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# **GCE AS MARKING SCHEME**

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**SUMMER 2018**

**AS  
GEOGRAPHY - COMPONENT 1  
B2110U10-1**

## **INTRODUCTION**

This marking scheme was used by WJEC for the 2018 examination. It was finalised after detailed discussion at examiners' conferences by all the examiners involved in the assessment. The conference was held shortly after the paper was taken so that reference could be made to the full range of candidates' responses, with photocopied scripts forming the basis of discussion. The aim of the conference was to ensure that the marking scheme was interpreted and applied in the same way by all examiners.

It is hoped that this information will be of assistance to centres but it is recognised at the same time that, without the benefit of participation in the examiners' conference, teachers may have different views on certain matters of detail or interpretation.

WJEC regrets that it cannot enter into any discussion or correspondence about this marking scheme.

## **Component 1: Changing Landscapes**

### **Mark Scheme**

#### **Guidance for Examiners**

##### **Positive marking**

It should be remembered that learners are writing under examination conditions and credit should be given for what the learner writes, as opposed to adopting an approach of penalising him / her for any omissions. It should be possible for a very good response to achieve full marks and a very poor one to achieve zero marks. Marks should not be deducted for a less than perfect answer if it satisfies the criteria of the mark scheme. The mark scheme for this component includes both point-based mark schemes and banded mark schemes.

##### **Point-based mark schemes**

For questions that are objective or points-based the mark scheme should be applied precisely. Marks should be awarded as indicated and no further subdivision should be made. Each creditworthy response should be ticked in red ink. Annotations must reflect the mark awarded for the question. The targeted assessment objective (AO) is also indicated.

##### **Banded mark schemes**

For questions with mark bands the mark scheme is in two parts. The first part is advice on the indicative content that suggests the range of concepts, processes, scales and environments that may be included in the learner's answers. These can be used to assess the quality of the learner's response. This is followed by an assessment grid advising on bands and the associated marks that should be given in responses that demonstrate the qualities needed in the three AOs, AO1, AO2 and AO3, relevant to this component. The targeted AO(s) are also indicated, for example AO2.1c. Banded mark schemes are divided so that each band has a relevant descriptor. The descriptor for the band provides a description of the performance level for that band. Each band contains marks. Examiners should first read and annotate a learner's answer to pick out the evidence that is being assessed in that question. Once the annotation is complete, the mark scheme can be applied. This is done as a two stage process.

Assessment Objective	Strands	Elements
<p>AO1</p> <p>Demonstrate knowledge and understanding of places, environments, concepts, processes, interactions and change, at a variety of scales.</p>	N/A	This AO is a single element.
<p>AO2</p> <p>Apply knowledge and understanding in different contexts to interpret, analyse and evaluate geographical information and issues.</p>	N/A	1a - Apply knowledge and understanding in different contexts to analyse geographical information and issues.
		1b - Apply knowledge and understanding in different contexts to interpret geographical information and issues.
		1c - Apply knowledge and understanding in different contexts to evaluate geographical information and issues
<p>AO3</p> <p>Use a variety of relevant quantitative, qualitative and fieldwork skills to:</p> <ul style="list-style-type: none"> <li>investigate geographical questions and issues</li> <li>interpret, analyse and evaluate data and evidence</li> <li>construct arguments and draw conclusions.</li> </ul>	1 - investigate geographical questions and issues	N/A
	2 - interpret, analyse and evaluate data and evidence	
	3 - construct arguments and draw conclusions	

### Banded mark schemes Stage 1 – Deciding on the band

Beginning at the lowest band, examiners should look at the learner’s answer and check whether it matches the descriptor for that band. Examiners should look at the descriptor for that band and see if it matches the qualities shown in the learner’s answer. If the descriptor at the lowest band is satisfied, examiners should move up to the next band and repeat this process for each band until the descriptor matches the answer.

If an answer covers different aspects of different bands within the mark scheme, a 'best fit' approach should be adopted to decide on the band and then the learner's response should be used to decide on the mark within the band. For instance if a response is mainly in band 2 but with a limited amount of band 3 content, the answer would be placed in band 2, but the mark awarded would be close to the top of band 2 as a result of the band 3 content.

Examiners should not seek to mark candidates down as a result of small omissions in minor areas of an answer.

### **Banded mark schemes Stage 2 – Deciding on the mark**

Once the band has been decided, examiners can then assign a mark. During standardising (marking conference), the qualities of each mark band will be discussed in detail. Examiners will then receive examples of answers in each mark band that have been awarded a mark by the Principal Examiner. Examiners should mark the examples and compare their marks with those of the Principal Examiner.

When marking, examiners can use these examples to decide whether a learner's response is of a superior, inferior or comparable standard to the example. Examiners are reminded of the need to revisit the answer as they apply the mark scheme in order to confirm that the band and the mark allocated is appropriate to the response provided.

Indicative content is not exhaustive, and any other valid points must be credited. In order to reach the highest bands of the mark scheme a learner need not cover all of the points mentioned in the indicative content but must meet the requirements of the highest mark band. Where a response is not creditworthy, that is contains nothing of any significance to the mark scheme, or where no response has been provided, no marks should be awarded.

The mark scheme reflects the layout of the examination paper. Mark questions 1 and 2 or 3 and 4 in Section A, all questions in Section B and all questions in Section C. If the candidate has responded to all questions in Section A, mark all these responses. Award the higher marks attained; further, possible rubric infringements will be discussed at the marking conference.

Be prepared to reward answers that give **valid and creditworthy** responses, especially if these do not fully reflect the 'indicative content' of the mark scheme.

## Section A: Coastal or Glacial Landscapes

### Either: Coastal Landscapes

<p>1. (a) Use <b>Figure 1</b> to describe <b>two</b> distinctive landforms of this coastal landscape.</p> <p>Content: 1.1.2</p>	AO1	AO2.1a	AO2.1b	AO2.1c	AO3		<b>Total</b>
					5		<b>5</b>
<p><b>Indicative content</b></p> <p>This is a high energy coastal environment characterised by erosion, high wave activity, exposure to prevailing winds and a long wave fetch. Landforms include headlands, cliffs and wave-cut platforms. The geological structure incorporates bedding planes, dip, folding and faulting and can add distinctive features to these landforms.</p> <p>Some students may also identify the low energy features of the landscape and will highlight the beach as the main characteristic landform of this particular environment.</p> <p>Both approaches seen above are acceptable. Credit any other valid points. Identification of landforms with little description may get into Band 2</p>							

Award the marks as follows:		
Band	Marks	
<b>3</b>	<b>4-5</b>	Clear description and identification of two landforms which are clearly linked to the resource. A confident understanding is shown and this is well applied to the resource.
<b>2</b>	<b>2-3</b>	Sound description of one feature or partial description of two. There may be some application of knowledge and understanding to the photograph. Generally lacks balance.
<b>1</b>	<b>1</b>	Simple statements that may be linked to the resource. Limited use of the resource as a source of data.
	<b>0</b>	No valid comment.

1. (b) Examine the role of sub aerial processes in the formation of <b>one or more</b> landforms of coastal erosion.  Content: 1.1.4	AO1	AO2.1a	AO2.1b	AO2.1c	AO3		<b>Total</b>
	7			3			<b>10</b>

**Indicative content**

**AO1**

Candidates should be able to show the knowledge and understanding of the sub aerial processes of coastal weathering (the breaking down of rock in situ).

Examples could include:

- Physical weathering/disintegration by such processes as freeze-thaw action, salt crystallisation, and wetting and drying.
- Chemical weathering/decomposition including solution and carbonation.
- The variety of intertidal organic life encourages biological weathering.

Landform/s will be clearly identified and must be erosional. Clear links should be made between the processes and the formation of the landform itself. Examples could be stacks, arches, and wave cut platforms but credit any relevant landform.

**AO2**

Candidates demonstrate application of knowledge and understanding through an examination of the role of sub aerial process in the formation of one or more landforms. Relevant responses may include:

- The relative importance of different sub aerial processes in the formation of one or more identified landforms
- The extent to which the role of sub aerial processes can vary over time and in different locations
- The extent to which associated factors such as mass movement, marine erosional processes, geological factors etc. can contribute to the formation and/or development of the landforms identified

Some responses may include annotated diagrams which could carry credit.

Credit any other valid points.

Award the marks as follows:		
	<b>AO1 (7 marks)</b>	<b>AO2.1c (3 marks)</b>
<b>Band</b>	<i>Demonstrates knowledge and understanding of sub aerial processes in the formation of one or more coastal landforms.</i>	<i>Applies knowledge and understanding to examine the role of sub aerial processes in the formation of one or more coastal landforms.</i>
<b>3</b>	<p><b>5-7 marks</b></p> <p>Demonstrates detailed and accurate knowledge and understanding through the use of appropriate, accurate and well-developed examples.</p> <p>Demonstrates detailed and accurate knowledge and understanding of sub aerial processes.</p> <p>Demonstrates detailed and accurate knowledge and understanding of the links between sub aerial processes and the landforms identified.</p> <p>Well annotated sketches / diagrams / maps may also be used and should be credited.</p>	<p><b>3 marks</b></p> <p>Applies knowledge and understanding to produce a thorough and coherent examination that is supported by evidence.</p> <p>Applies knowledge and understanding to produce a thorough and coherent examination of the role of sub aerial processes in the formation of one or more landforms.</p>
<b>2</b>	<p><b>3-4 marks</b></p> <p>Demonstrates accurate knowledge and understanding through the use of appropriate and well-developed examples.</p> <p>Demonstrates accurate knowledge and understanding of sub aerial processes.</p> <p>Demonstrates accurate knowledge and understanding of the links between sub aerial processes and the landforms identified.</p> <p>Sketches / diagrams / maps may also be used and should be credited.</p>	<p><b>2 marks</b></p> <p>Applies knowledge and understanding to produce a coherent but partial examination that is supported by some evidence.</p> <p>Applies knowledge and understanding to produce a coherent but partial examination of the role of sub aerial processes in the formation of one or more landforms.</p>
<b>1</b>	<p><b>1-2 marks</b></p> <p>Demonstrates limited knowledge and understanding through a limited number of undeveloped examples.</p> <p>Demonstrates limited knowledge and understanding of sub aerial processes.</p> <p>Demonstrates limited knowledge and understanding of the links between sub aerial processes and the landforms identified.</p> <p>Basic sketches / diagrams / maps may be used and can be credited.</p>	<p><b>1 mark</b></p> <p>Applies knowledge and understanding to produce an examination with limited coherence and support from some evidence.</p> <p>Applies knowledge and understanding to produce a limited examination of the role of sub aerial processes in the formation of one or more landforms.</p>
	<p><b>0 marks</b></p> <p>Response not creditworthy or not attempted.</p>	<p><b>0 marks</b></p> <p>Response not creditworthy or not attempted.</p>



2. (a) Use <b>Figure 2</b> to describe the pattern of sediment gain and loss along this coastline.	AO1	AO2.1a	AO2.1b	AO2.1c	AO3		<b>Total</b>
Content: 1.1.1					5		<b>5</b>
<p><b>Indicative content</b></p> <p>The plot shows rates of shoreline erosion (red) and deposition (yellow) over 79 years at Fire Island. There graph shows distinct zones that could be used to identify patterns. These different zones correspond to mapped variations in the geology at Fire Island. The pattern of loss and gain over space should be identified with confident use of x and y axis data.</p> <p>Specific areas of sediment loss <b>and</b> gain should be identified to reach Band 3.</p> <p>Significant areas of loss are located from 33 km to approximately 48 km reaching as low as -1.5 per year. Significant areas of gain are located from 0 to 4 km and reaches 3 m per year.</p> <p>Credit any other valid points.</p>							

Award the marks as follows:		
<b>Band</b>	<b>Marks</b>	
<b>3</b>	<b>4-5</b>	Clear description of patterns of loss and gain identified. Consistent and accurate use of the resource as a source of data to support the description. Not all areas of the graph need to be described to reach this band.
<b>2</b>	<b>2-3</b>	Some identification patterns of loss and gain or a clear description of either. Partial use of the resource as source of data to support the description.
<b>1</b>	<b>1</b>	Simple statements of varying validity. Limited use of the resource as a source of data.
	<b>0</b>	No valid comment.

2. (b) Discuss the view that the impacts of human activity on coastal environments are mainly negative.	AO1	AO2.1a	AO2.1b	AO2.1c	AO3		<b>Total</b>
Content: 1.1.9							
	7			8			<b>15</b>

### Indicative content

#### AO1

Human activity can have varying impacts on coastal environments. Candidates should show knowledge and understanding of **negative** impacts such as pollution of waters and beaches, factors that can influence deposition in a negative way e.g. building groynes, or human factors that influence coastal erosion in a negative way e.g. dredging of sands and gravels.

#### AO2

Candidates should apply knowledge and understanding to evaluate the impacts of human activity on the coastal environment. Relevant responses may include:

- The extent to which there is a balance between negative / positive impacts of human activity on coastal environments. Positive impacts could include the management and conservation of environmentally sensitive areas, the protection of areas of coastline from erosion as part of a shoreline management plan (SMP), where there has been an improvement of the coast as an amenity or where there is a perceived improvement in the aesthetic character of the coastline
- Discussion of the implementation and success of management strategies to mitigate the impact of negative human activity

### Marking guidance

Those that score well will evaluate inter-relationships in the coastal environment. Evaluation may refer to positive impacts in one area leading to negative impacts in another. In Band 3 (AO2) there will be a substantiated conclusion that links clearly to the question.

Near the lower end, there will be limited evaluation. Answers that do not discuss negative impacts are limited to Band 1 (AO1) but could reach mid Band 2 (AO2) showing evidence of a partial/unbalanced discussion.

Credit any other valid points.

Award the marks as follows:

	<b>AO1 (7 marks)</b>	<b>AO2.1c (8 marks)</b>
<b>Band</b>	<i>Demonstrates knowledge and understanding of the negative impacts of human activity on the coastal environment.</i>	<i>Applies knowledge and understanding to evaluate the extent to which humans impact negatively on the coastal environment.</i>
<b>3</b>	<p><b>6-7 marks</b></p> <p>Demonstrates detailed and accurate knowledge and understanding through the use of appropriate, accurate and well-developed examples.</p> <p>Demonstrates detailed and accurate knowledge and understanding of the negative impacts of human activity.</p> <p>Well annotated sketches / diagrams / maps may also be used and should be credited.</p>	<p><b>7-8 marks</b></p> <p>Applies knowledge and understanding to produce a thorough and coherent discussion that is supported by evidence.</p> <p>Applies knowledge and understanding to produce a thorough and coherent discussion on the extent to which impacts of human activity on coastal environments are mainly negative.</p> <p>A substantiated conclusion will be evident.</p>
<b>2</b>	<p><b>3-5 marks</b></p> <p>Demonstrates accurate knowledge and understanding through the use of appropriate and developed examples.</p> <p>Demonstrates accurate knowledge and understanding of some of the negative impacts of human activity.</p> <p>Sketches / diagrams / maps may also be used and should be credited.</p>	<p><b>3-6 marks</b></p> <p>Applies knowledge and understanding to produce a coherent but partial discussion that is supported by some evidence.</p> <p>Applies knowledge and understanding to produce a coherent but partial discussion on the extent to which impacts of human activity on coastal environments are mainly negative.</p>
<b>1</b>	<p><b>1-2 marks</b></p> <p>Demonstrates limited knowledge and understanding through a limited number of underdeveloped examples.</p> <p>Demonstrates limited understanding of some of the negative impacts of human activity.</p> <p>Sketches / diagrams / maps may be used and can be credited.</p>	<p><b>1-2 marks</b></p> <p>Applies knowledge and understanding to produce a discussion with limited coherence and support from some evidence.</p> <p>Applies knowledge and understanding to produce a limited discussion on the extent to which impacts of human activity on coastal environments are mainly negative.</p>
	<p><b>0 marks</b></p> <p>Response not creditworthy or not attempted.</p>	<p><b>0 marks</b></p> <p>Response not creditworthy or not attempted.</p>

**Or: Glaciated Landscapes**

<p>3. (a) Use <b>Figure 3</b> to describe <b>two</b> distinctive landforms of this glacial landscape.</p> <p>Content: 1.2.5</p>	AO1	AO2.1a	AO2.1b	AO2.1c	AO3		<b>Total</b>
					5		<b>5</b>
<p><b>Indicative content</b></p> <p>At the beginning of the last age snow began to accumulate in hollows on hillsides, slowly accumulating enough to turn into ice. This ice slowly gouged out a steep back wall through the processes of freeze-thaw and plucking. Large crevasses on the top of the ice, called Bergschrund allowed water to flow into the ice, where it froze to create more ice.</p> <p>The bottom of the corrie was eroded by abrasion as the ice moved forward in a rotational way. Where the rate of erosion was less, at the front of the ice, a rock lip was left. As more and more ice accumulated it flowed over the lip and into the valley below, creating a glacier.</p> <p>Once the ice melted the corrie was often filled by melt water to form a lake. The rock lip and moraine acted as a natural dam. These lakes are known in Britain as tarns.</p> <p><b>Marking guidance</b></p> <p>Some of the distinctive features identified may include:-</p> <ul style="list-style-type: none"> <li>• the steep back wall of the corrie</li> <li>• the glacial lake (Tarn)</li> <li>• scree slopes</li> </ul> <p>Credit any other valid points.</p>							

Award the marks as follows:		
<b>Band</b>	<b>Marks</b>	
<b>3</b>	<b>4-5</b>	Clear description and identification of two features from the resource. Wide use of the resource to support the description. Two distinctive landforms need to be clearly identified to enter this band.
<b>2</b>	<b>2-3</b>	Clear identification of one feature or partial identification of two. Partial use of the resource to support the description. Some understanding shown but lacks depth and clarity.
<b>1</b>	<b>1</b>	Basic statements to describe or simply name one/two features. Limited use of the resource as a source of data.
	<b>0</b>	No valid comment.

3. (b) Examine the role of abrasion in the formation of <b>one or more</b> landforms of glacial erosion.	AO1	AO2.1a	AO2.1b	AO2.1c	AO3		<b>Total</b>
Content: 1.2.5							
	7			3			<b>10</b>

**Indicative content**

**AO1**

Candidates should show knowledge and understanding of the erosional process of abrasion.

**Abrasion** is the action of the rock and sediment held by the ice on the surface underneath the glacier. Abrasion is involved in the formation of corries, aretes, ribbon lakes and *rôche moutonnées*, amongst others. Candidates should make clear links between the process and the landform/s identified.

**AO2**

Candidates demonstrate application of knowledge and understanding through an examination of the role of abrasion in the formation of erosional landforms. Relevant responses may include:

- The relative importance of abrasion in the formation of different identified landforms
- The relative importance of abrasion in the formation of the same landform in different locations
- The relative importance of abrasion in the formation of different parts of the same landform e.g. *rôche moutonnées*
- The extent to which other erosional processes e.g. plucking or other associated factors can contribute to the formation and/or development of the landforms identified

Some responses may include annotated diagrams which could carry credit.

Credit any other valid points.

Award the marks as follows:

	<b>AO1 (7 marks)</b>	<b>AO2.1c (3 marks)</b>
<b>Band</b>	<i>Demonstrates knowledge and understanding of the process of abrasion in the formation of one or more glacial landforms.</i>	<i>Applies knowledge and understanding to examine the role of abrasion in the formation of one or more glacial landforms.</i>
<b>3</b>	<p><b>5-7 marks</b></p> <p>Demonstrates detailed and accurate knowledge and understanding through the use of appropriate, accurate and well-developed examples.</p> <p>Demonstrates detailed and accurate knowledge and understanding role of abrasion in the formation of <b>one or more</b> landforms of glacial erosion.</p> <p>Demonstrates detailed and accurate knowledge and understanding of the links between abrasion and the landform/s identified.</p> <p>Well annotated sketches / diagrams / maps may also be used and should be credited.</p>	<p><b>3 marks</b></p> <p>Applies knowledge and understanding to produce a thorough and coherent assessment that is supported by evidence.</p> <p>Applies knowledge and understanding to produce a thorough and coherent examination of the role of abrasion in the formation of <b>one or more</b> landforms of glacial erosion.</p>
<b>2</b>	<p><b>3-4 marks</b></p> <p>Demonstrates accurate knowledge and understanding through the use of appropriate and well-developed examples.</p> <p>Demonstrates accurate knowledge and understanding of the role of abrasion in the formation of <b>one or more</b> landforms of glacial erosion.</p> <p>Demonstrates accurate knowledge and understanding of the links between abrasion and the landform/s identified.</p> <p>Sketches / diagrams / maps may also be used and should be credited.</p>	<p><b>2 marks</b></p> <p>Applies knowledge and understanding to produce a coherent but partial assessment that is supported by some evidence.</p> <p>Applies knowledge and understanding to produce a coherent but partial examination of the role of abrasion in the formation of <b>one or more</b> landforms.</p>
<b>1</b>	<p><b>1-2 marks</b></p> <p>Demonstrates limited knowledge and understanding through a limited number of undeveloped examples.</p> <p>Demonstrates limited knowledge and understanding of the role of abrasion as a process.</p> <p>Demonstrates limited knowledge and understanding of the links between abrasion and the landform/s identified.</p> <p>Basic sketches / diagrams / maps may be used and can be credited.</p>	<p><b>1 mark</b></p> <p>Applies knowledge and understanding to produce an assessment with limited coherence and support from some evidence.</p> <p>Applies knowledge and understanding to produce a limited examination of the role of abrasion in the formation of <b>one or more</b> landforms.</p>
	<p><b>0 marks</b></p> <p>Response not creditworthy or not attempted.</p>	<p><b>0 marks</b></p> <p>Response not creditworthy or not attempted.</p>

4. (a) Use <b>Figure 4</b> describe the relationship between runoff and temperature. Content: 1.2.1	AO1	AO2.1a	AO2.1b	AO2.1c	AO3		<b>Total</b>
					5		<b>5</b>
<p><b>Indicative content</b></p> <p>The plot shows the mean monthly temperature fluctuates with a high of 18°C and a low of 4/4.5°C The mean monthly runoff has a low of 15 cumecs and a high of 41 cumecs.</p> <p>The pattern of runoff and temperature should be compared with clear use of x and y axis data. Specific areas of runoff <b>and</b> temperature should be identified to reach Band 3 i.e. the temperatures highest point is in August which is two months after the highest point of runoff.</p> <p>Credit any other valid points.</p> <p>Some candidates will drift into explanation and this should not be credited.</p>							

Award the marks as follows:		
<b>Band</b>	<b>Marks</b>	
<b>3</b>	<b>4-5</b>	Clear description between the relationship with runoff and temperature, with a confident use of both x and y axis data. Wide use of the resource as source of data to support the description. Not all features are needed to enter this band but there must be a reference to time.
<b>2</b>	<b>2-3</b>	Some identification of the relationships with some use of data. Partial use of the resource as source of data to support the description. Some understanding of the relationship.
<b>1</b>	<b>1</b>	Simple statements made with no relationship (each line is discussed on its own merit). Limited use of the resource as a source of data.
	<b>0</b>	No valid comment.

4. (b) Discuss the view that the relationship between glaciated landscapes and human activity is mainly negative.	AO1	AO2.1a	AO2.1b	AO2.1c	AO3		<b>Total</b>
Content: 1.2.9							
	7			8			15

### Indicative content

#### AO1

Candidates will show knowledge and understanding of the negative relationship that can exist between humans and glaciated landscapes.

- Glacial processes have a major negative impact on people's lives, for example, glacial lake outburst floods (GLOFs) are a major hazard in mountainous areas such as the Himalayas
- Avalanches can also lead to death and serious injury in some regions
- Humans can also have a negative impact on the landscape e.g. reference to conventional construction techniques used in periglacial environments that alter the thermal balance of the ground leading to permafrost thaw and ground subsidence

#### AO2

Candidates will apply knowledge in order to evaluate and develop a discussion of whether the relationship between glaciated landscapes and human activity is mainly negative. Relevant responses may include:

- The extent to which glaciated landscapes having a negative impact on human activity e.g. glacial lake outburst floods are a major hazard in mountainous areas such as the Himalayas that can cause serious injury and death on a large scale
- The extent to which the relationship can also be a positive one e.g. the extraction of sands and gravels from fluvioglacial deposits and the construction of reservoirs or the development of tourism
- Reference to the strategies that can be used to manage either the impact of glacial processes or landforms on human activity such as glacial lake outburst floods, or to manage the impacts of human activity on glacial processes or landforms

### Marking guidance

Those that score well will evaluate inter-relationships in the glacial environment. Evaluation may refer to the greater resilience of some communities and/or their increased ability to successfully manage hazards or to create opportunities within glacial landscapes. In Band 3 (AO2) there will be a substantiated conclusion that links clearly to the question.

Near the lower end, there will be limited evaluation.

Credit any other valid points.



Award the marks as follows:		
	<b>AO1 (7 marks)</b>	<b>AO2.1c (8marks)</b>
<b>Band</b>	<i>Demonstrates knowledge and understanding of the negative relationship between glaciated landscapes and human activity.</i>	<i>Applies knowledge and understanding to evaluate the inter-relationship between glaciated landscapes and human activity.</i>
<b>3</b>	<p><b>6-7 marks</b></p> <p>Demonstrates detailed and accurate knowledge and understanding through the use of appropriate, accurate and well-developed examples.</p> <p>Demonstrates detailed and accurate knowledge and understanding of the negative links between human activity and the glaciated landscape.</p> <p>Well annotated sketches / diagrams / maps may also be used and should be credited.</p>	<p><b>7-8 marks</b></p> <p>Applies knowledge and understanding to produce a thorough and coherent discussion that is supported by evidence.</p> <p>Applies knowledge and understanding to produce a thorough and coherent discussion on whether the relationship between glaciated landscapes and human activity is mainly negative.</p> <p>A substantiated conclusion will be evident.</p>
<b>2</b>	<p><b>3-5 marks</b></p> <p>Demonstrates accurate knowledge and understanding through the use of appropriate and developed examples.</p> <p>Demonstrates accurate knowledge and understanding of some of the negative links between human activity and glaciated landscape.</p> <p>Sketches / diagrams / maps may also be used and should be credited.</p>	<p><b>3-6 marks</b></p> <p>Applies knowledge and understanding to produce a coherent but partial analysis that is supported by some evidence.</p> <p>Applies knowledge and understanding to produce a coherent but partial discussion on whether the relationship between glaciated landscapes and human activity is mainly negative.</p>
<b>1</b>	<p><b>1-2 marks</b></p> <p>Demonstrates limited knowledge and understanding through a limited number of underdeveloped examples.</p> <p>Demonstrates limited understanding of the negative links between human activity and glaciated landscape.</p> <p>Sketches /diagrams / maps may be used and can be credited.</p>	<p><b>1-2 mark</b></p> <p>Applies knowledge and understanding to produce an analysis with limited coherence and support from some evidence.</p> <p>Applies knowledge and understanding to produce a limited analysis and discussion on whether the relationship between glaciated landscapes and human activity is mainly negative.</p>
	<p><b>0 marks</b></p> <p>Response not creditworthy or not attempted.</p>	<p><b>0 marks</b></p> <p>Response not creditworthy or not attempted.</p>

## Section B: Tectonic Hazards

<p>5. (a) (i) Use <b>Figure 5a</b> to describe the immediate impacts of the earthquake.</p> <p>Skills: 7.1</p>	AO1	AO2.1a	AO2.1b	AO2.1c	AO3		<b>Total</b>
					5		<b>5</b>
<p><b>Indicative Content</b></p> <p><b>Demographic/Social</b> – destruction of infrastructure and housing, deployment of emergency services, injuries to people in the immediate vicinity, disrupted transport links, destruction of power lines affecting communications and electricity supply,</p> <p><b>Economic</b> – relief costs, cost of aid, business loss of earnings, transport and communication costs.</p> <p>Credit any other valid points.</p> <p><b>Marking guidance</b></p> <p>There are a wide variety of impacts that could be accepted but they should be evident in the photograph and related to the immediate impacts of the earthquake.</p>							

Award the marks as follows:		
Band	Marks	
<b>3</b>	<b>4-5</b>	Detailed description of two or more immediate impacts with clear links made to evidence from the photographs.
<b>2</b>	<b>2-3</b>	Lacks detail or could focus on one impact. Some links made to evidence from the photograph.
<b>1</b>	<b>1</b>	Partial statements made with limited understanding of the immediate impacts seen in the photographs.
	<b>0</b>	No valid comment.

5. (a) (ii) Use <b>Figures 5a and 5b</b> to suggest the possible long-term economic impacts of the earthquake.	AO1	AO2.1a	AO2.1b	AO2.1c	AO3		<b>Total</b>
Content: 1.3.6					5		<b>5</b>

### Indicative Content

**Economic** – costs of rebuilding with a lack of insurance, investment into the area may only be focussed on the repairing the damage, loss of income through a type of industry e.g. tourism or agriculture, loss of culturally significant buildings which could lead to a negative multiplier effect.

### Marking guidance

This answer is point marked (1 per economic impact) with a further one or two marks for development. There are a wide variety of impacts that could be accepted but they should be evident in the resources and related to the long-term **economic** impacts of the earthquake.

Long-term impacts identified must make links to the resources but do not credit direct lift from resources without development. Credit any other valid points.

5. (b) (i) Outline the characteristics of <b>two</b> types of earthquake (seismic) waves.	AO1	AO2.1a	AO2.1b	AO2.1c	AO3		<b>Total</b>
Content: 1.3.5	5						<b>5</b>

### Indicative content

Candidates should show knowledge and understanding of the characteristics of P and S waves and how they are generated by earthquakes.

**Primary waves (P)** - travel fastest, longitudinal, compressional, vibrate in the direction they are travelling, travel through the core and the mantle and any material.

**Secondary Waves (S)** - Half the speed of P waves, horizontal/transverse, they shear rock by vibrating at right angles to the direction of travel, S waves travel through to mantle.

Most students will concentrate on these two wave types as they are named in the specification but we should also accept a discussion of L waves which travel slowest and are near to ground level. These waves don't travel through the mantle. Credit discussion of Rayleigh waves also.

Accept a well annotated diagram. Credit any other valid points.

Award the marks as follows:		
Band	Marks	
<b>3</b>	<b>4-5</b>	Detailed understanding of two waves with clear characteristics identified.
<b>2</b>	<b>2-3</b>	Sound understanding shown with a lack of balance between the two types of waves.
<b>1</b>	<b>1</b>	Partial statements made with limited understanding and development.
	<b>0</b>	No valid comment.

5. (c) Explain how earthquakes can cause liquefaction. Content: 1.3.5	AO1	AO2.1a	AO2.1b	AO2.1c	AO3		<b>Total</b>
	3						<b>3</b>

**Indicative Content**

**Earthquake** waves **cause** water pressure to increase in the sediment (1) and the sand grains to lose contact with each other (1), causing the sediment to lose strength and coherence (1) and behave like a liquid (1).

Credit any other valid points.

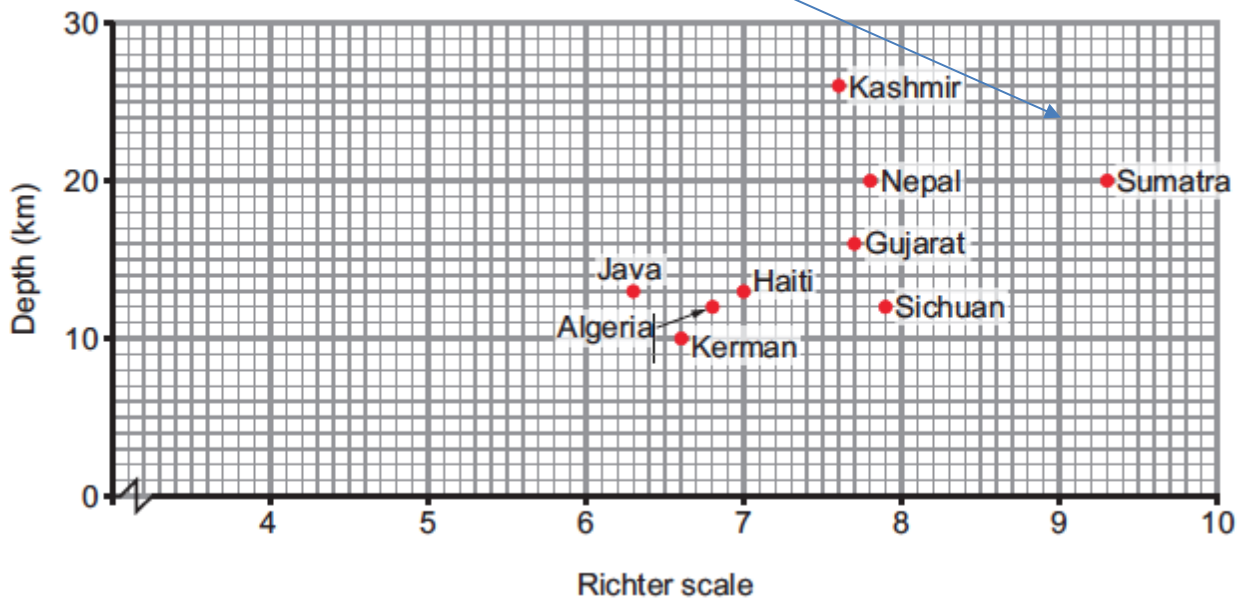
**Marking guidance**

One mark per valid point (including up to two marks for development).

5. (c) (i) Use <b>Figure 6b</b> to plot the data for Miyagi onto <b>Figure 6a</b> . Skills: 3.6	AO1	AO2.1a	AO2.1b	AO2.1c	AO3		<b>Total</b>
					2		<b>2</b>

Accurate plot related to the x axis (1 mark)  
Accurate plot related to the y axis (1 mark).

**Figure 6a: Magnitude and depth of selected earthquakes**



5. (c) (ii) Calculate the missing values for $d$ and $d^2$ for Kashmir and insert them into <b>Figure 6b</b> .	AO1	AO2.1a	AO2.1b	AO2.1c	AO3		<b>Total</b>
Skills: 2.14					2		<b>2</b>
$d = 5$ (1 mark) $d^2 = 25$ (1 mark)							

5. (c) (iii) Calculate the sum of $d^2$ and insert it into <b>Figure 6b</b> .	AO1	AO2.1a	AO2.1b	AO2.1c	AO3		<b>Total</b>
Skills: 2.14					1		<b>1</b>
$d^2 = 75.5$ (1 mark)							

5. (c) (iv) Calculate the value of the Spearman Rank correlation coefficient using the formula below, where $n$ is the number of pairs of data ( $n=10$ ). Give your answer to 2 decimal places. [3]	AO1	AO2.1a	AO2.1b	AO2.1c	AO3		<b>Total</b>
Skills: 2.14					3		<b>3</b>

**Indicative Content**

The correct response will be:

$6 * 75.5 = 453$  (1 mark)  
 $10 * (10^2 - 10) = 990$  (1 mark)  
 $1 - 453/990 = 0.54$  (1 mark)  
Completed formula top and/or bottom layers (2 marks)

Any two of the above plus the answer below:-  
**0.54** (1 mark)

Award 1 mark only for just the correct answer where no workings are shown.

5. (c) (v) Using the table below, state the statistical significance of the result of the Spearman Rank calculation.	AO1	AO2.1a	AO2.1b	AO2.1c	AO3		<b>Total</b>
Skills: 2.14					2		<b>2</b>

**Indicative content**

A Spearman Rank correlation coefficient value of 0.54 is below the 95% and 99% significance levels (1 mark). Therefore you can accept the null hypothesis ( $H_0$ ) or reject the alternative hypothesis ( $H_1$ ), that there is no significant correlation between the magnitude and depth of an earthquake (1 mark). Credit any other valid points.

5. (d) Of all the hazards resulting from earthquake activity, tsunami have the greatest impact.' Discuss. Content: 1.3.6, 1.3.7	AO1	AO2.1a	AO2.1b	AO2.1c	AO3		<b>Total</b>
	5			7			<b>12</b>

### Indicative content

#### AO1

Candidates should show knowledge and understanding to describe and explain the impacts of tsunami.

Out at sea, tsunami do not represent a hazard and go unnoticed. It is only as they approach a coastline and the water becomes shallower that they grow in height. A tsunami is not a single wave but a series of waves. The first wave is not necessarily the most destructive, so there is often an escalation effect in terms of danger and loss of life as the event continues. The amount of time between the waves can be a factor; this can increase impacts as people can return to their homes after the initial smaller waves. The global distribution of tsunamis is fairly predictable in terms of source areas, with around 90% of events occurring in the Pacific Ocean. However, the scale of the damage and the extent of the geographical area affected means that tsunami often eclipse other hazards in terms of death toll and scale/cost of destruction.

The impact of a tsunami depends on a number of physical and human factors:

- the duration of the event
- the wave amplitude, water column displacement and distance travelled.
- the degree of coastal ecosystem buffer, for example mangroves and coral reefs.
- the timing of the event – night versus day – and the quality of warning systems.
- the degree of coastal development and its proximity from the coast, especially tourist areas.

Use of examples will help clarify the above points but not all are needed.

#### AO2

Candidates are required to evaluate the impact of tsunamis. This could include:

- a discussion of the varying impacts of tsunami depending on a range of factors which may mitigate or enhance the effect of the hazard e.g. economic factors (levels of development and availability of technology) , social factors (population density, population profile (age, gender) and levels of education), political factors (quality of governance) and geographical factors (rural / urban location, time of day and degree of isolation)
- a discussion of the management strategies that may be able to mitigate the effects of tsunami over time
- a discussion of other hazards associated with earthquake activity which may have significant impacts at different scales e.g. lahar, pyroclastic flow.

### Marking guidance

In Band 3 (AO2) there will be a substantiated conclusion that links clearly to the question.

Credit any other valid points.

Award the marks as follows:

	<b>AO1 (5 marks)</b>	<b>AO2.1c (7 marks)</b>
<b>Band</b>	<i>Demonstrates knowledge and understanding of the impact of tsunami as a hazard associated with earthquake activity.</i>	<i>Applies knowledge and understanding to discuss the extent to which tsunami have the greatest impact.</i>
<b>3</b>	<p><b>4-5 marks</b></p> <p>Demonstrates detailed and accurate knowledge and understanding through the use of appropriate, accurate and well-developed examples.</p> <p>Demonstrates detailed and accurate knowledge and understanding of the impact of tsunami as a hazard associated with earthquake activity.</p> <p>Well annotated sketches / diagrams / maps may also be used and should be credited.</p>	<p><b>6-7 marks</b></p> <p>Applies knowledge and understanding to produce a thorough and coherent discussion that is supported by evidence.</p> <p>Applies knowledge and understanding to produce a thorough and coherent discussion of the extent to which tsunami have the greatest impact.</p> <p>A substantiated conclusion will be evident.</p>
<b>2</b>	<p><b>2-3 marks</b></p> <p>Demonstrates accurate knowledge and understanding through the use of appropriate and developed examples.</p> <p>Demonstrates accurate knowledge and understanding of the impact of tsunami as a hazard associated with earthquake activity.</p> <p>Sketches / diagrams / maps may also be used and should be credited.</p>	<p><b>3-5 marks</b></p> <p>Applies knowledge and understanding to produce a coherent but partial analysis that is supported by some evidence.</p> <p>Applies knowledge and understanding to produce a coherent but partial discussion of the extent to which tsunami have the greatest impact.</p>
<b>1</b>	<p><b>1 mark</b></p> <p>Demonstrates limited knowledge and understanding through a limited number of underdeveloped examples.</p> <p>Demonstrates limited understanding of the impact of tsunami as a hazard associated with earthquake activity.</p> <p>Sketches / diagrams / maps may be used and can be credited.</p>	<p><b>1-2 mark</b></p> <p>Applies knowledge and understanding to produce an analysis with limited coherence and support from some evidence.</p> <p>Applies knowledge and understanding to produce a limited analysis and discussion of the extent to which tsunami have the greatest impact.</p>
	<p><b>0 marks</b></p> <p>Response not creditworthy or not attempted.</p>	<p><b>0 marks</b></p> <p>Response not creditworthy or not attempted.</p>

6. (a) Assess the significance of processes operating at plate margins in explaining the global pattern of volcanic activity.	AO1	AO2.1a	AO2.1b	AO2.1c	AO3		<b>Total</b>
Content: 1.3.4							
	10			5			<b>15</b>

**Indicative content**

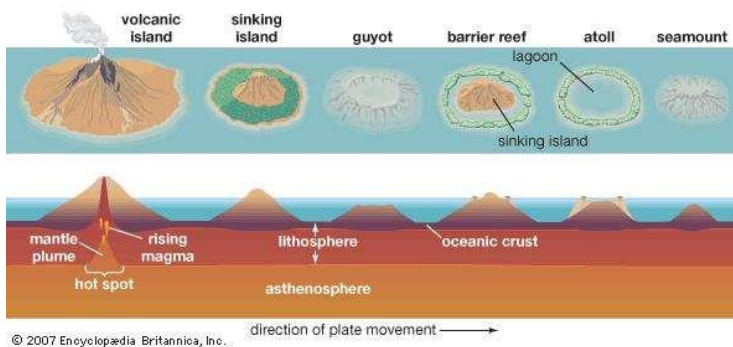
**AO1**

Most volcanoes are located along **divergent** plate margins where the earth's crust moves apart. As the two plates diverge, new lithosphere is created. At the same time, the release of pressure induces an upward movement of magma from the mantle, forming volcanoes such as fissure or shield volcanoes.

When two oceanic plates collide at a **convergent** plate margin, one sinks beneath the other and the rising magma from the subduction zone eventually forms volcanic islands (e.g. the Philippines). A series of these islands form an island arc.

Well-developed knowledge and understanding of processes operating at plate boundaries is expected to explain the global pattern of volcanic activity.

Most candidates will identify convergent and divergent plate margins but those that will enter upper Band 3 will discuss that not all processes occur on plate margins. Most volcanic eruptions occur near plate boundaries but there are some exceptions. For example, the islands of the US state of Hawaii are entirely of volcanic origin. This phenomenon occurs due to 'hotspots' which are largely due to being situated directly above a convectional cell.



**AO2**

Candidates should apply knowledge to evaluate the significance of processes at plate margins in the patterns seen – the more developed responses will discuss the role of hotspots and the interaction of the type of boundary and may be linked to the type of magma and type of eruption prevalent at different margins.

Candidates could also discuss the relative role of different plate margins in the overall pattern e.g. convergent at edges of continental plates.

**Marking Guidance**

Those that score well will assess the significance of the processes throughout their response (Band 3). Near the lower end, there will be limited or at times, no assessment (Band 1).

Credit any other valid points.



Award the marks as follows:		
	<b>AO1 (10 marks)</b>	<b>AO2.1c (5 marks)</b>
<b>Band</b>	<i>Demonstrates knowledge and understanding of process operating at plate margins and their link to the global pattern of volcanic activity.</i>	<i>Applies knowledge and understanding to evaluate the significance of processes operating at plate margins in producing the global pattern of volcanic activity.</i>
<b>3</b>	<p><b>8-10 marks</b></p> <p>Demonstrates detailed and accurate knowledge and understanding through the use of appropriate, accurate and well-developed examples.</p> <p>Demonstrates detailed and accurate knowledge of the processes affecting the global pattern of volcanic activity.</p> <p>Well annotated sketches / diagrams / maps may also be used and should be credited.</p>	<p><b>4-5 marks</b></p> <p>Applies knowledge and understanding to produce a thorough and coherent assessment that is supported by evidence.</p>
<b>2</b>	<p><b>4-7 marks</b></p> <p>Demonstrates accurate knowledge and understanding through the use of appropriate and developed examples.</p> <p>Demonstrates accurate knowledge and understanding of the processes affecting the global pattern of volcanic activity.</p> <p>Sketches / diagrams / maps may also be used and should be credited.</p>	<p><b>2-3 marks</b></p> <p>Applies knowledge and understanding to produce a coherent but partial assessment that is supported by some evidence.</p>
<b>1</b>	<p><b>1-3 marks</b></p> <p>Demonstrates limited knowledge and understanding through a limited number of underdeveloped examples.</p> <p>Demonstrates limited understanding of the processes affecting the global pattern of volcanic activity.</p> <p>Sketches / diagrams / maps may be used and can be credited.</p>	<p><b>1 mark</b></p> <p>Applies knowledge and understanding to produce an assessment with limited coherence and support from some evidence.</p>
	<p><b>0 marks</b></p> <p>Response not creditworthy or not attempted</p>	<p><b>0 marks</b></p> <p>Response not creditworthy or not attempted</p>

6. (b) 'The best way to reduce the risks associated with tectonic hazards is through the use of technology.' Discuss.  Content: 1.3.8, 1.3.9	AO1	AO2.1a	AO2.1b	AO2.1c	AO3		<b>Total</b>
	10			10			<b>20</b>

**Indicative content**

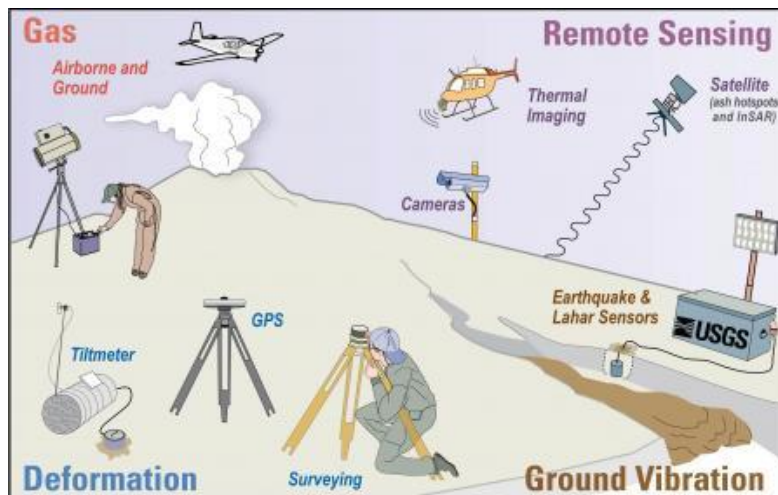
Accept approaches that discuss either earthquake and/or volcanoes. There are many ways to approach this question but the 'Discuss....' command must be addressed to gain AO2 credit.

**AO1**

Despite extensive research it is not yet possible to predict earthquakes accurately. The best advance warning at present is around 9 seconds which is too far too short a time to employ mitigating strategies in response. Therefore, most efforts have been put into preparing for them through the use of technology:

- **building earthquake resistant buildings** – These are built with deep foundations with rubber shock absorbers and concrete reinforced with steel. They are designed to twist and sway, have sprinkler systems and gas cut off valves
- **giving tsunami warnings** – as tsunamis occur mostly in the Pacific and Indian Oceans there are data collecting devices to give warnings of such an event
- **predicting volcanic eruptions** – technological advances are making it easier to predict volcanic eruptions, satellites monitor the temperature and shape of active volcanoes, sensors measure levels of sulphur dioxide and carbon dioxide gas, seismometers record earthquakes as magma rises to fill the volcano, tilt meters record any change in the shape of the volcano

Expect support from case study material.



**AO2**

Candidates will apply knowledge and understanding to evaluate the role of technology in mitigating the risks associated with tectonic hazards. Discussion could include:

- The importance of technology in mitigating the risk associated with particular events or case studies e.g. comparison of two events
- The importance of other factors in determining the ability of a state or country to utilise the technology available e.g. level of development, level of education and quality of governance

**Marking Guidance**

Those that score well will provide **discussion** throughout their response and will offer a substantiated conclusion that links back to the question (Band 3). Near the lower end, there will be limited and at times, no assessment and/or conclusion. Credit any other valid points.

Award the marks as follows:

<b>AO1 (10 marks)</b>		<b>AO2.1c (10 marks)</b>
<b>Band</b>	<i>Demonstrates knowledge and understanding of ways of using technology to mitigate risks resulting from tectonic activity.</i>	<i>Applies knowledge and understanding to discuss the extent to which technology is the most effective way to mitigate risks resulting from tectonic activity.</i>
<b>3</b>	<p><b>7-10 marks</b></p> <p>Demonstrates detailed and accurate knowledge and understanding through the use of appropriate, accurate and well-developed examples.</p> <p>Demonstrates detailed and accurate knowledge and understanding of technological tectonic management strategies.</p> <p>Well annotated sketches / diagrams / maps may also be used and should be credited.</p>	<p><b>7-10 marks</b></p> <p>Applies knowledge and understanding to produce a thorough and coherent assessment that is supported by evidence.</p> <p>Applies knowledge and understanding to produce a thorough and coherent discussion of the extent to which technology is the most effective tool to mitigate risk resulting from tectonic activity.</p> <p>A substantiated conclusion will be evident.</p>
<b>2</b>	<p><b>4-6 marks</b></p> <p>Demonstrates accurate knowledge and understanding through the use of appropriate and developed examples.</p> <p>Demonstrates accurate knowledge and some understanding of technological tectonic management strategies.</p> <p>Sketches / diagrams / maps may also be used and should be credited.</p>	<p><b>4-6 marks</b></p> <p>Applies knowledge and understanding to produce a coherent but partial assessment that is supported by some evidence.</p> <p>Applies knowledge and understanding to discuss the extent to which technology is the most effective tool to mitigate risk resulting from tectonic activity.</p>
<b>1</b>	<p><b>1-3 marks</b></p> <p>Demonstrates limited knowledge and understanding through a limited number of undeveloped examples.</p> <p>Demonstrates limited understanding of technological tectonic management strategies.</p> <p>Basic sketches / diagrams / maps may be used and can be credited.</p>	<p><b>1-3 mark</b></p> <p>Applies knowledge and understanding to produce an assessment with limited coherence and support from some evidence.</p> <p>Limited application of knowledge and understanding to discuss the extent to which technology is the most effective tool to mitigate risk resulting from tectonic activity.</p>
	<p><b>0 marks</b></p> <p>Response not creditworthy or not attempted.</p>	<p><b>0 marks</b></p> <p>Response not creditworthy or not attempted.</p>

## Section C: Challenges in the 21<sup>st</sup> Century

7. Suggest how hazards can affect connections between places.	AO1	AO2.1a	AO2.1b	AO2.1c	AO3.1	AO3.2	<b>Total</b>
			10				<b>10</b>

Within the answer to question 7, candidates may use Figures 7a and 7b, together with appropriate knowledge and understanding of the connections between different aspects of this area across the whole specification in order to develop a sustained line of reasoning which is coherent, relevant, substantiated and logically structured.

### **Indicative content**

Figure 7a shows flights grounded by a volcanic ash cloud. This will provide a potential stimulus for discussion on the impact of events such as these on connections between places in terms of business and trade and the impact on tourism.

Figure 7b shows a photo of international aid arriving in Nepal after the 2015 earthquake. This will provide stimulus to discuss the connections created as a result of aid distribution, the financial implications on the host and donor countries, and the potential for the host country to become reliant on aid from the donor after a tectonic event.

### **Marking guidance**

Accept discussion of any hazard and do not limit credit to discussion stimulated by the photographs. The discussion should draw upon knowledge and understanding from across the Specification.

Credit any other valid points.

Award the marks as follows:

<b>Band</b>	<b>Marks</b>	<b>AO2.1b (10 marks)</b>
<b>3</b>	<b>7-10</b>	<p>Applies knowledge and understanding from across the specification to produce a thorough and coherent evaluation that is supported by evidence.</p> <p>Well-developed synthesis of geographical ideas, concepts and issues from the resources provided and from across the specification and in different contexts, in order to make well-judged connections.</p> <p>Applies knowledge and understanding from across the specification to suggest how hazards affect connections between places and uses accurate and well-developed examples from across the specification.</p>
<b>2</b>	<b>4-6</b>	<p>Applies knowledge and understanding from across the specification to produce a coherent but partial evaluation that is supported by some evidence.</p> <p>Partial synthesis of geographical ideas, concepts and issues from the resources provided and from across the specification and in different contexts, in order to make partial connections.</p> <p>Applies knowledge and understanding from across the specification to partially suggest how hazards affect connections between places and uses mostly appropriate and developed examples from across the specification.</p>
<b>1</b>	<b>1 - 3</b>	<p>Applies knowledge and understanding from across the specification to produce an evaluation with limited coherence and support from some evidence.</p> <p>Limited synthesis of geographical ideas, concepts and issues from the resources provided and from across the specification and in different contexts, making limited connections.</p> <p>Limited application of knowledge and understanding from across the specification to suggest how hazards affect connections between places. The response draws upon a limited number of under developed examples from across the specification.</p>
	<b>0</b>	Response not creditworthy or not attempted.