

# UNIVERSITY OF CAMBRIDGE INTERNATIONAL EXAMINATIONS

GCE Advanced Level

## MARK SCHEME for the November 2004 question paper

### 9696 GEOGRAPHY

9696/02

Paper 2 (Physical Geography), maximum raw mark 50

This mark scheme is published as an aid to teachers and students, to indicate the requirements of the examination. It shows the basis on which Examiners were initially instructed to award marks. It does not indicate the details of the discussions that took place at an Examiners' meeting before marking began. Any substantial changes to the mark scheme that arose from these discussions will be recorded in the published *Report on the Examination*.

All Examiners are instructed that alternative correct answers and unexpected approaches in candidates' scripts must be given marks that fairly reflect the relevant knowledge and skills demonstrated.

Mark schemes must be read in conjunction with the question papers and the *Report on the Examination*.

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**Grade thresholds** taken for Syllabus 9696 (Geography) in the November 2004 examination.

	maximum mark available	minimum mark required for grade:		
		A	B	E
Component 2	50	30	27	18

The thresholds (minimum marks) for Grades C and D are normally set by dividing the mark range between the B and the E thresholds into three. For example, if the difference between the B and the E threshold is 24 marks, the C threshold is set 8 marks below the B threshold and the D threshold is set another 8 marks down. If dividing the interval by three results in a fraction of a mark, then the threshold is normally rounded down.

November 2004

**GCE A LEVEL**

**MARK SCHEME**

**MAXIMUM MARK: 50**

SYLLABUS/COMPONENT: 9696/02

GEOGRAPHY

Physical Geography

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	A LEVEL – NOVEMBER 2004	9696	2

## Tropical Environments

Only **one** question may be answered from this environment.

- 1 (a) Explain the term *etchplanation* and describe how it contributes to landform development in tropical areas. (10)

Etchplanation is brought about through the operation of deep chemical weathering on a basal weathering surface. This will be particularly effective where rock is closely jointed or fractured. Climatic conditions should be such as to promote active chemical weathering. The production of core stones can occur and episodes of the stripping of regolith can allow the exposure of landforms such as inselbergs, tors, kopjes etc. Diagrams can be employed effectively to illustrate much of the process.

- (b) Explain the nature of soil fertility in tropical ecosystems. Using examples, describe how soil fertility in tropical ecosystems can be affected by human activities (15)

### Level 3

Soil fertility refers to the status of soils in relation to the amount and availability of nutrients essential for plant growth. The intense leaching that occurs in much of the tropics leads to the development of ferrallitic soils where there are mineral deficiencies. When vegetation is disturbed as in the TRF then the relatively closed nutrient cycle is broken leading to further nutrient loss and soil degradation. Most activities viz. slash and burn, logging, plantation, grazing will result in some nutrient loss and degradation. In the seasonally humid tropics the situation can be complicated by dry season effects but the soils may retain higher nutrient stores. Fertility can be maintained or even enhanced by addition of fertilisers. (12-15)

### Level 2

Fertility will be described in terms of soils although the answer may be framed more in terms of human activities within tropical environments with reference to alterations to the vegetation. This can be developed with reference to either the TRF or Savanna type conditions. Even so there will be some recognition of the impact upon soils within nutrient cycles and hence impacts upon fertility. (7-11)

### Level 1

Seen as an opportunity to develop clearance activities in TRF or fire etc in Savanna. Little attention will be focused on soil fertility. More is likely to be devoted to soil erosion. For a pass, however, there should be some appreciation of the role of soils within tropical ecosystems. (0-6)

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2 (a) Fig. 1 shows source regions of tropical air masses.

**Describe the characteristics of each type of air mass shown and, using an example, or examples, explain how the passage of these air masses within tropical areas can affect weather** (10)

Air masses are large bodies of air that display homogeneous surfaces largely derived from their source regions. In the diagram maritime tropical, continental tropical are shown. mT is warm and moist whilst cT is warm and dry as would be expected from the source regions. Weather effects stem from convergence which can bring about uplift and ppt (ITCZ). Ppt is likely to be most marked where there is a convergence of air masses differing in temperature and humidity. Descending dry air will develop aridity. Some may develop seasonal changes associated with monsoons.

(b) **With reference to one tropical ecosystem, explain what is meant by sustainable management and suggest ways by which it might be achieved.** (15)

### Level 3

Sustainable management will be explained i.e. management that allows human activities to continue whilst causing as little harm to the ecosystem as possible. Thus its continued existence is to some extent ensured. Often easier to say than achieve in tropical LEDC contexts. Candidates should be able to produce a case study or at least examples of good practice in either TRF or savanna contexts. These accounts will show some evaluation in that all objectives may not be achieved. (12-15)

### Level 2

An awareness of sustainable management, but more an account of particular human activities (e.g.s. or case studies) some of which are deemed more desirable than others i.e. less destructive, loss of biodiversity etc. Little other evaluation. (7-11)

### Level 1

Accounts will largely concentrate upon destruction of rain forest or savanna biomes with some comment upon the loss to mankind, soil deterioration etc. There will be little appreciation of management although for a pass there should be some inkling of sustainability. (0-6)

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## Coastal Environments

Only **one** question may be answered from this environment.

### 3 (a) Describe and explain the generation and characteristics of sea waves (10)

Sea waves are oscillations of water particles induced by frictional drag from wind. Hence they are a function of fetch, wind strength and depth of water. (refraction) They can be classified in various ways (height, length etc.) but most will probably express this in terms of high and low energy breakers or as constructive and destructive waves.

### (b) Describe the main processes of marine erosion. Using examples, explain how these processes can affect the development of coastal landforms. (15)

#### Level 3

The processes of hydraulic action, quarrying, abrasion etc will be described and associated as being most effective in high energy environments. The products of such activities can then be demonstrated by actual examples (headlands, cliff forms, wave cut platforms etc). At this level there will be a correspondence between process and landform and at least some actual examples employed. **(12–15)**

#### Level 2

Some reasonable coverage of erosion processes although the precise nature of the link with landforms will be less well developed. There may be a tendency to produce generic examples (e.g. stacks, caves, geos etc) rather than actual examples of a coastal location. **(7–11)**

#### Level 1

A partial account of marine erosion. The examples, at best, will be generic or missing. Alternatively some coastal landforms will be vaguely described and then generally associated with marine erosion without specifying the precise process or processes that have contributed. **(0-6)**

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- 4 (a) Fig. 2 shows some options for the management of coastlines under threat from erosion.

Select one option and evaluate its impact upon a stretch or stretches of coastline you have studied. (10)

Good answers will not only describe the option in terms of likely activities (hard soft engineering etc.) but also give some estimate of its impact in particular coastal areas (7-10). Weaker responses will give generic descriptions which are unsupported by particular examples or by any evaluation of impact.

- (b) Describe and explain how beaches can vary both in their plan form and their profile (cross section). (15)

### Level 3

Beaches occur where LSD etc. is impeded by headlands or estuaries and can thus take the plan form of bay head beaches, pocket beaches etc. They are orientated to face wave direction and material can become sorted. Coarser material produces steeper beaches. In profile beaches will reflect the types of waves, amount of sorting etc. Such that profiles will demonstrate distinctive storm and swell profiles, berms, storm ridges etc. (12-15)

### Level 2

Description of the contribution of LSD to the formation of beaches although there may not be much indication of variations in plan form. Profiles will be seen as the result of constructive and destructive waves although the actual changes in terms of shape and material will be limited in development. (7-11)

### Level 1

Little to distinguish between plan and profile form with vague references to beach deposits. For a pass there should be some awareness of the transportation and deposition of sediment and the role of waves. (0-6)

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## Hazardous Environments

Only **one** question may be answered from this environment.

- 5 (a) Describe the nature and development of tornadoes. Why are they considered hazardous? (10)

Tornadoes (not hurricanes) are rapidly rotating columns of air developed around intense low pressure centres. Characterised by dark funnel shaped clouds with extremely violent winds moving in an anticlockwise spiral and accompanied by violent downdraughts. They develop where a layer of warm moist air occurs at low levels with dry air above with high altitude temperature inversion and a triggering mechanism of an intense cold front or high solar heating of ground. Common in mid west of USA (Tornado alley) and wreak a swathe of destruction c150 m across. Tornadoes have the greatest wind intensity of all met features and can lead to implosion of houses etc and everything from cars to frogs being lifted aloft.

- (b) To what extent can tornadoes and tropical storms be predicted? What measures can be taken to reduce their effects? (15)

### Level 3

USA has well-developed Tornado warning system but the actual occurrence and track remain very difficult to forecast (due to back tracking, leapfrogging etc). Hurricanes are generally more certain in track with more predictable courses. There still tends to be monitoring and forecasting rather than prediction. Hence with both hazards, there is still a considerable degree of uncertainty regarding course and intensity. Outside of USA prediction, forecasting etc. far less develop as are any attempts to reduce effects. (12-15)

### Level 2

Methods of forecasting and tracking (tornado chasing) will be described but there will be little evaluation as to the extent to which they are successful. More may be included on attempts to limit the effects. Battening down, evacuation, tornado shelters, etc. (7-11)

### Level 1

Some mention of forecasting, early warnings etc. although methods of achieving this are unlikely to appear in any detail. Similarly, attempts to reduce effects will be expressed at a simplistic and (for a pass) basic level. (0-6)

Page 6	Mark Scheme	Syllabus	Paper
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- 6 (a) Fig. 3 shows seismic (earthquake) risk and active volcanoes in tropical areas.

**Describe and explain the pattern of seismic risk and active volcanoes. (10)**

Both the patterns of low to moderate risk and high risk and active volcanoes clearly follow plate boundaries. The lower risk areas tend to be on constructive margins (e.g. mid Atlantic ridge) or outer areas of destructive margin. The high risk areas are characterised by a coincidence of active volcanoes and destructive margins (Pacific ring of fire). High risk is associated with subduction zones often at the junction of a continental and oceanic plate. Most, but not all, active volcanoes are found here. Some active volcanoes occur on other subduction margins or at hot spots.

- (b) **Using examples, describe the effects of seismic (earthquake) activity in hazardous areas. To what extent is it possible to predict seismic hazards? (15)**

### Level 3

Will contain some balance between effects, prediction and evaluation. The effects will largely revolve around a description of earthquake damage and can be organised into an account (or accounts) of actual earthquakes (San Francisco, Kobe etc.). Damage to the infrastructure, buildings etc will be tempered by some reference to landslides and other attendant effects. Prediction will be described and assessed (e.g. Kobe). **(12-15)**

### Level 2

Most of these accounts will concentrate on the effects of seismic activity in the form of earthquakes which will be retold in varying degrees of detail. Relatively little attention will be given to prediction and any form of evaluation. Examples will be cited from actual events. **(7-11)**

### Level 1

Basic accounts of earthquake effects (destruction and mayhem) with possibly some volcanic material thrown in for good measure. Poorly related to actual examples and little indication of prediction. **(0-6)**

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### Arid and semi-arid environments

Only **one** question may be answered from this environment

- 7 (a) Describe and explain the distribution of the world's major hot arid regions. (10)

Hot arid areas are largely limited to the inter-tropical areas of the world. Explanation should be given in terms of climatic conditions that bring about aridity (less 250mms ppt and high annual temperatures). Climatic causes are descending air of sub tropical highs, cold ocean currents and rain shadow effects. Good answers will illustrate each with an example.

- (b) Show how weathering processes and erosion have contributed to the formation of three different desert landforms. (15)

#### Level 3

A fairly wide choice of landforms is available, but clearly they need to be chosen with an eye to erosion and weathering. Wadis, mountain fronts, pediments, mesas and buttes could all be used to illustrate water erosion (sheet and stream) whilst zeugans, yardangs, etc. can demonstrate wind activities. Weathering will be seen as a combination of physical and chemical processes and as a weakening agent as well as sculpting eroded landform. (12-15)

#### Level 2

The landforms will be less well described and the erosive processes more loosely associated with their production. The choices, however, will be apposite. Weathering will be viewed as an additional feature that operates only on the finished article. (7-11)

#### Level 1

Vague descriptions of both landform and process with a tendency to produce generic process (e.g. wind erosion) which is then ascribed to a number of features (e.g. Yardang, zeugan, ventifacts etc.). Little concept of scale. Weathering may be described (e.g. exfoliation) but not really related to any particular landform. (0-6)

Page 8	Mark Scheme	Syllabus	Paper
	A LEVEL – NOVEMBER 2004	9696	2

- 8 (a) Fig. 4A shows the rainfall pattern in the Sahel region on the southern edge of the Sahara. Fig. 4B shows the spread of desert into a small area of the Sahel.

**Explain how the spread of the Sahara desert may have been influenced by the pattern of rainfall and by human activities. (10)**

The rainfall pattern of variance from the mean displays a longer period of relative drought than has been seen in past c100 years. Whilst this does not necessarily presage total change, it clearly puts pressure on the environment in such semi-arid conditions. This has been exacerbated by human activities as revealed by B where desert spread has emanated not from the Sahara margin but from centres of human activities which have subsequently joined. Thus pressure of population and livestock in conditions of drought has brought about deforestation, lack of vegetation cover, lowering of water tables and the invasion of dunes and desert conditions.

- (b) **Describe the landforms found in the desert piedmont and give an explanation of their formation. (15)**

### Level 3

Sensible to supply a diagram illustrating the features of the piedmont i.e. Mountain front, wadi, knick, bajada, pediment, peripediment, playa. These will be ascribed to largely water action (aided by weathering) and stream and sheet floods, retreat of mountain front etc will be accurately described and related to the landforms produced. It will be viewed as landform sequence stemming from linked causes largely in the past forming a relict, low activity landscape. (12-15)

### Level 2

The landforms will be dealt with in a piecemeal manner with differing amounts of detail. Some of the processes and landforms will not be linked in a very convincing manner (e.g. pediments and stream floods). There will be a realisation of past pluvial input even if it is not well expressed. (7-11)

### Level 1

Very bitty. A partial coverage of the landforms and a vague awareness of the significance of water action. This will not be expressed in terms of particular landforms other than in a general sense. For a pass, at least some of the landforms should be shown with some accuracy. (0-6)