CAMBRIDGE INTERNATIONAL EXAMINATIONS

GCE Advanced Subsidiary Level and GCE Advanced Level

MARK SCHEME for the May/June 2013 series

9696 GEOGRAPHY

9696/11 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, which would have considered the acceptability of alternative answers.

Mark schemes should be read in conjunction with the question paper and the Principal Examiner Report for Teachers.

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CAMBRIDGE
International Examinations

Section A

Hydrology and fluvial geomorphology

1 Fig. 1A shows two river catchments that have the same size and shape but different land-uses. Fig. 1B shows a rainfall event that occurred in both catchments.

(a) Draw a labelled hydrograph for river X and a labelled hydrograph for river Y that show the likely responses to the rainfall event shown in Fig. 1B. [6]

River Y should show the flashier response, hence the discharge curve should be steeper on the rising limb with a short lag time, a relatively high peak discharge and a steep recession limb. River X should have a flatter hydrograph with lower peak discharge, gentler rising and recession limbs and a longer lag time.

(b) Briefly explain the differences between the two hydrographs you have drawn in (a). [4]

The differences occur due to the greater amount of interception that occurs in the forested catchment of river X. Thus overland flow is decreased and the slower baseflow and throughflow provide most water to the river. Evapotranspiration will also reduce water flow. In catchment Y, interception is less with more chance of overland flow and hence a faster response shown within the hydrograph to any rainfall event. Agriculture may compact soils reducing infiltration.

Atmosphere and weather

2 Fig. 2 shows the mean (average) temperatures in July.

(a) Describe the location of the area showing the highest mean (average) temperatures. [2]

The highest temperatures (30 °C) are recorded either side of latitude 30 N in continental interiors of Africa and Asia.

(b) Explain why the highest mean (average) temperatures are found in the location you have described in (a) rather than at the equator. [4]

In the northern hemisphere summer the sun is overhead at the tropic of cancer due to the earth's tilt and its rotation around the sun. Thus there is a greater receipt of short wave radiation in the tropics than at the equator at this time of year limiting the amounts of solar radiation reaching the earth's surface. Furthermore due to convergence and uplift, the equator generally has more cloud, lowering incoming solar radiation.

(c) Explain why temperatures recorded over land often differ from those recorded over sea at the same latitudes. [4]

This is due to the different specific heat capacities of land and sea. It takes more radiation to heat up an equivalent volume of sea water than land. Thus in summer the sea is generally cooler than the land in equivalent latitudes. Sea water retains its heat longer than land, thus in winter the sea is warmer than the land.

Rock and weathering

3 Fig. 3 shows a map of a plate boundary.

(a) (i) Identify the type of plate boundary shown on Fig. 3 [1]

Divergent or constructive plate boundary

(ii) Identify the type of plates shown on Fig. 3 [1]

Oceanic

(b) (i) Draw a labelled cross section diagram showing this type of plate boundary and its associated landforms. [4]

Diagram should show a divergent plate boundary driven by convection currents in the magma, the upwelling of magma, the formation of a ridge and volcanoes.

(ii) Identify the type of plates shown on Fig. 3 [1]

The explanation should reflect the diagram. That is two oceanic plates being dragged apart in mid ocean locations. The plate movements are controlled by convection currents in the mantle. As the plates diverge magma reaches the surface and through a series of transverse faults, forms a ridge. Volcanoes are formed on the ocean floor and on occasion breach the ocean surface to form islands associated with the mid ocean ridges. The description can be general to divergent boundaries and need not directly allude to Iceland.

Population

4 Fig. 4 shows age-specific death rates for three countries in 2004.

(a) (i) In which age group is the death rate lowest for the two LEDCs shown in Fig. 4? [1]

10–14 years

(b) Describe the age-specific death rate for Japan, using data from Fig. 4. [4]

Infant mortality rate (<1) is 4 per 1000, DR drops to be lowest in age groups 5–9 and 10–14 (less than 0.1 per 1000), before rising steadily, in almost a straight line, through the adult age groups, to over 500 per 1000 for those who survive beyond the age of 100. The overall shape could be called that of a tick (or similar).

For a description of death rate without use of data, max 2.

(c) Explain why death rates in most countries are highest amongst the very young and the very old. [5]

The first year of life is especially vulnerable. Babies' survival is affected by a number of factors including the main ones of maternal health; quality of healthcare systems, such as midwifery; and the health of the child at birth (e.g. congenital heart problem or being HIV positive from the mother). The immune system is not fully developed putting infants at risk, as do poor nutrition and low living standards in LEDCs, etc. **3/2**

Death rates are high amongst the very old for statistical reasons. Nobody can live forever and many 'die of old age, in old age'. The longer you live, the greater the chances of dying in that age group – Fig. 4 shows '100+', for example. **2/3**

IMR is likely to be the easier element, with death rates amongst the very old perhaps functioning as the discriminator. Explanations do not need to be full for the modest mark allocation.

Migration

5 Fig. 5A shows net international migration, by country, in North America and South America, 2000–5. Fig. 5B names the countries.

(a) Describe the pattern shown in Fig. 5A, supporting your answer with information from both figures. [5]

A full description comprises observations on scale, location and net gain/net loss.

Attention will be given ideally to the whole map, not just the large values in North America and the dominance of the USA. For example, net gains occurred in countries in both sub-continents, such as Chile. Better descriptions may see broad pattern with anomalies or exceptions, or observe complexity.

Information about net numbers of migrants from Fig. 5A and the names of countries from Fig. 5B should be used. For a good description of pattern, without data or country names, max 3.

(b) Suggest reasons for the pattern you described in (a). [5]

The explanation covers why MEDCs, USA and Canada, are attractive to migrants and record net gains and why (most) LEDCs have net losses from international migration. This is likely to form the heart of most answers and, if done well, is worth 4 marks.

Indicators of quality may be the development of the response in one of the following ways:

- to suggest reasons for another element of the pattern in Fig. 5A, such as the exceptions
- to explain the complexity of push/pull factors and migration decision-making, which may make generalisations less valid
- suggestion that countries other than those in South America are involved

Or possibly, as contributory:

- to establish the limited nature of the data (net data only, no indication of overall scale of flows; problem with counting; illegal migration etc.)

Settlement dynamics

6 Table 1 gives the City Development Index (CDI) and its components for different groups of cities in 2008.

(a) State the range of values of the CDI in Table 1 [2]

42.9 to 96.2, 96.2 to 42.9, or 53.3

Allow **(1)** for a partially correct calculation.

(b) Using data from Table 1, show how the different components contribute to the CDI for cities in Latin America and the Caribbean. [3]

Performance varies across the five components: by far the lowest on city waste (39.5), best on health (82.7); good on education (75.7); moderate or intermediate on housing (62.9) and infrastructure (70.4).

As CDI is an average, the low score on waste drags the index down to 66.3, despite some strong elements.

A full response mentions at least three components and gives a sense of variation, offering some data support from Table 1.

(c) Suggest three reasons why it is difficult for many city authorities to provide cities with services such as waste management, health and education. [5]

A broad, open, explanatory demand allowing candidates to draw on MEDC or LEDC contexts for city governance and urban management. Approaches may vary, but possible reasons include:

- scale, physical extent and expansion growth
- population size and population growth
- cost, financing, income generation and debt issues
- political issues, indecision, disagreements, corruption
- outdated systems, deteriorating infrastructure and physical capital
- attitudes and behaviours of urban stakeholders
- events and catastrophes, e.g. earthquakes, conflicts

Credit each reason **(2)** or **(1)** to the maximum. Credit accounts that give a sense of city dynamism and complexity.

Section B: The Physical Core

Hydrology and fluvial geomorphology

7 (a) (i) Define the terms *riffle* and *pool.* [4]

Pools are relatively deeper areas excavated in the channel bed where the current flows slower. Riffles are shallow, gravel areas in the channel causing more friction to the current, with steeper slope and faster flow.

(ii) Briefly describe helicoidal flow. [3]

Helicoidal (helical) flow is a type of corkscrew flow that moves across the surface of the water from the inside bank of a meander to the outer returning as reverse flow along the channel bed in a downstream direction. An annotated diagram would suffice.

(b) Draw a labelled diagram to show a braided river channel and its landforms and explain their formation. [8]

The diagram should show a broad shallow channel with flow between eyots. These should be both temporary accumulations of sediment and more permanent vegetated islands. Such channels are developed in areas of unconsolidated materials, where channel slope can be relatively steep. The principal cause is variation in discharge of streams that are heavily charged with sediment. Thus periods of low discharge will produce significant deposition whilst high discharge (e.g. nival melt) will produce periods of erosion where much deposition is removed downstream. If no diagram, maximum mark is 4.

(c) Describe how rivers erode their channels and explain to what extent river erosion has contributed to the formation of waterfalls and rapids. [10]

Rivers erode their channels through abrasion (dragging of coarse fragments along channel floor and sides), this can lead to pot hole drilling, hydraulic action, (the force of the water on joints, cracks etc.) and chemical erosion (limestone, chalk areas). Many will mention cavitation, although this is more properly associated with plunge pools on waterfalls. Clearly all have a role in eroding waterfalls and rapids, but other factors such as geology, in the form of bands of more resistant rock, have an important part to play.
Candidates will probably demonstrate:

Level 3
Detailed accounts of the three main erosion processes. There will be some appreciation of the combination of erosional processes and geological conditions in terms of waterfalls and rapids. **[8–10]**

Level 2
Some grasp of the main erosional activities although it may include features such as attrition and cavitation. A tendency to merely repeat them in the case of the other features with only limited appreciation of geology. Rapids might be ignored which limits the mark. **[5–7]**

Level 1
A confused and often partial account of erosional processes with only vague illusion made to waterfalls and rapids. **[0–4]**

Atmosphere and weather

8 (a) (i) Define the terms *evaporation* and *condensation.* [4]

Evaporation is the transformation of water into a gas (water vapour) through heat. Condensation is the transformation of water vapour (gas) to water through cooling.

(ii) Briefly describe the factors that influence the rate of evaporation [3]

The rate of evaporation is influenced by heat (temperature), relative humidity and wind speed.

(b) With the aid of diagrams, explain how convectional rainfall and orographic rainfall are produced. [8]

Convectional rainfall is produced when air is heated by radiation from the ground causing it to expand and rise at the DALR. If it continues to cool at a rate slower than the ELR it will remain warmer than surrounding air and hence rise until condensation level occurs. At this point the air is saturated and rises at the SALR , producing clouds. Condensation around hygroscopic nuclei and the coalition and collision of water droplets can produce rainfall. In the case of orographic uplift, stable air is forced to rise over hills, and is thus cooled to dew point after which the air will rise at SALR and can produce rain in the same manner as in convectional uplift. Much can be achieved by well annotated diagrams.

(c) Explain how greenhouse gases influence the temperature of the earth's atmosphere. To what extent could an increase in greenhouse gases lead to climate change? [10]

Greenhouse gases (CO_2, methane, water vapour) occur naturally in the atmosphere and are vital in heating the atmosphere as they allow the passage of incoming short wave radiation, but absorb a significant amount of outgoing long wave radiation. This is the so called greenhouse effect that warms the earth. The vast increase in greenhouse gases due to human activities (fossil fuel burning, forest destruction, animal husbandry, rice cultivation etc.) could lead to more heat being retained in the atmosphere which could lead to significant changes to climate. Greater heat could induce drought in some places and by greater evaporation, wetter conditions elsewhere. Melting ice caps could affect humidity levels. With greater heat, systems could become more dynamic giving rise to stormier conditions and more hurricanes etc.

Candidates will probably demonstrate:

Level 3
Good knowledge of greenhouse gases and how they produce the greenhouse effect. Some argument will be advanced in terms of increased greenhouse effect and global warming leading to climate changes demonstrated by some exemplification. **[8–10]**

Level 2
Identification of some greenhouse gases and an appreciation of how they might contribute to the warming of the atmosphere. Global warming seen in more simplistic terms with emphasis on the impact of the possibility of higher surface temperatures. **[5–7]**

Level 1
Very little understanding of how greenhouse gases contribute to atmospheric warming. Global warming expressed in a doomsday scenario of fires, deserts, ice melt and sea level rise. **[0–4]**

Rocks and weathering

9 (a) (i) Define the terms *humic acid* and *chelation.* **[4]**

Humic acid are the acids released by the decay of organic materials.
Chelation is the weathering of rocks through the action of organic substances, including bacteria and humic acids.

(ii) Briefly explain how hydration weathers rock. **[3]**

Hydration is a mechanical weathering process whereby water is added to a mineral such that it expands and leads to granular disintegration.

(b) With the aid of diagrams show how

(i) rock slides and
(ii) mud flows

occur and can affect the shape of slopes. **[8]**

(i) Diagram should show a slide plane located along a bedded rock strata. The rock slides along this plane in response to the overcoming of the shear strength by circumstances (rainfall etc. or tectonic event) that allows shear stress to overcome strength. The slope tends to remain at the same angle although there is an accumulation of rock debris at the foot in planar slides. Rotational slides lead to slumping with a sear and slumped mass.

(ii) Mud flows most commonly occur in unconsolidated materials that have become saturated thus increasing pore pressure. The flow produces a steeper head of the slope but an extended foot giving more overall stability through a reduced angle.

(c) Explain to what extent climate, vegetation and relief influence the weathering of limestone. **[10]**

Climate affects weathering by the provision of water that is necessary for both the chemical weathering (carbonation) and freeze-thaw. The former occurs at a greater rate in hot, humid conditions (Van t'Hoffs rule) whilst the latter will be found in climates that oscillate around freezing. Vegetation can add humic acids on decay reinforcing carbonation as well as forcing cracks apart through root intrusion. Relief can increase exposure to sub-aerial processes as well as providing enough altitude for freeze thaw. All of these have an impact but the physical nature of limestone (calcium carbonate) and its structure (bedded and jointed) are also important contributors to its weathering.

Candidates will probably demonstrate:

Level 3
A structured account of the influences of the named factors on both chemical and physical weathering with some relative assessment. Good appreciation of the role of the nature and structure of limestone.

[8–10]

Level 2
More emphasis on the weathering processes of carbonation and freeze-thaw with some attention to climate. A more limited appreciation of the nature and structure of limestone, and the importance of relief. **[5–7]**

Level 1
A rather confused account of carbonation and freeze-thaw with only passing reference to climate and limestone. **[0–4]**

Section C: The Human Core

Population/Migration

10 (a) (i) Describe how natural increase rate is calculated.

NIR = birth rate – death rate **(2)** per 1000 or % **(1)** **[3]**

(ii) Briefly explain two ways that migration may contribute to population increase.

- by the addition of migrants (migration gains, positive net migration)
- as migrants (many of whom are young, fertile adults) reproduce and augment the birth rate. Migrant groups may have higher fertility rates than the population of the receiving area.

Credit **2/2** to **1/3** and **3/1**, depending on emphasis and development. **[4]**

(b) Describe and explain variations in the rate of population growth between the different stages of the demographic transition model.

A sketch diagram would help; a well annotated diagram could achieve full marks.

Stage 1	No or negligible growth, as high fluctuating DR and BR self-cancel.
Stage 2	Increase in growth rate as DR falls away from BR remaining
Stage 3	Growth rate slows (but growth continues) as BE begins to fall. DR may continue to fall, but the gap between the two narrows.
Stage 4	Low, no growth, negative growth, as low fluctuating rates self-cancel.
Stage 5	Defined as negative growth, as DR exceeds BR (not necessary for full marks).

The key explanatory point is the differential between BR and DR and how this widens and narrows over time. Mark on overall quality. **[8]**

(c) To what extent do you agree that population growth leads to an increase in food supply?

The classic population-resource issue. Emigration could release pressure. Look for theoretical understanding and evidence/examples. Can be examined at a variety of spatial scales.

Candidates will probably:

Level 3
Provide a response which is strong conceptually, recognising the work of Malthus and Boserup. Provide an effective assessment, offer detailed exemplar support, structuring the response well. **[8–10]**

Level 2
Make a reasonable attempt which may contain good points, but lack the knowledge or understanding 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 about a Malthusian crisis. **[5–7]**

Level 1
Offer only a few basic ideas, struggle to deal with the issue, make little or no assessment. Heavily irrelevant or fragmentary responses and notes remain in this level. **[0–4]**

[Total: 25]

Migration

11 (a) (i) Give the meaning of the term *forced (involuntary) migration*.

The definition needs to cover both elements

migration the movement of population/people for a period of 1 year or more

forced (involuntary) impelled or not by choice – sometimes the whole population has to move **[3]**

(ii) Outline two different circumstances in which forced migration may occur.

Any **two** different valid circumstances acceptable, e.g. slum clearance; government intervention; relocation and removal, e.g. on building of the Three Gorges Dam in China, other reasons might include war, disasters etc. Credit **2**, **2**. **[4]**

(b) With the help of one or more examples, explain how push factors and pull factors work together to cause economic migration.

Economic migration is the movement of population for economic gain or betterment, to obtain jobs or better paid employment. Pull factors may be significant both in the decision to move and in the choice of destination, e.g. factual information, news from pioneer migrants, advertising, media reports and perception. Mark on overall quality, looking for a sense of the factors' interaction and complexity in causation. For a general response, max. 5 **[8]**

(c) "Emigration is a door to the modern world and once it's open, it is very difficult to close." How far do you agree with this view?

No particular position is expected; clearly much depends on the case(s). This was said about emigration from Mexico (an LEDC) to the USA (an MEDC). There are two aspects: the idea of "a door to the modern world" and of closing it.

Candidates will probably:

Level 3
Make an effective assessment of the statement, covering both aspects, although one may dominate. Combine conceptual understanding with exemplar content well. Concentrates on emigration and not immigration. **[8–10]**

Level 2
Provide a sound response which may be good in parts, but which is limited through lack of detailed knowledge, restricted understanding of emigration or partial assessment. Might lead to concentrate on immigration. **[5–7]**

Level 1
Make an answer which is more a description than an assessment. Struggle to response appropriately or to limit themselves to emigration. Lack the knowledge or time to make more than a basic or note-form response. **[0–4]**

[Total: 25]

Settlement dynamics

12 (a) Describe the different locations in which retailing (e.g. shops and supermarkets) is found in urban areas.

Look for some sense of diversity or a hierarchy of retailing for all sizes of towns and cities in MEDCs and LEDCs. Clearly larger settlements offer more scope.
For example, progression may be described from the local 'corner' shop in a residential area; through a neighbourhood or suburban shopping centre; to the CBD. There could be indoor mall areas or peripheral retail parks or estates near main roads or road junctions. The description of location should be more than a list of places; for an outline of locations, without description, max. 4. **[7]**

(b) With the help of examples, suggest reasons why the Central Business District (CBD) in urban settlements is changing.

The **reasons** may be:

- economic e.g. to minimise the use of limited space, increase profits, remain competitive, develop new functions or services
- social e.g. to reflect new living and working patterns, for recreation
- environmental e.g. to replace outdated infrastructure, for the 'greening' of the urban area, to reduce congestion, urban renewal
- political e.g. the prestige projects, result of planning decisions, developing the 24-hour city, change in governance, after conflict/terrorism.

For a well-developed general response without examples, max 5. **[8]**

(c) Assess whether, in urban settlements, it is preferable to live in the CBD or in a residential suburb.

A broad question so that candidates can develop their own approach. Indicators of quality may include some balance (locations, merits/disadvantages); the integration of examples; and a sense of lived reality for different residents.

Candidates will probably:

Level 3
Develop a perceptive assessment of what both the CBD and suburbs offer, showing good conceptual understanding of urban living and with some exemplar detail. **[8–10]**

Level 2
Make a satisfactory but limited response, which may be quite general and/or unbalanced in attention to the two locations. The assessment may be appropriate, but partial, or attached to an explanatory piece. Might include areas that are not strictly CBD. **[5–7]**

Level 1
Make a few basic points about one or both locations. Struggle to make an assessment or offer a simple unsupported opinion. Notes and fragments remain in this level. **[0–4]**

[Total: 25]