ASSESSMENT and QUALIFICATIONS ALLIANCE

Mark scheme January 2003

GCE

Geography B

Unit GGB2

The Assessment and Qualifications Alliance (AQA) is a company limited by guarantee registered in England and Wales 3644723 and a registered charity number 1073334
Registered address: Addleshaw Booth & Co., Sovereign House, PO Box 8, Sovereign Street, Leeds LS1 1HQ
Kathleen Tattersall: *Director General*

Unit 2: The Physical Options

General guidance

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) Accumulation is the net gain in an ice mass. Inputs to the ice can include:
Precipitation
Re-freezing of meltwater
Avalanche
Drifting
It is dominant in upper parts of a glacier.

Ablation is the collective loss of water from a glacier or ice sheet. It could be from:
Melting (meltwater streams)
Calving
Evaporation/sublimation

1 mark for a simple definition and a further mark for a glacial input or relevant detail. ***(2 marks)***

(b) The balance between accumulation and ablation is the 'budget'. If accumulation exceeds ablation the mass of glacier will grow. This might happen annually during the winter, or it could be during a period of greater snowfall etc. This could mean that the glacier will thicken and it could also advance further down the valley. All converses plus equilibrium acceptable. Ref to Fig 1 acceptable.

1 mark for each explanation point made. ***(4 marks)***

(c) (i) The hill tops have become much more angular and a pyramidal peak has developed. The original upland river valleys have deepened and there are small lakes in them, they have also developed into hanging valleys. The main river valley has become deeper and has gone from a V-shape to a trough shape. Interlocking spurs in (a) have been truncated. Rivers develop waterfalls.

Level I *simple statement of change.* ***(0–3 marks)***

Level II *Any development of a stated change. (Use of glacial term to get Level II)* ***(4–6 marks)***

6 marks

(ii) Response will depend on the chosen landform. Possibilities will include: arête, pyramidal peak, corrie, trough (main or hanging), truncated spurs, rock basin. Relevant processes can be glacial (abrasion, plucking) though the question allows candidates to include periglacial processes, where relevant as well as glacial processes and pressure release.

Level I *Simple statements about glacial erosion with no link to what the processes do. Name of landform.* ***(0–3 marks)***

Level II *Detail of glacial erosion processes or the effect on the landscape that these processes have.* ***(4–8 marks)***

8 marks

(d) NB: There must be a diagram to gain the full range of marks. The diagram can be of an example of drainage diversion OR can be wholly theoretical. Ideally, the diagram should have an indication of 'before' and 'after'. The main features to look for are the advance of ice and its damming effect. The creation of a pro-glacial lake, overflow.

Level I *Simple statements about the damming effect of ice or the naming of an example.* ***(0-3 marks)***

Level II *Any development of the example quoted or any detail about how the new course comes about (overflow etc.) To get full marks, diagram must aid at least 1 level two.* ***(4-6 marks)***

6 marks

(e) (i) A – Drumlin, B – Outwash plain, C – Branded river, D – Recessional moraine

1 mark per correct label. ***(4 marks)***

(ii) The most common feature will be the drumlin. Any one of the five features in (i) will be allowed to reduce compounding error.

Size	50m – 1200m long 25m – 600m wide 15 – 50m high
Shape	Steep stoss, gentle lee / streamlined/ highest point near stoss. Elongation ratio 2.0:1 to 4.0:1
Field location	Usually found in lowland locations on valley floors where ice emerged from highlands
Deposits	Fine clays to boulders. Poorly sorted and angular.

Other features include: Outwash plain: size is extensive, gently angled plain crossed by braided streams. May have such features as kames; eskers; kettleholes etc. Deposits are graded and stratified.
Recessional moraine: ridge found across formerly glaciated areas, indicate glacial still-stand. Made from unsorted, unstratified material. Usually no more than 3m high.

Any 4 description points: 1 mark for each one. ***(0-4 marks)***

(iii) Outwash plain deposits are those brought out of the glacier by meltwater streams. The streams are highly energetic and so are able to carry a large amount of material in them. Their competence is high and so there is a range of sizes. As the streams emerge from or off the ice they encounter increased friction and so slow down. Their competence is reduced and the largest material is deposited first, the finer being taken a long way down the stream. This produces well sorted deposits. The stream usually becomes braided. The discharge of water is seasonal and so there are also graded deposits.

There is still some debate about how drumlins are formed, but the most widely accepted idea (that is found in most of the text books) is that they were formed when the ice became overloaded with sediment. When the capacity of the glacier was reduced, material was deposited BUT not in the same way that a river overloaded with sediment deposits the excess material. The glacier may have experienced a reduction in its competence for several reasons, including melting of the ice BUT not changes in velocity. Since 1983, several investigators have developed a theory of drumlin formation by catastrophic flooding due to the release of meltwater that is believed to have accumulated beneath melting ice sheets.

Recessional moraine is formed when a glacier is in the process of retreat but has stopped for a period of time. Material is brought down by the ice and deposited at the snout. Often this material is subject to thrusting within the ice close to the snout because the ice velocity is 0.
If e (iii) feature is not same as (e) (ii), then mark both and credit best.

Any 4 explanation points with one mark for each one. ***(0–4 marks)***

Option Q: Coastal Environments

Question 2

(a) (i) A – Zig-zag movement of sand
B – Longshore current
C – Net movement of sand grains
D – Waves approach the coast obliquely

1 mark for each correct label. ***(4 marks)***

(ii) Main features include (long wavelength (10–100 m) with a low frequency (6-8 per minute). They have a low height (<1 m) and low steepness. They are spilling waves with a swash greater than backwash.

1 mark for correctly labelled parts of a constructive wave. ***(4 marks)***

(iii) Spit, tombolo, bar, cuspate foreland

1 mark for the name and one for the example. ***(2 marks)***

(iv) Depends on the chosen landform. The landform can be a named example (e.g. Dungeness, Spurn Head, Llandudno, Looe Bar), or it can be a generic description. (long + narrow = 1 mark)

1 mark for each descriptive point. ***(4 marks)***

(b) Landform A is a stack. Sequence is: notch, cave, arch, stack. Explanation involves abrasion at base of cliff, with hydraulic action picking out weaknesses in the rock so that a cave is formed. If this occurs on both sides of the headland (wave refraction) then an arch will develop. Eventually the arch widens and subaerial processes cause the arch to collapse and form the stack. 2 Level II sequence max.

Level I *Simple sequence, naming the processes etc.* ***(0–3 marks)***

Level II *Any sequence with three or more stages. Any explained process or any process with the effect that process has on the headland.* ***(4-8 marks)***

8 marks

(c) (i) Barrier reef surrounds the island whereas there is no central island in an atoll. Barrier reef has less mass of coral and is not so deep. An atoll has some coral that is found above HWM, unlike the barrier reef.

1 mark for each difference. ***(0-2 marks)***

(ii) They need warm 18 - 31 degrees Celsius and clean water away from river mouths to a max depth of 60 metres. The coral is a polyp that lives in the light shallow water close to the land. It secretes a hard CaCO3 shell. It lives in colonies. Most coral like to live in aerated water and so is found on the windward side of the land where there are breaking waves.
Salinity 25 – 35 ppm.

1 mark for any marine condition that is appropriate. Extra mark for the actual quantification. ***(4 marks)***

(iii) The Darwinian theory states that the island sinks and the coral is able to grow at the same rate as the sinking. The atoll is the last stage in the Darwinian theory, where the island has sunk completely, but the coral has grown in the shallow water. Other theories state that the growth of atoll are more to do with a global base level change than a local one. Daly states that when sea level fell, the island and the coral around it were planed off by marine erosion. As the seal level rose again after the ice age then the coral grew with the rising sea level.

Level I *Simple explanation, with little or no detail.* ***(0-3 marks)***

Level II *More complex explanation with details of the evolution of atolls.* ***(4-6 marks)***

6 marks

(d) Colonisation by salt tolerant plant species with extensive root systems fixes the sand. As the dunes build they become drier and less alkaline enabling the colonisation by other plants. Their litter stains the sand grey and shallow soil develops fixing the dune still further. NB. Description of plant physiology/adaptation to the environment 2 max.

Saltmarshes are created in quiet environments where flocculated mud is stabilised by the roots of salt loving plants. This builds up and dries out. Water evaporates and leaves behind a salt deposit.

Level 1 *Simple statements regarding the role of plants in the stabilisation.* ***(0-3 marks)***

Level II *More detailed information regarding the role of plants OR detail of the role of one type/species of plant.* ***(4-6 marks)***

6 marks

Option R: Urban Physical Environments

Question 3

(a) (i) The peak temperature is 5°C. It stays over 4° for all of the central urban area. The rate of decrease in temperature is greater to the SSW than the NNE. To the NNE the fall is almost at a constant rate until the edge of the rural area (2.3°) where there is a 'cliff' and there is a fall to just below zero. To the SSW, the initial fall is to 2.6° and there is almost a 'plateau' with a slow fall to 2 degrees. Once again, there is a cliff. It is not as steep as that in the NNE, but it falls further (from 2 to 0.7°).

1 mark for each correct description. ***(4 marks)***

(ii) CBD peak caused by the UHI effect. Here there are more heat sources etc. as well as more retentive surfaces. Multiple reflections and absorptions mean that buildings absorb the heat and then give it out at night. Higher pollution levels mean that there are more clouds and the pollution dome to act as a blanket. The lack of moisture/veg means that heat is not lost through evapotranspiration.

The plateau is caused by all the same processes as the CBD but not to the same extent. The final cliff is the boundary between the urban area and its UHIE and the rural area.

1 mark for each link between the nature of the urban area and the associated temperature change. ***(4 marks)***

(iii) Any plausible change will be accepted.
It is likely that the temperatures will rise throughout the city and the differences between the CBD and the rest of the city will be less during the day. The rural areas will warm up at a greater rate than the city so the cliff will not be as great or as steep. There may be anomalous highs throughout the city where there is heavy daytime activity.

1 mark for each point made. ***(2 marks)***

(iv) Any plausible pattern change is to be accepted. This pattern was one in winter. In summer, depending on the city, the UHI could become more or less intense. In winter this pattern is only remarkable during a period of anticyclonic weather, and so much of the time it is not apparent. In summer, if the city is in the southern part of the temperate area, or is more continental, then it could be that the UHI is very acute because of the heat generated from air conditioners.

1 mark for each point made. ***(2 marks)***

(b) City A had an increase in foggy days during the early 60's, rising to a peak of 65-67 in 1964. The amount fell in a series of steep falls followed by small rises (1966, 1969) to a low of 8 in 1970/1. There was a rise in 1972 and then a much gentler fall away to under 5 days, though again there are peaks of 8 days in '82, '86, 88/89.
City B follows a similar pattern though it starts from a lower peak (55) and has a much smoother fall, with only one major interruption to the fall form 32 to 40 in 1969. The rate of decrease began to fall and there have been some years with no fog at all (78, 84)
Reasons for these changes could be because of:
De-industrialisation or cleaning up of industry. Changing household fuel. Cleaner cars etc. Or it could be because there have been government policies to reduce particulate pollution. NB The cities are in Japan.
Peaks, Troughs, Trends, Anamolies. Beware data waffle.

Level I *Simple description of change or patterns of change.* ***(0-3 marks)***

Level II *Detailed reading of the graph and/or attempt to give an explanation for the fall in the number of foggy days. There must be at least one explanation of the change to gain the maximum marks. Annotate EII.* ***(4-6 marks)***

6 marks

(c) Air flow is affected by buildings. There is a channeling of wind down urban 'canyons' (The Venturi Effect). Buildings divert air over buildings but trap some of the air in eddies between buildings, leading to the trapping of pollution. When air is diverted over buildings, the main force of the wind hits at approximately 60% of the height. Some of that air is diverted over the building, whereas some of it is diverted downwards, creating gusting at the base of the building. In the lee of the building there is a downwards eddy that blows against the general flow of air.
The problems of urban winds include gusting, creation of eddies and the consequent dangers of high wind speeds, dust in the eyes, slamming doors, swaying buildings etc. In the design of modern cities, buildings could be offset so as not to create the canyon effect. In the design of buildings, canopies over doorways reduces the downdraught and stops Venturi gusting through doors etc. The building of podia mean that the downdraughts never reach ground level, and stepped buildings have the same effect. Stilts allow the wind to pass through the building, reducing eddying and circular buildings reduce eddying at the corners of buildings.

(c) **Level I** *Simple description of one effect of structures on wind or simple attempt at an explanation.* ***(0- 3 marks)***

Level II *Detailed description and/or explanation of how problems are reduced. At least one way in which design overcomes hazard to achieve max.* ***(4-8 marks)***

8 marks

(d) (i) Almost all the plant species found in urban areas have been deliberately introduced except weeds and some wind-blown exotics. Thus Briar rose etc. for security. Roadside trees (sycamore, cherry, poplar etc.) are to create shade, add beauty, reduce noise and reduce wind and air pollution. Grasses in lawns and playing fields, able to keep short without killing it off. Border plants in parks and gardens for colour and aesthetic reasons. Bedding plants used for advertising.

1 mark for the name or variety of each introduced species/group of species.
1 mark for any reasonable explanation for their introduction. ***(4 marks)***

(ii) Any valid reason accepted. They could include the destruction of roadside trees by the laying of cables; the destruction of weeds alongside roads, in parks etc., the felling of trees whose roots are damaging buildings etc., clearance of undergrowth for protection, clearance of vegetation of previously neglected areas. Etc. etc.

Named species or group of species that have been destroyed (up to 2 names) and any valid reason for destruction. ***(4 marks)***

(iii) A niche, in this context is a precise description of a plant or animal's habitat. Because of the wide scope of this question and the variety of habitat's that some plants and animals can live in, examiners are going to have to use their own knowledge and judgement. An example could be a railway verge: Railway lines enable animals to move around the city with little or no interference from traffic. During the days of steam there were frequent fires which burnt off tall species of plant and allowed the light in encouraging light demanding species e.g. primroses and foxgloves to establish. Windborne seeds are sucked along by the trains e.g. Oxford Ragwort. Spiders are moved along the line in the same way. Also lack of human disturbance created by the fencing enables urban foxes and badgers to exist. On the unburnt, bramble filled railway land brambles have established and these provide nesting sites for a wide variety of birdlife. Road traffic acts in the same way.

Level I	*Simple naming of niches linked to fauna or flora*	***(0-3 marks)***
Level II	*Naming of niches linked to named species. Description of those niches.*	***(4-6 marks)***

6 marks