GCE AS MARKING SCHEME

SUMMER 2023

AS
GEOGRAPHY – UNIT 1
2110U10-1

INTRODUCTION

This marking scheme was used by WJEC for the 2023 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.

GCE AS GEOGRAPHY

UNIT 1: CHANGING LANDSCAPES

SUMMER 2023 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 unit 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. Do not use crosses to indicate answers that are incorrect. 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.

The second part is 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 unit. The targeted AO(s) are also indicated, for example AO2.1c.

Assessment Objective	Strands	Elements
AO1 Demonstrate knowledge and understanding of places, environments, concepts, processes, interactions and change, at a variety of scales.	N/A	This AO is a single element.
AO2 Apply knowledge and understanding in different contexts to interpret, analyse and evaluate geographical information and issues.	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
AO3 Use a variety of relevant quantitative, qualitative and fieldwork skills to: • investigate geographical questions and issues • interpret, analyse and evaluate data and evidence • construct arguments and draw conclusions.	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 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.

Banded mark schemes Stage 1 – Deciding on the band

When deciding on a band, the answer should be viewed holistically. 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), detailed advice from the Principal Examiner on the qualities of each mark band will be given. 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 also provided for banded mark schemes. 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 specialised concepts from the specification that apply in the indicative content are underlined.

The mark scheme reflects the layout of the examination paper. Mark questions 1 and 2 or questions 3 and 4 in Section A, all questions in Section B. 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: Changing Landscapes

Either: Coastal Landscapes

1. (a) (i) **Use Figure 1** to describe the pebble's movement from 4 November to 30 November. Skills: 2.5 and 8.2	AO1	AO2.1a	AO2.1b	AO2.1c	AO3		**Total**
Award each valid point 1 mark + 1 for supporting data using key					5		**5**

Indicative content

- Overall movement towards NE / from SW
- Reverses direction briefly between 19 and 21 November
- Moves in a more northerly direction after 28 November
- Slowest rate of movement is between 4 and 13 November (positions 2 and 3)
- Fastest rate of movement is between 28 and 30 November (positions 6 and 7)
- Travels around 30-40 m along beach (total distance)
- Travels around 40-50 m in total (including change of direction)
- Moves offshore to final position (1) around 10 m (1).

Marking guidance

Credit other valid responses. Reserve two marks for the overall trend of movement towards N/E (1) and for the reversal of direction (1). Do not credit isolated comments on individual time periods e.g.between 19 and 18 of November it moves 13m.

1. (a) (ii) Suggest **one physical** reason for the rapid movement of the pebble from Location 1 to Location 2. Content: 1.1.6 and 1.1.8	AO1	AO2.1a	AO2.1b	AO2.1c	AO3		**Total**
Award 1 mark for suggestion and up to 2 marks for development.			3				**3**

Indicative content

The indicative content is not prescriptive and candidates are not expected to cover all points for full marks. Credit other valid points not contained in the indicative content. This may include:

- High energy storm events (1) resulting in very strong swash (1) and a long distance covered quickly by coastal transport processes (1)
- Longshore drift (1) causes lateral movement of pebbles along a coastline (1) and strong / storm winds may explain why the process was highly active 1-3 November (1).

1. (b) Examine how constructive waves differ from destructive waves. Content: 1.1.2	AO1	AO2.1a	AO2.1b	AO2.1c	AO3		**Total**
	5			3			8

Indicative content

The indicative content is not prescriptive and candidates are not expected to cover all points for full marks. Credit other valid points not contained in the indicative content.

AO1 content encompasses knowledge and understanding of different types of wave. Possible themes include their causes, characteristics, contexts, seasonality and impacts.

- Constructive waves – low frequency; long wavelength; spilling waves
- Constructive waves – build up and steepen beaches
- Constructive waves – produce berms at the high tide mark / larger material deposited at high tide mark
- Constructive waves – more likely in summer / relatively calm conditions
- Destructive waves – high frequency; short wavelength; plunging waves
- Destructive waves – typically associated with scouring of the lower beach creating a gentle gradient
- Destructive waves – create steep storm ridges at the back of the beach, especially in shingle. Larger material spread across the beach
- Major storm events / surges and destructive waves more likely to occur during winter in the UK.

AO2 content encompasses the application of knowledge and understanding to examine different perspectives/ways of thinking about how the two categories of wave type differ.

- Examination of wave type *characteristics* as a way in which they differ
- Examination of different *spatial* and *temporal contexts* in which they develop
- Examination of their different *impacts*
- Critical thinking about extent to which it is always *easy to distinguish* / see differences.

Marking guidance

For award of maximum AO2 marks, expect two ways in which they differ to be explicitly examined.

Award the marks as follows:		
	AO1 (5 marks)	**AO2.1c (3 marks)**
Band	*Demonstrates knowledge and understanding of C and D waves*	*Applies knowledge and understanding to explicitly examine varied ways in which C and D waves differ*
3	**4-5 marks** Well-developed knowledge and understanding of C and D waves. Demonstrates accurate knowledge and understanding using appropriate and well-developed examples. Well annotated sketches / diagrams / maps may also be used and should be credited.	**3 marks** Applies knowledge and understanding to construct a well-developed and structured examination of how they differ. Applies knowledge and understanding to construct well-developed and balanced arguments, supported by appropriate evidence.
2	**2-3 marks** Partial knowledge and understanding of C and D waves. Demonstrates partial knowledge and understanding through the use of examples which may not be fully developed. Generalised sketches / diagrams / maps may also be used and should be credited.	**2 marks** Applies partial knowledge and understanding to construct a partial examination of how they differ. Applies knowledge and understanding to construct partially developed and partially balanced arguments, supported by mostly appropriate evidence.
1	**1 mark** Limited knowledge and understanding of C and D waves. Demonstrates limited knowledge and understanding through the use of examples which are undeveloped. Basic sketches / diagrams / maps may also be used and should be credited.	**1 mark** Applies limited knowledge and understanding to construct a limited examination of how they differ (one way may be implied). Applies limited knowledge and understanding to construct limited arguments, supported by limited evidence.
	0 marks Response not creditworthy or not attempted.	**0 marks** Response not creditworthy or not attempted.

2. (a) (i) **Use Figure 2** to describe geographical variations in the level of protection along coastlines in England and Wales. Skills: 8.2	AO1	AO2.1a	AO2.1b	AO2.1c	AO3		**Total**
Award 1 mark for each valid point					5		**5**

Indicative content

- West coast and Wales in particular have no defences or management strategy
- Northeast coast of England lacks defences
- Hold the line most common along east coast of England
- A very small area of east/southeast has 'advance' (new defences will be built)
- Many small lengths of managed retreat are distributed fairly evenly around the coast, with the most in SW England and S Wales

Marking guidance

Max. 3 if the candidate produces a simple list of points with no geographical overview. Only credit located statements.

2. (a) (ii) Suggest **one physical** reason why the option of 'managed retreat' has been chosen for some places. Content: 1.1.4 and 1.1.8	AO1	AO2.1a	AO2.1b	AO2.1c	AO3		**Total**
Award 1 mark for suggestion and up to 2 marks for development.			3				**3**

Indicative content

The indicative content is not prescriptive and candidates are not expected to cover all points for full marks. Credit other valid points not contained in the indicative content. This may include:

- Geology of cliffs (1) – the type/structure is highly vulnerable to erosion and too costly to defend (1), for example soft clay that is prone to slumping (1)
- Isostatic down-tilting (1) – combines with rising sea-levels due to climate change (1) to create a projected rate coastal retreat that is unmanageable (1)
- Climate change and / or projected sea level rise (1) increases the likelihood of erosion / flooding (1) creates more costs to defend the coast in future (1).

2. (b) Examine the role of sea level change in the development of **one** coastal landform. Content: 1.1.8	AO1	AO2.1a	AO2.1b	AO2.1c	AO3		**Total**
	5			3			**8**

Indicative content

The indicative content is not prescriptive and candidates are not expected to cover all points for full marks. Credit other valid points not contained in the indicative content.

AO1 content encompasses knowledge and understanding of landforms and the processes creating them over time. The content will depend upon the landform(s) chosen and may include:

- Raised beaches – indicating emerging coastline, relative fall in sea level
- Relict caves, stacks and stumps – indicating emerging coastline, relative fall in sea level
- Rias and fjords – indicating submerged coastline, relative rise in sea level
- Raised wave-cut platforms – indicating relative fall in sea level, retreat of cliffs, undercutting and collapse

AO2 content encompasses the application of knowledge and understanding to examine the role of sea-level change in the formation of landform(s). The content may vary according to the landscape but may include:

- Examination of the role of other processes//influences in the past (e.g. relict stack is a product of undercutting and collapse prior to isostatic uplift)
- Examination of the role of other processes//influences in the present (e.g. sub-aerial processes impacting on relict cliff profile)
- Examination of how sea-level changes have varied over time, adding to landscape complexity e.g. series of raised beaches.

Marking guidance

Answers that focus on sea level change (and do not develop the link to the landform) should not be awarded and AO1 mark beyond top of Band 2.

Award the marks as follows:		
	AO1 (5 marks)	**AO2.1c (3 marks)**
Band	*Demonstrates knowledge and understanding of the impact of sea-level change on the development of a selected landform.*	*Applies knowledge and understanding to examine the role of sea-level change*
3	**4-5 marks** Demonstrates accurate knowledge and understanding of the impact of sea-level change on the development of one landform. Demonstrates accurate knowledge and understanding using appropriate and well-developed examples. Well annotated sketches / diagrams / maps may also be used and should be credited.	**3 marks** Applies knowledge and understanding to construct a well-developed and structured examination of the role. Applies knowledge and understanding to construct well-developed and balanced arguments, supported by appropriate evidence.
2	**2-3 marks** Demonstrates partial knowledge and understanding of the impact of sea-level change on the development of one landform. Demonstrates partial knowledge and understanding through the use of mostly appropriate examples which may not be fully developed. Generalised sketches / diagrams / maps may also be used and should be credited.	**2 marks** Applies partial knowledge and understanding to construct a partial examination of the role. Applies knowledge and understanding to construct partially developed and partially balanced arguments, supported by mostly appropriate evidence.
1	**1 mark** Demonstrates limited knowledge and understanding of the impact of sea-level change on the development of one landform. Demonstrates limited knowledge and understanding through the use of examples which are undeveloped. Basic sketches / diagrams / maps may also be used and should be credited.	**1 mark** Applies limited knowledge and understanding to construct a limited examination of the role. Applies limited knowledge and understanding to construct limited arguments, supported by limited evidence.
	0 marks Response not creditworthy or not attempted.	**0 marks** Response not creditworthy or not attempted.

Or: Glaciated Landscapes

3. (a) (i) **Use Figure 3** to describe the movement of the glacier between 1960 and 2010. Skills: 8.2	AO1	AO2.1a	AO2.1b	AO2.1c	AO3		**Total**
Award each valid point 1 mark + 1 for supporting data using key					5		**5**

Indicative content

- General trend of retreat 1960-2010
- Has moved by about 700 m over the time period
- Advanced 1970-1980 (1) around 80-100m (1)
- Slowest rate of retreat was 1990-2000 (1) only retreated by 200m (1)
- Fastest rate of retreat was 1960-1970 or 1980-1990 at around 250-300m
- Retreat greatest on the Northern edge.

Marking guidance

Credit other valid responses. Reserve two marks for overall retreat (1) and reversal of direction (advance) (1). Do not credit isolated comments on individual time periods e.g. between 1960 and 1970 it retreated 220m.

3. (a) (ii) Suggest **one** reason for the rapid retreat of the glacier during the 1950s. Content: 1.2.1	AO1	AO2.1a	AO2.1b	AO2.1c	AO3		**Total**
Award 1 mark for suggestion and up to 2 marks for development.			3				**3**

Indicative content

The indicative content is not prescriptive and candidates are not expected to cover all points for full marks. Credit other valid points not contained in the indicative content. This may include:

- Higher-than-average temperatures/global warming or climate change (1) resulting in a significant excess of ablation over accumulation (1) and reduction in mass balance / ice volume (1)
- Much-lower-than-average snowfall (1) and so a greatly reduced accumulation of new ice (1) and reduced volume of valley glacier (1).

3. (b) Examine how cold-based glaciers differ from warm-based glaciers. Content: 1.2.3	AO1	AO2.1a	AO2.1b	AO2.1c	AO3		**Total**
	5			3			**8**

Indicative content

The indicative content is not prescriptive and candidates are not expected to cover all points for full marks. Credit other valid points not contained in the indicative content.

AO1 content encompasses knowledge and understanding of the two categories of glacier. Possible themes include their characteristics, processes and contexts.

- Cold-based – basal part entirely below the pressure melting point
- Cold-based – move via internal deformation as no water for basal sliding
- Warm-based – surface melt water conveyed through glacier via internal tunnels
- Warm-based – faster rate of movement and so carry out more erosion
- Cold-based at higher latitudes and altitudes.

AO2 content encompasses the application of knowledge and understanding to examine different perspectives/ways of thinking about how the two categories of glacier differ.

- Examination of differing ice / flow *characteristics*
- Examination of different *spatial locations* and *temporal contexts* in which they develop
- Examination of their different *landscape impacts*
- Critical thinking about extent to which it is always *easy to distinguish* / see differences.

Marking guidance

For award of maximum AO2 marks, expect two ways in which the differ to be explicitly examined.

Award the marks as follows:		
	AO1 (5 marks)	**AO2.1c (3 marks)**
Band	*Demonstrates knowledge and understanding of cold-based and warm-based glaciers.*	*Applies knowledge and understanding to explicitly examine varied ways in cold-based and warm-based glaciers differ.*
3	**4-5 marks** Well-developed knowledge and understanding of cold-based and warm-based glaciers. Demonstrates accurate knowledge and understanding using appropriate and well-developed examples. Well annotated sketches / diagrams / maps may also be used and should be credited.	**3 marks** Applies knowledge and understanding to construct a well-developed and structured examination of how they differ. Applies knowledge and understanding to construct well-developed and balanced arguments, supported by appropriate evidence.
2	**2-3 marks** Partial knowledge and understanding of cold-based and warm-based glaciers. Demonstrates partial knowledge and understanding through the use of examples which may not be fully developed. Generalised sketches / diagrams / maps may also be used and should be credited.	**2 marks** Applies partial knowledge and understanding to construct a partial examination of how they differ. Applies knowledge and understanding to construct partially developed and partially balanced arguments, supported by mostly appropriate evidence.
1	**1 mark** Limited knowledge and understanding of cold-based and warm-based glaciers. Demonstrates limited knowledge and understanding through the use of examples which are undeveloped. Basic sketches / diagrams / maps may also be used and should be credited.	**1 mark** Applies limited knowledge and understanding to construct a limited examination of how they differ (one way may be implied). Applies limited knowledge and understanding to construct limited arguments, supported by limited evidence.
	0 marks Response not creditworthy or not attempted.	**0 marks** Response not creditworthy or not attempted.

4. (a) (i) **Use Figure 4** to describe geographical variations in the severity of glacial erosion in England and Wales. Skills: 8.2	AO1	AO2.1a	AO2.1b	AO2.1c	AO3		**Total**
Award 1 mark for each valid point					5		**5**

Indicative content

- Intense erosion is found in N Wales and NW England
- Most of N England and Wales experienced major glacial erosion
- Minor erosion found in S Wales and Midlands
- Parts of E England have minor erosion – East Anglian coast
- Little evidence at all in southern England
- Severity of erosion decreases from North to South
- Two very small areas of major erosion in SW England.

Marking guidance

Max. 3 if the candidate produces a simple list of points with no geographical overview. Only credit located statements.

4. (a) (ii) Suggest **one physical** reason why intense glacial erosion only occurred in certain places. Content: 1.2.5	AO1	AO2.1a	AO2.1b	AO2.1c	AO3		**Total**
Award 1 mark for suggestion and up to 2 marks for development.			3				**3**

Indicative content

The indicative content is not prescriptive and candidates are not expected to cover all points for full marks. Credit other valid points not contained in the indicative content. This may include:

- Thermal regime (1) glacial erosion operates more effectively when a glacier is warm-based (1) meltwater facilitates abrasion and regelation (one of the key elements of plucking) (1)
- Ice velocity (1) – abrasion is more effective where ice velocities are higher (1) because more debris passes a given point per unit of time (1)
- Ice thickness (1) – the thicker the ice the more pressure is exerted on the bedrock (1) increasing power of erosional processes (1)
- Nature of bedrock (1) – abrasion will be more effective where the rock particles transported by the ice are harder than the bedrock surface beneath (1). Plucking is also more effective where the underlying bedrock is highly fractured (1) and semi-permeable (1)
- High altitude/relief (1) – large/thick ice masses would have formed in mountainous areas (1), due to increased snowfall (1) giving rise to glacier formation increasing erosive power (1)
- Aspect (1) NE-facing upland slopes receive less solar radiation (1) which favours the deepest cirque formation and ice plucking (1).

4. (b) Examine the influence of post-glacial processes on **one** glacial landform. Content: 1.2.5 and 1.2.9	AO1	AO2.1a	AO2.1b	AO2.1c	AO3		**Total**
	5			3			**8**

Indicative content

The indicative content is not prescriptive and candidates are not expected to cover all points for full marks. Credit other valid points not contained in the indicative content.

AO1 content encompasses knowledge and understanding of post-glacial processes operating on the chosen landform. The content will depend upon the landform(s) chosen and may include:

- Glacial lakes – infilling
- Misfit streams – created by fluvial processes
- Corrie/cirque – loss of ice and formation of lake/tarn and/or scree slopes
- Glacial troughs – gradual slope decline / scree slope formation / vegetation growth
- Pyramidal peak – weathering, rock falls, mass movement, scree slopes.

AO2 content encompasses the application of knowledge and understanding to examine the role of erosional processes in the formation of landform(s). The content may vary according to the landscape but may include:

- Examination of the importance of historical glacial processes in creating the landform
- Examination of the roles / importance of different post-glacial processes e.g. weathering, mass movement, biological processes
- Examination of the timescale for the changes (post-Pleistocene or more recent ice retreat).

Award the marks as follows:		
	AO1 (5 marks)	**AO2.1c (3 marks)**
Band	*Demonstrates knowledge and understanding of the selected landform and the relevant post-glacial processes*	*Applies knowledge and understanding to examine the influence / role of post-glacial processes (e.g. weighing up of importance of different processes)*
3	**4-5 marks** Demonstrates accurate knowledge and understanding of one landform. Demonstrates accurate knowledge and understanding using appropriate and well-developed examples. Well annotated sketches / diagrams / maps may also be used and should be credited.	**3 marks** Applies knowledge and understanding to construct a well-developed and structured examination of the influence / role. Applies knowledge and understanding to construct well-developed and balanced arguments, supported by appropriate evidence.
2	**2-3 marks** Demonstrates partial knowledge and understanding of one landform. Demonstrates partial knowledge and understanding through the use of mostly appropriate examples which may not be fully developed. Generalised sketches / diagrams / maps may also be used and should be credited.	**2 marks** Applies partial knowledge and understanding to construct a partial examination of the influence / role. Applies knowledge and understanding to construct partially developed and partially balanced arguments, supported by mostly appropriate evidence.
1	**1 mark** Demonstrates limited knowledge and understanding of one landform. Demonstrates limited knowledge and understanding through the use of examples which are undeveloped. Basic sketches / diagrams / maps may also be used and should be credited.	**1 mark** Applies limited knowledge and understanding to construct a limited examination. Applies limited knowledge and understanding to construct limited arguments, supported by limited evidence.
	0 marks Response not creditworthy or not attempted.	**0 marks** Response not creditworthy or not attempted.

Section B: Tectonic Hazards

5. (a) (i) Use **Figure 5** to describe the distribution of volcanoes in Guatemala. Skills: 8.2	AO1	AO2.1a	AO2.1b	AO2.1c	AO3		**Total**
Award 1 mark for each valid point + 1 for supporting evidence from resource					5		**5**

Indicative content

- The volcanoes follow a linear pattern
- Parallel to coast
- Cluster / highest number of volcanoes in Jutiapa
- Volcanoes are mostly in eastern part of Guatemala
- Few in north of Guatemala
- Accurate use of scale to describe distribution / position of volcanoes relative to other features e.g. they are 50-70km away from the coast
- Reference to population density e.g. many volcanoes are found in areas with more than 200 people / km² OR most volcanoes are found in areas with 100-199 people per km². Award a maximum of 1 mark for population density data lift.

Marking guidance

Max 3 for a list of departments/statements with no overview of distribution or pattern e.g. there are two volcanoes in San Marcos. Credit other valid points. Accept reference to all green areas of the Figure as being of high population density.

5. (a) (ii) State the nature of the relationship shown in **Figure 6**. Skills: 2.14	AO1	AO2.1a	AO2.1b	AO2.1c	AO3		**Total**
					1		**1**

Indicative content

- negative correlation/equivalent description of relationship.

5. (a) (iii) Name and justify a valid statistical test that could be used to analyse these data. Skills: 2.14	AO1	AO2.1a	AO2.1b	AO2.1c	AO3		**Total**
Award 1+1 (for correct selection of test and linked justification)					2		**2**

Indicative content

- Spearman's Rank (1) can be used to test strength and/or significance of relationship (1)
- Pearson's Product Moment (1) can be used to test the linear association between two variables (1)
- Paired sets of data can be ranked / there are more than 10 pairs/ordinal data (1)
- Do not accept scatter graph/plot.

5. (a) (iv) Use **Figure 5 and 6** to suggest why the impacts of volcanic activity may vary within Guatemala. Content: 1.3.2 and 1.3.4	AO1	AO2.1a	AO2.1b	AO2.1c	AO3		**Total**
			9				**9**

Indicative content

Answers should refer to the physical and human factors shown in Figs 5 and 6 that influence variation of impacts of volcanoes within Guatemala. The question is AO2 and so there will need to be application of knowledge and not a simple description of the resources without reference to the operation of the factors.

The content may include:

- Examination of the physical distribution of volcanoes within Guatemala – answers may refer to the distance of high population to volcanic clusters, distribution of volcanoes within Guatemala
- Northern Guatemala has no volcanoes, impacts will decrease with distance from the volcanoes in the south. Eastern areas have more volcanoes than the west and therefore would suffer more impacts. Ash clouds become less dense, lava / pyroclastic flows will not reach the North or the West
- However, though e.g. Alta Verapaz is further from the volcanoes than Baja Verapaz, due to a higher population density more severe impacts may be felt e.g. economic damage
- Examination of variation of departmental vulnerability to disaster with comment on the factors that influence vulnerability
- Examination of variation of departmental ability to cope with disaster with comment on the factors that influence coping capacity
- Examination of the link between vulnerability and coping capacity to comment on the relationship that shows the departments that are most vulnerable are least able to cope e.g. Figure 5 shows that Guatemala city and Zacapa may suffer less severe impacts, having lower vulnerability and higher coping capacity. This may be due to higher wealth in these regions which allows more effective planning to mitigate against the impacts e.g. evacuation plans, emergency services, insurance for damage.

Marking guidance

Credit other approaches that may address valid factors related to Figures 5 and 6 that influence variation of impacts. Max 6 where only one of the resources is addressed.

Award the marks as follows:	
	AO2.1b (9 marks)
Band	*Demonstrates applied knowledge and understanding of factors that may influence variation in the impacts of volcanic activity in Guatemala.*
3	**7-9 marks** Applies knowledge and understanding to construct a well-developed and structured examination of factors that may influence variation in the impacts of volcanic activity in Guatemala. Applies knowledge and understanding to construct well-developed and balanced arguments, supported by appropriate evidence.
2	**4-6 marks** Applies knowledge and understanding to construct a partial examination of factors that may influence variation in the impacts of volcanic activity in Guatemala. Max 6 marks if only one resource referenced. Applies knowledge and understanding to construct partially developed and partially balanced arguments, supported by mostly appropriate evidence. Developed description of resources.
1	**1-3 marks** Applies knowledge and understanding to construct a limited examination of factors that may influence variation in the impacts of volcanic activity in Guatemala. Applies knowledge and understanding to construct limited and basic arguments, supported by limited evidence. Simple description of resources.
	0 marks Response not creditworthy or not attempted.

5. (b) Explain how volcanoes form at converging plate margins. Content: 1.3.1	AO1	AO2.1a	AO2.1b	AO2.1c	AO3		**Total**
	10						**10**

Indicative content

The indicative content is not prescriptive and candidates are not expected to cover all points for full marks. Credit other valid points not contained in the indicative content. The content may include:

Ocean to continent – continental and oceanic plates collide, the thinner and more dense oceanic plate is overridden by the thicker and less dense continental plate, oceanic plate is forced down into the mantle via subduction. As the oceanic plate descends and is forced into higher temperature environments, at a depth of about 160 km materials in the subducting plate begin to partially melt.

This partial melting produces magma chambers. Magma is less dense than the surrounding mantle materials and is buoyant, ascends through the overlying materials, melting and fracturing their way upwards, magma chamber rises to the surface forming the volcano.

Ocean to ocean – when a convergent boundary occurs between two oceanic plates, one of those plates will subduct beneath the other, subducting plate is heated as it is forced deeper into the mantle, begins to melt, magma produced as a result of this melting, magma is lower in density than the surrounding rock material, ascends by melting and fracturing its way through the overlying rock material. Magma that reaches the surface breaks through to form a volcanic cone. At early stages of this type of boundary the cones will be deep beneath the ocean surface but later grow to be higher than sea level to produce an island chain.

Marking guidance

Max 5 where the formation of a volcano is described with no reference to processes operating at converging plate margins.
If a candidate bases their response on diverging plate margins, credit up to a max. of 3 marks.

Award the marks as follows:	
	AO1 (10 marks)
Band	*Demonstrates knowledge and understanding of the formation of volcanoes at converging plate margins.*
3	**7-10 marks** Demonstrates accurate knowledge and understanding of the formation of volcanoes at converging plate margins. Demonstrates accurate knowledge and understanding using appropriate and well-developed examples. Well annotated sketches / diagrams / maps may also be used and should be credited.
2	**4-6 marks** Demonstrates partial knowledge and understanding of the formation of volcanoes at converging plate margins. Demonstrates partial knowledge and understanding using mostly appropriate examples which may not be fully developed. Generalised sketches / diagrams / maps may also be used and should be credited.
1	**1-3 marks** Demonstrates limited knowledge and understanding of the formation of volcanoes at converging plate margins. Demonstrates limited knowledge and understanding using examples which are undeveloped. Basic sketches / diagrams / maps may be seen and can be credited.
	0 marks Response not creditworthy or not attempted.

6. (a) Use **Figure 7** to describe the impacts of the eruption on San Miguel Los Lotes. Skills: 4.1	AO1	AO2.1a	AO2.1b	AO2.1c	AO3		**Total**
Award 1 mark for each valid point made and up to 2 marks for development using the resource.					5		**5**

Indicative content

- Destruction of houses (1) in squares 2A, 3A, 2B, 3B (1) OR majority of housing is affected (1)
- Homelessness as a result of loss of housing (1)
- Destruction of main roads OR destruction of minor roads within settlement (1)
- Economic costs of loss of property and infrastructure (1)
- Destruction of natural vegetation / trees (1) particularly in squares 1C to 3C (1)
- Destruction of fields (1)
- Deposition of volcanic debris (1) in named square/s (1)
- Evidence of ash in the air in squares 1 and/or 2C (1) This might affect air quality and cause death of wildlife through suffocation (1)
- Evidence of channels within the debris in square 3C (1) could indicate water which washes ash into water courses (1) could affect aquatic life / pH levels (1).

Marking guidance

Max 2 marks if no direct reference to the resource. Accept any other valid responses.

6. (b) Use **Figure 8** to outline variations in the potential economic losses caused by volcanic ash fall. Skills: 3.5 and 3.7	AO1	AO2.1a	AO2.1b	AO2.1c	AO3		**Total**
					6		**6**

Indicative content

The map contains 3 elements; overall economic loss, insured economic loss and uninsured economic loss.

- Overall economic loss has Japan as largest followed by Italy and Indonesia. Other identified countries have the same loss. Answers should use the key to give quantification of losses
- Insured economic loss shows variation – Iceland has all insured, Chile is next (30%) with Italy and Japan next with 15%. Others have lower % at about 6%
- Accept converse reference to uninsured losses but avoid double credit of same data.

Award the marks as follows:	
	AO3 (6 marks)
Band	Analysis of resource to outline variations of economic loss.
3	**5-6 marks** Accurate interpretation and analysis of resources to outline variations of economic loss. Well-developed and balanced arguments, supported by appropriate evidence.
2	**3-4 marks** Mostly accurate interpretation and analysis of to outline variations of economic loss. Partially developed arguments, supported by some evidence.
1	**1-2 marks** Limited interpretation and analysis of resources to outline variations of economic loss and links to GDP. Limited arguments, supported by limited evidence.
	0 marks Response not creditworthy or not attempted.

6. (c) Use **Figures 7 to 9** to examine why the impacts of volcanic ash vary. Content: 1.3.2 and 1.3.4	AO1	AO2.1a	AO2.1b	AO2.1c	AO3		**Total**
				10			**10**

Indicative content

The indicative content is not prescriptive and candidates are not expected to cover all points for full marks. Credit other valid points not contained in the indicative content.

The content may include:

- Application of knowledge and understanding to examine how different hazards associated with ash cause variations in physical damage e.g. destruction of vegetation due to thickness / weight of ash / damage to engines and machinery / disruption to transport due to ash causing clogging and blockages / pollution of water supplies due to contamination by ash and changes in pH and temperature. The best answers may discuss the relative severity of each type of damage or categorise as economic or environmental. Expect reference to Figure 9 to illustrate this
- Application of knowledge and understanding to examine how economic factors cause variations in the impacts of volcanic ash e.g. Iceland is fully insured for losses whereas other countries are not. Expect reference to Figure 8 to illustrate this
- Application of knowledge and understanding to examine how different sectors cause variations in the impacts of volcanic ash in different areas e.g. presence of infrastructure and/or agricultural activity. Impacts on people could be argued to be the most immediately dangerous. This could be linked to quality of governance and to each of the three Figures.
- Application of knowledge and understanding to examine how distance causes variations in the impacts of volcanic ash e.g. weight of ash causes more structural damage and the damage is more likely to be permanent closer to the eruption / clogging of machinery / lung problems more severe the closer to the eruption. Effects diminish with distance though dependent on wind direction. Expect reference to Figures 7 and 9 to illustrate this.

Marking guidance

A minimum of two resources should be referenced to access full marks.

Award the marks as follows:	
	AO2.1c (10 marks)
Band	*Demonstrates knowledge and understanding of the factors to examine the causes of variation in the impacts of volcanic ash.*
3	**7-10 marks** Applies knowledge and understanding to construct well-developed and structured examination of the factors to examine the causes of variation in the impacts of volcanic ash. Applies knowledge and understanding to construct well-developed and balanced arguments, supported by appropriate evidence.
2	**4-6 marks** Applies knowledge and understanding to construct a partial examination of factors to examine the causes of variation in the impacts of volcanic ash. Applies knowledge and understanding to construct partially developed and partially balanced arguments, supported by mostly appropriate evidence.
1	**1-3 marks** Applies knowledge and understanding to construct a limited examination of factors to examine the causes of variation in the impacts of volcanic ash. Applies knowledge and understanding to construct limited and basic arguments, supported by limited evidence.
	0 marks Response not creditworthy or not attempted.

7. (a) Outline the local and global impacts of **one** earthquake event. Content: 1.3.3	AO1	AO2.1a	AO2.1b	AO2.1c	AO3		**Total**
	8						**8**

Indicative content

The indicative content is not prescriptive and candidates are not expected to cover all points for full marks. Credit other valid points not contained in the indicative content. Answers must be based on one earthquake event to illustrate both elements. The content will vary according to the example chosen but may include:

Local

- Cracks / fissures in the land
- Destruction of or damage to buildings causing death and homelessness
- Fires due to broken power lines and gas pipes
- Destruction of or damage to infrastructure e.g. roads, bridges
- Damage to livelihoods and local economies.
- Rupture of water mains and other utilities
- Flooding due to dam failure or drainage of lakes
- Rockfalls / landslides
- Destruction of forests
- Liquefaction causing subsidence of buildings, loss of cars and property
- Impacts of tsunami include devastation of coastal region / beaches eroded / wildlife killed
- Debris deposited inland causing damage to land and vegetation.

NB – tsunami is not in the specification at AS level therefore this must not be expected, though if mentioned should be given credit.

Global

- Transnational companies may lose part of their business which causes disruption to the supply of products globally
- International aid is required to help recovery
- Military help is often mobilized
- Often triggers global fundraising efforts by the public and volunteering
- Death of foreign citizens / organization of evacuation of foreign citizens
- Credit points specific to named earthquake e.g. risks of radiation from damage to nuclear power station in Japan 2011, with protests worldwide against nuclear power being triggered
- Tourism and international events e.g. sports events usually decrease dramatically following a major earthquake. Also a decrease in international students. People globally are affected by this
- Loss of or damage to globally significant cultural heritage.

Marking guidance

Credit any other valid points. Max 5 where only one scale of impact is discussed i.e. response is unbalanced. A named developed example is expected for marks in Band 3.
If a candidate bases their response on volcanic hazards, credit up to a max. of 2 marks.

Award the marks as follows:	
	AO1 (8 marks)
Band	*Demonstrates knowledge of the local and global impacts of **one** earthquake event.*
3	**6-8 marks** Demonstrates accurate knowledge of **both** local and global impacts of **one** earthquake event. Answer has a good balance between local and global impacts. Demonstrates accurate knowledge and understanding using appropriate and well-developed examples. Well annotated sketches / diagrams / maps may also be used and should be credited.
2	**3-5 marks** Demonstrates partial knowledge of **both** local and global impacts of **one** earthquake event OR demonstrates accurate knowledge of **either** local **or** global impacts of **one** earthquake event. Demonstrates partial knowledge and understanding using mostly appropriate examples which may not be fully developed. Generalised sketches / diagrams / maps may also be used and should be credited.
1	**1-2 marks** Demonstrates limited knowledge of both local and global impacts OR demonstrates partial knowledge of either local OR global impacts of **one** earthquake event. Demonstrates limited knowledge and understanding using examples which are undeveloped. Basic sketches / diagrams / maps may be seen and can be credited.
	0 marks Response not creditworthy or not attempted.

7. (b) Examine the role of depth of focus in determining the impact of an earthquake. Content: 1.3.3	AO1	AO2.1a	AO2.1b	AO2.1c	AO3		**Total**
	5			3			**8**

Indicative content

The indicative content is not prescriptive and candidates are not expected to cover all points for full marks. Credit other valid points not contained in the indicative content.

AO1
AO1 content encompasses knowledge and understanding of how depth of focus influences the impacts of earthquakes. Answers may refer to the differing impacts of shallow and deep focus earthquakes. With explanation examining the absorption of energy by the earth in deep focus earthquakes with corresponding diminution of impacts. Answers may also examine and explain other factors that affect the impacts. The content will depend upon the factors chosen and may include:

- **Impacts of shallow and deep focus earthquakes:** Shallow earthquakes are between 0 and 70 km deep. In general, the term "deep-focus earthquakes" is applied to earthquakes deeper than 70 km. Shallow quakes are usually of large spread and generally tend to be more damaging than deeper quakes. Seismic waves from deep quakes have to travel farther to the surface, losing energy along the way. These occur within the subducting oceanic plates as they move beneath the continental plates.
- **Location**: an earthquake that hits in a populated area is more likely to do damage than one that hits an unpopulated area or the middle of the ocean.
- **Magnitude**: the higher on the Richter scale the more energy in an earthquake, the more destructive it can be. This can be linked to the primary and/or secondary effects of various earthquakes.
- **Distance from the epicentre**: the epicentre is the point at the surface right above where the earthquake originates and is usually the place where the earthquake's intensity is the greatest and more impact
- **Local geologic conditions**: the nature of the ground at the surface of an earthquake can have a profound influence on the level of damage. Loose, sandy, soggy soil can liquefy if the shaking is strong and long enough, for example
- **Human factors affecting risk and vulnerability** e.g. building quality and political factors e.g. earthquakes can be made worse by poor construction, weak cement and unenforced building codes.

AO2
AO2 content encompasses the application of knowledge and understanding to examine the importance of depth of focus. The content may vary according to the response chosen but may include:

- Reference to the relative importance of depth of focus
- Reference to the relative importance of other factors
- Reference to the importance of depth of focus in different earthquakes.

Marking guidance

For an AO1 mark in Band 3, developed example(s) are expected.

Award the marks as follows:		
	AO1 (5 marks)	**AO2.1c (3 marks)**
Band	*Demonstrates knowledge and understanding of the importance of depth of focus as a characteristic that determines the impact of an earthquake.*	*Applies knowledge and understanding to appraise through examination the importance of depth of focus as a characteristic that determines the impact of an earthquake.*
3	**4-5 marks** Demonstrates accurate knowledge and understanding of depth of focus and other factors. Demonstrates accurate knowledge and understanding using appropriate and well-developed examples.	**3 marks** Applies knowledge and understanding to construct well-developed and structured examination of the importance of depth of focus. Applies knowledge and understanding to construct well-developed and balanced arguments, supported by appropriate evidence.
2	**2-3 marks** Demonstrates partial knowledge and understanding of depth of focus and other factors. Demonstrates partial knowledge and understanding through the use of mostly appropriate examples which may not be fully developed.	**2 marks** Applies partial knowledge and understanding to construct partial examination of the importance of depth of focus. Applies knowledge and understanding to construct partially developed and partially balanced arguments, supported by mostly appropriate evidence.
1	**1 mark** Demonstrates limited knowledge and understanding of depth of focus and other factors. Demonstrates limited knowledge and understanding through the use of examples which are undeveloped.	**1 mark** Applies limited knowledge and understanding to construct limited examination of the importance of depth of focus. Applies limited knowledge and understanding to construct limited arguments, supported by limited evidence.
	0 marks Response not creditworthy or not attempted.	**0 marks** Response not creditworthy or not attempted.