CAMBRIDGE INTERNATIONAL EXAMINATIONS

GCE Advanced Subsidiary Level and GCE Advanced Level

MARK SCHEME for the May/June 2013 series

9696 GEOGRAPHY

9696/13 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.

Cambridge will not enter into discussions about these mark schemes.

Cambridge is publishing the mark schemes for the May/June 2013 series for most IGCSE, GCE Advanced Level and Advanced Subsidiary Level components and some Ordinary Level components.

SECTION A

1 Fig. 1A shows a rainfall event and storm hydrographs for two river catchments, the River Wye and River Severn. Fig. 1B shows the land-use of the two river catchments.

(a) (i) State the peak discharge of the River Wye (in cumecs). [1]

Peak discharge of River Wye is 40 cumecs.

(ii) At what time does the peak discharge occur on the River Severn? [1]

Peak discharge on River Severn occurred at 4am on 6th August.

(b) Using Fig.1A, describe the responses of the River Wye and River Severn to the same rainfall event. [3]

Candidates should comment on differences in speed and scale of response to gain full marks. River Wye response is more rapid, peak discharge reached approx 1-2 hrs earlier than River Severn. Peak discharge also greater 40 m3/sec compared to 25 m3/sec. Falling and rising limbs steeper for River Wye.

(c) Using Figs 1A and 1B, explain the differences in the shape of the two hydrographs. [5]

Candidates need to focus on the differences in land use as illustrated in fig 1B, as the catchments are similar and the rainfall event is the same. Reference should be made to the difference in the peak flow and lag time and the steepness of the rising and falling limb as identified in b). Explanation will refer to the forested area of the R. Severn catchment reducing the discharge through interception by vegetation, hence a lower peak, and more gentle rising and falling limbs due to smaller contribution of surface runoff. Alternatively answer may be approached with reference to R. Wye.

Atmosphere and weather

2 Fig. 2 shows isotherms for Dublin, an urban area in Ireland, on a day in November at 10.00pm (22.00 hours).

(a) State the highest and lowest isotherms as shown on Fig.2. [2]

The highest isotherm is 3.5 °C.
The lowest isotherm is minus 1.5 °C.

(b) Describe the pattern of isotherms shown on Fig. 2. [3]

A heat island is a zone of slightly increased air temperature that occurs in association with an urban area. The main concentration of heat on this winter night in Dublin is in the north, central area of the city. Temperatures are 5 °C warmer than surrounding countryside. A wedge of warmth extends east. Temperatures decrease rapidly to the north and west, whilst temperatures decrease more gently to the south. This pattern can be illustrated by reference to isotherm values in Fig.2.

(c) Explain how urban areas have an effect on precipitation, pollution and winds in comparison with surrounding rural areas. [5]

The question refers to precipitation, pollution and winds. Candidates should cover all aspects for full credit. Higher temperatures lead to greater convection which coupled with hygroscopic nuclei from pollutants give rise to higher rainfall. Urban areas generate more dust, condensation nuclei, alter chemical composition and moisture content of air. Tall buildings give rise to friction which generally lowers wind speeds, but funnel effects may raise wind speeds locally.

Rocks and weathering

3 Fig. 3 shows different features associated with processes of mass movement.

(a) (i) Identify the process labelled A. [1]

rockfall

(ii) Identify the process labelled B. [1]

rotational slump or landslide

(b) For the mass movement labelled B explain how this mass movement has occurred. [4]

A slump, or landslide, is a downward movement of rock or unconsolidated material moving at the same speed, as a unit, along a slip plane. Candidates may re-draw part of Fig. 3 to illustrate movement. It is important that candidates note the rotational movement and the curved slip plane. Slumps occur on weaker rocks such as clay, when having absorbed water and become unstable, they then slide along slip plane when shear stress exceeds shear strength.

(c) Discuss the impact of mass movements such as these on the shape and stability of slopes. [4]

The question mentions both shape and stability. Give credit for reference to case studies. Diagrams may be used although they are not required, but for 4 marks, don't expect discussion of too many types of mass movement. As the question says 'such as these', then allow mass movements such as soil creep and debris flows. Slumps have concave shear planes and leave behind a spoon shaped hollow in the slope. As they occur in series, there can be a stepped effect. Alternatively if the slump has been formed due to erosion at the base of the slope, the resulting slide leaves behind a bare rock face at the top called the scarp and a fan-shaped toe of material at the bottom. Rock falls impact on the slope shape as pieces of rock collect at the bottom to form talus or scree in a cone-shape, as they ascend up the side of the slope. Better candidates may refer to a change in angle of slope, such as head wall steepening and deposition in valley floors. Unstable slopes may collapse and become more stable, whereas a rotational slide may generate further instability.

Population

4 Fig. 4 shows the life expectancy and Gross National Income (GNI) per person for selected countries in 2011.

(a) Outline the relationship shown in Fig. 4. [2]

Life expectancy increases as GNI rises – 1 mark.
Second mark for any qualification such as non-linear, clear gap in GNI, LEDC v MEDC.

(b) Suggest <u>two</u> reasons for the relationship outlined in (a). [3]

Higher GNI means more wealth to invest in better diets, higher standards of health care, more services such as proper sewers, better paid safer jobs e.g. offices rather than mining. 1 mark per reason with 3rd mark for detail of explanation.

(c) Explain why an increase in life expectancy in an LEDC may cause problems for that country. [5]

This creates an ageing population or at least a higher number of people living into old age so creating pressures (especially costs) on providing:

- Health services
- Social services (if these exist)
- Pensions or social security or care by family
- Specialised facilities for the old.

But equally this means problems for young people as older people work for longer so 'blocking' promotion or jobs, the need to be taxed to pay for facilities to support the elderly
An increase in the dependency ratio may be described. Some may argue that in some LEDCs with persistently high birth rates population may increase putting further pressure on resources.

Migration/Settlement dynamics

5 Fig. 5 shows where a person in a MEDC city lived as he got older.

(a) Identify <u>two</u> main features of this person's migration. [2]

This migration is stepped (1 mark) showing movement initially towards the centre then outwards (2nd mark) or it slows down with age (2nd mark).

(b) Suggest <u>two</u> reasons for this person's migration within the urban area. [3]

Answers could look at this as a whole or take it stage by stage:
Economic forces such as job type, income, drive this - related to property prices.
Family status – as first marriage then children occur there is a need for a larger house.
Increased mobility – e.g. car ownership means can commute from further out.
Social factors – young often want to live near the CBD for entertainment.
1 mark per reason with 3rd mark for detail of explanation.

(c) Using examples, explain why many people migrate away from cities in old age. [5]

This relates to the idea that retirement may encourage a person to move to non city locations such as rural areas, seaside resorts or to be with their families in other cities or even abroad e.g. to the sun.
Basic answer which is largely descriptive, such as above, then **max 2.**
Additional marks for explaining why this group wants to and is able to move in old age.
This could include – no longer any need to be near employment, on pension so may need to find cheaper location to live, health is declining so need to find less polluted and more healthy/restful environment, downsizing of property (possibly to release equity), family grown up and left home so no need to be near schools etc., desire to return to roots/origin, live with other family members.
If no attempt at examples then **max 3**.

Settlement dynamics

6 Table 1 shows service provision in a shanty town (favela) of Sao Paulo, Brazil, a NIC, between 2000 and 2010.

(a) Describe the changes in the service provision in the shanty town shown in Table 1. [2]

They have all increased – with examples – 1 mark.
2nd mark for those that point out the relative rate of change - electricity improved the most and piped water the least.

(b) Suggest reasons for the changes described in (a). [4]

The favela is becoming mature and stable so the authorities are more willing and able to supply services. As incomes rise the local population can afford more services. Max 2 additional marks for those offering explanations for the differentials between services e.g. electricity is easier to supply and has a big impact on economic activity, higher provision already existing for piped water.

(c) Explain why many cities in LEDCs find it difficult to improve shanty towns or squatter settlements. [4]

Sheer cost of upgrading is a massive barrier to cash strapped authorities and favelas keep growing due to natural increase and net migration so difficult to plan development. They are vital as sources of cheap housing so it is difficult to raise taxes or rents to help pay for development – **max 3 marks.**
Additional mark for other aspects such as political opposition, lack of information on which to base development, difficulty of the physical geography as often shanty towns/favelas are built on marginal (e.g. steep, marshy) land.

SECTION B

Hydrology and fluvial geomorphology

7 (a) (i) Define the fluvial terms *laminar flow* and *turbulent flow*. [4]

Laminar flow is a very low velocity movement of a liquid over a smooth surface. The movement of the fluid along a specific path is uniform. A straight path is followed. Rarely experienced in rivers.
Turbulent flow consists of a series of eddies, both vertical and horizontal, in a downstream direction. Turbulence varies with the velocity of the river, and depends on the energy available after friction has been overcome.

(ii) Briefly explain what is meant by the thalweg of a river. [3]

Thalweg will be understood as the line of maximum flow velocity in a river channel. It is generally seen to swing in a meander towards the outer river cliff bank. This could be shown by a correctly annotated diagram.

(b) With the help of a diagram, describe how precipitation reaches a river channel in a drainage basin. [8]

Water can reach the channel by a variety of means which may be illustrated by use of a system diagram showing inputs, stores, transfers and flows.
Reference should be made to direct precipitation over the river channel, overland flow/surface runoff where water is running over the land surface into the channel. Throughflow is where water having infiltrated into the soil, flows parallel to the surface and into streams above water table/unsaturated zone. Groundwater flow, where water that has percolated deeper down into the rock flows parallel to the surface and enters the stream through hydrostatic pressure and flows within saturated zone. Pipeflow where water follows roots of vegetation may be mentioned. Candidates may refer to how water reaches a channel in urban areas.

(c) Using examples, explain to what extent human activities can lead to the prevention and amelioration (reduction of impact) of floods. [10]

Syllabus refers to prevention and amelioration of floods and so the candidate has the opportunity to answer this with reference to the modification of drainage basin characteristics to limit the speed and amount of runoff by changing land use, afforestation and changing farming practices. Also by managing the channel so that it may accommodate more water by structures that are added so that the river channel is directly interfered with and the speed of flow is altered or level of storage is changed. Examples will include dams, straightening, building up levées and diversion spillways. Expect examples such as The Three Gorges Dam, River Severn and River Mississippi. Some reference may be made to prediction.

Level 3
Good description of a range of human activities will be given at this level, with good use of case study examples. Consideration of whether the technique is sympathetic to the environment and the impact downstream will be covered convincingly. An assessment of the extent to which humans can lessen the impact of floods will be given. [8–10]

Level 2
The question asks the candidate to comment on how human activities can lead to prevention and amelioration of floods so expect more than just a catalogue of types of management. Examples will be used and some advantages and disadvantages of techniques will be given. [5–7]

Level 1
There will be limited understanding of the measures to prevent and ameliorate floods. Expect examples of hard engineering such as building levees and dams, with no use of examples. Assessment of the extent to which human activities can do this will not be convincing. [0–4]

Atmosphere and weather

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

Condensation is the process by which the state of water vapour (gas) in the atmosphere is changed into a liquid, or if temperatures fall below 0 °C, a solid. It results from air being cooled until it is saturated at the dew point.
Evaporation is the physical process by which moisture is lost directly into the atmosphere from water surfaces and the soil due to the effects of air movement and sun's heat. This involves a change of state (liquid-gas). Rates vary depending upon humidity, wind velocity, insolation and nature of ground surface.

(ii) Briefly explain what is meant by latent heat transfer. [3]

The amount of energy emitted or absorbed when a body changes state, without any change of temperature within the body. It is emitted during the processes of condensation and freezing, but is absorbed when evaporation and melting occurs. Latent heat allows energy to be transferred within the atmospheric circulation as well as energy transfer from ground to the atmosphere.

(b) With the help of diagrams, explain how land and sea breezes are created. [8]

Expect cross-section diagrams showing land and sea breezes; land breeze at night and sea breeze in the daytime. Land and sea breezes result from circulation on a diurnal timescale due to differential heating and cooling between land and adjacent sea areas. The resulting pressure differences produce gentle breezes which affect coastal areas in anticyclonic conditions. In a morning, low pressure results in breeze from sea to land which can lower coastal temperatures and cause advection fogs. Sea retains heat longer at night; reversal of pressure gradient and it produces a land breeze.

(c) Explain how instability in the atmosphere causes different types of weather. [10]

In unstable conditions, a lifted parcel of air will be warmer than the surrounding air at altitude. Because it is warmer, it is less dense and is prone to further ascent. The parcel cools adiabatically until dew point (condensation level) is reached after which the parcel rises at the SLAR. The question asks for a discussion of the resultant weather phenomena. Expect reference to the production of clouds, types of rainfall, and also sleet and hail.

Level 3:
A good understanding of the condition of instability in the atmosphere. Correct reference to the weather phenomena associated with instability. Expect accurate, well labelled diagrams at this level to back up the discussion of the main types of rainfall. [8–10]

Level 2:
More than a basic knowledge of the link between weather and the process of instability. [5–7]

Level 1:
Lacks sound understanding of instability and focuses on the occurrence of thunderstorms and rainfall. [0–4]

Rocks and weathering

9 (a) (i) Define the terms *freeze-thaw* and *pressure release* as they apply to weathering processes. [4]

Freeze-thaw is a type of weathering process in which water freezes and the resulting ice melts as temperatures fluctuate around freezing point. Occurs in rocks which are jointed. Water causes a 9% increase in cracks in rocks and leads to splitting of rock. Rock is weakened and carried away by meltwater.

Rocks which developed under considerable pressure may be exposed at a later date and there is a considerable release of pressure. Joints may develop and once loosened outer layers are carried away by gravity. Associated with the development of granite domes.

(ii) Briefly explain how vegetation contributes to weathering. [3]

Tree roots may grow along bedding planes and extend into joints, widening them until rock becomes detached. Humic acid derived from decomposition of vegetation contains elements released by process of chelation. Concentration of carbon dioxide is increased by presence of plants and bacteria. Role of lichens may be mentioned.

(b) Explain the processes involved in the weathering of limestone. [8]

Candidates need to be able to explain that the most important solution weathering process affecting limestone rock is **carbonation**. Carbon dioxide and water form carbonic acid which reacts to dissolve out the calcium carbonate in the limestone rock. Candidates should be able to write out the equations that describe this process that results in a dissected landscape and subsurface cave and karst scenery.

$CO_2 + H_2O \Rightarrow H_2CO_3$

carbon dioxide + water => carbonic acid

$H_2CO_3 + CaCO_3 \Rightarrow Ca(HCO_3)_2$

carbonic acid + calcium carbonate => calcium bicarbonate

Many answers may include physical processes such as freeze –thaw. Similarly some may outline the role of humic acids.
Some answers may include processes of **hydrolysis** of carbonate rocks – water ionises and reacts with silicate minerals to produce acid ions which increase the rate of dissolution of limestone. Also **oxidation** may be mentioned- this is the reaction of iron in limestone (rusting) which produces reddish-brown colours and weakens the rock ($Fe^{2+}$with oxygen and water to form Fe^{3+}).

(c) Discuss the extent to which different types of weathering are effective in different climates. [10]

Candidates may draw out the Peltier diagram, but this is not necessary as long as there is an understanding of the factors influencing weathering. Most will realise the importance of climatic controls on weathering; but good answers will also notice that weathering is affected by rock type, and structure. Freeze thaw requires frequent low temperatures around freezing point; chemical weathering is most effective when temperatures are higher (Van't hoffs law). Mechanical weathering may be linked to climate only.

Level 3:
There is a good explanation of the link between weathering and climate. Also there is an understanding of the role of rock type and structure. A sound knowledge of weathering processes and good use of examples of weathering types to back up their discussion. [8–10]

Level 2:
Factors influencing weathering restricted to climatic only. There is little appreciation of rock type and structure with only a general discussion of the link between different types of weathering and different climates. There is little use of examples. [5–7]

Level 1:
There is a description of some processes, such as freeze-thaw, with little link to climatic factors. [0–4]

SECTION C

Population

10 (a) (i) Give the meaning of the term *carrying capacity.* [3]

Carrying capacity is the maximum number of people which the resources of an area can support – 2 marks. At a given level of technology. Suggest 1 mark for idea of a maximum and 1 for idea of resources supporting population 1 mark for technology

(ii) Outline two causes of food shortages. [4]

Clearly the main cause is population exceeding food supplies (1 mark) so causes may reflect: Supply issues (max 3 marks) such as: Climatic problems e.g. drought, flood or other natural disasters, Pests and/or diseases, transport issues including import problems, war.
Population/demand issues (max 3 marks) such as: high natural increase, influx of population, use of agricultural land/produce for non food purposes e.g. energy

(b) Explain some of the possible consequences of food shortages in an area. [8]

Most will probably focus on increased deaths due to starvation or resulting disease (2 marks). In addition this may trigger out migration, increased imports, emergency aid, food riots/unrest etc – max for short term consequences 6 marks.
2 marks for long term consequences such as change in agricultural base, irrigation projects, population control etc.

(c) To what extent can technology solve food shortages? Use examples to support your answer. [10]

Technology could include: use of hybrid or GM crops, use of agri-chemicals, mechanisation, irrigation, specialised animal breeding, drainage. Many of these are capital intensive so create other problems. Also low level technology may be considered e.g. use of water wheels. Transport, processing, storage and distribution technology may also be relevant. Technology can ease some of the supply issues especially in the medium term but rarely the demand issues. Short term shortages are rarely successfully solved by technology.

Candidates will probably:

L3 Make a response from detailed knowledge and strong conceptual understanding. Provide an effective assessment. Use examples in detail. [8–10]

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

L1 Offer one or more basic ideas and struggle to deal with the issue. Take a descriptive approach making little or no assessment. Offer limited or no examples. [0–4]

Migration

11 (a) Describe how and explain why countries attempt to control international migration. [7]

Answers may be unbalanced but if either how or why clearly missing then max 5.
How: quotas, visas, work permits, building physical barriers, setting entry or exit criteria
Why: to control the nature and number of migrants which in turn may be related to the economic, social and political nature of the country.

(b) Explain why international migration (both to and from a country) tends to increase as a country develops. [8]

This is the result of increased mobility – **physical** (2 marks) such as improved transport, **economic** (2 marks) such as higher incomes so people can afford to travel and there are more specialist jobs available, **socio-political** (2 marks) such as better education, more information, more political freedom to migrate/accept migrants. Max marks are possible from explanations drawn from reasons from one category. An alternative approach may look at push and pull factors and the decrease in the friction of distance separating countries.
The extra marks for any overall comment about migration and development linkage.

(c) Assess the impact of international migration on <u>one</u> country or area. [10]

This can be both negative and positive. Aspects of economic e.g. employment, social e.g. housing, cultural e.g. religion, political may be discussed. More effective answers may refer to the number and type of migrant as crucial in the level and type of impact.

Candidates will probably:

L3 Make a response from detailed knowledge and strong conceptual understanding. Provide an effective assessment. Use example in detail. [8–10]

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

L1 Offer one or more basic ideas and struggle to deal with the issue. Take a descriptive approach making little or no assessment. Offer limited or no example. [0–4]

Settlement Dynamics

12 Study Fig. 6 which shows population change in a village in a rural area in a LEDC between 1950 and 2010.

(a) Describe and suggest reasons for the changing population size of the village in Fig. 6. [7]

Suggest max 3 for description - growth to 1960 (1 mark) steady decline to 2000 (1 mark) and recent growth (1 mark).
Reasons (4 marks) – could be taken period by period e.g. decline since 1960 as migration to urban area, recent growth as some counterurbanisation or growth in tourism etc. Also allow explanation of why rural populations fluctuate and/or decline in LEDCs. Accept reasonable suggestions e.g. outbreak of disease or famine.

(b) Explain the issues for rural settlement or rural areas that result from either decline or growth. [8]

Issues will depend on whether decline or growth is chosen but will probably cover:
Population structure e.g. dependency ratio
Settlement changes e.g. in size, state of buildings
Economic e.g. type and range of economic activity
Social and cultural e.g. type and level of education

High level responses will make the cause-effect link clear between decline/growth and the particular issue. High marks can be obtained by a few issues explained in depth/detail.

(c) Evaluate the success of the responses to either rural decline or growth in a rural settlement or rural area that you have studied. [10]

Success may vary over time – short v long term, or between sections of the community e.g. farmers, or with different aspects of the decline/growth e.g. economic v environmental v social. How is success measured and who makes the judgements of this?

Candidates will probably:

L3 Make a response from detailed knowledge and strong conceptual understanding. Provide an effective assessment. Use example in detail. [8–10]

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

L1 Offer one or more basic ideas and struggle to deal with the issue. Take a descriptive approach making little or no assessment. Offer limited or no example. [0–4]