

Markscheme

May 2024

Geography

Higher level and standard level

Paper 1

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Paper 1 markbands

These markbands are to be used for paper 1 at both standard level and higher level.

Marks	Level descriptor		
	AO1: Knowledge and understanding of specified content AO2: Application and analysis of knowledge and understanding	AO3: Synthesis and evaluation	AO4: Selection, use and application of a variety of appropriate skills and techniques
0	The work does not reach a standard described by the descriptors below.		
1–2	The response is too brief, lists unconnected information, is not focused on the question and lacks structure.		
	<ul style="list-style-type: none"> The response is very brief or descriptive, listing a series of unconnected comments or largely irrelevant information. The knowledge and understanding presented is very general with large gaps or errors in interpretation. Examples or case studies are not included or only listed. There is no evidence of analysis. Terminology is missing, not defined, irrelevant or used incorrectly. 	<ul style="list-style-type: none"> No evidence of evaluation or conclusion is expected at this level. 	<ul style="list-style-type: none"> Information presented is not grouped logically (in paragraphs or sections). Maps, graphs or diagrams are not included, are irrelevant or difficult to decipher (only if appropriate to the question).
3–4	The response is too general, lacks detail, is not focused on the question and is largely unstructured.		
	<ul style="list-style-type: none"> The response is very general. The knowledge and understanding presented outlines examples, statistics, and facts that are both relevant and irrelevant. Links to the question are listed. The argument or analysis presented is not relevant to the question. Basic terminology is defined and used but with errors in understanding or used inconsistently. 	<ul style="list-style-type: none"> If appropriate to the question, the conclusion is irrelevant. There is no evidence of critical evaluation of evidence (examples, statistics and case studies). 	<ul style="list-style-type: none"> Most of the information is not grouped logically (in paragraphs or sections). Maps, graphs or diagrams included lack detail, are incorrectly or only partially interpreted without explicit connections to the question (only if appropriate to the question).
5–6	The response partially addresses the question, but with a narrow argument, an unsubstantiated conclusion, and limited evaluation.		
	<ul style="list-style-type: none"> The response describes relevant supporting evidence (information, examples, case studies et cetera), outlining appropriate link(s) to the question. The argument or analysis partially addresses the question or elaborates one point repeatedly. Relevant terminology is defined and used with only minor errors in understanding or is used inconsistently. 	<ul style="list-style-type: none"> If appropriate to the question, the conclusions are general, not aligned with the evidence presented and/or based on an incorrect interpretation of the evidence. Other perspectives on evidence (examples, statistics and case studies) and/or strengths and weaknesses of evidence are listed. 	<ul style="list-style-type: none"> Logically related information is grouped together (in sections or paragraphs) but not consistently. Maps, graphs or diagrams included do not follow conventions, and include relevant and irrelevant interpretations in the text (only if appropriate to the question).

7–8	<p>The response addresses the whole question, the analysis is evaluated and the conclusion is relevant but lacks balance.</p> <ul style="list-style-type: none"> • The response describes relevant supporting evidence correctly (information, examples and case studies) that covers all the main points of the question, describing appropriate links to the question. • The argument or analysis is clear and relevant to the question but one-sided or unbalanced. • Complex terminology is defined and used correctly but not consistently. <ul style="list-style-type: none"> • If appropriate to the question, the conclusion is relevant to the question, aligned with the evidence but unbalanced. • Other perspectives on evidence (examples, statistics and case studies) and/or strengths and weaknesses of evidence are described. <ul style="list-style-type: none"> • Logically related information is grouped together (in sections) consistently. • Maps, graphs or diagrams included contribute to/support the argument or analysis (only if appropriate to the question).
9–10	<p>The response is in-depth and question-specific (topic and command term); analysis and conclusion are justified through well-developed evaluation of evidence and perspectives.</p> <ul style="list-style-type: none"> • The response explains correct and relevant examples, statistics and details that are integrated in the response, explaining the appropriate link to the question. • The argument or analysis is balanced, presenting evidence that is discussed, explaining complexity, exceptions and comparisons. • Complex and relevant terminology is used correctly throughout the response. <ul style="list-style-type: none"> • If appropriate to the question, the conclusion is relevant to the question, balanced and aligned with the evidence. • Evaluation includes a systematic and detailed presentation of ideas, cause and effect relations, other perspectives; strengths and weaknesses of evidence are discussed; (if appropriate) includes justification of the argument and conclusion. <ul style="list-style-type: none"> • Response is logically structured with discussion (and if appropriate to the question, a conclusion) focusing on the argument or points made, making it easy to follow. • Maps, graphs or diagrams are annotated following conventions and their relevance is explained and support the argument or analysis (only if appropriate to the question).

Option A — Freshwater

1. (a) (i) Identify the Australian state with the greatest number of MAR sites. [1]

Western Australia

- (ii) State the water source of the aquifer recharge on the coast of the Northern Territory. [1]

Groundwater

- (b) Outline **one** reason why most MAR sites are near cities. [2]

Award [1] for the reason and [1] for development /explanation.

For example: Greatest population / most demand [1] due to a large domestic usage of water [1].

Other possibilities include, but are not limited to:

- Cities situated on water courses
- Other physical factors related to water availability

- (c) (i) Explain **one** way in which agricultural activities may cause salinization. [3]

Award [1] for a valid cause and up to [2] for explanation / development / exemplification.

For example: Irrigation [1] may cause the water table to rise [1] so any dissolved minerals will increase the salt content at the surface / e.g. in semi-arid or arid areas [1].

For example: Poor drainage systems [1] causes excessive surface water [1] which may evaporate leading to salinization/high salinity [1].

Other causes include, but are not limited to:

- Inappropriate application of fertilizers

- (ii) Explain **one** consequence of salinization for farmers. [3]

Award [1] for a consequence for farmers and up to [2] for explanation / development / exemplification.

For example: Loss of income [1] due to decline in agricultural productivity / land becoming unproductive [1] leading to a need for changes in agricultural practice/management (e.g. drip irrigation) / salinity is toxic to plant growth [1].

Other consequences include, but are not limited to:

- Altered soil structure – soil compaction
- Soil erosion due to loss of vegetation cover
- Eventually soil poisoning – useless for cultivation

2. (a) Examine how human activities within drainage basins may affect the characteristics of river hydrographs.

[10]

Marks should be allocated according to the markbands.

River hydrographs show how a drainage basin responds to a period of rainfall (inputs), reflecting the speed and amount of water flowing through the system in different pathways (flows) and the discharge of the river (outputs). The shape of the hydrograph should be addressed in terms of peak rainfall, lag time, peak discharge, base flow, steepness of rising and falling limbs, and the contributions of overland flow and throughflow. Human activities, including changes in land use, urbanization, channel modification and dam construction, have a significant influence on the shape of hydrographs.

Possible applied themes (AO2) demonstrating knowledge and understanding (AO1):

- Characteristics of hydrographs, including lag time, peak discharge, base flow, steepness of rising and falling limbs.
- Human activities, including changes in land use, (e.g. afforestation and changes in agriculture), urbanization, channel modification and dam construction.
- These activities affect the volume and speed of overland flow, throughflow and baseflow, reflected in the shape of the hydrograph.
- Possible responses include a “flashy” response (high peak discharge and short lag time) due to changes in land use. These may significantly increase the volume and speed of overland flow.
- Dam and reservoir construction will increase surface storage, reduce discharge and increase lag times, contributing to a subdued, flat hydrograph.
- Physical factors also affect hydrographs, such as geology, slope steepness, and the intensity of different rainfall events.

Good answers may be **well structured** (AO4) and may additionally offer a **critical evaluation** (AO3) that examines the relative importance/spatial scale of human activities on processes within drainage basins, and how these have changed over time.

For 5–6 marks, expect weakly-evidenced outlining of how at least one human activity may influence one or more characteristics of a hydrograph.

For 7–8 marks, expect a structured account that includes:

- Either an evidenced explanation of the effects of at least two human activities on hydrograph characteristics
- Or a discursive conclusion (or ongoing evaluation) grounded in geographical concepts and/or perspectives.

For 9–10 marks, expect both of these traits.

2. (b) Examine the costs **and** benefits that dam building brings to different stakeholders. [10]

Marks should be allocated according to the markbands.

Dam building for multi-purpose schemes may cause considerable controversy between different stakeholders because of perceived costs and benefits. Stakeholders include local communities, farmers, government officials, water managers and environmentalists, and the costs/benefits may be at different scales from local to national and international.

Possible applied themes (AO2) demonstrating knowledge and understanding (AO1):

- The costs and benefits vary between different stakeholders, including local communities, water managers, power companies, government officials, specific countries and environmentalists.
- The stakeholders have differing perspectives, and some will benefit more than others
- Economic, social and environmental costs include forced migration/displacement of population, drowning of settlements and historic sites, loss of farmland, impacts on ecosystems and reduction of discharge downstream.
- Economic, social and environmental benefits include reducing flood risk, improved water supply for urban dwellers and farmers, power generation, recreation and tourism.
- The costs and benefits vary between different places and scales.

Good answers may be **well structured** (AO4) and may additionally offer a **critical evaluation** (AO3) that examines the relative importance of costs and benefits to stakeholders in different places and spatial scales (e.g. local cost but national benefit). Another approach might be to examine the costs and benefits in terms of the perspectives and power of different stakeholders.

For 5–6 marks, expect weakly-evidenced outlining of at least one cost and/or benefit of building a dam.

For 7–8 marks, expect a structured account which includes:

- Either an evidenced explanation of the costs and benefits to different stakeholders
- Or a discursive conclusion (or ongoing evaluation) grounded in geographical concepts and/or perspectives.

For 9–10 marks, expect both of these traits.

Option B — Oceans and coastal margins

3. (a) (i) State the main direction of the tracks of tropical cyclones in the Southern Hemisphere. [1]

W / SW / WSW / SSW

- (ii) Using the world map, state which continent experiences typhoons between April and January. [1]

Asia

- (b) Outline **one** reason why hurricanes (tropical cyclones/typhoons) usually form over tropical oceans. [2]

Award [1] for a valid reason, and [1] for development /explanation.

For example: Warm ocean [1] provides the energy for a storm to develop [1].

Other possibilities include:

- Coriolis effect / rotation of the Earth allows storms to spin in the tropics.
- Low atmospheric pressure.
- High levels of insolation keeping water warm.

- (c) Explain **two** reasons why stakeholders value mangrove swamps. [3+3]

In each case, award [1] for a valid reason and up to [2] for development / explanation / exemplification including connection to a stakeholder

Maximum [1] for development if the reason is not linked to a stakeholder.

For example: Mangroves may mean the villages/fishing communities/ tourist resorts are more protected from hurricanes / tropical cyclones [1], as mangroves absorb wave energy [1] and dissipate the force of the storm [1].

For example: Fishermen value the mangrove swamps due to the habitat and biodiversity / various types of fish [1] for example, prawn fishing in Thailand [1] so they can gain income / profit from their catches [1].

Other reasons include:

- They provide breeding and feeding grounds for fish
- They provide natural filters of run-off from farms and sewage
- They potentially help with stabilization of shorelines / prevention of erosion.

4. (a) Examine the contribution of conservation areas to the management of oceanic fish stocks.

[10]

Marks should be allocated according to the markbands.

Oceanic fish stocks are under threat because of overfishing, and policies are needed or the world's fisheries will become unsustainable. Conservation areas (or Marine Protection Areas), where fishing is usually banned or restricted, have been established to allow fish stocks to recover and protect the biodiversity of the oceans. The success of MPAs is variable as regulation controls and policing may be weak. Illegal fishing, factory fishing and destructive bottom dredging may continue, and many MPAs are very small. So, protection of fish stocks is not guaranteed.

Possible **applied themes (AO2) demonstrating knowledge and understanding (AO1)**:

- Overfishing has led to the depletion of fish stocks (e.g. cod, tuna) and is unsustainable.
- Fish stocks have collapsed in some ocean areas, such as the North Sea and Grand Banks of Newfoundland.
- Establishment of conservation areas (Marine Protected Areas) to manage fishing, allow fish stocks to recover, and protect marine biodiversity. Also, important scientific research is carried out.
- Success of MPAs is varied, due to weak regulation and controls, conflict over ownership and rights in ocean areas. Fishing permitted in some MPAs; illegal fishing and bottom dredging continue.
- Conservation areas may conserve fish stocks for the future, but those who rely on fishing for their food/livelihood may not be in favour in the short-medium term.
- Conservation areas may have limited success in protecting fish stocks; other strategies, including quotas and aquaculture, may be required.

Good answers may be **well-structured** (AO4) and may additionally offer a **critical evaluation** (AO3) that examines the effectiveness of conservation areas as a management strategy, the perspectives and possible conflict between stakeholders in different places and spatial scales.

For 5–6 marks, expect weakly-evidenced outlining of the contribution of conservation areas in the context of fish stocks.

For 7–8 marks, expect a structured account that includes:

- Either an evidenced explanation of the contribution of conservation areas as a management strategy
- Or, a discursive conclusion (or ongoing evaluation) grounded in geographical concepts and/or perspectives of limitations of conservation areas and the possible contribution of other policies (quotas and aquaculture).

For 9–10 marks, expect both these traits.

4. (b) Examine the roles of wind and vegetation in the development of coastal sand dunes. [10]

Marks should be allocated according to the markbands.

Sand dunes are a prominent feature of coastlines of deposition, where there is a plentiful accumulation of sediments available to be transported by wind. Sand dunes typically develop where there is a strong onshore wind and wide sandy beaches. Vegetation is important in trapping and stabilizing sand, blown by onshore winds, to form dunes. Vegetation plays an important role in stabilizing both new and eroded dunes. It also creates new habitats and ecosystems. On an advancing shoreline, newer dunes form in front of older inland dunes, and a recognizable vegetation succession is evident. If vegetation is destroyed by human activity the dunes may be eroded, forming blow-outs.

Possible applied themes (AO2) demonstrating knowledge and understanding (AO1):

- Wind and vegetation play a vital role in the formation of coastal sand dunes.
- Other factors are also important, including constructive wave action, a plentiful supply of sand, wide, flat beaches (which allows the sand to dry out) and strong on-shore winds.
- Vegetation traps the sand, anchors the shifting wind-blown sand, allowing more sand to accumulate.
- Over time, more dunes will form in front of the existing dunes and plant succession occurs on the older, inland dunes. The development of vegetation is accompanied by soil formation and a complex ecosystem.
- Human activity may destroy vegetation, causing erosion of the dunes. Re-planting of vegetation and restrictions on access for people are important in dune conservation
- Wind and vegetation work together in the development of sand dunes.

Good answers may be **well structured** (AO4) and may additionally offer a **critical evaluation** (AO3) that examines the importance of wind and vegetation, and other factors such as wave action and wide beaches in sand dune formation. Another approach might be to examine the spatial variation in the role of vegetation, succession over time and space, and the interaction of human activity. Wind plays a vital role in dune formation but it can also destroy dunes, if vegetation is damaged or as part of a severe storm, perhaps related to climate change and rising sea levels.

For 5–6 marks, expect weakly-evidenced outlining of the role of wind and/ or vegetation in sand dune formation.

For 7–8 marks, expect a structured account that includes:

- Either an evidenced explanation of the importance of wind and vegetation in sand dune formation
- Or a discursive conclusion (or ongoing evaluation) grounded in geographical concepts and/or perspectives of the relative importance of these and other factors such as wave action, sand supply, beach profile, and human activity.

For 9–10 marks, expect both of these traits.

Option C — Extreme environments

5. (a) Identify landform **A** and landform **B** shown in the photograph. **[1+1]**

A = pyramidal peak/horn / arête

B = moraine

- (b) Outline **one** way in which accessibility may cause a challenge for resource development in the area shown in the photograph. **[2]**

Award [1] for a valid challenge, and [1] for development / explanation.

For example: Limited infrastructure means [1] helicopters may be needed to bring in construction material to build bridges [1].

Other possibilities include:

- Steep relief
- Length of time taken to reach the location / increased costs
- Heavy snowfall

- (c) (i) Explain how **one named** landscape feature in a hot, arid environment is formed by wind erosion. **[3]**

Award [1] for the named feature and up to [2] for further explanation / development.

For example: Rock pedestal / mushroom rock [1] formed by abrasion by sand / sand blasting [1] eroding the base of a rock structure [1].

For example: A zeugen [1] is a mass of resistant rock separated by trenches [1] where the wind has cut vertically through the softer rock [1].

Other possibilities include:

- Yardangs
- Deflation hollows
- Desert pavements

NB: If feature is incorrectly named but process is correct then award max [1].

- (ii) Explain how **one named** landscape feature in a hot, arid environment is formed by water. **[3]**

Award [1] for the named feature and up to [2] for further explanation / development.

For example: A wadi / canyon [1], forms after by a flash flood / during a wetter pluvial period [1] in which the force of the water erodes the sides and bottom of a river channel [1].

For example: Alluvial fans [1] water spreads out at the mouth of the wadi/canyon [1] and velocity is slowed / material is deposited [1].

Other possibilities include:

- Mesas and buttes
- Salt lakes / Playa lake
- Pediments and inselbergs

NB: If feature is incorrectly named but process is correct then award max [1].

6. (a) Examine the opportunities **and** challenges associated with mineral extraction in **one** extreme environment.

[10]

Marks should be allocated according to the markbands.

Large deposits of valuable minerals (e.g. iron, copper, uranium, gold, oil) occur in extreme environments, offering potential wealth and development opportunities. Potential opportunities include employment, investment in infrastructure, health care and education. There are, however, significant challenges associated with extreme environments, including inaccessibility, climatic hardships, pollution and scarcity of water resources. Other challenges include dependency on TNCs, leakage of money overseas, conflict with economic migrants, and land ownership. The environment and local society may no longer be sustainable because of mineral exploitation.

Possible applied themes (AO2) demonstrating knowledge and understanding (AO1):

- Valuable and extensive mineral deposits occur in extreme environments.
- Exploitation of these minerals offers significant opportunities to local communities, including employment, wages, investment in infrastructure, health and education.
- Challenges of extreme environments include remoteness, isolation and inaccessibility, climate discomfort and scarce water resources.
- Economic challenges include minerals exported elsewhere due to TNC involvement, leakage of profits overseas; lack of a skilled local labour pool.
- Social and cultural challenges include conflicts over land ownership and rights, in-migration of labour, and inequalities.
- Environmental challenges include loss of biodiversity, pollution, damage to ecosystems.

Good answers may be **well-structured** (AO4) and may additionally offer a **critical evaluation** (AO3) of the opportunities and challenges and the varying power of different stakeholders in different places. They may also examine possibilities for conflict resolution and ways of promoting/safeguarding the interests of local people.

For 5–6 marks, expect weakly-evidenced outlining of at least one opportunity and/or challenge in one extreme environment.

For 7–8 marks, expect a well-structured account which includes:

- Either an evidenced examination of the opportunities and challenges in one extreme environment
- Or a discursive conclusion (or ongoing evaluation) grounded in geographical concepts and/or perspectives.

For 9–10 marks, expect both of these traits.

6. (b) Examine the reasons why desertification is accelerating in some arid regions. **[10]**

Marks should be allocated according to the markbands.

Desertification is a major problem in many arid extreme environments, caused by a combination of physical and human factors. The scale and rate of desertification is accelerating in some parts of the world but decreasing in others. Causes of acceleration include climate change, increasing population pressure on natural resources (over-grazing, deforestation, depletion of water resources), poverty and conflicts/wars. Strategies to manage desertification may cause a reduction in rate and result in a more sustainable future for environment and communities.

Possible applied themes (AO2) demonstrating knowledge and understanding (AO1):

- Desertification is caused by both natural and human factors, and is accelerating both spatially (new areas) and in intensity in some arid regions.
- Causes of acceleration include the consequences of climate change, e.g. lower and more unreliable rainfall and an expansion of arid regions.
- Increasing population growth and pressure on the environment, including over-grazing, over-cultivation, deforestation, and depletion of water supplies, also result in an acceleration of desertification.
- Successful management of desertification may reduce the rate of increase. Strategies include more sustainable water use and management, improved agricultural practices, land management, afforestation, infrastructure investment and reduction in poverty.

Good answers may be **well-structured** (AO4) and may additionally offer a **critical evaluation** (AO3) of the causes and acceleration and changing rate of desertification in different places, the interaction between physical and human factors. A recognition that desertification is not increasing in all areas due to successful management by different stakeholders of causes and consequences, and a reduction over time and space.

For 5–6 marks, expect weakly-evidenced outline of one or more causes of desertification.

For 7–8 marks, expect a well-structured account which includes:

- Either an evidenced explanation of the causes and acceleration of desertification in some regions
- Or a discursive conclusion (or ongoing evaluation) grounded in geographical concepts and/or perspectives.

For 9–10 marks, expect both of these traits.

Option D — Geophysical hazards

7. (a) (i) Identify the mass movement type with the slowest speed of movement. [1]
Soil creep
- (ii) State the percentage slope steepness for point A. [1]
20% (units not required)

- (b) Outline **one** situation in which a rock fall would be classified as a **secondary** hazard. [2]

Award [1] for a valid reason/situation and [1] for further development/exemplification.

For example: Heavy rain occurs (accept earthquake, cliff failure) [1] and this causes the slope to become unstable [1].

- (c) (i) Explain **one** reason why mass movement hazard risk could **increase** in the future. [3]

Award [1] for the reason and up to [2] for development / explanation / exemplification of how it causes an increase of the risk

For example: climate change [1] may mean more intense rain storms / weather events [1] which will increase the weight of the soil / decrease stability on a hillslope [1].

Other possible reasons include:

- Deforestation
- Undercutting of slopes for roads/housing
- Poorly maintained drainage
- Deteriorating retaining structures
- Increased population pressure / growth of informal settlements
- Permafrost melting

- (ii) Explain **one** reason, **other than** the one you identified in (c)(i), why mass movement hazard risk could **decrease** in the future. [3]

Award [1] for the reason and up to [2] for development / explanation / exemplification of how it causes a decrease of the risk

For example: slope stabilization [1] e.g. slope terracing in Bali [1] reduces slope gradient / slows downward movement of material [1].

Other possible reasons include:

- Any other mitigation methods e.g. restraining structures
- Land use zoning
- Installing drainage
- Personal resilience e.g. insurance
- Education, awareness and preparedness

8. (a) Examine why earthquakes of similar magnitude may have contrasting human impacts.

[10]

Marks should be allocated according to the markbands.

The focus of the question is on the human impacts of earthquakes of similar magnitude. The impacts will vary with a range of human and physical factors, including level of preparedness, population characteristics, time of day, rural or urban location. Physical factors include areal extent/frequency/duration, and secondary factors such as tsunami and landslides, all of which contribute to the impact of earthquakes in different places.

Possible applied themes (AO2) demonstrating knowledge and understanding (AO1):

- The severity of impacts of earthquakes upon communities are affected partly by the magnitude; but events of similar magnitude may have very different impacts. Some large magnitude earthquakes have very small impacts.
- The impacts will depend upon a variety of demographic, socio-economic and political factors, which many change over time.
- Population characteristics include demographic structure, and density. Distribution of population (rural or urban) is also significant and affects ease of response to provide aid.
- Perception, awareness, previous experience, and education.
- Economic factors include relative wealth and poverty, housing, infrastructure and communications.
- Time of day and degree of isolation.
- Physical factors include areal extent/frequency/duration/depth of focus/liquefaction.

Good answers may be **well structured** (AO4) and may additionally offer a **critical evaluation** (AO3) of the relative importance of differing geographic factors, and why these vary between different places with events of similar magnitude. Another approach might be to consider how the impacts may vary over time, and the role of different stakeholders in influencing the impacts.

For 5–6 marks, expect weakly-evidenced outlining of one or more human impacts from earthquake events of similar magnitude.

For 7–8 marks, expect a well-structured account which includes:

- Either an evidenced explanation of reasons for contrasting human impacts of earthquake events of similar magnitude
- Or a discursive conclusion (or ongoing evaluation) grounded in geographical concepts and/or perspectives.

For 9–10 marks, expect both of these traits.

8. (b) Examine how processes at plate boundaries affect volcanic hazard event profiles. **[10]**

Marks should be allocated according to the markbands.

A volcanic hazard event profile describes the physical characteristics of the hazard in terms of factors such as: magnitude, duration, frequency, probability/predictability, and areal extent. The characteristics of volcanic activity are affected by processes occurring at different types of plate margin (e.g. convergent, divergent). These processes affect the nature and magnitude of eruptions, associated types of lava, gaseous and pyroclastic emissions, and associated hazards such as lahars and landslides. Convergent/destructive margins are associated with violent, explosive eruptions, andesitic lavas and large volumes of pyroclastic materials and damaging secondary hazards. Volcanic activity often has a high explosivity index (VEI), and a relatively low frequency. Divergent/constructive margins are associated with basaltic lava eruptions with a low VEI and higher frequency.

Possible applied themes (AO2) demonstrating knowledge and demonstrating knowledge and understanding (AO1):

- Volcanic hazard event profiles describe the magnitude, duration, speed of onset frequency, predictability, and areal extent of eruptions.
- Hazard profiles are associated with different types of volcanic activity, such as lava types, magnitude of explosions, gaseous and pyroclastic emissions.
- Convergent (destructive) plate margins produce violent high magnitude eruptions (high VEI), with andesitic lava and large volumes of pyroclastic material, and devastating hazards such as lahars and landslides.
- Processes at divergent (constructive) plate margins result in less explosive basaltic eruptions (low VEI), with fewer hazards.
- Frequency and predictability of eruptions also vary between plate margins - e.g., eruptions on convergent margins are often high magnitude eruptions of low frequency. They may be difficult to predict and occur without warning. Eruptions at constructive/divergent margins have high frequency and are much more predictable.

Good answers may be **well-structured** (AO4) and may additionally offer a **critical evaluation** (AO3) examining the relationship between processes, volcanic activity, and associated hazards at places on contrasting types of plate margin, although the relationship is not always straightforward. Another approach might be to examine the varying scale of activity and associated hazards, and how this may change over time.

For 5–6 marks, expect weakly-evidenced outlining of a volcanic hazard event profile and /or processes/activity at plate boundaries.

For 7–8 marks, expect a well-structured account which includes:

- Either an evidenced explanation of processes at contrasting plate margins and hazard event profiles
- Or a discursive conclusion (or ongoing evaluation) grounded in geographical concepts and/or perspectives.

For 9–10 marks, expect both of these traits.

Option E — Leisure, tourism and sport

9. (a) (i) Estimate the straight-line distance, in metres, between Fort Charlotte and the Lodberrie. [1]

Accept 360-420

- (ii) State **one** recreational activity that might take place at the Knab. [1]

Possibilities include but not limited to:

- Walking
- Sight seeing / bird watching
- Mountain biking
- Kite flying
- Rock Climbing / cliff jumping

NB: Must be land based so do not accept water sports or beach activities.

- (b) Outline **one** reason for the location of the Clickimin Leisure Complex. [2]

Award [1] for a valid reason and up to [1] for development / explanation.

For example: Located near to a main road [1] to give easy access for visitors [1].

Other possible reasons include:

- Space for parking
- Near to town for visitors and residents
- Water-based activities may be possible on the loch
- Space for expansion
- Flat land for the running track

- (c) Explain **two** management strategies to increase site resilience in **urban** tourist hotspot areas. [3 + 3]

Award [1] for stating a relevant management strategy, and up to [2] for further development / explanation of how it increases site resilience.

For example: Limiting visitor numbers (e.g. in Venice) [1] by having timed tickets / visitor permits [1] to reduce overcrowding / damage to property [1].

For example: Urban areas can create new experiences/attractions [1] e.g. providing a pedestrian-friendly walk along a river bank [1] that increases the carrying capacity of the area (future sustainability) / benefits residents and visitors alike [1].

Other possibilities include:

- Promote the dispersal of visitors within and beyond the city limits
- New rules and regulations (e.g. Rome)
- Improve city infrastructure and facilities e.g. car parks, pedestrianization, signage, public transport
- Communicate and engage with local stakeholders
- Ensure local communities benefit from the tourism
- Promote urban ecotourism
- Waste management

10. (a) To what extent does personal affluence affect people's participation in leisure activities?

[10]

Marks should be allocated according to the markbands.

Leisure activities include sport and tourism. People's participation is influenced by personal affluence, together with a variety of other, possibly related, factors such as stage in lifecycle gender, race, and place of residence. These will affect the type, duration, and frequency of people's participation in leisure activities. The relative importance of these factors will vary spatially, between different people and societies and may change over time.

Possible applied themes (AO2) demonstrating knowledge and understanding (AO1):

- There has been a significant growth in participation in different types of leisure activities (sport and tourism) in recent years.
- Participation is partly linked to personal affluence, in addition to a variety of other factors including gender, ethnicity and religion and stage in lifecycle.
- Ability/knowledge to access leisure activities (including those that are free/low-cost), social media use, awareness of promotional campaigns by groups/local councils.
- Personal affluence/disposable income is a key factor affecting participation in sports and tourism, including the type of activity, cost, and duration. "Affluence" can include time, in addition to wealth.
- Stage in lifecycle (e.g. older/retired people or younger people with families) will affect participation in different types of activities. Ageing populations often have increased leisure time and more disposable incomes.
- Place of residence (e.g. rural or urban/ inner city or suburbs), which is partly influenced by affluence and perhaps stage in lifecycle, affects access to different types of leisure activity and sports facilities.

Good answers may be **well structured** (AO4) and may additionally offer a **critical evaluation** (AO3) the statement in such a way that examines the extent to which affluence is an important factor in influencing participation in leisure activities, while also recognizing that other factors are important. These factors could be considered at different time and spatial scales, and how they differ between and within societies.

For 5–6 marks, expect a weakly-evidenced outlining of one or more effects of affluence on participation in leisure activities.

For 7–8 marks, expect a well-structured account, which includes:

- Either an evidenced explanation of the extent to which personal affluence affects participation in leisure activities, and the contribution of other factors;
- Or a discursive conclusion (or ongoing evaluation) grounded in geographical concepts and perspectives.

For 9–10 marks, expect both of these traits

10. (b) Examine the environmental **and** economic impacts of a festival in a rural location. **[10]**

Marks should be allocated according to the markbands.

Increasing numbers of festivals are being held in rural locations and these may have significant positive or negative geographical impacts. They may be large music, sporting, religious or cultural festivals, attracting large numbers of visitors from a wide catchment area. Impacts might be environmental and economic at varying scales from local to regional.

Possible applied themes (AO2) demonstrating knowledge and understanding (AO1):

- Festivals held in rural locations may be music, sporting or religious, attracting large numbers of visitors from a wide catchment area.
- Geographic impacts may be both negative and positive, and affect places and people at different scales from local to regional.
- Environmental impacts might include noise pollution and congestion, exceeding the carrying capacity, pressure on water supplies, waste disposal and damage to ecosystems.
- There may be positive impacts such as promoting green issues/sustainability, encouraging use of recyclable materials at the site, promoting conservation, donating tents to charity after the event.
- Economic impacts include increased demand for accommodation and food, greater spending in the local area, increased local employment, improvements to infrastructure.
- Travel to festivals is a major issue, causing congestion on surrounding roads and settlements. Land may not be suitable for farming for some time after the festival.
- Different stakeholders will have varying perspectives on the costs and benefits of how rural areas are used for festivals.
- Impacts, for example disposal of all types of waste, should be managed in a sustainable way, so that benefits outweigh the costs of festivals. Many of the impacts are temporary/seasonal.

Good answers may be **well-structured** (AO4) and may additionally offer a **critical evaluation** (AO3) of the statement in such a way that examines the positive and negative geographic impacts in rural areas. These could be examined around an analysis of perspectives and power of different stakeholders, at different spatial and temporal scales.

For 5–6 marks, expect a weakly-evidenced outlining of at least one environmental and/or economic impact of a festival.

For 7–8 marks, expect a well-structured account, which includes:

- Either an evidenced explanation of a variety of economic and environmental impacts of a festival in a rural location
- Or a discursive conclusion (or ongoing evaluation) grounded in geographical concepts and perspectives (e.g. examining how the impacts might be managed in a sustainable manner).

For 9–10 marks, expect both of these traits.

Option F — Food and health

11. (a) (i) State the percentage of people with food insecurity in Sub-Saharan Africa in 2018. [1]

35% (units not needed)

- (ii) State which region will have the greatest decrease in percentage of people with food insecurity between 2018 and 2028. [1]

Asia

- (b) Outline **one** political factor that may lead to high levels of food insecurity. [2]

Award [1] for a political factor and [1] for development / explanation.

For example: political instability / civil war / unrest [1] disrupts food production / food supply [1].

Other possibilities include but are not limited to:

- Corruption
- Lack of access to international markets / economic sanctions
- Political discrimination against women

- (c) Explain **two** disadvantages of relying on international aid to reduce the severity of famine in a region. [3 + 3]

Award [1] for each disadvantage and a further [2] for development / explanation / exemplification.

For example: Dependency / over-reliance on donations [1] gives farmers less incentive to farm [1] thus reducing food productivity [1].

For example: Aid may reduce the price of locally-grown food [1] making it hard for farmers to make a profit [1] so they may switch to growing non-food crops [1].

Other possibilities include:

- Logistical problems of distribution/storage
- Creates inequalities
- Deters long term solutions to agricultural techniques
- Encourages corruption
- Destabilizes local markets and agricultural growth
- Disrupts commercial trade patterns.
- Import of food may be disrupted by conflict or war

12. (a) Examine the importance of economic factors in the incidence of water-borne disease. **[10]**

Marks should be allocated according to the markbands.

The focus of the question is on the incidence of disease, rather than its impact. Water-borne diseases include cholera, dysentery, typhoid and hepatitis, mainly caused by lack of access to clean water and poor sanitation. The incidence of these diseases is influenced by the complex interaction of a range of different environmental, social, and economic factors. These diseases are prevalent in low-income countries, particularly among young children. Improved access to clean water plays a vital role in reducing the incidence of the disease.

Possible applied themes (AO2) demonstrating knowledge and understanding (AO1):

- A variety of different geographic factors (physical, social, demographic, economic and political) contribute to the incidence of water-borne diseases.
- Economic factors include relative wealth and poverty of the population and affect access to infrastructure for clean water and disposal of waste. Access to health services, medical workers, and vaccinations are also influenced by economic factors. Inequalities between wealth and poverty at local and regional scales will affect the incidence of disease.
- Social and demographic factors are related to economic conditions, including over-crowding, especially in urban areas, poor quality housing (such as in informal housing areas), education, and rapid population growth. Young children and pregnant women are more vulnerable to water-borne diseases.
- Political factors influencing decision-making and strategies for reducing the disease. Also, security issues, such as civil war and terrorism.
- Physical factors also important. They include climate (rainfall and temperature) and stagnant surface water. Flooding and natural hazards such as earthquakes and hurricanes often cause drastic changes to water bodies, resulting in outbreaks of disease.
- The incidence of disease may be reduced by a variety of relatively low-cost actions, including making clean water accessible and improving sanitation (e.g. boreholes and wells; latrines). Economic development and improvement in quality of life for the poor will reduce the incidence of water-borne diseases.

Good answers may be **well-structured** (AO4) and may additionally offer a **critical evaluation** (AO3) the statement in such a way that examines the importance of economic and other geographic factors affecting the incidence of disease. Another approach might be to examine the distribution of the disease at spatial scales (from local regional and international), how the incidence might change over time, and the changing relative importance of different factors, such as changes in levels of poverty or climatic changes.

For 5–6 marks, expect weakly-evidenced outlining of the importance of at least one economic factor in the incidence of a water-borne disease.

For 7–8 marks, expect a well-structured account which includes:

- Either an evidenced examination of the importance of economic factors, and the contribution of other factors in the incidence of water-borne disease
- Or a discursive conclusion (or ongoing evaluation) grounded in geographical concepts and perspectives.

For 9–10 marks, expect both of these traits.

12. (b) To what extent do genetically modified organisms (GMOs) and vertical farming improve food security in different places?

[10]

Marks should be allocated according to the markbands.

There is increasing food insecurity and a need to increase food production, especially in low-income countries, due to low agricultural productivity, environmental degradation, and rapid population growth. Modern farming techniques, such as vertical farming and GMOs, have focused on the application of science to increase agricultural productivity, within the background of environmental impacts of global warming and population growth.

Possible applied themes (AO2) demonstrating knowledge and understanding (AO1):

- Genetically modified crops have higher yields, greater resistance to pests and diseases and may reduce food waste and reduce the use of pesticides. They may also have increased nutritional value which can increase the health of people with limited access to food.
- GMOs may also be grown in a harsh, dry climate and in salty soils.
- GMOs are mainly focused on a few crops, such as soya beans, corn, and rapeseed; vertical farming similarly focuses on a limited range of crops. HYV rice is not an acceptable example of a GMO.
- Vertical farming may be established in densely populated urban areas, to provide fruit, vegetables and herbs all year round, using less land and water than traditional farms. Crops are grown using indoor farming techniques in controlled artificial environments.
- Vertical farming requires high energy and set-up costs and high labour costs; and a high dependency on technology.
- Concerns regarding GMO crops include food safety, environmental impacts, loss of biodiversity.
- Other issues include the role of agribusiness in food production, rich versus poor farmers and increasing economic and social inequality. Also, have limited impact on traditional subsistence agriculture in low-income countries.

Good answers may be **well structured** (AO4) and may additionally offer a **critical evaluation** (AO3) the statement in such a way that shows understanding of the issues surrounding these modern farming technologies, and the often-competing views and perspectives of different stakeholders as to whether they can reduce food insecurity in different places and at different scales. Consideration may also be given to other ways of improving food security, such as improved storage and distribution.

For 5–6 marks, expect weakly-evidenced outlining of how GMOs and/or vertical farming increase food security.

For 7–8 marks, expect a well-structured account, which includes:

- Either an evidenced explanation of the extent to which GMOs and vertical farming increase food security in different places
- Or a discursive conclusion (or ongoing evaluation) grounded in geographical concepts and perspectives.

For 9–10 marks, expect both of these traits.

Option G — Urban environments

13. (a) (i) State which continent shows the greatest increase in percentage of urban population between 1950 and 2050. [1]
- Latin America and Caribbean
- (ii) State the year in which **world** urbanization reached 50%. [1]
- 2011 (allow 2010 – 2012)
- (b) Outline **one** factor that could influence the slower urban population growth in some continents. [2]
- Award [1] for the factor and [1] for development / explanation.*
- For example: A falling birth rate [1] due to higher living costs/standards (in cities) [1].
- Other factors include, but are not limited to:
- Out migration
 - Slowing of rural–urban migration
 - Reduced rate of natural increase
- (c) Explain **two** causes of **urban** deindustrialization. [3 + 3]
- Award [1] for a relevant cause and up to [2] for development / explanation / exemplification.*
- For example: Historic/small/cramped sites in cities are less competitive/close down [1] because larger out-of-town sites [1] are more accessible [1].
- For example: Cheaper production costs / labour / land [1] leading to the movement of industry overseas [1] e.g. Detroit where car manufacturing declined due to overseas competition [1].
- Other possibilities include:
- Development of alternative service industries
 - Transport developments – requirement to be near ports / major railway lines
 - Change of focus of cities to be service centres for retail, legal and financial
 - Machinery becomes cheaper / more reliable / automation so lessening the need for workers.

14. (a) Examine the contribution of smart city design to the sustainable management of urban systems and services.

[10]

Marks should be allocated according to the markbands.

Sustainable management of urban systems includes encouraging economic development and enhancing quality of life, making cities better places to live for everyone, protecting the environment and the prudent use of natural resources. The aim of Smart cities is to use information technologies (ICT) and data analysis to run city services and systems and make cities more sustainable. Data is collected using information technologies and used to efficiently manage aspects of urban system. These include traffic management, reducing congestion, easing parking, and reducing pollution; the prudent use of resources such as energy and water, and waste disposal. Sustainable smart cities also imply improving safety and quality of life for everyone. Smart city design may be used in purpose-built settlements or retrofitted to older urban areas.

Possible applied themes (AO2) demonstrating knowledge and understanding (AO1):

- Smart city design is distinct from resilient or eco-city design in its focus on using information technologies (ICT) to collect and analyse data.
- Smart cities use different electronic devices to collect data from urban infrastructure systems, such as traffic, water, waste disposal and power, and monitoring communities and citizens.
- Analysis and monitoring of the data makes more efficient use of physical infrastructure – for example enabling more efficient traffic flow and reducing pollution, contributing to environmental sustainability.
- Smart phones enable people to access instant information about traffic, health services, and safety alerts.
- Smart cities use technology and data to make better decisions and deliver a higher quality of life. Help cities fight crime and improve aspects of public safety (i.e. social sustainability).
- Concerns regarding smart cities include privacy issues, social and political control, dependency on the internet; lack of skilled workers; high requirement for electricity to power data hubs.
- Other disadvantages include: significant capital investment required, increase in electronic waste; technological gaps between smart cities and other urban areas. (i.e. are Smart cities economically and socially sustainable?)

Good answers may be **well structured** (AO4) and may additionally offer a **critical evaluation** (AO3) of the statement in such a way that examines the contribution and possible limitations, of Smart city design to the sustainable management of urban systems and services. The power and perspectives of different stakeholders might also be considered. Another approach might be to examine how far Smart city design might be delivered in different places and scales (i.e. in established large mega-cities compared with newly planned settlements, or in urban areas/countries with different levels of economic development).

For 5–6 marks, expect weakly-evidenced outlining of at least one way in which Smart city design contributes to the management of cities.

For 7–8 marks, expect a well-structured account, which includes:

- Either an evidenced explanation of the contribution and limitations/disadvantages of Smart city design in the sustainable management of urban areas
- Or a discursive conclusion (or ongoing evaluation) grounded in geographical concepts and perspectives.

For 9–10 marks, expect both of these traits.

14. (b) Examine the role of different stakeholders in the management of urban social deprivation.

[10]

Marks should be allocated according to the markbands.

There are many aspects to urban social deprivation, including unemployment, poor quality housing, overcrowding, access to water and energy, poor diet, health and education, high levels of crime. Most problems are related to poverty, and it is important to break the cycle of deprivation. Stakeholders might include local residents, local/national government, police/judiciary, religious/community groups, businesses.

Possible applied themes (AO2) demonstrating knowledge and understanding (AO1):

- Aspects of urban social deprivation include employment, housing, education, access to services such as water and power, overcrowding.
- It may also reflect social exclusion and lack of political power.
- The cycle of deprivation concept assumes that a combination of factors results in deprivation, and a variety of different groups are involved in breaking the cycle and reducing deprivation.
- Stakeholders include individuals and families, government and local authorities, police/judiciary, businesses, religious and community organizations.
- Solutions include increasing employment and generating local wealth, improving housing, education and health provision, access to transport and communications, food banks, community level initiatives.
- Management of social deprivation may be very costly, rely on political will, and the interaction of different stakeholders.

Good answers may be **well structured** (AO4) and may additionally offer a **critical evaluation** (AO3) the statement in such a way that examines the causes of deprivation and the role/power and perspectives of stakeholders in the management of deprivation in different places and at varying scales.

For 5–6 marks, expect a weakly-evidenced outlining of management of urban social deprivation by at least one major stakeholder.

For 7–8 marks, expect a well-structured account, which includes:

- Either an evidenced explanation of the role of different stakeholders in the management of urban social deprivation
- Or a discursive conclusion (or ongoing evaluation) grounded in geographical concepts and perspectives.

For 9–10 marks, expect both of these traits.