UNIVERSITY OF CAMBRIDGE INTERNATIONAL EXAMINATIONS

GCE Advanced Subsidiary Level and GCE Advanced Level

MARK SCHEME for the May/June 2010 question paper

for the guidance of teachers

9696 GEOGRAPHY

9696/11   Paper 11 (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.

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International Examinations

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Section A

Hydrology and fluvial geomorphology

1   **Fig.1 shows changing levels of the water tables in an area and the location of two valleys.**

   (a)   (i)   **Which valley will have flowing water only in the wet season?**   [1]

      Valley B

   (ii)   **What is the process marked X?**   [1]

      Percolation

   (iii)   **What is the zone marked Y?**   [1]

      Zone of temporary saturation or Vadose zone

   (iv)   **What is the zone marked Z?**   [1]

      Zone of permanent saturation or Phreatic zone (accept ground water zone or aquifer)

   (b)   **Explain how water reaches, is stored in and removed from the water table.**   [6]

      Water is infiltrated at the surface and then is percolated under gravity through pores, joints and bedding planes to reach an area of permanent saturation where all pores, joints, etc are full of water. This may be seasonal or permanent depending upon the nature of the rock and the level of ppt input. The water table will generally follow the surface topography and hence water will flow under gravity and by the hydraulic gradient to a point where it will emerge as a spring or base flow of a river. It may also be abstracted by wells or boreholes. For all 6 marks the three aspects of water movement, storage and loss should be mentioned.

                                                                                    [Total: 10]

Atmosphere and weather

2   Figs 2A and Fig. 2B show two temperature/height diagrams of different atmospheric conditions.

(a)   (i)   What is the name of the atmospheric condition shown in Fig. 2A?   [1]

Conditional instability

(ii)   What is the name of the atmospheric condition shown in Fig. 2B?   [1]

Absolute stability

(iii)   Give two differences in the ELR shown in Fig. 2A and Fig .2B.   [2]

In Fig. 2A, the ELR is warmer than the DALR up to condensation level (dew point) and thereafter (up to 2500 m) is cooler than the SALR. In Fig. 2B the ELR is increasingly warmer than the DALR and remains so at and after condensation level, although the two approach each other at 2500m.

(b)   Explain how the cloud shown in Fig. 2A is formed and why a cloud is not formed in Fig. 2B.   [6]

In A, a parcel of air is forced to rise (e.g. by orographic uplift or frontal), despite conditions of stability in the lower atmosphere. The air is cooled with ascent to condensation level (1000m) when condensation takes place around hygroscopic nuclei, giving rise to the cloud shown in Fig. 2A. The air continues to rise at the slower rate of the SALR due to the latent heat of vaporization but is still warmer than the ELR giving a great vertical extent to the cloud (1500m). In B the trigger for air to rise does not occur and the environmental air (and lapse rate) is always warmer than any air parcel. Thus the atmosphere remains stable and the ELR never approaches the DALR or SALR so that no condensation takes place and the air remains absolutely stable, in Fig. 2A. Reward any understanding of the nature of lapse rates.

[Total: 10]

Rocks and weathering

3   Photograph A shows a landslide.

(a)   Draw a fully labelled diagram identifying the main features of the landslide a shown in the photograph.   [4]

The diagram should show the slumping of the mass and the exposed new slope surface (scar) the toe of the slump may be shown as a flow extending into the occupied area. The features indicated could include the scar, slide plane, rotation of the slumped mass and the toe. Suggest 2 for the sketch and 2 for two relevant features identified.

(b)   Explain how landslides occur and describe the effects that they have upon slopes.   [6]

Landslides are the result of sudden and massive slope failure. This occurs along a slide plane where shear stress overcomes shear strength. This could be due to a geological unconformity or to the percolation of water. Human agency can play a part in producing instability in slopes and hence land slides through increases in weight (buildings reservoirs etc), undercutting and diversions of water flows. The result is to produce a shallower slope where the angle of rest has been reduced and the length of the slope increased.

[Total: 10]

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Population

4   Fig. 3 shows the age/sex pyramid of the world's population in 2000 and the predicted age/sex pyramid for 2100.

(a)   Identify *two* differences in shape between the age/sex pyramids for 2000 and 2100. Support your response with information from Fig. 3.   [4]

Candidates are most likely to identify,

-    triangle shape or tapered, stepped sides/straight sides
-    small 75+ bar/top-heavy appearance with large 75+ bar

but other **differences** may be accepted, e.g. looking at other cohorts, such as below 40 years or above 45 years (40–44 representing a balance point), or the narrowing base. No credit for similarities.

Information in support may be given in terms of percentages and/or age cohorts.

Suggest credit each **difference**, identification **(1)** and support **(1)**.

(b)   Explain how the demographic transition model may help in understanding the predicted decrease in the percentage of the world's population under 15 years of age by 2100.   [6]

Although the DTM is descriptive, the relative changes in birth rate (BR), death rate (DR) and therefore natural increase rate (NIR) help to understand the overall dynamics. Some candidates may be able to link this to changing population structures accompanying the different Stages. An annotated sketch diagram of the model (and population structures?) may help the explanation and could save time, but is not necessary for full marks.

The key change is in LEDCs (late Stage 2 and Stage 3 in 2000), for which, the prediction *assumes* that there will be progress towards Stages 3 and 4 as BR and DR fall. As BR drops and family sizes decrease, there are fewer potential parents for the next generation and accompanying changes in thinking about ideal family sizes, costs of childrearing, etc. These still relatively youthful populations in 2000 are predicted to age over the next century. Falling DR and increasing life expectancy simply bolster the adult/aged population and so assist the overall change in proportions.

Indicators of response quality may be a focus on LEDCs; recognition of the Stage 4/5 scenario in MEDCs; and acknowledgement of the role of DR <u>as well as</u> BR. Better candidates may point out what the DTM does not help with (e.g. the validity of the prediction, time scale, the reasons for the changes in vital rates, etc).

Mark on overall quality of the explanation offered.

[Total: 10]

Migration

5 (a) Fig. 4 shows the main movements of Afghan refugees, 1979–90, from the war with the Soviet Union, mapped by the United Nations Refugee Agency.

Using Fig. 4, compare the scale and destination of the refugee flows into Iran with those into Pakistan. [4]

Scale movements were large-scale (in excess of 3 million); broadly similar; but 190,000 more into Pakistan **(2)**.

Destinations movements into Pakistan were into a large number of refugee camps (over 40) along the border and east of it, concentrated in the area between the two capital cities Kabul and Islamabad, whereas in Iran there were no purpose-built refugee camps and refugees were mostly accommodated in existing urban areas, such as the named towns in the border region, or at much greater distance, the capital Tehran **(2)**.

(b) Outline the impacts of refugee flows on areas which receive refugees. [6]

An open question to allow candidates to use the examples they have. Impacts may be organised by dimension (social, economic, environmental and political) or time scale (short-term, medium-term, long-term). Indicators of quality may be an overall perspective; the ability to structure the account; the logistical and humanitarian challenges involved; and the quality of the description, rather than just "bad" everything.

A full answer may or may not refer to Fig. 4 specifically or generically, e.g. in terms of the impacts of widespread refugee camps on localities.

[Total: 10]

PMT

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6 Table 1 gives information about the world's urban population, by region, in 1975 and 2000 and its predicted urban population in 2030.

(a) Name the world region which experienced between 1975 and 2000: **[2]**

(i) the greatest absolute increase in urban population; **[1]**

Asia

(ii) the greatest percentage increase in urban population. **[1]**

South America and the Caribbean

(b) Suggest *two* reasons why some of the data in Table 1 may be unreliable. **[3]**

Credit any two **reasons** relating to the difficulties of conducting population censuses, collating data, international comparability and/or making projections. Credit simple **reasons (1)** and a developed **reason (2)** to **max. 3**.

(c) Briefly explain why the percentage of urban population predicted for 2030 varies among the world regions. **[5]**

Percentage ranges from 53–54%, a little over half, to 83–84%, often seen as maximal or 'saturation level'. There is clear divergence between the Americas and Europe and Asia/Africa, with Oceania in an intermediate position.

Urbanisation is the process of the concentration of population into areas defined as urban (as opposed to rural). Candidates may explain this in terms of the differences between the world regions in,

- internal migration (scale and direction of flows, especially rural-urban)
- natural increase rates
- history of urbanisation or stage in the urbanisation cycle
- and development, although LEDCs are complex in Table 1.

Comprehensive accounts are not needed for the small mark allocation.

Mark on overall quality of explanation offered.

[Total: 10]

Section B: The Physical Core

Hydrology and fluvial geomorphology

7 (a) (i) Define the terms *solution load* and *suspension load* as they apply to transportation in rivers. [4]

Solution load is the dissolved sediments that are the product of solution weathering. Suspension load is sediment that is light enough to be suspended within the body of the flowing water. Could be shown diagrammatically.

(ii) Briefly explain the conditions under which rivers will entrain (pick up) and transport sediment load. [3]

Whenever the river velocity is great enough to erode or pick up sediment. This could occur in periods of high discharge or where river gradient is steep.

(b) Using diagrams, describe and explain two landforms produced by river deposition. [8]

Candidates could choose the vegetated (permanent bars), temporary bars of a braided channel, point bars and riffles in meandering channels, flood plains, levées or even alluvial fans and deltas. There should be a description of shape and composition as well as an explanation of formation that deals with the significance of discharge and velocity. Divide the marks between the two landforms (4 each).

(c) Describe the processes of erosion in river channels. Illustrate your answer with reference to the landforms produced. [10]

The processes of erosion should include abrasion (corrasion) whereby coarse and angular rock fragments are dragged along the channel floor – could be illustrated by pot holes or channel deepening. Hydraulic action where the force of the river flow penetrates joints and bedding planes leading to the undercutting of bank sides, erosion of bed rock, solution where acidulated water removes limestone and chalk and cavitation produced by the implosion of water bubbles in plunge pools.

Candidates will probably:

L3 Demonstrate a clear grasp of most, if not all, processes and illustrate them with appropriate features. [8–10]

L2 Despite possible confusion of hydraulic action and cavitation will explain most processes although there will be less illustrative material. [5–7]

L1 Vague description of only one or two of the erosive processes and lacking any landforms. [0–4]

[Total: 25]

Atmosphere and weather

8 (a) (i) Define the terms *short wave radiation* and *long wave radiation*.   [4]

Short wave radiation is incoming solar radiation.
Long wave radiation is outgoing terrestrial radiation whereby the earth's surface has been heated by solar radiation.

(ii) Briefly explain what is meant by a temperature inversion.   [3]

An increase rather than a decrease of temperature with height. They can form at the surface (radiative cooling, anticyclonic, frontal, advection cooling) or in the upper atmosphere (stratosphere and thermosphere). Explanation of all causes not required; just some exemplars.

(b) Explain how the global distribution of temperatures is influenced by areas of land and sea.   [8]

Land and sea areas affect temperatures through their different thermal capacities, i.e. land heats up faster and cools faster than the seas. This leads to a greater migration and concentration of isotherms over land masses rather than oceans. The annual range of temperatures is greater in continental than in coastal locations. The oceans absorb and store vast amounts of heat, making them warmer in winter producing a poleward shift of isotherms over oceans. The role of ocean currents (e.g. N.Atlantic Drift pushing isotherms poleward in N hemisphere winter and cold Peruvian current displacing isotherms towards the equator).

(c) What are greenhouse gases? Explain how build-ups of greenhouse gases are caused and the effects they may have upon global warming.   [10]

The main greenhouse gases are water vapour, carbon dioxide, methane, nitrous oxide and in the stratosphere, ozone. They are particularly effective in absorbing out going (terrestrial) LWR. Whilst most occur naturally, there have been significant increases in the past century or so in gases such as CO_2 and N_2O due to industrialization. Intensive farming has also led to a great increase in methane. This has had the effect of increasing the greenhouse effect, whereby SWR relatively easily passes through the atmosphere whilst outgoing LWR is effectively trapped within the atmosphere leading to global warming.

Candidates will probably:

L3 Have a good grasp of greenhouse gases (even if not complete) and will be able to explain the greenhouse effect and hence impact upon global warming.   [8–10]

L2 A more limited appreciation of gases mainly CO_2 and methane. Some idea of heat being trapped within the atmosphere but less certain about the processes.   [5–7]

L1 Gases limited to CO_2 and confused with pollutants in general. Very limited grasp of greenhouse effect and its link to global warming.   [0–4]

[Total: 25]

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Rocks and weathering

9   (a)   (i)   Define the weathering terms *exfoliation* and *crystal growth (salt)*.   [4]

Exfoliation or onion–weathering is the peeling off of surface layers. Most will associate this with thermal fracture.
Crystal growth is due to the presence of salt solutions within the rock which evaporate and develop crystal growth which leads to rock disintegration.

(ii)   Describe the process of freeze-thaw weathering.   [3]

Freeze-thaw requires the entry of water into joints and cracks in rock and its subsequent expansion upon freezing. It requires frequent temperature fluctuations around 0°C and plentiful water supply.

(b)   Explain the effects upon weathering of:

(i)   rock type and structure;

(ii)   vegetation.   [8]

Rock strength and hardness influences its resistance to physical weathering although may be vulnerable to chemical weathering. Chemical composition of rock affects its vulnerability to chemical weathering e.g. carbonation, whilst some minerals e.g. quartz are extremely stable. Rock texture (coarse grained or fine grained) and joints and bedding planes effects the ingress of water and chemicals and increases surface area available for weathering.

Vegetation provides some degree of protection from weathering and enhances slope stability. In tropical areas can lead to organic weathering through humic acid and chelation. Biological weathering can also occur. Allow a 5/3 or 3/5 split as necessary.

(c)   Explain how plate tectonics can be used to explain the development of ocean ridges and ocean trenches.   [10]

Ocean ridges are produced at divergent plate boundaries as a result of sea floor spreading. Convection currents in the mantle induce the divergence of ocean plates and the upwelling of magma along transform faults.

Ocean trenches occur at convergent plate margins where an oceanic plate is subducted below a continental plate, producing a deep off shore trench. These could be admirably demonstrated by well annotated diagrams.

Candidates will probably:

L3   Show a good grasp of the plate tectonics of both divergent and convergent boundaries, with correct indication of plates involved and processes.   [8–10]

L2   Will give rather indiscriminate account of convergent and divergent plate boundaries with limited appreciation of processes and the inclusion of irrelevant material such as vulcanicity, island arcs, etc.   [5–7]

L1   Rather crude accounts of divergent boundaries with simple splits in the earths surface and generalized subduction zones in the case of convergent boundaries. No process or link to trenches.   [0–4]

[Total: 25]

Section C: The Human Core

Population

10 (a) (i) Give the meaning of the term *infant mortality rate*. **[3]**

the number of deaths of babies/children (1)
under one year of age or before their first birthday (1)
per thousand live births per year (1)

(ii) Outline *two* reasons why the first year of a child's life is a very vulnerable period. **[4]**

Credit any two valid **reasons**, e.g. consequences for the newborn of maternal health, delivery, lack of natural immunity, nutrition and feeding issues, risk from infections, poor parenting, large family sizes, etc. No need for biological or medical detail; more an appreciation of the factors affecting infant mortality. Credit (2,2) or exceptionally, (3,1).

(b) Explain why educating mothers is seen as fundamental to reducing child mortality. **[8]**

CMR is higher in LEDCs, where women may run the family and household but have less access to education than boys. Educating mothers, and future mothers, may produce positive impacts in a number of areas,

- social e.g. better knowledge of primary health care, nutrition and hygiene; modernisation/rejection of traditional practices; benefits of literacy
- economic e.g. take paid work to afford a better diet, medicine, etc.
- environmental e.g. safe water strategies, better living conditions
- political e.g. empowerment, finding a voice, campaigning, action groups.
Reducing child mortality is one of the UN Millennium Development Goals.
Mark on overall quality of explanation offered.

(c) To what extent do you agree that in MEDCs, compared to LEDCs, most people die of old age? **[10]**

Main causes of death in MEDCS are cancers and cardiovascular, both somewhat age-related, whereas in LEDCs it is infectious and parasitic diseases including AIDS. Links can be made to standard of living and life expectancy, other causes of death, the DTM, healthcare provision, etc.

Candidates will probably:

L3 Make a response from a strong perspective on mortality in both MEDCs and LEDCs. Provide an effective assessment with some exemplar support. **[8–10]**

L2 Make a reasonable attempt which may contain good points, but which remains partial. Offer a valid but limited assessment. **[5–7]**

L1 Offer one or more basic ideas and struggle to deal with the issue of differential mortality. Make little or no effective assessment. **[0–4]**

[Total: 25]

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Migration

11 (a) With the help of examples, explain the terms *push factors* and *pull factors* in relation to *internal* migration. [7]

Push factors operate where the person is to provoke or stimulate them to migrate. They vary in magnitude and seriousness and may be social, e.g. relationship breakdown; economic, e.g. job loss, windfall; environmental, e.g. degradation; or political, e.g. instability. Although mainly "negative", some may be "positive". Conversely *pull factors* are actual – or perceived – attributes of the destination which draw or entice a person to migrate. Many relate to betterment. News, information, friends and family, etc. exert their own pull.

Examples may be located or generic. Suggest credit (3, 4) or (4, 3).

(b) Describe some of the ways in which constraints, obstacles and barriers affect internal migration flows. [8]

The syllabus gives distance and cost as examples. Candidates may include any others they know, e.g. social distance, lack of information, the operation of the property market, regional divides, tribal rivalries, etc. All work against the free movement of migrants, restricting and reducing the scale of flows and deterring many. They may therefore work to delay a person's migration (e.g. whilst saving up enough money). Some candidates may have specific examples, for example of the Hukou system in China, or the effects of wars and conflicts in Africa. A few may recognise that some individuals, rather than being put off by constraints, are stimulated to overcome them and to migrate.

Suggest that a full answer consists of two or more **ways**.

(c) Assess the extent to which *patterns* of internal migration may be identified. [10]

Candidates need to restrict themselves to movements of one year's duration or more. Movements may appear random or individual, but patterns are discernible, for example to the capital city; to the coast or sunbelt for retirement; centrifugally from towns and cities; stepped migration, etc. Some may use a simple typology e.g. rural-urban, urban-urban, etc. Other patterns may be included, for example in relation to life cycle or gender.

Candidates will probably:

L3 Make an assessment of internal migration which is good quality, strong conceptually and well-supported. [8–10]

L2 Provide a sound response which may be good in parts, but which is limited through lack of detailed knowledge or partial assessment. [5–7]

L1 Make an answer which is essentially descriptive rather than evaluative Lack the knowledge or time to make more than a basic response. [0–4]

[Total: 25]

Settlement dynamics   World cities are examined here for the first time.

12 (a) **Describe the character and main functions of world cities.**   **[7]**

Candidates need to demonstrate an understanding that world cities are of world significance. They tend to be large (population, extent, global reach), powerful economically, and familiar from the media, travel and world events.

Functionally they are best described <u>economically</u> (TNC operation, financial hubs, producer services, business networks, advanced transportation systems, etc.) but also <u>politically</u> (many are capitals or regional capitals, homes to governmental institutions such as the UN, WTO, and venues for summits) and, perhaps, <u>socially</u> (multi-ethnic; diverse, vibrant arts and cultural life, etc.).

Suggest mark flexibly and on merit, without separating the two aspects.

(b) **Explain the factors which have encouraged the emergence and development of world cities.**   **[8]**

Candidates may helpfully set urbanisation and urban development, which were already happening, in the context of globalisation since, say, 1970 (the syllabus dateline). Possible **factors** include the emergence of,

- a fast growing increasingly integrated world economy, based in world cities
- the transport (especially air) and telecommunications revolutions
- urbanism and preferences for urban living and working
- urban agglomeration e.g. growth of conurbations, megalopolises
- facilitation e.g. architecture, planning, finance, infrastructure, stability, etc.

Mark on merit, as candidates may have been prepared in different ways and have different perspectives. Indicators of quality may include the clear identification of **factors** and the use of examples.

(c) **To what extent is Fig. 5 helpful in understanding the hierarchy of world cities?**   **[10]**

Candidates may be able to appreciate what the representation does offer (e.g. the three levels, a sense of world distribution) and does not offer (e.g. basis of differentiation, top London/Paris/NY, indication of emergent cities). It is also based on one definition, GaWC's, whereas others exist, and is dated (1999).

Candidates will probably:

L3 Develop a good assessment of what Fig. 5 does and does not offer. Show firm conceptual understanding of the world city hierarchy and offer some exemplar content.
[8–10]

L2 Make a satisfactory but limited response, which may be quite general. The assessment may be suitable but partial or unbalanced.   [5–7]

L1 Make one or two basic points. Struggle to deal with the concept and describe rather than assess. Offer notes or fragments.   [0–4]

[Total: 25]