water column. The displaced water then becomes the tsunami waves. The waves radiate outwards from the epicentre which travel at about 800km per hour. The waves of the tsunami have a low amplitude and are barely detectable in open deep water as the tsunami moves through the depth of the water. When the waves move towards shallow water, wave shoaling occurs as there is increased friction with the seabed. The wavelengths shorten as there is less water to move through and the amplitude increases as there are massive amounts of energy being compressed. The amplitude increases until there is a threshold for the wave to break.

Examiner´s comments
This response is awarded 6 marks.
This response is much stronger. Although some of the ideas in the first few lines are irrelevant (e.g. asthenosphere melting and Benioff zones), the subsequent outlining of key ideas as a chain of events (e.g. displacement, waves radiate outwards, amplitude, shelving, wavelength detail, speed, crest breaking) are both accurate, relevant to the question and show a range of ideas. The crucial detail that sets the response apart is in the last 4-5 lines.

Example 4 – Question 1 (e)

(e) Assess the significance of earthquake hazard profiles in relation to the effectiveness of management strategies.

(12)

Mark scheme

Question number	Answer
1(e)	**AO1 (3 marks)/AO2 (9 marks)** **Marking instructions** Markers must apply the descriptors in line with the general marking guidance and the qualities outlined in the levels-based mark scheme below. Responses that demonstrate **only** AO1 without any AO2 should be awarded marks as follows: • Level 1 AO1 performance: 1 mark • Level 2 AO1 performance: 2 marks • Level 3 AO1 performance: 3 marks. **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. Relevant points may include: **AO1** • hazard profiles relate to the magnitude, speed of onset, areal extent, duration, frequency and spatial predictability of earthquakes • management strategies include modifying the event through land-use zoning and hazard-resistant design • management strategies include modifying the vulnerability and resilience of a population through education and community preparedness • management strategies include modifying the loss which includes emergency, short- and longer-term aid and insurance, and the actions of affected communities themselves **AO2** • the magnitude of an earthquake can be the most important factor in determining the success of modifying the event management strategies as even in MEDC that have invested heavily, such approaches cannot cope with mega earthquake events as the Tohoku earthquake in 2011 demonstrated • in contrast, smaller earthquakes can be managed more effectively, even with basic aseismic buildings such as beams and columns, such as the reduced impacts in Chile • the areal extent of an earthquake can also be a vital factor as it not only determines the number of people affected but also, crucially, can determine the success of modifying the loss, as the larger the area the more difficult it is for the existing emergency services to reduce the loss of the earthquake event, as the Sichuan earthquake of China that devastated a large area demonstrated • conversely, a small areal extent allows the emergency services to reduce the loss by concentrating resources in a smaller area as the Christchurch earthquake of 2011 demonstrated • the frequency of earthquakes is also a key factor in determining the success of modifying the vulnerability of the population as the more frequent the earthquake the more likely the community is likely to be

Question number	Answer
	educated and aware of the hazard threat as demonstrated by the relatively low impacts of the San Francisco 1989 and Los Angles 1994 earthquake events showed • conversely, a low frequency can reduce the awareness of the hazard risk as shown in the Kobe earthquake of 1995 which was an area chosen by Japanese planners to resettle survivors of the Tokyo earthquake of 1923 due to the low number of recorded earthquakes in the area. The subsequent earthquake highlighted the failure of the management strategies in the Kobe region • the level of economic development is, however, a vital factor as it determines whether areas can afford to implement all three types of strategies as the example of Haiti 2010 shows.

Level	Mark	Descriptor
	0	No rewardable material.
Level 1	**1–4**	• Demonstrates isolated elements of geographical knowledge and understanding, some of which may be inaccurate or irrelevant. (AO1) • Applies knowledge and understanding of geographical information/ideas, making limited logical connections/relationships. (AO2) • Applies knowledge and understanding of geographical information/ideas to produce an interpretation with limited relevance and/or support. (AO2) • Applies knowledge and understanding of geographical information/ideas to make unsupported or generic judgements about the significance of few factors, leading to an argument is unbalanced or lacks coherence. (AO2)
Level 2	**5–8**	• Demonstrates geographical knowledge and understanding, which is mostly relevant and may include some inaccuracies. (AO1) • Applies knowledge and understanding of geographical information/ideas logically, making some relevant connections/relationships. (AO2) • Applies knowledge and understanding of geographical information/ideas to produce a partial but coherent interpretation that is mostly relevant and supported by evidence. (AO2) • Applies knowledge and understanding of geographical information/ideas to make judgements about the significance of some factors, to produce an argument that may be unbalanced or partially coherent. (AO2)
Level 3	**9–12**	• Demonstrates accurate and relevant geographical knowledge and understanding throughout. (AO1) • Applies knowledge and understanding of geographical information/ideas logically, making relevant connections/relationships. (AO2) • Applies knowledge and understanding of geographical information/ideas to produce a full and coherent interpretation that is relevant and supported by evidence. (AO2) • Applies knowledge and understanding of geographical information/ideas to make supported judgements about the significance of factors throughout the response, leading to a balanced and coherent argument. (AO2)

Student answers to 1 (e)

#Hazard profiling of earthquakes is a method of comparing the cause and effects of earthquakes in relation to their Scale Size as well as other factors including amount of damage. This therefore also allows the comparing of management strategies as the impacts would be much less severe if suitable strategies were enforced before the earthquake.

Firstly, the Indian Ocean Earthquake in 2004 and its subsequent ts-nami is one of the most devastating events in human history. Causing a large amount of damage and loss of life. It was a magnitude 9.0 earthquake on the richter scale and its ts-nami was a XII (12) on the ts-nami intensity scale. therefore on its hazard profile it would be seen as a large scale. This cannot be changed by management strategies since it is a natural occurance. However the impacts were severe due to the lack of an efficent strategy to dope with the impacts, such as an early warning system or any evacuation and safety planning. Therefore its hazard management was not very effective and so therefore the ts-nami affected and killed a large number of people. This meant that its hazard profile would be largly towards the right side of the scale due to its large effects. This can be compared to the Tohoku earthquake and ts-nami of 2011 which was of the same scale and magnitude compared to the Indian ocean earthq-ke. Howeve

had much lessened effects in comparision, with 19,785 deaths compared to around 300,000. This is due to evacuation drills and plans enforced by the Japanese goverment. As well as having earthquake proof buildings and a ts-nami early warning system. And though this warning

(Total for Question 1 = 28 marks)

TOTAL FOR SECTION A = 28 MARKS

Plan:

Hazard profile: Scale

Examiner´s comments

This response is awarded 7 marks.

12 mark assess questions are marked based on levels-criteria, formed from a mix of subject recall (AO1, 3 marks) and ability to think and manipulate the question (AO2, 9 marks). The response here tends to be more descriptive (AO1) and needs to do some analysis to score higher marks (AO2)

However there are some attempts to answer the 'assess' part of the question by making some judgements about how wealth affects the effectiveness of management strategies. This fits against the 'partial but coherent' interpretation in the mark scheme. In order to assess throughout the answer, it would be helpful for the candidate to have identified other factors that affect effectiveness and consider if they were more or less helpful than hazard profiles.

There are also some inaccuracies in the response (for example, the candidate has a slightly incorrect understanding of hazard profiles and needs to focus more on the physical geography characteristics of earthquakes).

The answer finishes quite abruptly and centres are reminded about the need to make it obvious to examiners if material exists elsewhere in the paper booklets.

Overall this is a strong Level 2 answer.

Earthquake hazard profiles are able to give us a moderate insight to a hazard that had taken place since they include factors such as magnitude, speed of onset, duration, spatial area, deaths etc. When taken into consideration, this is the type of information required to implement successful management strategies. High magnitude earthquakes are likely to overwhelm even the best management strategies. A clear example of this is the Tokyo hazard. It could be considered that one would need to know the magnitude of an event to comprehend how successful you could be when changing the management strategies. Hazard profiles can however be considered to be somewhat unreliable and therefore not so useful in effect to the management strategies. An example of this could be that if an earthquake was generally small and not so dangerous, the way in which this could be managed would definitely be different to a larger earthquake. You wouldn't need the more complex management strategies to deal with small hazards - so it could be classed as irrelevant. The areal extent is rather significant to the effectiveness of management strategies as it allows you to judge how loss was minimised. Christchurch is an example of a smaller area that had been affected and this then generally means that aid and services can reach and be distributed in an area quickly and equally,

without having wasted much time. The hazard profile does generally have an effect on management strategies as it allows you to cater for the earthquake and help maintain aid, although could be misleading if you focus on one scale - as this could also be difficult to compare.

Examiner´s comments

This response is awarded 8 marks.

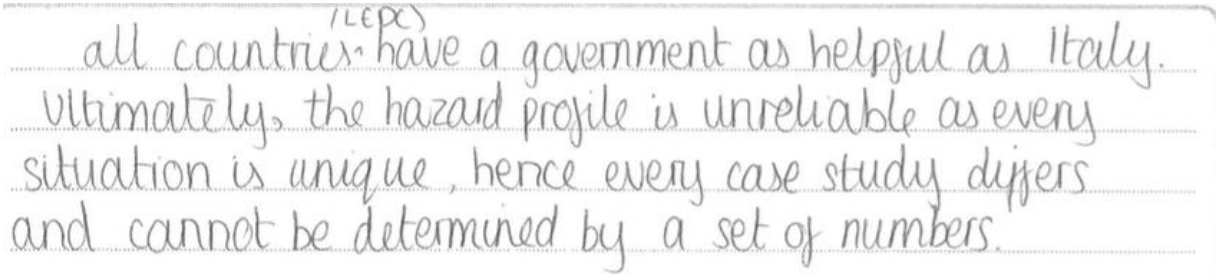
This is a good example of a response that correctly identifies the components of hazard profiles towards the beginning. It uses these components to start judging how usefully they helped earthquake management (e.g. areal extent). However it needed much stronger understanding of different management strategies to help it get more than Level 2.

The response did identify some potential examples (Christchurch and Tokyo), but more detail about these places is required to demonstrate accurate geographical knowledge (AO1). Centres are advised to help candidates remember to includes a couple of key facts about geographical context when teaching so that responses are rooted in real world situations, rather than remaining just theoretical.

Earthquake hazard profiles assess the magnitude, speed of onset, duration, frequency, spatial area, damage costs, deaths, recovery rate and random spatial prediction. By measuring the frequency of an earthquake, high frequency areas allows communities to be more prepared as a result of education and awareness of the hazard. This not only helps decrease the severity but also modify the vulnerability of the people. For instance the earthquakes in California had little impact (Los Angeles 1994) in comparison to Bam, Ethiopia. However, due to the fact that communities are always prepared they may become hazard fatigued and not assess a situation with as much importance it needs.

Although there are many factors taken into consideration when managing strategies, creating a standardised scale of measurement is difficult when comparing different events since each player's opinion varies, reaching an objective conclusion is hard to achieve.

However, economic development may be the most important factor as it dictates if a country can afford the strategies proposed - it is perhaps the most realistic factor considered. For example when the threat for Mount Etna is high, the national governance of Catania gives financial assistance (£5-6 million) to account for losses in agriculture. Not


all countries (LEDC) have a government as helpful as Italy. Ultimately, the hazard profile is unreliable as every situation is unique, hence every case study differs and cannot be determined by a set of numbers.

Examiner´s comments

This response is awarded 10 marks.

This response was significantly better. It had a clear understanding of the question, and utilised knowledge about different components of hazard profiles and different hazard management strategies to make judgements about the effectiveness of hazard profiles. This helped the response be awarded Level 3. To get higher marks, paragraphs could be clearer, e.g. about standardised scale of measurement, or more specific e.g. expanding the idea about governance in Catania. By providing a contrasting point, they could have shown more effectively that lack of governance is often more important than the hazard profile characteristics.

The answer had well chosen examples (California, Bam, Catania), however it assumes that we know what happened in these events and therefore needed a touch more detail about them to going beyond Level 2 for AO1.

Centres could help students to answer this kind of question by asking them to firstly to recall consider 3 aspects of hazard profiles and 3 aspects of hazard management. Students could then be challenged to work systematically through each hazard profile component and consider whether it helps each aspect of hazard management in turn. A 3 by 3 grid would help students to be systematic in their thinking. The number of 'yes' and 'no' answers would, in turn, help them decide how effective hazard profiles, particularly if there are different examples they can use to justify their decisions. Other approaches to the answer could be equally effective.

Overall, in this answer AO1 is 2 marks because the level of detail is limited. AO2 is 8 marks because of the reasons outlined above.

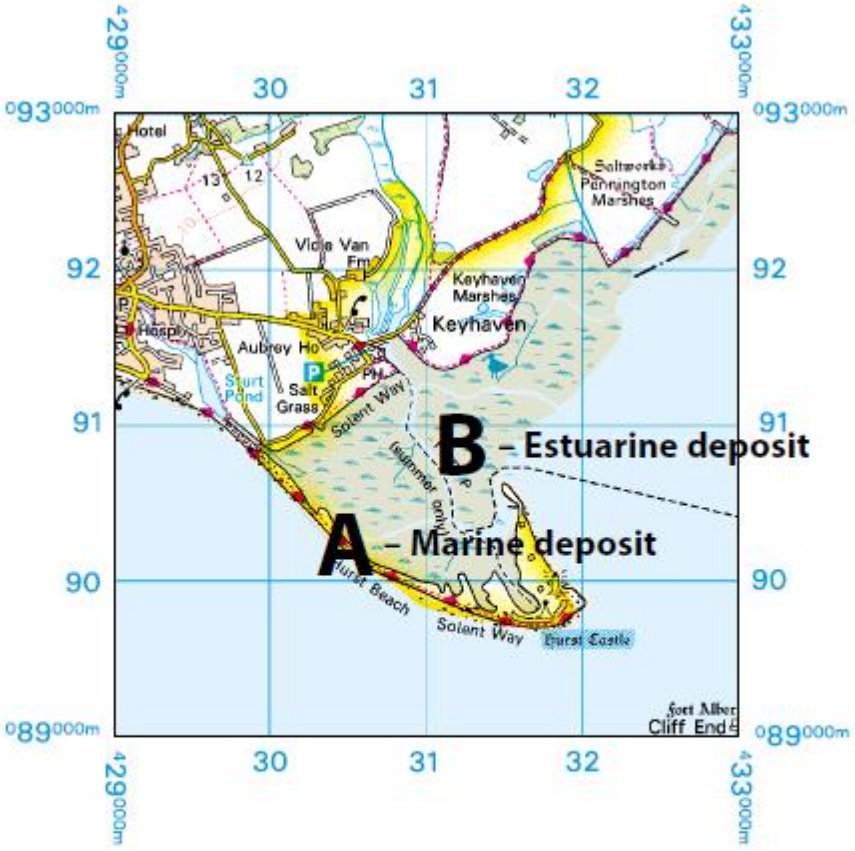
Question 5: Coastal Landscapes and Change

Example 5 – Question 5 (b) (iii)

(b) Study Figure 5 in the Resource Booklet.

(iii) Suggest one reason for the differences in the characteristics of the sediment found at A and the sediment found at B.

(3)



(Source: Extract produced by Ordnance Survey 2015.
© Crown copyright 2014. All rights reserved)

Figure 5: A 1:50000 scale map extract showing Hurst Castle, a coastal landform on the south coast of England

Mark scheme

Question number	Answer	Mark
5(b)(iii)	**AO1 (2 marks)/AO2 (1 mark)** Award **1** mark for using map evidence to identify a difference between the sediment characteristics of A and B and a further **2** marks for explaining why this is the case. • Site A is likely to be larger (1)/or more angular (1) as it is derived from mass movement (1)/or erosion (1) from the coast and then transported along the coast through longshore drift (1)/or currents (1)/or tides (1). • Site B is likely to smaller (1) as it is a fluvial deposit (1) and so transported by a river and then deposited through flocculation (1). Accept any other appropriate response.	(3)

Student answers to 5 (b) (iii)

A is on a spit and will be made out of sand and sediment, the spit has been made through marine erosion and longshore drift. Where as B is an the salt marsh which is made up of silt that has been deposited by the river.

Examiner´s comments

This response is awarded 1 mark.

This response does not offer any suggestion about sediment characteristics (shape and size). However it does offer a sensible suggestion about why they might be different (marine erosion and longshore drift as opposed to river deposition).

At A it is a Spit, where the land is made of Sand and sediment caused by longshore drift. This sediment comes from Marine Erosion. However at B it comes from a salt marsh, which is typically silt. This sediment comes from rivers and settles behind the spits in still water.

Examiner´s comments
This response is awarded 2 marks.
1 mark is awarded for identifying the type of sediment that is found at a spit (sand) and a salt marsh (silt) (AO2). The candidate explains that the sediment characteristics will reflect river deposition and longshore drift, however they do not make a link to the sediment shape or size, and so 2 marks are awarded overall, 1 for AO1 and 1 for AO2.

A is marine deposit which is deposit from the ocean when it erodes the foot of a cliff, meaning the deposition will be much larger than the deposition from point B which is ~~deposit~~ Estuarine deposit, coming from a river, meaning the deposition will be smaller due to the deposition bouncing along the floor and into each other, making them smaller.

Examiner´s comments
This response is awarded 3 marks.
This response reflects the mark scheme a little more obviously. 1 mark is awarded for identifying that sediment at location B is likely to be smaller (AO2), and then identifying that estuarine deposits are the reason, and how bouncing (saltation) will make the sediment smaller (AO1).

Example 6 – Question 5 (c)

(c) Explain **two** processes in the formation of offshore bars.

(4)

Mark scheme

Question number	Answer	Mark
5(c)	**AO1 (4 marks)** For each process, award **1** mark for identifying the process and a further mark for an explaining how it forms offshore bars, for example: • offshore bars can be created when waves approach the shore and break on a submerged bar (1) depositing the larger material that they are carrying and so accrete vertically (1) • offshore bars are created when sediment being carried along the coast through longshore drift (1) enters a low-energy part of the sediment cell (1) and so is deposited in submerged bars parallel to the shore (1) • channel-mouth bars are formed where rivers enter the sea, resulting in a drop in river velocity (1) leading to the deposition of river bed load (1). Accept any other appropriate response.	**(4)**

Student answers to 5 (c)

(c) Explain **two** processes in the formation of offshore bars. (4)

1 Destruchie waves break out at sea, losing energy therefore depositing sediment creating the off shore Bar

2 long shore drift slows down, which deposits sand.

Examiner´s comments

This response is awarded 2 marks.

4 mark explain questions are factual recall questions (AO1). In this case two processes are required, each followed by explanation.

The first half of the response scores 1 mark for identifying the deposition of material, however it does not explain why this happens, i.e. why destructive waves have broken.

The second half scores 1 mark for identifying the role of longshore drift slowing down.

1 Longshore drift transports sediment along a beach due to swash and backwash along a coast. However, if Longshore drift slows down and the waves lose energy (due to a nearby river) sediment is deposited offshore as a bar.

2 Destructive waves break out at sea and erode the seabed where they have broke. The waves no longer have enough energy to transport the sediment elsewhere, so it remains deposited offshore as a bar.

Examiner´s comments
This response is awarded 1 mark.
The first half of the response is not sufficiently clear to score 2 marks. Rather, the answer explains spit formation.
The second half correctly identifies that material is deposited in the sea.

1 Destructive waves breaking out at sea and deposits sand.

2 Long shore drift slows down and deposits sand.

Examiner´s comments
This response is awarded 0 marks.
This response is insufficiently clear to score any marks. An explanation is needed as to why waves break at sea or why material is deposited.

Example 7 – Question 5 (d)

(d) Explain how geological structure affects the development of coastal landforms.

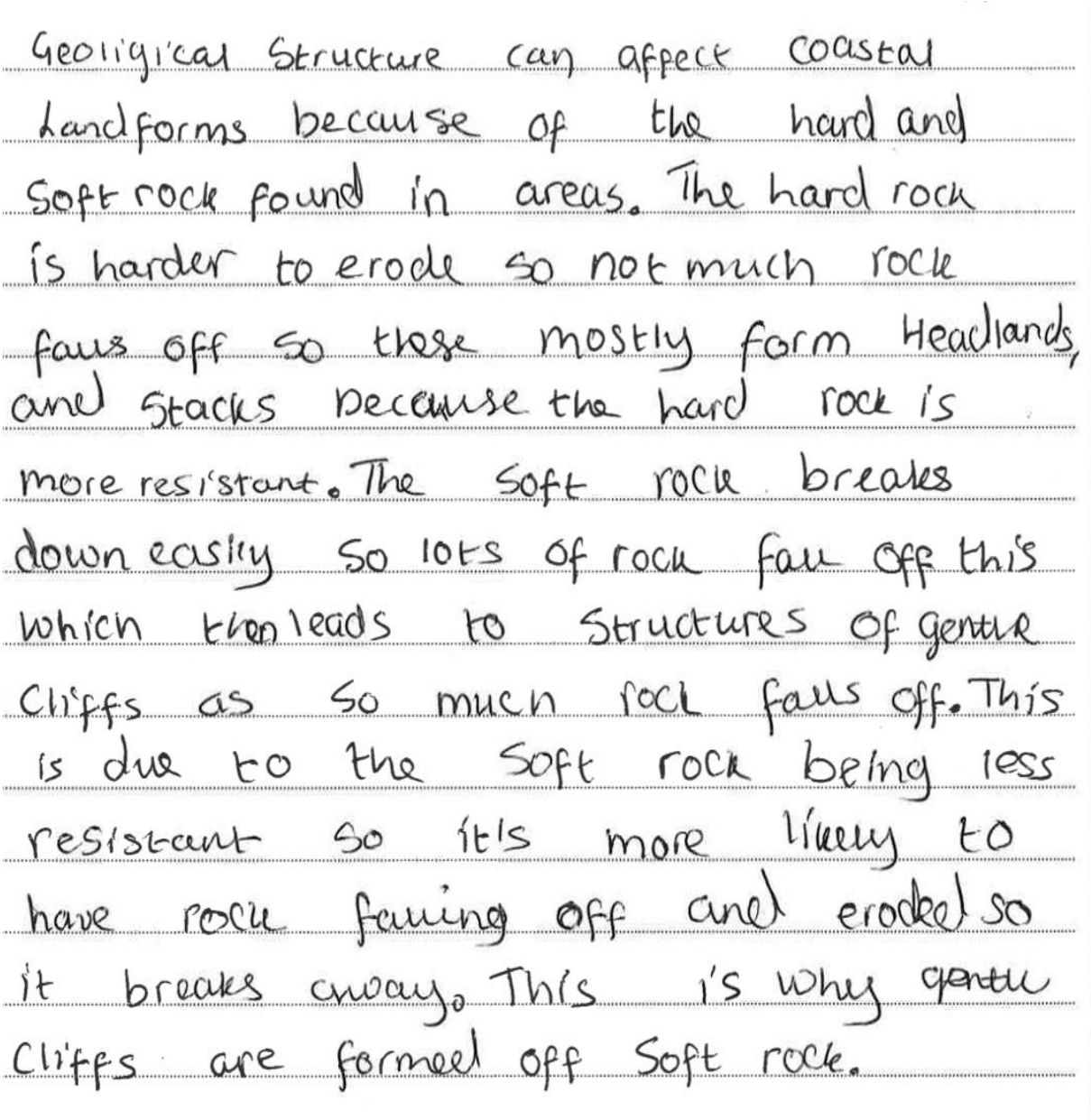
(6)

Mark scheme

Question number	Answer
5(d)	**AO1 (6 marks)** **Marking instructions** Markers must apply the descriptors in line with the general marking guidance and the qualities outlined in the levels-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. Relevant points may include: • geological structure can refer to concordant and discordant coasts • geological structure can also refer to the lithology and structure of rocks • concordant coasts are where the geology runs parallel to the coast and is associated with landforms such as coves as well as Dalmatian and Haff type coastlines • in some cases, such as at Lulworth Cove, the band of resistant rock can be exploited by fluvial erosion • complex depositional features such as spits are more likely to be found on concordant coasts where longshore drift can operate • discordant coasts are where the geology runs at right angles to the coast and creates landforms such as bays and headlands reflecting variations in rock resistance • the horizontal bedding of resistant rocks such as sandstone leads to vertical cliffs • the exact profile of vertical cliffs can also be determined by the joint pattern of the rock, as well-jointed granite or limestone creating blocky profiles.

Level	Mark	Descriptor
	0	No rewardable material.
Level 1	**1–2**	• Demonstrates isolated elements of geographical knowledge and understanding, some of which may be inaccurate or irrelevant. (AO1) • Understanding addresses a narrow range of geographical ideas, which lack detail. (AO1)
Level 2	**3–4**	• Demonstrates geographical knowledge and understanding, which is mostly relevant and may include some inaccuracies. (AO1) • Understanding addresses a range of geographical ideas, which are not fully detailed and/or developed. (AO1)
Level 3	**5–6**	• Demonstrates accurate and relevant geographical knowledge and understanding throughout. (AO1) • Understanding addresses a broad range of geographical ideas, which are detailed and fully developed. (AO1)

Student answers to 5 (d)



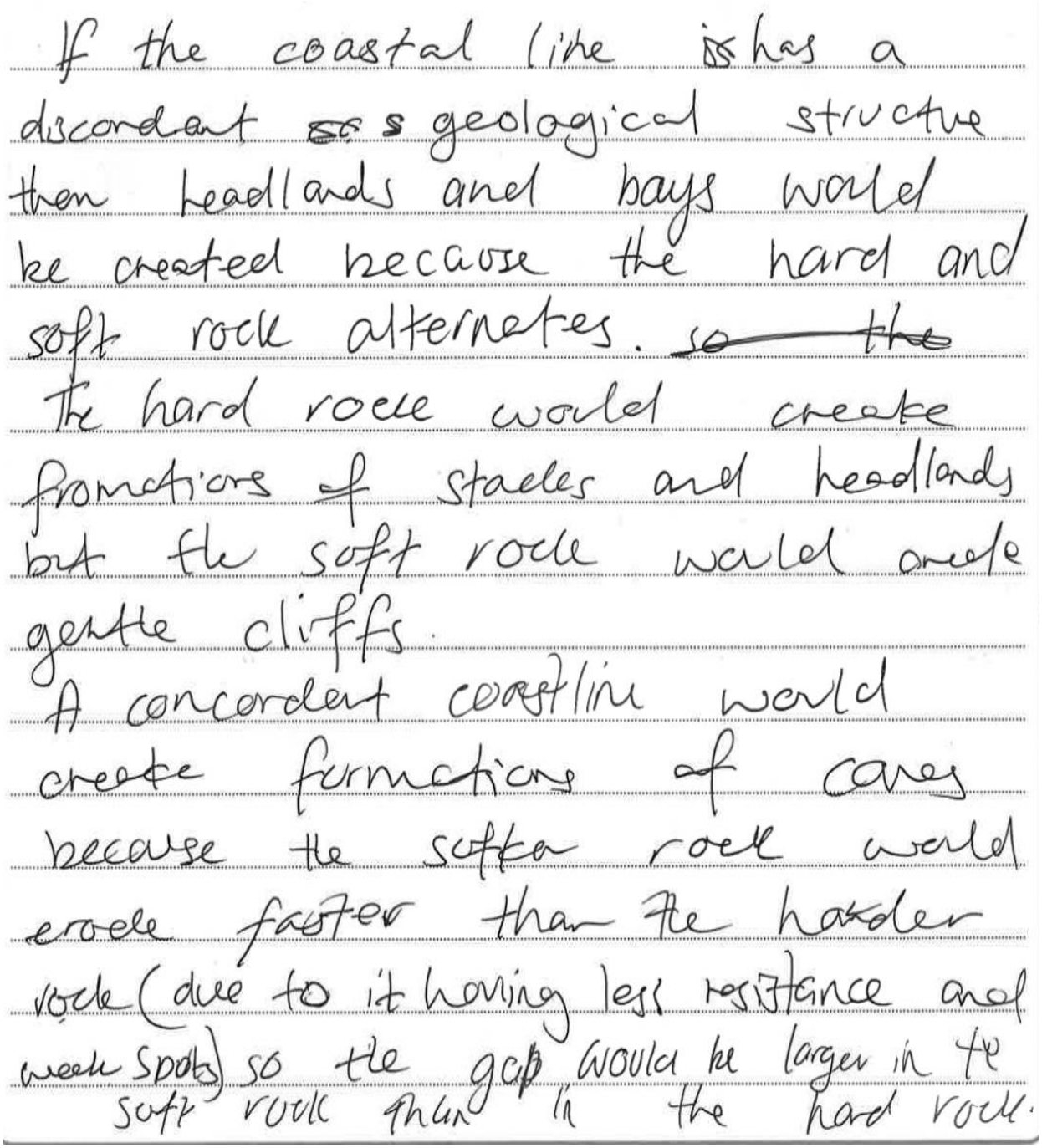
Geological Structure can affect coastal landforms because of the hard and soft rock found in areas. The hard rock is harder to erode so not much rock falls off so these mostly form Headlands and Stacks because the hard rock is more resistant. The soft rock breaks down easily so lots of rock fall off this which then leads to Structures of gentle Cliffs as so much rock falls off. This is due to the soft rock being less resistant so it's more likely to have rock falling off and eroded so it breaks away. This is why gentle Cliffs are formed off Soft rock.

Examiner´s comments

This response is awarded 2 marks.

On 6 mark explain questions, candidates need to identify a series of reasons and spell out why they are important.

This response identifies the role of hard and soft rock and implies a discordant coastline where headlands are formed from the harder rock which over time becomes stacks. The knowledge is relevant to the question, but is not that detailed and the ideas are not developed. In particular it does not clearly go onto explain the formation of coastal landforms. As a result the response scores Level 1, but the higher end, i.e. 2 marks overall.



If the coastal line has a discordant geological structure then headlands and bays would be created because the hard and soft rock alternates. The hard rock would create formations of stacks and headlands but the soft rock would create gentle cliffs.
A concordant coastline would create formations of caves because the softer rock would erode faster than the harder rock (due to it having less resistance and weak spots) so the gap would be larger in the soft rock than in the hard rock.

Examiner´s comments
This response is awarded 3 marks.
This response explicitly identifies discordant geological structure and how this results in alternating hard and soft work. It contrasts this with concordant but, although it starts to link these differences to landforms, it doesn't really explain these correctly, i.e. there are some inaccuracies. Because it starts to develop ideas, this response is slightly better than the previous one.

The lithology of a coastline can affect the formation of landforms. If the rock is harder, it will erode much slower than softer rock and the landforms will differ. Bedding planes (layers of different rock) can also affect the coastal landforms. A wave cut notch is more likely to form at a bedding plane and a wave cut platform may also form. Different coastal landforms occur at concordent or discordent coastlines. A concordent coast ans parralled to the sea and a cave will form. Headlands and bays occur at discordent coasts as they are perpendicular to the sea.

Examiner´s comments

This response is awarded 4 marks.

This response starts to identify a couple of other factors (e.g. bedding planes) and the likelihood that wave-cut notches might occur as a result, as well as headlands and bays (and associated different rates of erosion). There is a range of ideas in this response, all of which are relevant, although the explanations could be developed more, for example commenting that the bedding planes increase susceptibility to hydraulic action / rock breakdown resulting in more rapid coastal retreat. The response scores 4 marks, the top of Level 2.

Example 8 – Question 5 (e)

(e) Assess the importance of lithology in influencing the rate of coastal recession.

(12)

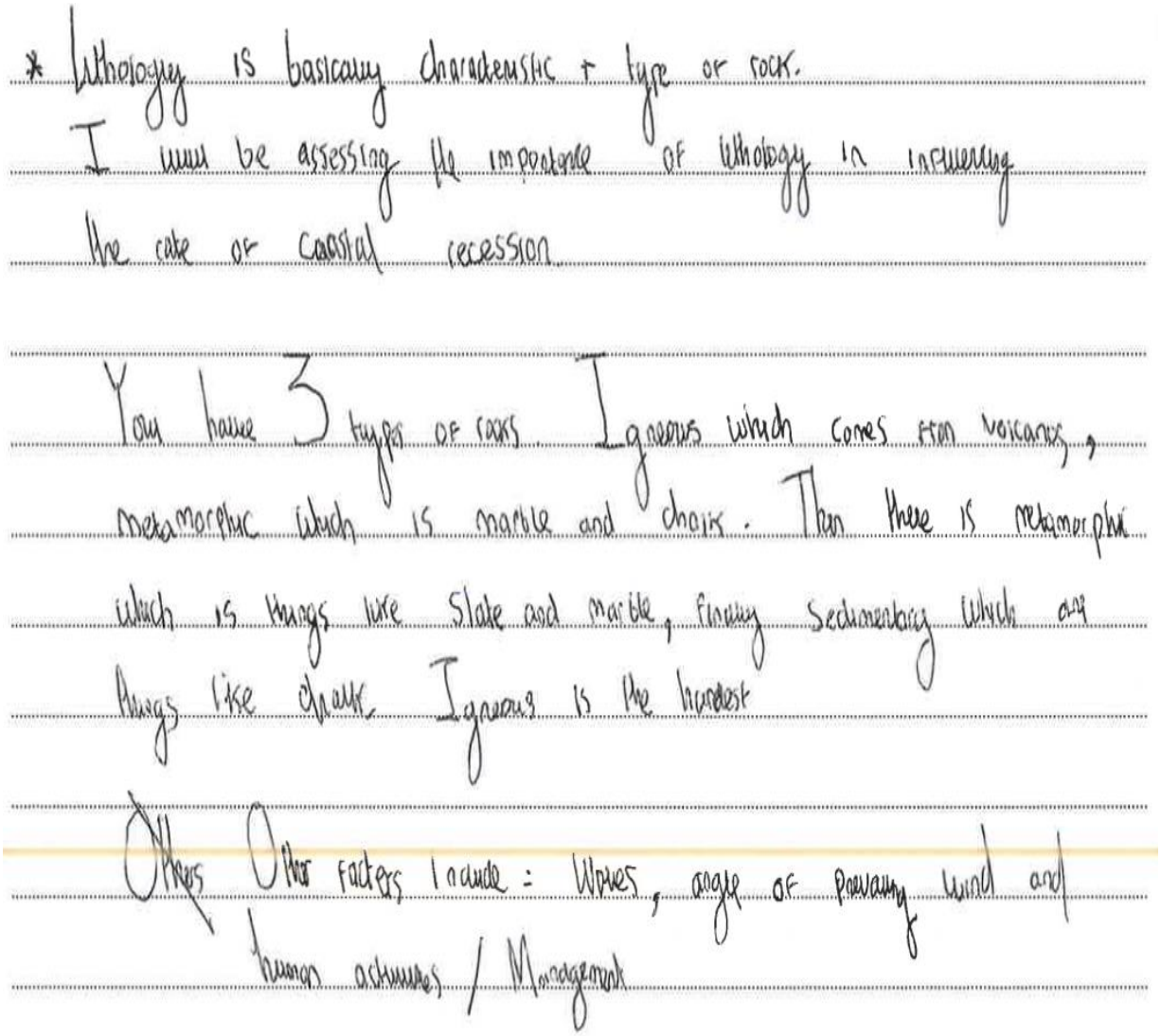
Mark scheme

Question number	Answer
5(e)	**AO1 (3 marks)/AO2 (9 marks)** **Marking instructions** Markers must apply the descriptors in line with the general marking guidance and the qualities outlined in the levels-based mark scheme below. Responses that demonstrate **only** AO1 without any AO2 should be awarded marks as follows: • Level 1 AO1 performance: 1 mark • Level 2 AO1 performance: 2 marks • Level 3 AO1 performance: 3 marks. **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. Relevant points may include: **AO1** • lithology (igneous, sedimentary, metamorphic) and unconsolidated material geology can determine the rate of coastal recession • lithology also affects geological structure and strata and so can determine the rate of coastal recession • lithology also affects sub-aerial processes of mass movement and weathering and so can determine the rate of coastal recession • human actions can affect both marine and subaerial processes and both increase and decrease the rate of coastal recession • rates of recession are not constant and vary in both the short- and long term **AO2** • on a macro scale, lithology is the dominant factor as metamorphic and igneous rocks have a lower rate of coastal recession than sedimentary and unconsolidated rock types because the resistance of such rocks resist marine erosion • on a meso scale, the indirect influence of lithology on geological structure and strata is key in determining coastal recession as the pattern of jointing and faulting can either promote or reduces subaerial processes such as weathering and mass movement. Similarly, the indirect effect of lithology on geological strata, such as layers of permeable/impermeable rocks, also largely determines the rate of coastal recession as it can raise pore water pressure leading to rapid mass movement • on a micro scale, humans can be the key determinate of the rate of coastal recession because they can both directly and indirectly reduce the marine and subaerial processes that cause coastal recession through a range of hard and soft engineering approaches • humans can also, however, stabilise the coastline through the

Question number	Answer
	development of vegetation such as sand dunes and salt marshes and so reduce the rate of coastal recession as well increase the rate of coastal recession through interference either intentionally or unintentionally in physical processes and systems such as in terminal groyne syndrome or dredging • yet, while humans can influence the rate of coastal recession on short timescales, lithology and marine factors such tides, seasons, weather systems and the occurrence of storms play are more important part in determining the long-term rates of coastal recession • however, lithology plays a vital role in determining whether human action is taken or is successful in determining the rate of coastal recession as some areas due to their lithology and/or their geological structure are physically or economically impossible to manage through either hard or soft engineering

Level	Mark	Descriptor
	0	No rewardable material.
Level 1	1–4	• Demonstrates isolated elements of geographical knowledge and understanding, some of which may be inaccurate or irrelevant. (AO1) • Applies knowledge and understanding of geographical information/ideas, making limited logical connections/relationships. (AO2) • Applies knowledge and understanding of geographical information/ideas to produce an interpretation with limited relevance and/or support. (AO2) • Applies knowledge and understanding of geographical information/ideas to make unsupported or generic judgements about the significance of few factors, leading to an argument is unbalanced or lacks coherence. (AO2)
Level 2	5–8	• Demonstrates geographical knowledge and understanding, which is mostly relevant and may include some inaccuracies. (AO1) • Applies knowledge and understanding of geographical information/ideas logically, making some relevant connections/relationships. (AO2) • Applies knowledge and understanding of geographical information/ideas to produce a partial but coherent interpretation that is mostly relevant and supported by evidence. (AO2) • Applies knowledge and understanding of geographical information/ideas to make judgements about the significance of some factors, to produce an argument that may be unbalanced or partially coherent. (AO2)
Level 3	9–12	• Demonstrates accurate and relevant geographical knowledge and understanding throughout. (AO1) • Applies knowledge and understanding of geographical information/ideas logically, making relevant connections/relationships. (AO2) • Applies knowledge and understanding of geographical information/ideas to produce a full and coherent interpretation that is relevant and supported by evidence. (AO2) • Applies knowledge and understanding of geographical information/ideas to make supported judgements about the significance of factors throughout the response, leading to a balanced and coherent argument. (AO2)

Student answers to 5 (e)



Examiner´s comments

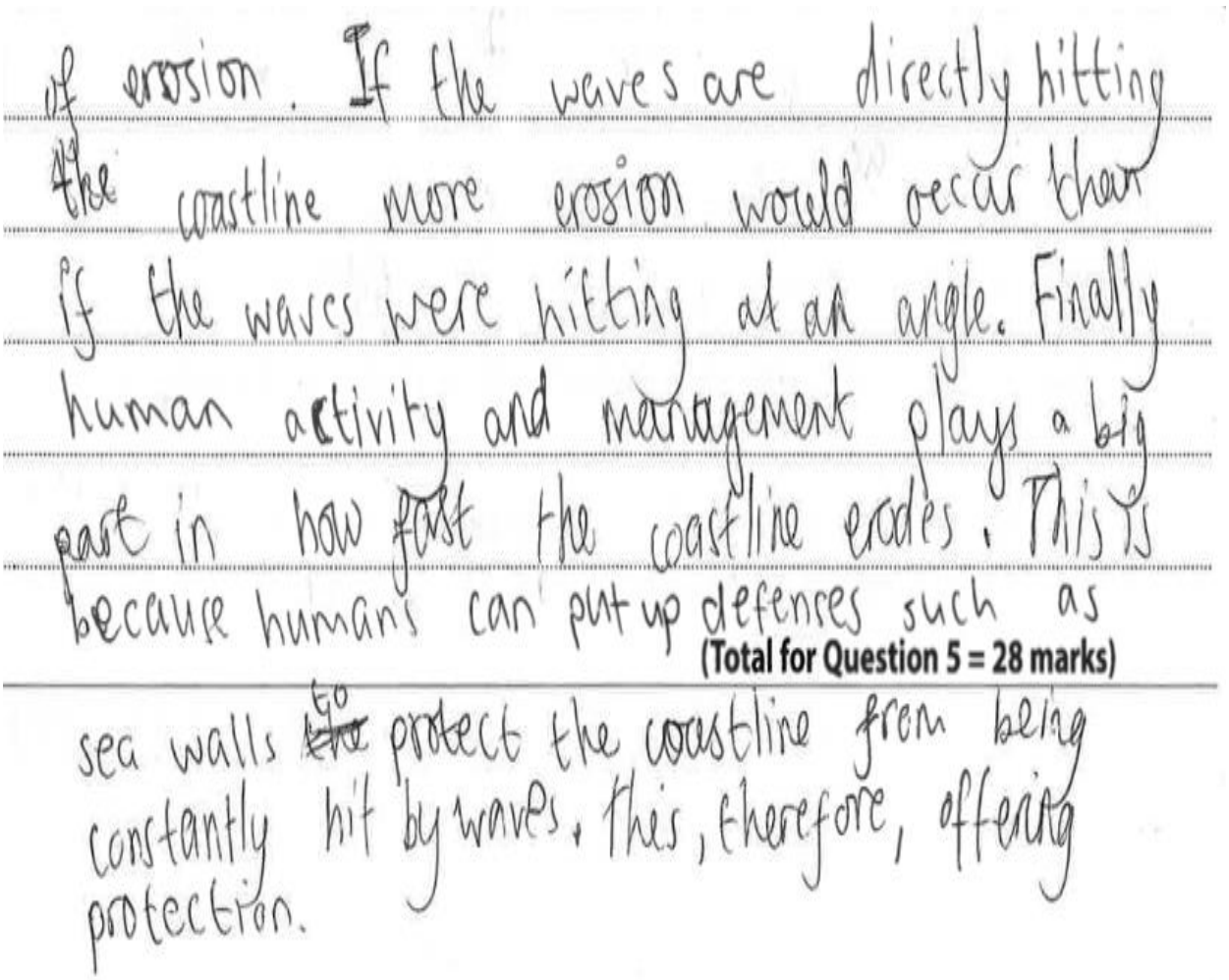
This response is awarded 1 mark.

To score well on 12-mark assess questions, candidates must address the importance of the factor identified (in this case lithology), but also consider what other factors are responsible for coastal recession and assess whether they are more or less important than lithology. The answer is level marked, and prioritises AO2 (9 marks) by expecting logical links to be made between coastal recession and different factors, as well as assessment about the significance of those factors. AO1 marks might be awarded for accurate geographical knowledge, for example about place locations, or theory about coastal geomorphology. This response is Level 1. There are isolated bits of geographical knowledge, which although accurate, are not linked to coastal recession. For example, they do not comment on relative resistance to coastal processes.

Lithology is the different types of rock plus their characteristics. There are 3 types of rock, igneous, metamorphic and sedimentary. The lithology of the rock determines how vulnerable the rock is to marine ergion and weathering.

Hard rock, or igneous rock is ~~eg~~ physical and chemical resistant. This means it is less likely to erode and be worn away by weathering. However, chalk which is a sedimentary rock is soft and will erode away quickly in comparison to igneous rock. This means in areas where there is soft rock the coast line will erode quickly and if there is hard rock it will erode slower.

However, there are other factors which influence how fast the coastline erodes. For example the wave. How long the fetch is. The longer the fetch the more powerful the wave will be. Therefore, the more damage it will cause the coast line. Also the angle of the prevailing wind affects the amount



of erosion. If the waves are directly hitting the coastline more erosion would occur than if the waves were hitting at an angle. Finally human activity and management plays a big part in how fast the coastline erodes. This is because humans can put up defenses such as

(Total for Question 5 = 28 marks)

sea walls ~~the~~ to protect the coastline from being constantly hit by waves. This, therefore, offering protection.

Examiner´s comments

This response is awarded 6 marks.

There is correct identification of the three main types of rock, and how they would respond differently to agents of erosion. The response then goes on to consider other factors, i.e. wave characteristics, direction and also human activity.

The content of the response is relevant, and makes some logical connections between the factors and coastal recession. Therefore it is likely to score within Level 2. However the writing is requires more detail (particularly evidence of locations) and also lacks a clear judgement about the significance of the different factors mentioned. Contrasting examples of places where different types of rock affect rate of recession would be useful for instance.

Lithology is the type of rock, its build up and its characteristic behaviour. This in turn affects the rocks structure and is thought of as highly influential in the coast's profile. However, it is one of many factors.

Lithology may be considered as most important because the resistance of the rock can be determined by its lithology (whether it is igneous, sedimentary, metamorphic). This in turn determines the rate that weathering and marine erosion affects cliffs of this rock therefore influencing how quickly coastline tends to be eroded and recedes. This is most apparent in discordant coastlines, such as the Dorset Coast, where the rate of recessions is dependant on the lithology of its rock, which is visible in the changing profile of the coast. For instance, less resistant rocks like chalk or clay are more vulnerable to weathering and marine erosion, therefore erode faster than the rest of the coastline and so form bays (such as Swanage Bay). The reverse of this process can explain why more resistant rock found at Studland Point causes headlands.

Lithology is, in my opinion, more important than some factors influencing coastal recession. For instance, the angle of the prevailing wind does influence the rate of ~~coastal~~ marine erosion and/or of the transportation of material that is needed to protect the cliffs from

erosion. However, the lithology of rocks is more influential over a coastline's rate of recession.

On the other hand, Lithology is less important than the location of the rock. I believe that the weather and climate of a specific coastline has detrimental

(Total for Question 5 = 28 marks)

effect over its rate of recession. For instance, coasts ~~are~~ in stormy or rainy climates tend to be more susceptible to sub-aerial erosion, whether its rock is resistant or less resistant.

Examiner´s comments

This response is awarded 8 marks.

Although the introduction provides a focused start, it doesn't add very much to the answer. Rather candidates are encouraged to get straight to explaining key factors. The second paragraph makes clear links between lithology and the consequence for landforms and, although explanation of how change happens could be clearer, an example is used that demonstrates understanding. The response then goes on to suggest how important lithology is compared to other factors but, again, could usefully explain why these alternative factors lead to recession.

For example, the rate of erosion is significantly higher on eastern coasts of the UK because coastlines made of boulder clay coastline are, on the one hand, softer and less resistant, wave fetch and height are significantly lower and this suggests that lithology is the critical factor. Even here there are local variations caused by different approaches to coastal management with 'hold the line' in some areas reducing erosion rates to zero whilst along other coastal stretches rates are more than 60cm a year'.

The response again scores Level 2, because it applies knowledge and understanding and starts to make judgements, as well as making links between factors and coastal recession. More clarity is needed about processes in order to produce a full and coherent interpretation.

Question 6: Coastal Landscapes and Change Fieldwork

Example 9 – Question 6 (a) (iv)

6 (a) Study Figure 6 in the Resource Booklet.

At site 1 (a groyne), two transects were taken to investigate its impact on the sediment cell as part of fieldwork.

The student collected data on the size of the beach sediment and on the gradient of the beach.

(iv) Suggest **one** reason why the deposits measured at transect A are different from those measured at transect B.

(2)

Figure 6: Results of student investigation into sediment size for two beach transacts.

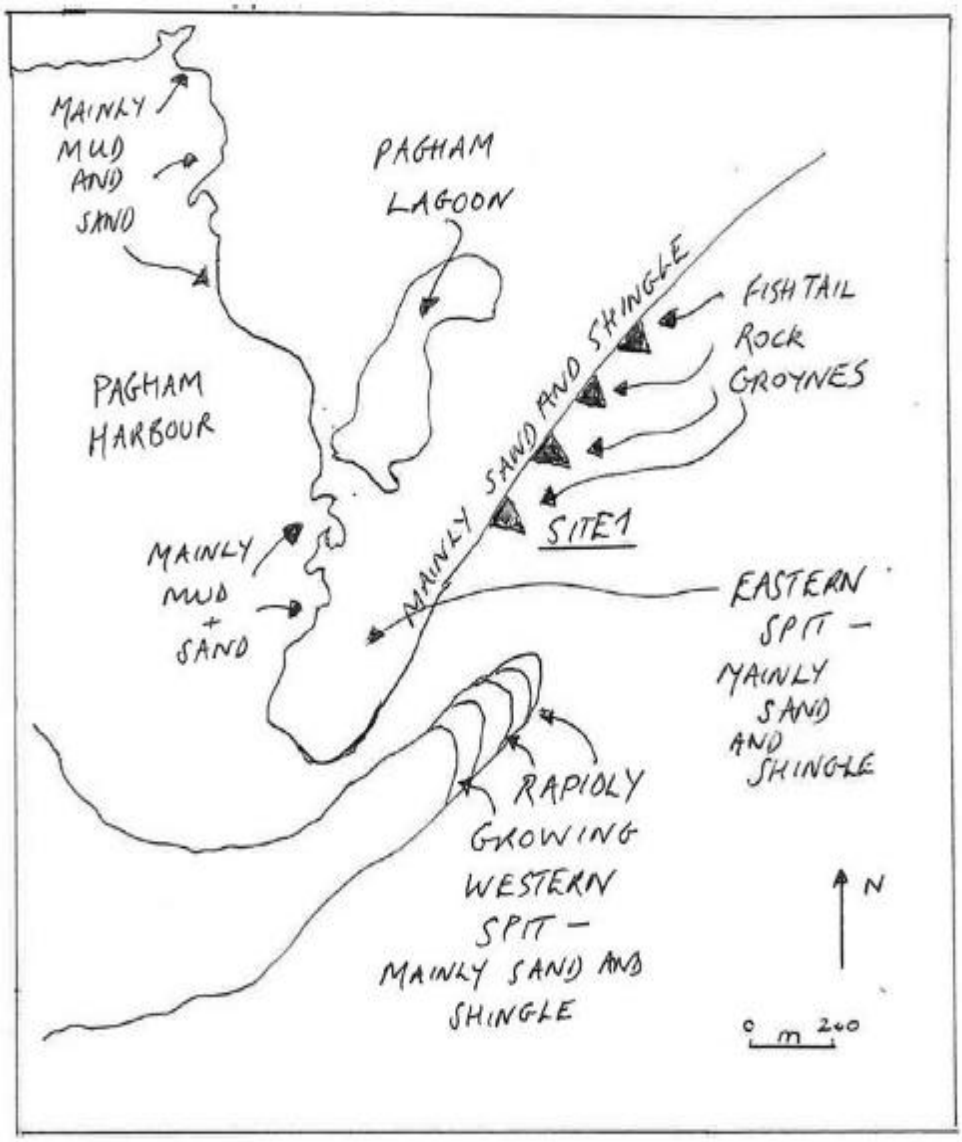
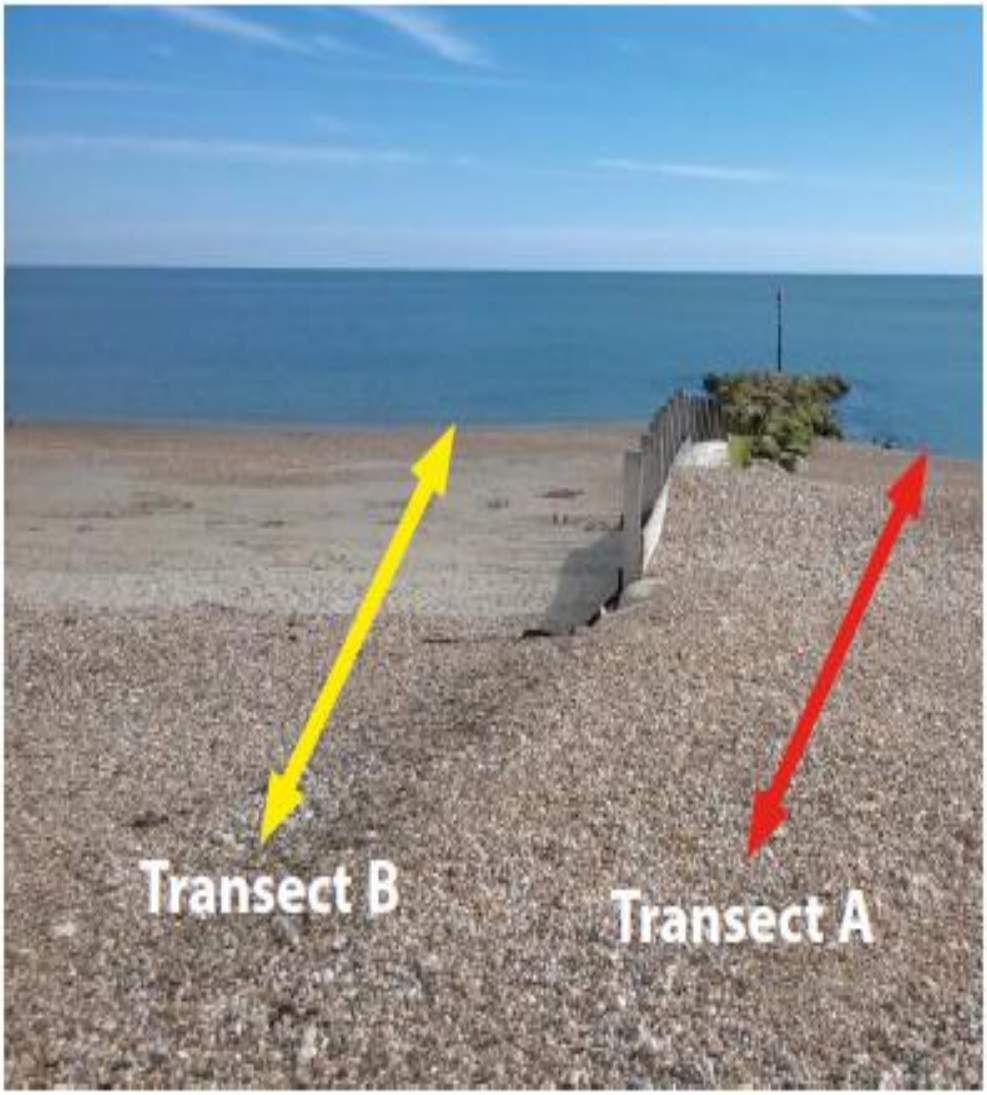


Figure 6A: A student's hand-drawn sketch map of their study area



(Source: Photo – Mark Crundwell)

Figure 6B: A digital photograph of the location of two beach transects

Characteristics of the two beach profiles	Average sediment size	Average beach gradient	Cross-sectional area of the beach
Transect A	7.4 cm	10.6 degrees	12.12 m^2
Transect B	2.1 cm	5.1 degrees	6.02 m^2

Figure 6C: A table showing data collected by the student

Mark scheme

Question number	Answer	Mark
6(a)(iv)	**AO3 (2 marks)** Award **1** mark for identifying a reason for differences and a further mark for justifying why this is the case, up to a maximum of **2** marks. • A has larger sediment/pebbles (1) which will maintain a steeper angle of repose/encourage constructive waves/maintain higher percolation rate (1) • B which is more sandy/smaller sediment (1) and so has a lower angle of repose/lower percolation rate/will encourage destructive waves (1) • the groyne is selectively stopping sediment at transect A (1), which causes the larger sediment to build along the beach being trapped by the groyne (1).	(2)

Student answers to 6 (a) (iv)

Transect A has more sediment because the groyne traps the sediment which is braught along by longshore drift.

Examiner´s comments
This response is awarded 2 marks.

The groyne is trapping the sediment. This causes the sediment to build up. Therefore leading more sediment to be at A than B.

Examiner´s comments
This response is awarded 2 marks.

The groyne is stopping sediment at transect A
This means larger pebbles (mean = 7.4cm) build up along the beach

Examiner´s comments
This response is awarded 2 marks.

Example 10 – Question 6 (b)

(b) The student undertook the transects during a one-day field trip in summer.

Explain **two** ways in which the student could improve their study by collecting further data.

(4)

Mark scheme

Question number	Answer	Mark
6(b)	**AO3 (4 marks)** Award up to **1** mark for stating the type/nature/source of the additional data/information and a further mark for how the data/information improves the overall study up to a maximum of **2** marks each. • The student could return at a different time of year to collect more data (1). This would give a better context for how the beach or coastal system might change in different seasons (1). • The student could collect data at different sites along the coast using information from the sketch map (1). This would give improved spatial coverage and a greater number of fieldwork sites (1). • The student could use additional (primary) fieldwork approaches linked to the beach transect (1). This would allow a greater range of primary data would improve understanding of beach processes (1). • The student could use more secondary (published) data from additional research sources (1). This would allow a greater understanding of wider coastal processes particularly those linked to coastal management and sediment cell operation (1). Accept any other appropriate response.	(4)

Student answers to 6 (b)

1 The student could go back on different days. Whether that be within the week or in a different season to work out an average and give a better context on how the coast changes.

2 The student could measure transects along other groynes for comparison, as greater spacial coverage provides more data.

Examiner´s comments
This response is awarded 4 marks.
The first half of this answer is correct and scores 2 marks.
The second half is also correct, scoring a further 2 marks.

1 They could ~~to~~ do the transects at a different time of the year like winter because the weather will be different and the average sediment size would change. There may be more or less sediment on the beach.

2 They could do it at different locations on the same beach and could compare and get an average. Do more transects at different parts of the beach.

Examiner´s comments
This response is awarded 4 marks.

Example 11 – Question 6 (c)

(c) You have also carried out field research investigating coastal landscapes and change.

Assess how the accuracy and reliability of your fieldwork results affected your conclusions.

(9)

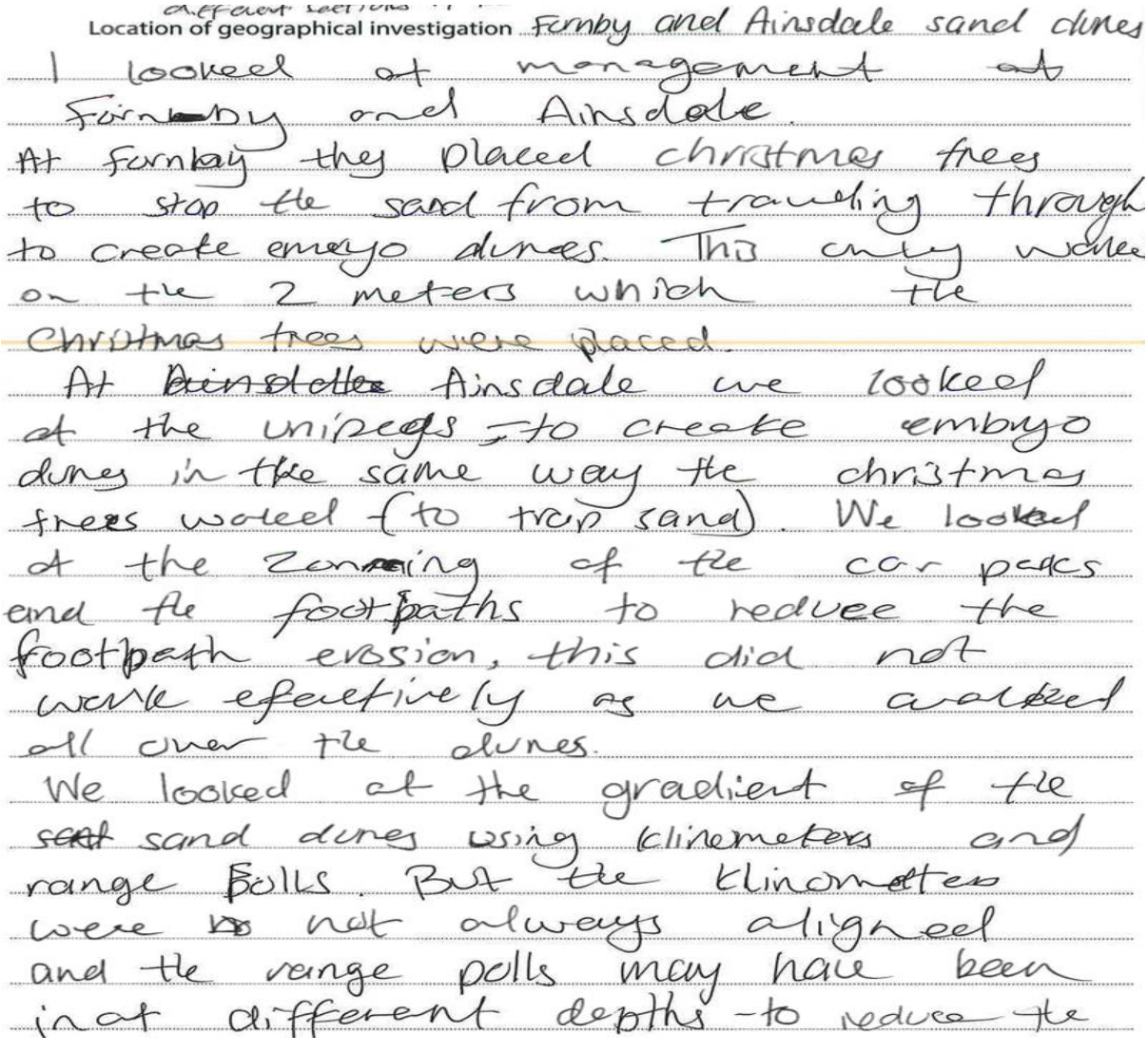
Location of geographical investigation .....

Mark scheme

Question number	Answer
6(c)	**AO3 (9 marks)** **Marking instructions** Markers must apply the descriptors in line with the general marking guidance and the qualities outlined in the levels-based mark scheme below. No marks for stating research question, but this should be used as the context for the answer. **Indicative content guidance** Content depends on students' choice of field research and the conclusions drawn. Assessment should include the following: • results should be clearly outlined with some supportive quantitative data • both primary data and secondary data should be identified • links with conclusions should be clear • conclusions should be clearly explained with appropriate links to the data gathered • qualifications should be evident about the strength of the relationship between the data. All conclusions are likely to be partial and tentative given the limited range of primary data gathered.

Level	Mark	Descriptor
	0	No rewardable material.
Level 1	1–3	• Shows evidence that fieldwork investigation skills used may not have been fully appropriate or effective for the investigation of the geographical questions/issue. (AO3) • Considers the fieldwork investigation process/data/evidence, with limited relevant connections and/or judgements. (AO3) • Argument about the investigation is simplistic and/or generic. (AO3)
Level 2	4–6	• Shows evidence that fieldwork investigation skills used were largely appropriate and effective for the investigation of the geographical questions/issue. (AO3) • Critically considers the fieldwork investigation process/data/evidence in order to make some relevant connections and valid judgements. (AO3) • Argument about the investigation may have unbalanced consideration of factors, but is mostly coherent. (AO3)
Level 3	7–9	• Shows evidence that fieldwork investigation skills used were appropriate and effective for the investigation of the geographical questions/issue. (AO3) • Critically considers the fieldwork investigation process/data/evidence in order to make relevant connections and judgements that are supported by evidence. (AO3) • Argument about the investigation includes balanced consideration of factors and is fully developed and coherent. (AO3)

Student answers to 6 (c)



Location of geographical investigation Formby and Ainsdale sand dunes

I looked at management at Formby and Ainsdale.

At Formby they placed christmas trees to stop the sand from travelling through to create embryo dunes. This only worked on the 2 meters which the Christmas trees were placed.

At ~~Ainsdale~~ Ainsdale we looked at the uniPegs - to create embryo dunes in the same way the christmas trees worked (to trap sand). We looked at the Zoning of the car parks and the footpaths to reduce the footpath erosion, this did not work effectively as we walked all over the dunes.

We looked at the gradient of the ~~sand~~ sand dunes using klinometers and range Polls. But the klinometers were ~~not~~ not always aligned and the range polls may have been in at different depths - to reduce the

accuracy of my results.
Also we only went one day a ~~y~~ in the year, we should have gone more times in the yew.

(Total for Question 6 = 18 marks)

Examiner´s comments

This response is awarded 3 marks.
'Assess' questions about fieldwork are marked in levels, and 9 marks are awarded for Level 3, i.e. recall of the geographical skills students have used during their course.
In this response, some of the material was not fully focussed on the question, which required students to comment on how the results of their fieldwork affected their conclusions. This is different to just describing the fieldwork that was completed. A brief description might be helpful to set the scene. Marks were awarded for comments in the third paragraph about measuring the gradient of sand dunes. Together with a need for a slightly more formal approach to writing, this is a Level 1 response, scoring 3 marks overall.

Location of geographical investigation Formby and Ainsdale Sand Dunes

In Ainsdale the cars were on the beach which in return compacted the sand which then reduced the amount of saltation for the dunes. However the uni-pegs had helped create dunes because they ~~had~~ have helped create the embryo dunes.

~~For~~ my fieldwork the cross section with the clinometer and range poles we measured distance and height which was unaccurate because we did not place the range poles at the same depth each time which could have changed effected the accuracy of the fieldwork.

In Formby there was christmas trees that had been planted on the beach to manage the embryo Sand dunes however not much was actually achieved as there was only a slight build up of Sand behind the tree which was not enough to start an embryo dune.

Whilst we were in Ainsdale we also monitored the foot path erosion, which came back in a negative way, there was a lot of foot path erosion and we believe this is because there isn't that many designated footpaths so people wonder about anywhere.

Examiner´s comments
This response is awarded 3 marks.
This is also a Level 1 response. There are some brief descriptions of some legitimate use of fieldwork, but most paragraphs needed just a little more expansion discussing whether the results were reliable or accurate.

Location of geographical investigation Formby + Ainsdale Sandunes

Purpose of ~~es~~ my fieldwork was to look at the effects of people on sand dunes and also to look at whether management is working

When we went to Ainsdale we could have been inaccurate with our range poles as we stuck them in at different lengths. Doing this would affect the angle which read on our clingometer as 1 of the poles would have been higher than the other anyway. The clingometer was also very basic and might not have read accurately The management at Ainsdale was good as they had unipegs helping to create embrio dunes. The management could've been better as they let cars park on the beach which compacted the sand meaning saltation won't occur so embrio dunes won't get created

We went to compare the ~~accuracy~~ management at Formby at Ainsdale. At formby there was christmas trees which were there to build up embriodunes but they werent working. This conclusion that the trees werent working may be inaccurate because we went ~~the~~ 10 months after they was been put there.

At Ainsdale they tried to control footpath erosion by using markers although the markers were very hard to see.

(Total for Question 6 = 18 marks)

Overall the ~~accuracy~~ reliability of our results may not be good because we only compared 2 places which we went to on the same day. Ideally we should've revisited these places to see them throughout the year as the results will change. Many other factors such as if we are good at estimating the transect could also effect our results.

Examiner´s comments

This response is awarded 6 marks.

This response was slightly stronger – a Level 2 answer. In two places, the candidate focuses on accuracy of the results (e.g. about the clinometer readings, and time of measurements), with only a brief reference to reliability right at the end. They have slightly confused accuracy and reliability and also are not clear about the results. A good way to answer this kind of question is to start by being clear about accuracy and reliability, and how the conclusions depend on them. In addition, good description of the geographical context is needed for evaluation of techniques to make sense.

Question 7: Tectonics and Coasts Synoptic Question

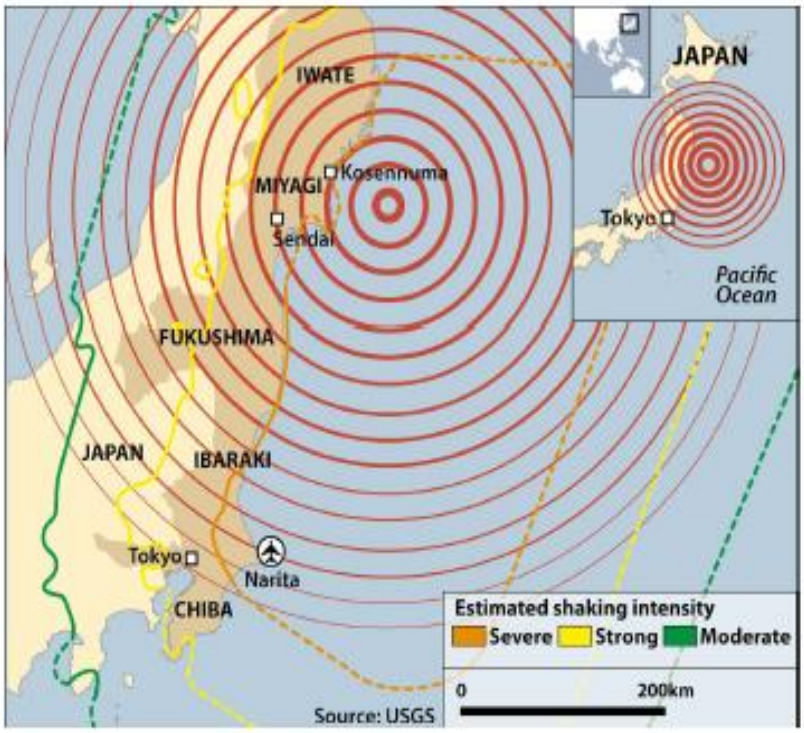
Example 12 – Question 7

7 Study Figure 7 in the Resource Booklet.

Evaluate the relative importance of the human and physical geography of the coasts and the characteristics of the tsunami event in determining its impact.

(16)

Figure 7: Information relating to the Sendai tsunami.



(source: © USGS)

Figure 7A: Map showing areas affected by the earthquake.

Information on the Tohoku Earthquake

Magnitude – 9.0 MMS (the most powerful earthquake event in Japanese history)

Epicentre – 70km east of Miyagi

Tsunami impact – on Miyagi in 10 minutes, Iwate in 30 minutes and Ibaraki in 1 hour after the earthquake.

Area of Japan	Deaths	Missing	Economic losses in $billion	Tsunami height in metres
Iwate	888	159	82	8.5
Miyagi (including Kesennuma and Sendaik	4214	877	145	7.6
Ibaraki	27	0	8	4.2

Figure 7B: Data relating to effects of the tsunami.

Iwate – a rocky coastline with steep cliffs

Miyagi (Kesennuma) – a coastal plain with a high population density

Ibaraki – a 10m high tsunami wall protecting low lying areas

(Source: © Kaisuke Iwamoto/Getty Images)

Figure 7C: Photographs of coastal locations affected by the tsunami.

Mark scheme

Question number	Answer
7	**AO1 (4 marks)/AO2 (12 marks)** **Marking instructions** Markers must apply the descriptors in line with the general marking guidance and the qualities outlined in the levels-based mark scheme below. Responses that demonstrate **only** AO1 without any AO2 should be awarded marks as follows: • Level 1 AO1 performance: 1 mark • Level 2 AO1 performance: 2 marks • Level 3 AO1 performance: 3 marks • Level 4 AO1 performance: 4 marks **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. Relevant points may include: **AO1** • rocky coastlines and coastal plains (sandy coastline and estuarine coasts) have distinct physical characteristics which can reduce or increase their vulnerability to tsunami events • the characteristics of the tsunami event can be considered through their magnitude, speed of onset and areal extent, duration, frequency, and spatial predictability • hazard events in developed countries show the interaction of physical factors and the significance of context in influencing the scale of disaster **AO2** • rocky coastlines with steep cliffs offer a natural protection against tsunami (as shown in photo 1) and as a result even though Iwate had the highest tsunami wave of 8.5 m (table) it suffered far fewer social and economic impacts than Miyagi (table) as Miyagi is a coastal plain • yet the earthquake did not produce only tsunami waves, there was also ground shaking and as a result most of the prefecture of Iwate was subjected to strong ground shaking (map) and which would have caused economic impacts as there would have inevitably been some loss of buildings • in contrast, lowland coastal plains are more vulnerable to tsunami as not only do they not have a cliffed coastline but because of their easier access to the coast they are more likely to be developed and so have a higher population density (as shown in photo 2). This means, therefore, that despite having a lower tsunami wave (table) there were far higher social and economic impacts (table) • although Japan had invested in tsunami walls in Miyagi, they were not high enough to save areas such as Kesennuma which suggest that the physical characteristic of the coastline, coupled with the characteristic of the tsunami event combined to overcome the ability of the country to modify the event in this case and so reduce the impacts • yet not all coastal plains are vulnerable to the tsunami. In Ibaraki the use of tsunami walls to modify the event (photo), coupled with the fact

Question number	Answer
	that the characteristic of the tsunami event was far lower (table) meant that the impacts were far lower (table). The population in this area, however, might also have greater time to prepare for the hazard and evacuate lowland areas as the area is further from the epifocus/centre of the earthquake (map) and so the speed of onset would have been far lower • overall, the nature of the coastline is key as cliffed coastlines are far less vulnerable than coastal plains to the tsunami hazard. Yet the characteristic of the tsunami event in terms of the magnitude and the speed of onset are vital in determining the impacts on coastal plains.

Level	Mark	Descriptor
	0	No rewardable material.
Level 1	1–4	• Demonstrates isolated elements of geographical knowledge and understanding, some of which may be inaccurate or irrelevant. (AO1) • Applies knowledge and understanding of geographical information/ideas, making limited and rarely logical connections/relationships, to produce an interpretation with limited relevance and/or support. (AO2) • Applies knowledge and understanding of geographical information/ideas to produce an unsupported or generic conclusion, drawn from an argument that is unbalanced or lacks coherence. (AO2) • Limited synthesis of geographical ideas from across the course of study. (AO2)
Level 2	5–8	• Demonstrates geographical knowledge and understanding, which is occasionally relevant and may include some inaccuracies. (AO1) • Applies knowledge and understanding of geographical information/ideas with limited but logical connections/relationships to produce a partial interpretation that is supported by some evidence but has limited coherence. (AO2) • Applies knowledge and understanding of geographical information/ideas to come to a conclusion, partially supported by an unbalanced argument with limited coherence. (AO2) • Argument partially synthesises some geographical ideas from across the course of study, but lacks meaningful connections. (AO2)
Level 3	9–12	• Demonstrates geographical knowledge and understanding, which is mostly relevant and accurate. (AO1) • Applies knowledge and understanding of geographical information/ideas to find some logical and relevant connections/relationships to produce a partial but coherent interpretation that is supported by some evidence. (AO2) • Applies knowledge and understanding of geographical information/ideas to come to a conclusion, largely supported by an argument that may be unbalanced or partially coherent. (AO2) • Argument synthesises some geographical ideas from across the course of study, making some meaningful connections. (AO2)
Level 4	13–16	• Demonstrates accurate and relevant geographical knowledge and understanding throughout. (AO1)

		• Applies knowledge and understanding of geographical information/ideas to find fully logical and relevant connections/relationships to produce a full and coherent interpretation that is supported by evidence. (AO2) • Applies knowledge and understanding of geographical information/ideas to come to a rational, substantiated conclusion, fully supported by a balanced argument that is drawn together coherently. (AO2) • Argument comprehensively and meaningfully synthesises geographical ideas from across the course of study throughout the response. (AO2)

Student answers to 7

The impacts of a Tsunami are determined by both human and physical geographical feckors of the coast in many ways. For example, if the gradiant of the land is steep or the location has tsunami defences / warning systems or if the population have been taught what to do incase of a tsunami.

The most impact human facker is Coastalisation and whether the population density is high on the coast. This is important because this is the first place to get impacted by the wave and if there were a high population at this location, more lives will be at risk. Also, if there are a lot of buildings at the coast then there will be more damage delt to the buildings and more buildings falling down and collapsing, not only risking lives, but then dampening the locations economy when recovering. This leads on the second most impor human factor. The second most important human facker is the quality of buildings and whether they are life safe or not or whether they are tsunami proof. This is important because

if a building is life safe and earthquake proof then more lives will be saved.

The most important ~~this~~ physical factor is the proximity of the land to the epicentre of the earthquake. If the epicentre is close to land, then the tsunami impact will be more severe and stronger, also the waves would be taller, causing a more devastating out come. This then leads on to the second most important factor, being the height of the wave and structure of the land. If there is a tall wave, but small cliffs, then the outcome will be more severe to that of tall cliffs and a smaller wave.

I think that human factors are more important because humans can control the outcomes with defences and warning systems, whereas physical factors are natural

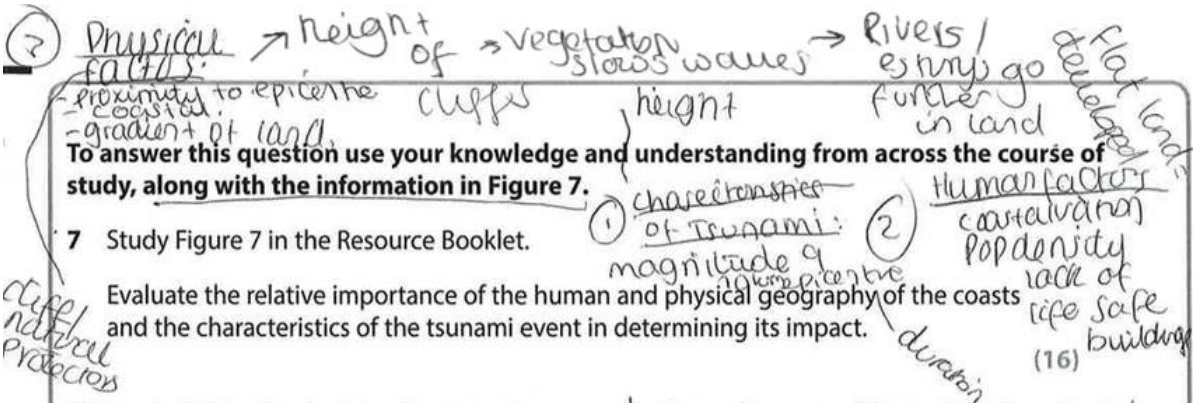
Examiner´s comments

This response is awarded 10 marks.

The synoptic questions in AS Paper require candidates to have knowledge of the links between tectonics and coastal processes. However factual recall of ideas (AO1) only counts for 4 marks, and indeed most of the marks are given for the thinking skills employed making sense of the data (12 marks for AO2). The mark-scheme is level-based, with 4 levels.

This is a good answer and fell into Level 3. It refers to the evidence, although not explicitly, and because there is no direct reference to the resources or indeed very little reference to coastal environments.

There is a framework presented immediately that focuses on the question, and this helps it cover a range of accurate ideas across the paragraphs. The answer deals with both sides of the question and is somewhat balanced, which ultimately helps the writer weight up their response. However the conclusion seems to be contrary to the data that is presented. More is needed here to conclude the idea because the evidence needs to be used to prove whether one factor is more important than another, e.g. does the epicentre position really make much difference, according to the data that has been presented.



To answer this question use your knowledge and understanding from across the course of study, along with the information in Figure 7.

7 Study Figure 7 in the Resource Booklet.

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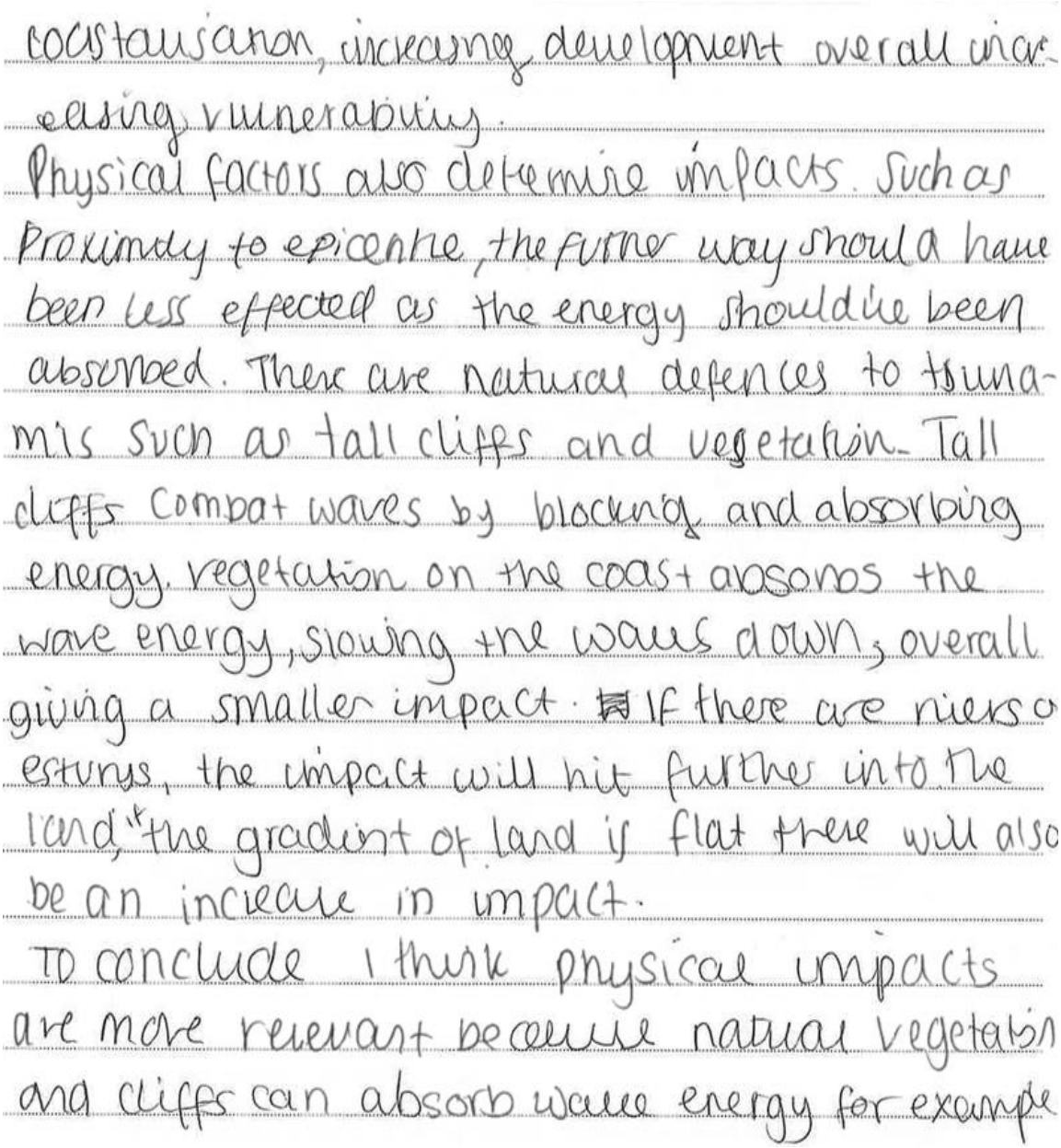
(16)

There are many human and physical factors that determine the impact of a Tsunami also using its characteristics. // The Sendai tsunami of figure 7 helps us determine the impacts as characteristics are shown. The magnitude was 9.0 MMS, which is extreamley powerful, with the epicentre being east of Miyagi (70km), caving great devistation on Miagi. The area's closest to the epicentre have the highest waves being 8.5 in Iwate. Overall the characteristics show that the Tsunami was extreamley powerful with seviere shaking intensity close to the epicentre.

Human factors also effect in determining the impacts such as lack of life safe buildings, which collapse effecting everyone arround it including the infrastructure. Coastalisation is also a big aspect as if the land is flat, ~~globalisation~~ urbanisation is more likely to occur increasing vulnerability as it will be more developed. I assume Miyagi is flat land as close to a city, 4214 people died, 877 missing and $145 billion loss, which could mean the gradient of land can increase


coastalisation, increasing development overall increasing vulnerability.
Physical factors also determine impacts. Such as Proximity to epicentre, the further way should a have been less effected as the energy should've been absorbed. There are natural defences to tsunamis such as tall cliffs and vegetation. Tall cliffs combat waves by blocking and absorbing energy. vegetation on the coast absorbs the wave energy, slowing the waves down, overall giving a smaller impact. If there are rivers or esturies, the impact will hit further into the land, if the gradient of land is flat there will also be an increase in impact.
To conclude I think physical impacts are more relevant because natural vegetation and cliffs can absorb wave energy for example

Examiner´s comments

This response is awarded 13 marks.

This is a strong response to the question, just scoring into the Level 4 band because of its use of the resources. The understanding of concepts is accurate, although the candidate could write in more detail about geographical ideas. The response includes a broad range of ideas in response to the evidence and, crucially, bases this on the evidence. However the use of evidence is limited to data from Miyagi. Equally, the candidate brings in knowledge and understanding about coasts from beyond the resources, and uses this to infer what is happening and make judgements.

Tsunamis are known around the world as the rarest - but deadliest - natural event. Caused when a subducting plate rebounds, displacing the water above and creating huge waves (up to 10m in height), they tend to occur just after an earthquake.

The most important factor that affects the characteristic is the development of the shoreline. Many of Japan's major cities (such as Sendai and Tokyo) are found along the eastern coast, therefore there is a high percentage of people living in the vicinity of the sea. This in turn results in a higher percentage of people at risk from tsunamis which contributes to how deadly a tsunami can be. For example, Miyagi had a high number of fatalities (4217 dead) which could be due to the high population it has living by the sea in cities such as Kesennuma and Sendai).

Alternatively, the second most important factor of a tsunami's impacts is the gradient of the shoreline. ~~Howeve~~ Shallow continental shelfs running up to the beach tend to cause higher wave heights and ~~longer areas affected by the waves~~ larger onset of waves into land, as opposed to steeper coastline gradients (for example at headlands or cliffs). This means shallower coastline gradients put a greater population of people at risk (as the tsunami travels further in land to more towns and villages) and so tends to result in higher fatalities and injury rates. This was the case for the

Indian Ocean tsunami of 2003, but also for lowland areas of eastern Japanese coastline, which would have been a contributing factor for the deaths of 180,000 people.

My thirdly most important factor (least important in terms of the Sendai Earthquake) is the mitigation installed. Should an area have tsunami walls of sufficient height and substantial warning systems in place, the gradient and population/development of a coastline would be of less importance. However, only highly developed countries have the funds to install mitigation, therefore the mitigation (or lack of it) can only have certain importance when in terms of tsunamis.

To conclude, I believe that a combination of the development, population, gradient and mitigation of a coastline all affect the tsunamis impact. However, more factors can influence the onset, speed and height of tsunamis.

Examiner´s comments

This response is awarded 11 marks.

This is a reasonably strong response that makes good use of evidence in the resource booklet. At times it drifts in just theory that can't be backed up the material in booklet, and there is some confusion about the location of Japan and the Indian Ocean. This is a reminder that decision making should be about the geographical context being presented. There is also evidence of high-order thinking but, again, the judgments must be made using (and therefore, supported by) the evidence in the booklet, rather than from mainly outside knowledge.

The structure is good – there are 3 factors mentioned, although overall, the candidate is slightly unclear about the reasons for the different levels of importance explaining why tsunami impact varied so much – and indeed stronger links back to the question were needed throughout the response.