ASSESSMENT and QUALIFICATIONS ALLIANCE

Mark scheme June 2003

GCE

Geography B

Unit GGB2

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The Dynamics of Change

General Instructions

It is important that every Examiner marks the scripts to the same standard as the rest of the panel. All Examiners must operate the Marking Scheme in a similar and consistent manner, and hence they must all participate in the application of that scheme at the Standardisation Meeting. In particular they should take careful note of all decisions taken or changes made at that meeting. Examiners are allocated to a Team Leader for the period of examining, and any difficulties that arise should be discussed with that person.

The Marking Scheme

The Marking Scheme consists of two sections for each question or sub-question - the Notes for Answers and the Mark Scheme itself.

Notes for Answers (NFA):

These indicate the possible content for the various sections of the question paper. In some cases (for example short answer questions) the NFA might indicate the only response that is acceptable, but in many cases they indicate either a range of suitable responses, or an exemplar of the type of response required. Therefore in most cases, the NFA do **not** provide model answers, and should be regarded as such. More NFA may be added at the standardisation meeting if it is felt by the Principal Examiner that details of appropriate ways of answering the question have been omitted.

The Mark Scheme

This is provided in italics and provides the instructions to Examiners as to how they are to assess the work of candidates. The number of marks allocated within the mark scheme to a question should correspond to the number of marks for that question on the question paper.

There are two ways in which the Mark Scheme operates:

(a) It indicates how the marks to short answer questions are to be allocated - usually to a maximum of 4 marks.

(b) It indicates how Examiners should move through the levels in a level response mark scheme - -usually to all questions of 5 marks or more. Each level has a levels descriptor, with clear statements of the "triggers" to move candidates from one level to another. Each Level contains a range of marks as shown on the Mark Scheme.

A number of features have been used to distinguish between levels, for example:

- a number of characteristics, reasons, attitudes etc.
- the degree of specification, for example the use of specification case studies, or accurate detail
- responses to more than one command word, for example, describe and suggest reasons
- the degree of linkage between two aspects of the question
- the depth of understanding of a concept.

The Marking process.

A sample of the Examiner's marked scripts will be marked again by a Senior Examiner according to the procedures set out by the Board. Also the scripts may be re-examined at the Awards Meetings and the subsequent Grade Review. Therefore, it is most important that Examiners mark clearly according to the procedures set out below.

- All marking should be done in red.
- The right-hand margin should be used for marks only.
- The overall mark for a question must be ringed at the end of the answer.
- The total mark for the question must be transferred to the front of the script.
- The left hand margin is where an indication of the level achieved is written. Comments and codes (see below) may also be written on the left.
- Indications of the level achieved may also occur in the body of the answer if this is easier for the Examiner to apply (e.g. in the marking of diagrams).
- Ticks should be used for short answer responses and Level I responses only, with one tick representing one mark (to the maximum allowed in a Levels scheme).
- Levels II, III, and IV should be indicated with a Roman II, III or IV on the script, and this symbol should be used each time this Level is achieved. Examiners may wish to bracket an area of text where this level of response has been achieved.
- Once a candidate has reached Level II, additional Level I credit should be indicated using a + symbol. If these points are of sufficient quality **one additional mark** can be awarded (assuming no further Level II points are made).
- Examiners may indicate strong Level II or III material by writing "Level II (or III) - good" in the left hand margin of the script. The Examiner should ensure that this is reflected in the **awarding of an appropriate number of marks** at the end of the answer.
- Level III is to be used only for questions of 9 marks or more, and Level IV is to be used only for questions of 25 marks in total.

Other Mechanics of marking

- Underline all errors and contradictions.
- Cross out irrelevant sections using a line from top-left to bottom right. (However be careful to check that there is no valid material, however brief, in the mass of irrelevance.)
- Indicate repeated material with "rep".
- Other useful marking codes can be used, for example, "va" for vague, "NQ" or "Not Qu." For failure to answer the question, "Irrel" for irrelevant material, and SIF" for self-penalising material.
- Put a wavy line in the left-hand margin to indicate weak dubious material.
- If the rubric is contravened, mark all answers but count only the best mark towards the candidate's total mark for the script. Put the mark for the question on the front of the script in the usual way, but also write "RAM Rubric" on the front of the script.
- Large areas of text must not be left blank - use the wavy line or write "seen" alongside the text. All pages must have indication that they have been read, especially supplementary sheets.

Unless indicated otherwise always mark text before marking maps and diagrams - do not give double credit for the same point made in the text and a diagram.

Quality of Language Descriptors

The following descriptors concerning the quality of language must be applied to **all** questions in which candidates are required to produce extended writing. To attain full marks available at a level of response, the appropriate Quality of Language descriptor must be achieved. Use the same quality of language levels as are used in the geographical element of the mark scheme under consideration.

Three-level descriptors

Level I
- Style of writing is suitable for only simple subject matter.
- Expression of only simple ideas, using a limited range of specialist terms.
- Reasonable accuracy in the use of English.

Level II
- Manner of dealing with subject matter is acceptable, but could be improved.
- Reasonable clarity and fluency of expression of ideas, using a good range of specialist terms, when appropriate.
- Considerable accuracy in the use of English.

Level III
- Style of writing is appropriate to subject matter.
- Organises relevant information and ideas clearly and coherently, using a wide range of specialist vocabulary, when appropriate.
- Accurate in the use of English.

Two-level descriptors

Level I
- Manner of dealing with subject matter is acceptable, but could be improved.
- Reasonable clarity and fluency of expression of ideas, using a good range of specialist terms, when appropriate.
- Considerable accuracy in the use of English.

Level II
- Style of writing is appropriate to subject matter.
- Organises relevant information and ideas clearly and coherently, using a wide range of specialist vocabulary, when appropriate.
- Accurate in the use of English.

OPTION P: GLACIAL ENVIRONMENTS

Question 1

(a) (i) Inputs to the ice can include:
Precipitation (all forms)
Re-freezing of meltwater
Avalanche; Rock Fall
Drifting

Outputs from the glacier can include:
Melting (meltwater streams)
Calving; Ice Bergs
Evaporation/sublimation

1 mark for each correct input/output **2 marks**

(ii) Clockwise starting from top right:
Accumulation; ablation; ice; firn

1 mark for each correct label **4 marks**

(iii) Movement of ice involves; basal slippage and internal flow. Basal slippage occurs most rapidly on steep slopes in summer when gravity is assisted by melt water lubrication. The melt water can come from the surface or be produced by pressure melting. Creep occurs when ice moves, in a plastic fashion, around large obstacles at the base. Internal flow involves ice crystals sliding past one another. Movement is related to the slope and so there is extending and compressing flow. Ice moves fastest in the centre of the glacier and at the surface. Drag by base and sides slow it down at the margins. Temperate glaciers move at a much faster rate than cold glaciers because there is much more lubrication at the base to enable there to be basal movement.

Level 1 Simple description of glacial movement and/or basic definitions of types of glacial movement.. **0 - 3 marks**

Level 2 Detailed description of glacial movement (2XL2Qmax) and detail types of glacial movement. There must be at least one explanation (annotated E) at level 2 to gain full marks. **4 – 8 marks**

(b) (i) Response will depend on the chosen landform. Possibilities will include; arête, pyramidal peak, corrie, trough (main or hanging), truncated spurs, rock basin, roche moutonee, striation, fjord etc. The description can include scale (either a named example or a theoretical range), shape, field relationship etc.

Level 1 Simple description of the chosen landform with little detail and no use of specialised terminology. Name **0 – 3marks**

Level 2 Detailed description of the chosen landform (2XL2Qmax) **4 – 7 marks**

(ii) Relevant processes must be glacial (abrasion, plucking, rotational flow, pressure melting and dilatation etc.); the question does not allow candidates to include periglacial processes (except where they provide material for abrasion).

Level 1 Simple statements about glacial erosion with no link to what the processes do. **0 – 3 marks**

Level 2 Detail of glacial erosion processes or the effect on the landscape that these processes have. **4 –7 marks**

(c) The features highlighted are: A: kame terrace/delta kame; B; Kame; C; outwash plain; D; esker.
The question requires just one of the features. If more than one feature has been given mark them all and credit the best. The relevant descriptions include scale, deposits, shape and field relationships.
Kame terraces are found where the side of the glacier used to be and there were melt water streams. They consist of sorted, rounded deposits which are often slumped down the valley side.
Kames are mounds of meltwater deposits that are formed along the front of a melting glacier. They can be delta like where streams have emerged from the ice or they can be where supraglacial streams have fallen through the ice.
Outwash plains are found in front of a melting glacier. They consist of sorted rounded deposits that are dropped in the rapidly slowing meltwater that emerges from the glacier.
Eskers are sinuous ridges of sorted, rounded slits, sands and gravels. They mark the course of a subglacial stream. They are formed at right angles to the ice front. They also can be subject to slumping.
Varves

Level 1 Simple description (i.e. one word), or simple explanation that they have been formed by meltwater. Name **0 – 3 marks**

Level 2 Detailed description of the chosen feature (2XL2Q max). Named process linked to the nature of the chosen landform or detailed description of a relevant process. There must be at least one L2 explanation to gain max (annotate E). **4 - 8 marks**

(d) (i) X is a pingo. From the photo it can be seen that the pingo is a small hill standing proud from a flat plain. It appears to be circular with convex sides that are steep and cut into by cracks or gullies. The top of the pingo has split open and exposed ice in the core.

Level 1 Simple description of the landform (i.e. one word), little detail. Name **0 – 3 marks**

Level 2 Detailed description of the landform, 2 X QL2max. There must be at least one description taken from the photograph to gain max marks. **4 – 7 marks**

(ii) Any landform which could occur in Periglacial areas would be valid. These include; patterned ground (stone polygons [including garlands and stripes] or ice-wedge polygons); felsenmeer; tors; scree; solifluction terraces; ice wedges; nivation hollows; asymmetrical valley profiles and pingoes. The explanation then depends on the landform. Patterned ground includes the process of frost-heave. Lower temperatures below stones I the active layer cause ice lenses to grow beneath the stone. Expansion of these lenses force the stone up. Any melting is replaced by silt etc. Soon reaches the surface and rolls into hollows in humpy ground. Ice wedges are formed from the cracking of the ground under extremely low temperatures. Water gets in the cracks in the warmer periods and then freezes, expands and opens the crack for further water invasion.
Felsenmeer, tors and scree are the produce of frost action, each under different circumstances. Nivation hollows are the product of nivation (not solifluction). Under snowfields meltwater gets into rock under snow and freezes, breaking up the rock. This is then washed out of the hollow in the summer melt.
Pingoes could be open or closed (do not differentiate). Formed by migration of water into the upper layers of permafrost or the trapping of water beneath advancing permafrost. Either way the water freezes, expands and also draws water to it. The expanding ice domes the land above and causes the hill to grow. The top can be ruptured and the ice core melted to cause central collapse.
Freeze/thaw ideas only at L1

Level 1	Simple explanation of the chosen landform. Naming of processes without any explanation.	**0 – 3 marks**
Level 2	Detailed explanation. Explained relevant process of link between named process and the change that the process causes to the landscape.	**4 – 7 marks**

OPTION Q: COASTAL ENVIRONMENTS

Question 2

(a) (i) Landform A – Cave/enlarged crack/enlarged weakness
Landform B – Stack / Old Harry or any reasonably named stack

1 mark for each correct answer. **2 marks**

(ii) Stage 1 to 4 should be in the order: Waves attack weakness in the rock; Arch formed by action of waves; Arch of rock collapses; stump (this must be identified if spit is also given).

1 mark for each correct answer **4 marks**

(ii) In deep water, waves approach the coastline in parallel lines. As they approach the coastline, the sea bed interferes with the base of the waves to adopt the shape of the coastline and become parallel to the shore. This means that the waves approach the headland from both sides and so concentrate the erosive power of the waves.

Level 1 Simple description of the path taken by the waves, with no attempt to explain why the paths of the waves change. Erosion processes by themselves Hi L1 max. **0 - 3 marks**

Level 2 Description of the changing path of the waves linked to valid reasons for that changing direction. Sequence of events. **4 - 7 marks**

(b) Depends on the example. Candidates could e.g. choose the Isle of Purbeck example and give the full range of features from headlands and bays to caves and arches. On the other hand they could just decide to concentrate on just one aspect e.g. Lulworth Cove. Both are allowed to get to full marks. Any length of coastline is acceptable. Candidates could also choose to look at the effect that bedding/faulting/rock type etc have on the cliff profile. Thus horizontal bedding generally gives steep cliffs, many cliffs are fault lined, clay leads to slumped cliffs etc.

Level 1 Simple link between any aspect of geology to a shape of a coastline. Only vague use of named example. **0 - 3 marks**

Level 2 Link between the geology of a named length of coastline and the nature of that coastline. Generic statements linking geology to coastline without using named example 7 max. **4 - 8 marks**

(c) Landforms could be: Raised beaches; relict cliffs; exposed estuarine mudflats etc. The description depends on the landform chosen. If more than one is chosen, mark them all and credit the best one. Put all other marks in brackets.

Level 1 Simple description (i.e. one word), with little detail or reference to named example. Name **0 - 3 marks**

Level 2 Detailed description with 2 X L2Q max. Detailed description of a named example is valid. **4 - 7 marks**

(d) Eustatic change is worldwide sea level change as a result of an increase or decrease in the amount of water in the oceans and/or thermal expansion/contraction. Decrease is because the hydrological cycle is interrupted by falling global temperature and precipitation does not return to the sea instead it stays on the land (base level fall)& thermal expansion/contraction. The converse occurs during global warming. Ice melts, returns to the sea and sea level rises (and/or thermal expansion etc).
Isostatic change is localised. Commonly caused either by build up of ice on the land and causing the crust to sink into the mantle because of excess weight (base level rise) or the ice melts and the weight is released and the land 'rebounds' (base level fall). Tides and storm surges acceptable.

Level 1 Simple explanation of changing base levels. Naming of the terms eustatic/isostatic with no explanation of the terms or processes. **0 – 3 marks**

Level 2 Explanation of the eustatic/isostatic as terms. Explanation of the process of eustatic/isostatic change. 2 LII seq. **4 - 8 marks**

(e) (i) Depends on the example chosen. Relevant reasons could include the rapid retreat of the coastline (Holderness), the saving of infrastructure (Mappleton), the conservation of amenity (Barton on Sea, Brighton etc). reasons include also the physical processes operating on the chosen coastline (LSD, slumping etc) that have caused the problem in the first place.

Level 1 Simple description of the problem/generic problems. Name **0 – 3 marks**

Level 2 Detailed description of the problem with detail of the causes of the problem and/or the problem itself. 2 X L2Q max. Generic descriptions of coastal management problems to 6 max. **4 - 7 marks**

(ii) Sea defences include:
Gabions – wire filled baskets placed at the base of a cliff. They present a large surface area and allow the water to infiltrate so as to reduce backwash effects.
Sea wall – designed to take the force of the waves, set deep in the bedrock for strength, often curved to dissipate the wave's energy upwards. They are expensive and can cause problems with scouring at their base or further along the coast.
Revetments – designed to allow the sea to break on them and expend the energy by allowing some of the water to infiltrate. Once again the backwash is reduced.
Groynes stop longshore drift by preventing waves travelling up a beach at an angle.
They can however cause depletion of sediment to areas further down the drift.

Reefs- waves break offshore. Energy is expended there.
Drains on the cliffs allow rainwater to soak in the rocks and be discharged reducing the chances of slumping.

Managed retreat as in East Anglia. Recognised that the cost of defence is greater than the value of the land.
Beach nourishment.

Level 1	Naming of the management scheme with vague information of how that scheme overcomes the problems outlined in (i).	**0 – 3 marks**
Level 2	Details of the scheme and how it works to overcome the named problems. 2 X L2Q max. One L2 detail of a named scheme and how it works to gain max marks.	**4 - 7 marks**

OPTION R: URBAN PHYSICAL ENVIRONMENTS

Question 3

(a) (i) Highest average wind speeds – A
Most diverse ecology – B or A
Least diverse ecology – E
The area most likely to experience fog – C
The highest temperatures – D
The most-planned introduction of species – F
NB if 2 letters are given against a quality then it is SiF.
1 mark for each correctly identified. **6 marks**

(ii) The paradox that confuses students is that urban RH is lower than rural RH, mainly caused by the higher urban temperatures and yet urban fogs are common. The absolute humidities may be greater, in certain locations because of emission of water into the atmosphere by factories, power station, car exhausts, air conditioners etc. Thus fog in urban areas occurs when the RH is less than 100% because of the presence of hygroscopic nuclei in the form of a variety of particulates present in large quantities in urban areas.
As temperature decreases then RH increases until it reaches 100% and then condensation of water vapour takes place on nuclei. Although there is some occurrence of radiation fog in urban areas i.e. the ground losing heat rapidly at night and cooling the air above it etc this is not all that common due to the UHI effect. It can happen in isolated areas of parks and urban commons or over areas of water.
Many urban areas are built in a valley along a river. The cooler water of the river coming in from the rural area cools the air above it but also provides water vapour through three process of evaporation. This is increased if there is any warm effluent draining into the river. Cool air also flows down the valley sides and/or along the valley from the rural area. This cold air gathers in the valley floor producing an inversion that keeps the cold air trapped and can delay its dispersal. Low wind speeds also delay the dispersal of fog.

Level 1 Simple links between precipitation & fog-inducing factors to precipitation and fog in urban areas. **0 - 3 marks**

Level 2 Detailed link between named urban characteristics and the formation of fog/precipitation and/or generic explanation of fog/ppn formation. To gain max there must be at least one urban factor (labelled U) at Level 2. **4 - 8 marks**

(b) (i) The highest temperatures are between 33 and 33.5°C. These are small areas (largest approx. 2km2. These are found 7km SE, 2km NW, 12 km E and 6km SW of the centre. There are steep falls from these areas to a plateau of 31.5 to 32.5°C. The steepest drop in temperatures is to the north of the centre falling 5°C in approx. 12km. The lowest temperature is 27.5°C 13+km from the centre. Temperatures fall less rapidly to the E and W than to the N and S etc. etc.

Level 1 Simple description of the distribution with little or no reference to the location. **0 - 3 marks**

Level 2 Detailed description of the distribution/location using the axes for distances, description of rates of change and/or anomalies. **4 - 6 marks**

(ii) The main reason for the variations is the Urban Heat Island Effect.
As one approaches the urban centre from the outskirts there is a series of 'cliffs' and 'plateaux' caused by sudden changes in land use and then a uniformity of land use. Generally the greater the building density, the greater the temperature. There are anomalies 'sinks' over parks and water bodies and 'peaks' over industrial areas and the CBD. The causes include; the production of heat by human activity (home heating/air conditioning; factory; car; office heat emissions; human body emissions); lack of surface water producing less heat less evapotranspiration; absorption of insolation by multiple urban surfaces which is then re emitted as long wave radiation that heats the air. The pollution in the urban atmosphere helps to increase cloud amount and also creates a pollution dome which allow in the short wave radiation but absorbs a lot of the outgoing radiation as well as reflecting it back to the surface. Relief could be contributors.

Level 1 Simple explanation of the UHI effect with no reference to the map. Lists of heat sources. **0 – 3 marks**

Level 2 More detailed links between the pattern shown on figure 7 and possible reasons for the pattern. There must be at least one link between a reason and the pattern in Figure 7 to gain full marks (labelled Figure 7).Annotate U. **4 – 7 marks**

(c) (i) Although candidates will use examples of areas that they have studied, most will probably follow along the lines of urban succession as outlined by Gilbert. Thus there is likely to be mosses and lichens followed by the pioneers of the Oxford Ragwort stage followed by the tall herb stage, the grassland stage, scrub woodland and the possibility of a full woodland stage. There will be variations caused by the original nature of the site (the substratum), the role of chance, regional variations and human intervention. Substratum variations could include acid/alkali conditions, wetland, ponds etc. The sequence of changes from one vegetation sere to another is valid. NB any one factor causing seral change can be accepted only once unless further developed (e.g. particular types of competition such as access to moisture, light nutrients etc.)
e.g. an abandoned factory site, mosses and lichens can begin to develop on the bare concrete. They are able to exist in areas where there is little water. They extract nutrients from the sun and from the bare concrete below. When they die they provide a thin mat of organic matter and some weathered mineral which mixes to provide proto-soil that other plant species can use to root into. Cracks in the surface provide a sheltered place for seeds to germinate. They also retain moisture and dust etc which again help plants to root. The most common invaders are plants with windblown seed e.g. Oxford Ragwort. This has long flowering season enabling it to produce millions of seeds. As these higher plants die off they produce

thicker and more nutrient rich soil. Taller plants that are more nutrient demanding then can establish. These could be e.g. Rosebay Willowherb. These shade out the smaller plants stopping them photosynthesising so easily. In turn herbaceous plants are replaced by shrubs and eventually trees, the most common being the sycamore. All the while the processes of soil enrichment and competition continue.

Level 1 Simple description of the sequence of vegetation succession on a cleared surface. **0 - 3 marks**

Level 2 Detailed description of the plant succession, including succession sequences. Reasons for the nature of the succession. There must be at least one level 2 reason to gain max marks. Species names linked to nature of neglect 2XL2 max. **4 - 8 marks**

(ii) The difference between this and the question before is that this is succession that has been influenced deliberately by man. The nature of the development will depend on the example chosen. The answer should focus on the managed aspect of the area, thus one which simply left alone to go through the succession not relevant.
Management techniques include the reduction in acidity of old industrial and coal spoil sites by addition of lime etc. The deliberate clearing of areas to create a variety of habitats for smaller light demanding species. Some areas have a system whereby mowing is only done once meadow wildflowers have flowered.

Level 1 Description of the example that has been studied with one activity that has been carried out to show the effect of human interference. **0 – 3 marks**

Level 2 Detailed description of the area of ecological conservation OR detailed description of the work done there OR a generalised account of the work related to the example. Species names linked to nature of work done 2XL2 max. **4 – 7 marks**

(d) The vast majority of most urban parks is mown grass, a wildlife desert, with low species diversity, one of the few beneficiaries is the starling. Other areas within parks include flowerbeds, with a variety of bedding plants and annuals and shrubs, many of which are exotic species. The wildlife is reduced because of chemical pesticides etc. There are some parks that have trees, many of which were planted during Victorian times. These provide a habitat for large numbers of insects that in turn provide food for creatures further up the food chain. During Victorian times the parks were planted with laurel bushes and carpet bedding, they could survive the pollution. As the urban air has been cleaned there has been an increase in the variety of plant life. Animal life includes squirrels (though their increase may have been the cause of the decline in songbird numbers) and urban foxes etc. The main reason for the differences between the parks and other urban areas is because they have been designed for mass usage. Thus the football pitches have to be mown regularly, much more so than e.g. verges. The flower beds have often had more money spent on than

gardens, but economies of scale created by extensive planting have meant that there are often many more exotic species than a garden. Also the nature of the planting has been planned to please the majority of park users rather than individual tastes. Etc etc.

Level 1	Simple description of the ecology of parks with no attempt at pointing out the unique qualities of explaining why there is such ecology.	**0 - 3 marks**
Level 2	Detailed description of the ecology of parks 2 X L2 Sp max; reasons for the unique nature of park ecology. There must be at least 1 L2 explanation of difference to gain max mark.	**4 – 8 marks**