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**GEOGRAPHY**

**9696/21**

Paper 2 Advanced Physical Options

**October/November 2017**

MARK SCHEME

Maximum Mark: 50

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**Published**

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Question	Answer	Marks
1(a)	<p><b>Fig. 1 shows tropical rainforest vegetation.</b></p> <p><b>Describe and explain the characteristics of the vegetation shown in Fig. 1.</b></p> <p>There are many features shown in the figure that require description. The main components are the emergents, the canopy layer, the under-canopy and the shrub layer with vines, strangler figs, epiphytic and parasitic plants. Vegetation on the forest floor can also be credited. The large buttress roots could also be described.</p> <p>Explanation will be in terms of the copious amounts of precipitation, high temperatures, continuous growing season and the need for sunlight. For example, the emergent layer is an attempt to reach sunlight.</p> <p>Credit only the features seen in the figure.</p>	<b>10</b>

Question	Answer	Marks
1(b)	<p><b>For <u>either</u> a tropical rainforest <u>or</u> a savanna ecosystem, describe the effects of human exploitation on nutrient cycling. Evaluate ways in which your chosen ecosystem might be sustainably managed.</b></p> <p>The key to understanding both ecosystems is the nutrient cycle. If the tropical rainforest is chosen, deforestation will have a significant effect on the nutrient cycle. This will be demonstrated by the loss of biomass, the largest nutrient store in the TRF, which can lead to degradation of the whole system. Soils will also be deprived of nutrient input.</p> <p>There will be somewhat similar effects on the nutrient cycle in savanna ecosystems but probably to a more limited extent. Deforestation, overgrazing and burning have a major effect on the nutrient cycle. Lateritic soils are naturally lacking in nutrients and therefore need soil enrichment such as the application of fertilisers. The crops grown should be adapted to the climatic conditions.</p> <p>Sustainable management in either ecosystem may depend on the response to the depletion of nutrients, but may include other management strategies. Ways to overcome these problems could be expressed in terms of particular projects such as selective logging, restricted agricultural developments and specific conservation measures, all of which help to maintain the biodiversity with a concomitant influence on the nutrient cycle.</p> <p>Credit well annotated diagrams.</p> <p><b>Level 3</b> <span style="float: right;"><b>12–15</b></span> An accurate and detailed description of the effects of human exploitation on nutrient cycling in the chosen ecosystem. The response includes a thorough evaluation of the ways in which the ecosystem might be sustainably managed. Where relevant, examples used are appropriate and integrated effectively into the response.</p> <p><b>Level 2</b> <span style="float: right;"><b>7–11</b></span> A sound (but partial) description of the effects of human exploitation on nutrient cycling in the chosen ecosystem. Focus may not be maintained throughout. The response includes a clear (although not complete) evaluation of the ways in which the ecosystem might be sustainably managed. Some examples are used but may lack detail or development. Expression may be unclear in places.</p> <p><b>Level 1</b> <span style="float: right;"><b>1–6</b></span> A brief and limited description of the effects of human exploitation on nutrient cycling in the chosen ecosystem. Evaluation is limited and/or unsubstantiated. Examples are in name only or lacking entirely. Expression is unclear.</p> <p>No response, or no creditable response <span style="float: right;"><b>0</b></span></p>	15

Question	Answer	Marks
2(a)	<p><b>Describe and explain the characteristics of a tropical monsoon climate.</b></p> <p>The description and explanation may be interlinked but there needs to be a description of the seasonal shift of winds and the contrast between the extremely wet summer months and the dry winters. The more detailed descriptions will mention humidity characteristics and the extreme heat before the monsoon breaks. The unreliability and variability of rainfall amounts could also be mentioned. Explanations will be in terms of the movement of the overhead sun and the switch in pressure systems from high to low. The South Asian monsoon would be the obvious example to use because of the nature of the Tibetan Plateau influencing pressure systems and the jet stream. Other areas, such as East Africa and Northern Australia, experience a type of monsoon.</p>	<b>10</b>
2(b)	<p><b>Evaluate the extent to which the development of tropical landforms in either granite or limestone is the result of the characteristics of the rock type.</b></p> <p>The answer requires a detailed description of the landforms and the processes influencing their development. The emphasis is clearly on how the characteristics of the rock type influence the development of the landforms, but the question asks for an evaluation, thus other factors need to be discussed, such as rock structure and climate.</p> <p>The main granite landforms are bornhardts, castle kopjes and tors. The main limestone landforms are tower karst, cone karst and cockpit karst. The focus of the response should be on tropical karst.</p> <p><b>Level 3</b> <span style="float: right;"><b>12–15</b></span> An accurate and detailed understanding of the characteristics of the chosen rock type and the development of the landforms. The response includes a thorough evaluation of the ways in which the development of landforms is the result of the characteristics of the rock type and other factors. Where relevant, examples used are appropriate and integrated effectively into the response.</p> <p><b>Level 2</b> <span style="float: right;"><b>7–11</b></span> A sound (but partial) understanding of the characteristics of the chosen rock type and landforms. Focus may not be maintained throughout. The response includes a clear (although not complete) evaluation of the ways in which the development of the landforms is related to the characteristics of the rock type and other factors. Some examples are used but may lack detail or development. Expression may be unclear in places.</p> <p><b>Level 1</b> <span style="float: right;"><b>1–6</b></span> A brief and limited understanding of the characteristics of the rock type and the landforms. Evaluation is limited and/or unsubstantiated. Examples are in name only or lacking entirely. Expression is unclear.</p> <p>No response, or no creditable response <span style="float: right;"><b>0</b></span></p>	<b>15</b>

Question	Answer	Marks
3(a)	<p><b>Photograph A shows some coastal depositional landforms.</b></p> <p><b>With the aid of a labelled diagram, describe the landforms in Photograph A and explain how they may have developed.</b></p> <p>The photograph is of a recurved spit with a salt marsh developing behind. Other features worthy of credit include the sand dunes, the beach and a berm. Mega-ripples are also shown on the inward spit area exposed as it is low tide. At least two landforms should be described and explained. Explanation could be in terms of longshore drift with the recurve feature the result of wave approach from a different direction. The salt marsh will be seen in terms of deposition in shallow and sheltered water. The diagram should show these depositional features but does not need to be directly related to the photograph.</p> <p>If no relevant diagram, maximum 6 marks.</p>	<b>10</b>

Question	Answer	Marks
3(b)	<p><b>Describe the conditions required for coral growth and development. Assess the major threats to the continued development of coral reefs.</b></p> <p>Coral requires clear, relatively shallow water up to 60 metres deep, water temperatures around 20 to 25 degrees centigrade and salt water. Other conditions could include reference to wave action to oxygenate the water and a firm base for the reef to develop on.</p> <p>Threats will involve any potential changes to these optimum conditions such as: increase in water temperatures as a result of global warming, increase in the acidity/decrease in the alkalinity of the water (a possible result of increased carbon dioxide in the atmosphere), marine pollution, sediment/fertiliser input from land-based sources, freshwater input from major rivers, storm and/or tsunami damage, and physical interference such as recreational activities and fishing. Rising sea levels are not really a threat as coral growth can keep pace with the rising levels.</p> <p><b>Level 3</b> <span style="float: right;"><b>12–15</b></span> An accurate and detailed description of the conditions required for coral growth and development. The response includes a thorough assessment of the major threats to the continued development of coral reefs. Where relevant, examples used are appropriate and integrated effectively into the response.</p> <p><b>Level 2</b> <span style="float: right;"><b>7–11</b></span> A sound (but partial) description of the conditions required for coral growth and development. Focus may not be maintained throughout. The response includes a clear (although not complete) assessment of the major threats to the continued development of coral reefs. Some examples are used but may lack detail or development. Expression may be unclear in places.</p> <p><b>Level 1</b> <span style="float: right;"><b>1–6</b></span> A brief and limited description (or list) of the conditions required for coral growth and development. Assessment of the threats is limited and/or unsubstantiated. Examples are in name only or lacking entirely. Expression is unclear.</p> <p>No response, or no creditable response <span style="float: right;"><b>0</b></span></p>	<b>15</b>

Question	Answer	Marks
4(a)	<p><b>Describe and explain how rock type <u>and</u> structure may influence cliff profiles.</b></p> <p>Both rock type and structure are required. More limited answers will probably write about soft and hard rock but with little conviction. There could be more of an emphasis on rock structure such as degree of jointing and the inclination of bedding planes. The answers should be based on the description of different types of cliffs, possibly with annotated diagrams. The best responses will discuss both marine and sub-aerial processes in combination with the rock characteristics.</p> <p>Discussion of rock type and structure with no reference to cliff profiles, maximum 2 marks.</p>	<b>10</b>
4(b)	<p><b>To what extent do human activities affect the erosion, transport and deposition of sediment along coasts?</b></p> <p>Human activities can affect the erosion of coastlines and the production of sediment. Sediment transport by longshore drift can be interrupted by human activities. This interruption may also have an effect on the deposition of sediments. Better answers might note that there can be no deposition if the source of sediment is affected, such as the protection of cliffs from erosion and dredging offshore. Most candidates will probably write about groynes and other coastal protection procedures. The effects could include starving spits and beaches of sediment, leading to the occurrence of coastal erosion and mass movement on coasts where the protection of a beach has been reduced. Removal of sediment could also lead to the undermining of coastal defences. An assessment of the importance of relevant physical factors can be credited.</p> <p><b>Level 3</b> <span style="float: right;"><b>12–15</b></span> An accurate and detailed understanding of the erosion, transport and deposition of sediment along coasts. The response includes a thorough evaluation of the extent to which human activities affect these processes. Where relevant, examples used are appropriate and integrated effectively into the response.</p> <p><b>Level 2</b> <span style="float: right;"><b>7–11</b></span> A sound (but partial) understanding of erosion, transport and deposition of sediment along coasts. Focus may not be maintained throughout. The response includes a clear (although not complete) evaluation of the extent to which human activities affect these processes. Some examples are used but may lack detail or development. Expression may be unclear in places.</p> <p><b>Level 1</b> <span style="float: right;"><b>1–6</b></span> A brief and limited understanding of erosion, transport and deposition of sediment along coasts. Evaluation is limited and/or unsubstantiated. Examples are in name only or lacking entirely. Expression is unclear.</p> <p>No response, or no creditable response <span style="float: right;"><b>0</b></span></p>	<b>15</b>

Question	Answer	Marks
5(a)	<p><b>Fig. 2 shows a tropical cyclone (hurricane).</b></p> <p><b>Using Fig. 2, describe and explain the development of tropical cyclones (hurricanes).</b></p> <p>The features shown in the figure should be used to explain the development. This will be in terms of intense evaporation from warm seas with warm air rising and condensing to form towering clouds and heavy rainfall. The uplift of air is accentuated by the release of latent heat as a result of condensation. The rising air also creates intense low pressure with warm air being sucked in which then also rises and so the hurricane develops. The upflow of warm and humid air continues. Air that surrounds the low pressure zone at the centre flows in a spiral at very high speeds, anti-clockwise in the northern hemisphere. The Coriolis force of the earth is needed to develop the spinning motion. Air is ejected at the top of the eye.</p>	<b>10</b>



Question	Answer	Marks
5(b)	<p><b>Describe the hazardous impacts of tropical cyclones (hurricanes). To what extent can these impacts be reduced?</b></p> <p>There needs to be a thorough description of the hazardous impacts of tropical cyclones before an evaluation of impact reduction is attempted. The impacts from tropical cyclones are associated with high winds, storm surges and high precipitation amounts which result in a number of primary and secondary hazards. There are various strategies for reducing the impacts. Early warning and prediction may allow evacuation. There are various engineering strategies to limit storm surges and flooding in rivers and coastal areas. Buildings can be constructed to resist high winds and to protect people from storm surges.</p> <p><b>Level 3</b> <span style="float: right;"><b>12–15</b></span> An accurate and detailed description of the hazardous impacts of tropical cyclones. The response includes a thorough evaluation of the extent to which these impacts can be reduced. Where relevant, examples used are appropriate and integrated effectively into the response.</p> <p><b>Level 2</b> <span style="float: right;"><b>7–11</b></span> A sound (but partial) description of the hazardous impacts of tropical cyclones. Focus may not be maintained throughout. The response includes a clear (although not complete) evaluation of the extent to which these impacts can be reduced. Some examples are used but may lack detail or development. Expression may be unclear in places.</p> <p><b>Level 1</b> <span style="float: right;"><b>1–6</b></span> A brief and limited description of the hazardous impacts of tropical cyclones. Evaluation is limited and/or unsubstantiated. Examples are in name only or lacking entirely. Expression is unclear.</p> <p>No response, or no creditable response <span style="float: right;"><b>0</b></span></p>	<b>15</b>

Question	Answer	Marks
6(a)	<p><b>Compare <u>two</u> types of mass movements. Explain why some mass movements may be hazardous.</b></p> <p>A variety of mass movement types can be hazardous, such as rockfalls, landslides and mudflows. Avalanches may also be considered. Description and explanation will vary depending on the type of mass movement described. A strong response will have explicit comparisons.</p> <p>There should be some explanation as to why some mass movements may be hazardous. The hazardous mass movements chosen need not necessarily be those compared in the first part of the question.</p>	<b>10</b>

Question	Answer	Marks
6(b)	<p><b>Examine the extent to which a hazardous area can be sustainably managed.</b></p> <p>This could develop the analysis in part (a) but the focus does not need to be on areas where mass movements are a hazard. Hazardous areas can only be managed sustainably if the hazards are understood well. The assessment will depend on the hazardous area chosen because management strategies vary from hazard to hazard. However, there are some strategies that relate, generically, to most hazards, such as education of the population.</p> <p><b>Level 3</b> <span style="float: right;"><b>12–15</b></span> An accurate and detailed understanding of the ways in which a hazardous area can be managed. The response includes a thorough evaluation of the extent to which the management is sustainable. Where relevant, examples used are appropriate and integrated effectively into the response.</p> <p><b>Level 2</b> <span style="float: right;"><b>7–11</b></span> A sound (but partial) understanding of the ways in which a hazardous area can be managed. Focus may not be maintained throughout. The response includes a clear (although not complete) evaluation of the extent to which the management is effective. Some examples are used but may lack detail or development. Expression may be unclear in places.</p> <p><b>Level 1</b> <span style="float: right;"><b>1–6</b></span> A brief and limited understanding of the ways in which a hazardous area can be managed. Evaluation is limited and/or unsubstantiated. Examples are in name only or lacking entirely. Expression is unclear.</p> <p>No response, or no creditable response <span style="float: right;"><b>0</b></span></p>	<b>15</b>

Question	Answer	Marks
7(a)	<p><b>Explain the global distribution of hot arid environments.</b></p> <p>Explanation will vary depending on the areas discussed. Explanation should include the descending limbs of the Hadley Cell/Ferrel Cell leading to high pressure, continentality, rain shadow effects and cold offshore ocean currents. The best answers will relate the explanations to specific areas where hot arid environments occur.</p>	<b>10</b>
7(b)	<p><b>Fig. 3 shows some hot desert landforms.</b></p> <p><b>Describe the landforms shown in Fig. 3. Evaluate the relative importance of processes, past and present, in the development of those landforms.</b></p> <p>The diagram provides the features that need explanation and evaluation. The landscape may be a partially relic one with present processes restricted to occasional flash floods in the wadis, adding sediment to the alluvial fans and their coalescence to form bajadas. Intermittent streams may cross the piedmont slope adding to the playa and there might be some weathering of the mountain front. The landforms will need to be described and explained in terms of weathering and fluvial processes. Wadis are deep valleys eroded in past wetter climates with the deposition of sand and gravel as alluvial fans. Assessment of the past and present day scale of the processes will be the hallmarks of good understanding.</p> <p><b>Level 3</b> <span style="float: right;"><b>12–15</b></span> An accurate and detailed description of the landforms. The response includes a thorough evaluation of the relative importance of processes, past and present, in the development of the landforms. Where relevant, examples used are appropriate and integrated effectively into the response.</p> <p><b>Level 2</b> <span style="float: right;"><b>7–11</b></span> A sound (but partial) description of the landforms. Focus may not be maintained throughout. The response includes a clear (although not complete) evaluation of the relative importance of processes, past and present, in the development of the landforms. Some examples are used but may lack detail or development. Expression may be unclear in places.</p> <p><b>Level 1</b> <span style="float: right;"><b>1–6</b></span> A brief and limited description of the landforms. Evaluation is limited and/or unsubstantiated. Examples are in name only or lacking entirely. Expression is unclear.</p> <p>No response, or no creditable response <span style="float: right;"><b>0</b></span></p>	<b>15</b>

Question	Answer	Marks
8(a)	<p><b>With the aid of labelled diagrams, describe and explain the development of <u>two</u> different types of sand dune found in arid environments.</b></p> <p>There are many different types of dune that could be described and explained, such as barchans, star, seif and nebkhas. Two types should be chosen. Explanations will be in terms of wind direction, wind strength and availability of sand. There should also be some indication of size in the description.</p> <p>Mark 5/5, 4/6 or 6/4 depending on the quality. If no diagram, maximum 3 marks for each type of dune.</p>	10
8(b)	<p><b>With reference to <u>either</u> an arid <u>or</u> a semi-arid area, evaluate the ways in which it can be developed sustainably.</b></p> <p>Such a study is a requirement of the syllabus but quite often answers are not sufficiently focused. There needs to be a clear indication of which environment is being addressed and the ways it can be developed sustainably. Sustainability will be related to the characteristics of the chosen environment, such as climate, biomass and soil. Rising populations in semi-arid areas put increasing demands on the limited natural resources.</p> <p>Evaluation of ways of sustainable development should be firmly based on an area studied. Changes to agricultural practices, such as the introduction of drought resistant crops and paddocking of livestock, have proved moderately successful. Development of a basic electricity supply, improved methods of irrigation and water extraction have enabled sustainable land use. Examples of successful sustainable development may be drawn from MEDCs such as Israel and the Gulf States. The exploitation of mineral resources such as oil and the economic development within the chosen environment could be significant if related to sustainability.</p> <p><b>Level 3</b> <span style="float: right;"><b>12–15</b></span> An accurate and detailed understanding of the nature of the chosen area. The response includes a thorough evaluation of the ways in which the area can be developed sustainably. Where relevant, examples used are appropriate and integrated effectively into the response.</p> <p><b>Level 2</b> <span style="float: right;"><b>7–11</b></span> A sound (but partial) understanding of the nature of the chosen area. Focus may not be maintained throughout. The response includes a clear (although not complete) evaluation of the ways in which the area can be developed sustainably. Some examples are used but may lack detail or development. Expression may be unclear in places.</p> <p><b>Level 1</b> <span style="float: right;"><b>1–6</b></span> A brief and limited understanding of the nature of the chosen area. Evaluation is limited and/or unsubstantiated. Examples are in name only or lacking entirely. Expression is unclear.</p> <p>No response, or no creditable response <span style="float: right;"><b>0</b></span></p>	15