UNIVERSITY OF CAMBRIDGE INTERNATIONAL EXAMINATIONS

GCE Advanced Subsidiary Level and GCE Advanced Level

MARK SCHEME for the May/June 2008 question paper

9696 GEOGRAPHY

9696/01 Paper 1 (Core Geography), maximum raw mark 100

This mark scheme is published as an aid to teachers and candidates, to indicate the requirements of the examination. It shows the basis on which Examiners were instructed to award marks. It does not indicate the details of the discussions that took place at an Examiners' meeting before marking began.

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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UNIVERSITY of CAMBRIDGE
International Examinations

Section A

Hydrology and fluvial geomorphology

1 Fig. 1 shows the development of a meandering channel.

(a) (i) Draw a labelled cross section across the channel along the line A-A, showing a riffle. [2]

1 mark for channel shape (symmetrical/shallow), 1 mark for named deposition of gravel or sediment.

(ii) Draw a labelled cross section across the channel along the line marked B-B, showing a pool. [2]

1 mark for channel shape(asymmetrical/deeper on river cliff side), 1 mark for indication of pool.

(b) Explain how the river shown in Fig. 1 develops from a straight to a meandering channel. [6]

A channel develops a meandering pattern in response to the need to distribute energy. Most will see it as the development of a sinuous path by the thalweg (line of fastest current), which begins to swing due to friction with the bed. This can be increased due to the existence of pool and riffle sequences with the alternation of the deeper pools (on the outside of meander bends) and the higher riffles. In addition, the circular pattern of helical flow will erode the outer beds whilst encouraging deposition in the form of point bars on the inside bends.

Atmosphere and weather

2 Fig. 2 shows warm and cool ocean currents in the Atlantic Ocean and the mean monthly temperatures of the warmest and coolest months of some coastal locations.

(a) (i) Identify the coastal location which has the greatest difference between its warmest and coolest months and state the difference in temperature. [2]

St John's, with a difference of 22°C.

(ii) Identify the coastal location which has the smallest difference between its warmest and coolest months and state the difference in temperature. [2]

Belem, with a difference of 1°C.

(b) Describe the pattern of ocean currents shown on Fig. 2 and, using examples, explain how warm and cool ocean currents can affect temperatures on land. [6]

Ocean currents are one of the main mechanisms for redistributing heat around the earth's surface. Hence warm currents move polewards from equatorial areas – in the northern hemisphere clockwise and anticlockwise in the southern hemisphere. Cool currents represent the return of cooler water in the circulation pattern. The effects produce amelioration of temperatures on land, although these are limited to coastal locations. This can be seen by the east west differences in temperatures in the North Atlantic Drift between places on the same latitude (e.g. St John's and Bordeaux.) Here summer temperatures are 5°C higher but winter temperatures are 12°C higher. The impact of cold as against warm currents can be illustrated by the Benguela current (southern Africa) as against the Brazil current's effects on South America.

Rocks and weathering

3 Figs 3A and 3B show the average rates of physical and chemical weathering in relation to mean annual temperature and precipitation.

(a) What rate of physical weathering occurs where:

(i) mean annual precipitation is 200mm and mean annual temperature is 10°C; [1]

Fairly rapid

(ii) mean annual precipitation is 1200mm and mean annual temperature 20°C? [1]

Slow

(b) What rate of chemical weathering occurs where:

(i) mean annual precipitation is 600mm and mean annual temperature is 20°C; [1]

Moderate

(ii) mean annual precipitation is 1600mm and mean annual temperature is 26°C? [1]

Very rapid

(c) Using examples of weathering processes, explain how climate can affect the rate of both physical and chemical weathering. [6]

Climate is one of the main controls of weathering processes. In the case of physical processes it is aided by, but not dependent upon, water supply. Hence freeze thaw requires water but it will not always be in a liquid state. The fluctuation of temperature across freezing point allows this process to occur at a relatively rapid rate. Both temperature and precipitation have a significant role in the rapidity of chemical weathering. Van Toft's law (rates double for every 10° C rise) and water allows the ingress of acids into rocks. This can be illustrated by the role of most chemical processes in tropical environments.

Population change

4 Table 1 shows some population statistics for India, an LEDC in South Asia, in 2001.

(a) Give the value of P, the natural increase rate for India's rural areas. [1]

18.2 (per 1000, ideally, but not needed for the mark).
Candidates may know the formula or work it out from the two examples given.

(b) Describe and explain briefly the relationship between infant mortality rate and birth rate suggested by the information in Table 1. [3]

Mark on overall quality. The data shows that the two are related positively, so the higher the IMR, the higher the BR. The classic explanation is that where IMR is perceived as high parents have more children to ensure the survival of some and thus a labour force, an heir, security in old age etc.

For explanation only **max. 2**.

(c) Explain why the death rate in rural areas of many LEDCs, such as India, is significantly higher than the death rate in their urban areas. [6]

A range of factors in all four dimensions interact to bring this about, for example

social	low levels of literacy and education larger family sizes more aged population structure healthcare may be distant and low level traditional society
economic	lower average household incomes little investment in housing and infrastructure a largely subsistence economy
environmental	use of unprotected water sources lack of sanitation systems incidence of hazards
political	dominance of urban elites influences investment priorities governmental structures limited aid and NGOs activity, spread thinly

Better quality answers may be distinguished by the use of examples other than 'India'; by the awareness of counter-arguments e.g. rural food production or less polluted environments; and by a sense of judgement on how *slight* improvements and *minor* changes may make significant differences to death rates, rather than an answer suggesting 'bad everything'.

Settlement dynamics

5 Fig. 4 shows the distribution of squatter settlements in Lima in 2004. Lima is the capital of Peru, an LEDC in Latin America. In 2004 the city's population was 7.8 million.

(a) Compare the location and extent of squatter settlements in the districts named Metropolitan Lima and Cono Sur. [5]

ML (total 4 squatter settlements)	**CS** (total 3 squatter settlements)
close to City Centre (within 5km)	distant from City Centre 15-25km
small to medium extent	medium to large extent
both may be seen as clustered/close together	
away from mountains	Villa Maria del Triunfo onto slopes
inside (west of) highway	outside (east of) highway
close to River Rimac	no clear relationship to R. Lurin
embedded in built-up area	separate areas on periphery
other	

An element of comparison is needed for good marks (4–5), although this may be through the use of simple words such as but, whereas, or more/less.

(b) Squatter settlements can be seen as 'slums of hope'. Explain why living in a squatter settlement may be a *positive* experience for many people. [5]

Increasingly in cities such as Lima (where an estimated 40% of the population lived in informal housing in 2004), city authorities and NGOs recognise the value of investment in the built landscape and community life and development of squatter areas. Problems notwithstanding, there is a growing "slums of hope" literature which ties in with candidates' awareness of migration outcomes.

Positives include a place to live to which the householder may be given title; the incentive to look after and upgrade your own place over time; self-help groups within the squatter settlement; people to work with and a feeling of shared initiatives; a measure of security for the future; neighbours and a community who may speak your own language or come from your own area and who may identify with you and your needs and offer support, advice, friendship, recreation, even employment; infrastructure such as electricity supply or waste disposal. Service provision such as schools, clinics and bus transport.

If the alternative is homelessness, rural poverty, political instability or a hazardous environment, the living may be good, all that some aspire to or beyond their dreams? Many well-established squatter settlements are indistinguishable from low income housing areas because of their upgrading over time.

Mark on overall quality, crediting well any use of examples and the recognition of factors in more than one dimension (social, economic, environmental, political).

Section B

Hydrology and fluvial geomorphology

6 (a) (i) Define the terms *infiltration* and *groundwater*. [4]

Infiltration is the process by which water enters into the soil in a downward direction through pores and small openings.

Groundwater is the water that occupies all cavities, cracks and other spaces in crustal rocks within the area of permanent saturation (i.e. below the water table).

(ii) Briefly indicate how rates of infiltration might vary with the intensity of rainfall. [3]

If the intensity of rainfall is greater than the capacity of the soil to absorb water, then runoff will ensue, reducing the rate of infiltration (i.e. all the pores, cracks etc get filled with water). Steady drizzle (i.e. relatively low intensity of rainfall) will maximise the entry of water to the soil at the expense of runoff). Both elements, at least one explained, for full marks.

(b) Using examples of hydrographs, demonstrate how discharge in a drainage basin can be affected by:

(i) soils and geology;

Soils affect both infiltration rates and percolation. Hence they can alter the balance between the flows. Where there is relative impermeability, quickflow will result in steep sided hydrographs representing a flashy response. Contrasts could be drawn between clay soils and sandy soils.

(ii) slopes. [8]

Slopes – steep slopes encourage runoff – hence flashy type hydrographs whilst gentle ones encourage surface storage and longer lag times.

(c) Using examples, explain how human activities can affect channel flow. [10]

Human activities can affect channel flow directly within the channel or more indirectly by activities within the catchment. Thus dams may obstruct the channel and be used to control discharge (flood prevention). Examples could be used from Colorado, Nile, Yangtze etc. Changes can be made to the channel itself - scouring, deepening concreting etc which will induce greater velocity. In the catchment changes in land use will bring about changes in runoff, storage, base flow, which will impact upon both discharge and velocity. Good responses should cite examples and link human activities to channel flows and not just catchment flows in general.

Candidates will probably:

L3 8–10 demonstrate a good appreciation of how human activities in the channel (dams, straightening etc) will affect discharge and how catchment changes will impact upon channel flow. Use appropriate exemplification.

L2 5–7 concentrate more upon catchment changes but will display some awareness of the impact upon channel discharges. Some vague examples used.

L1 0–4 restrict their accounts to catchment area changes (deforestation, urbanisation) with only passing reference (if any) to channel flows. Little/no exemplification.

Atmosphere and weather

7 (a) (i) Define the terms *solar radiation* and *terrestrial (earth) radiation*. [4]

Solar radiation is short wave radiation that enters the earth's atmosphere. Earth or terrestrial radiation is long wave radiation formed by the re-radiation at longer wave length of solar radiation that penetrates to the earth's surface.

(ii) Briefly explain why the lower part of the earth's atmosphere cools at night. [3]

The lower part of the atmosphere is cooled by terrestrial radiation. The earth cools faster than the atmosphere and hence at night cools the layer immediately above it.

(b) With the help of diagrams, show how lapse rates influence the formation of clouds and rainfall. [8]

Lapse rates are the change of temperature with height. Diagrams showing DALR, SALR and ELR should demonstrate stability and instability and the cooling induced on rising air. On reaching dew point temperature, condensation will occur producing cloud and possibly rainfall. Conditional instability is perfectly acceptable, but not necessary for full marks.

(c) Explain how buildings, tarmac and concrete can affect the climate in urban areas. [10]

An opportunity to tackle urban climates but focused upon the impact of surfaces that absorb heat and only slowly re-radiates it. This allows urban areas to retain heat, particularly in the evenings and at night, raising urban temperatures. This in turn will allow greater convection giving rise to slight increases in rainfall. The relatively rapid dispersal of rainwater and the lack of vegetation tends to lower humidity. Buildings also provide increased friction, lowering overall wind speeds, although, skyscrapers and roads may channel winds.

Candidates will probably:

L3 8–10 concentrate on how buildings and tarmac bring about heat island effects. This in turn will be employed to demonstrate factors of humidity, convection, and wind.

L2 5–7 demonstrate some appreciation of the urban heat island but with less explanation of the role of tarmac, buildings etc. More of a general account of urban climates.

L1 0–4 give an all purpose account of random elements of urban climates (including smogs etc), with little reference to either heat islands or of the effects of buildings and roads.

Rocks and weathering

8 (a) (i) Define the term *tectonic plate* and give two differences between oceanic and continental tectonic plates. [4]

Tectonic plate is one of the structural components that make up the earth's lithosphere (crust).

Oceanic tectonic plates are those underlying ocean basins and are 10–16 km thick.

Continental plates are those underlying the continents and are thicker (33 km).
Could be differentiated by composition as well Any **two** differences.

(ii) Briefly describe an ocean trench. [3]

Ocean trenches are found in conjunction with subduction zones and are trenches in excess of 5,500 metres deep. Could be shown by a diagram.

(b) Using diagrams, explain how sea floor spreading occurs. [8]

Sea floor spreading is the lateral extension of some ocean floors as the oceanic plates move apart from a zone of separation. They are characterised by parallel magnetic striping and are part of constructive plate margins. Most will produce diagrams of mid ocean ridges, but for good marks should indicate the sea floor spreading aspect.

(c) Explain how climate and vegetation can affect the form and development of slopes. [10]

Climate plays the main role as it affects the type and rate of weathering and erosion. Thus the active retreat or lowering of a slope will be more pronounced in areas where chemical weathering is active, such as the humid tropics. Mechanical weathering, particularly in the form of frost heave or freeze thaw will produce craggy slopes with pronounced screes. Climate will also affect vegetation. Vegetation stabilises slopes through roots and intercepts precipitation. It can thus produce more rounded slopes in temperate areas or protect slopes in the humid tropics. Candidates usually find slopes a difficult topic, so any effects of vegetation or climate that are related to slopes should be well rewarded. It is unlikely that any will see those as components within a system, but if they do, reward should be appropriate.

Candidates will probably:

L3 8–10 relate both weathering processes and vegetation directly to slope form and development. The latter may be rather simply expressed in terms of steepness or smoothing.

L2 5–7 show an understanding of some appropriate weathering processes (e.g. freeze thaw leading to block disintegration destabilising a slope. Similarly, vegetation will be seen to promote slope stability. Little appreciation of slope form or development.

L1 0–4 vague descriptions of freeze thaw or chemical weathering with little attempt to relate them to slopes.

Section C

Population change

9 (a) (i) Give the meaning of the term *overpopulation*. [3]

the situation where there are too many people
for the available resources
at a given level of technology (likely to be the discriminator)

(ii) Describe the evidence of overpopulation in *one* named area. [4]

any example is acceptable at any scale, credit detail and data cf.

(b) Explain why it may be difficult for a country to achieve its optimum population. [8]

For a cluster of reasons, especially that it is a theoretical equilibrium position and likely to be transitory given population dynamics. All three elements in the population-resource relationship may change:

total population by natural increase ± migration
resources e.g. through depletion or discovery
technology e.g. through technology transfer or innovation.

There are real difficulties in controlling population, especially the birth rate, in collecting accurate population data (and in assessing resources?) Credit candidates who address the word **difficult** and who use examples in support of their explanation.

(c) To what extent do you agree that population growth stimulates an increase in food supply? [10]

The classic theory of Danish economist Ester Boserup (1965), with the increase in food supply being found through agricultural innovation or importation. Candidates may argue a number of positions, whilst the simply Malthusian is not well supported by world history or the Green Revolution, some may give famines such as in China (1958-61) as counter-evidence.

Candidates will probably:

L3 8–10 make a response from a strong perspective, recognising, but not necessarily giving, much detail of Boserup's work (or Malthus's). Provide an effective assessment, offer good exemplar support and structure the response well.

L2 5–7 make a reasonable attempt which may contain good points, but lack the knowledge of examples to make a fuller response. The assessment may be valid but limited or simply found at the end of an otherwise descriptive piece, for instance of Boserup's theory.

L1 0–4 offer only a few basic ideas here, struggle to deal with the issue, make little or no assessment. Heavily irrelevant or fragmentary responses and notes remain in this level.

Population change

10 Choose one country whose population policy you have studied in detail.

Clearly much depends on the country chosen but the question seeks to be open to allow candidates to use the example they have.

(a) Outline the reasons why the country's government needed to introduce a population policy. [7]

The **reasons** may be in any dimension, timescale or spatial scale. Credit well their clear identification and evidence, detail or data in support. Good accounts may be realistic, show familiarity with the material and be clearly demographic rather than, say, generally developmental.

(b) Describe and explain government attempts at managing either natural increase or migration in your chosen country. [8]

Natural increase is far more likely but the syllabus includes migration policy.

No specific allocation or separation of marks for **describe** or **explain**. For a response which only considers birth rate, **max. 6**, as good candidates will recognise the significance of changes in the death rate (although the country may have no express policy except to address issues such as IMR or HIV/AIDS). Credit well detail of **attempts** such as what, when, where, why, how, by whom and any country detail beyond the name.

(c) Assess the extent to which the attempts you described in (b) have been successful. [10]

If candidates plan their answer carefully, part **(b)** sets them up to assess without the need to repeat material. Better candidates may compare the relative success or failure of different attempts, rather than deal with each one. Assessment may cover how far objectives were achieved, point out spatial variations in success and/or identify constraints and unforeseen circumstances. Some may give data in support e.g. decreased BR or suggest future action.

Candidates will probably:

L3 8–10 make an assessment of the success of at least two attempts which is good quality, realistic and well-supported from the chosen country. Recognise the dynamism and complexity of the country's demography and/or identify the role of other factors or constraints.

L2 5–7 provide a sound response which may be good in parts, but which is limited through lack of detailed knowledge, restricted understanding of success or its partial assessment. For one attempt max. 6.

L1 0–4 make an answer which is essentially descriptive rather than evaluative and which may repeat material from **(b)**. Simplistic assessment, such as 'this was a success' may achieve the top of the level. Lack the knowledge or time to make more than a basic response.

Settlement dynamics

11 Study Fig. 5, which shows possible changes over time in land values in an industrial city in an MEDC.

(a) Describe the changes in the relationship between land value and distance from the CBD shown on Fig. 5. [7]

The growing industrial city has a simple land value surface showing that values decrease from the CBD outwards in a progressive, non-linear way, to give a gentle curve, **3/2**. Over time as the city declines, the relationship becomes more complex: the CBD still has the highest values but depressed, values in inner areas decrease, lowest at Q, but values increase in outer areas (S) to moderate levels. Crossover point, R, is where land values are stable, **4/5**.

(b) Suggest reasons why land in zone *S* increases in value during the declining industrial stage. Use examples to support your answer. [8]

It becomes more valuable as it is more desirable and competition increases compared with bid rent. Suburban or peripheral land may be valuable for reasons including,

- availability and development potential
- positive externalities and amenity value
- transport provision/commuting/car ownership
- servicing, classically schools and retail
- undesirability of the inner city (Q)

The examples may be generic or named and located.

(c) To what extent do you agree that re-urbanisation (movement back to live in inner urban areas) has much to offer to people? [10]

Living near to or just off centre in towns and cities may offer proximity to shops and services including entertainment; cost savings and time savings by proximity to work, or shortened journeys to work; and a vibrant, active, cultured urban environment, especially for young adults. There may be refurbished heritage properties or new build. Prices may be high, however, space low and the environment noisy, polluted and not particularly green. May, as before, see London Docklands and Birmingham as examples but accept any, including LEDC.

Candidates will probably:

L3 8–10 develop a good assessment of what inner urban areas may – and may not – offer, show good conceptual understanding of re-urbanisation and offer some exemplar content.

L2 5–7 make a satisfactory but limited response, which may be quite general. The assessment may be suitable but partial and 'tacked on' to a more narrative piece.

L1 0–4 make one or two basic points. Struggle to deal with the concept, may cover other aspects of the urbanisation cycle irrelevantly. Notes and fragments remain in this level.