CAMBRIDGE INTERNATIONAL EXAMINATIONS

GCE Advanced Subsidiary Level and GCE Advanced Level

MARK SCHEME for the May/June 2014 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 2014 series for most IGCSE, GCE Advanced Level and Advanced Subsidiary Level components and some Ordinary Level components.

Section A

Hydrology and fluvial geomorphology

1 Fig. 1A shows storm hydrographs for the same precipitation event, in two drainage basins; one is rural and the other is urban. Fig. 1B shows the different precipitation pathways, in the two drainage basins.

(a) Using Fig. 1A, state which storm hydrograph, P or Q, shows:

(i) a rural drainage basin, [1]

Q.

(ii) an urban drainage basin, [1]

P.

(b) Using Fig. 1A identify the parts of the storm hydrographs:

(i) R, [1]

Lag time.

(ii) S. [1]

Peak.

(c) Using Fig. 1B, describe and explain the differences between the pathways taken by precipitation in the rural drainage basin as compared to the urban drainage basin. [6]

100% rainfall hits both areas (i.e. same precipitation event). The presence of trees in the natural area allows for 40% evapotranspiration and only 10% immediate runoff. 50% is infiltrated by both deep and shallow infiltration.

30% is evapotranspirated and 55% is available for immediate surface runoff. Only 15% is infiltrated into the ground (10% shallow and only 5% deep infiltration).

The differences are explained by the presence of the natural vegetation, trees, which intercept the rainfall and the leaves carry out a higher % evapotranspiration than the urban area where there are fewer/no trees, only impermeable surfaces of tarmac and concrete, buildings etc. There is a higher % infiltration in rural areas as the rainfall has a longer time to reach the surface via interception, stem flow and leaf drip. The water then infiltrates via root system of plants and permeable soil surface. 55% runoff in urban area results from impermeable surfaces which prevent infiltration (hence lower % of infiltration). Explanation requires good comparison of the rural and urban areas.

Max 3 for description only.

Atmosphere and weather

2 Fig. 2A shows the Earth's radiation balance for one year. Fig. 2B shows a model of atmospheric circulation.

(a) Name the features in Fig. 2A labelled:

(i) X, [1]

X is radiation surplus, this is where the radiant energy input is greater than the output meaning there is a positive energy balance in that part of the year.

An alternative answer would be comparison of long wave and short wave radiation.

(ii) Y. [1]

Y is radiation deficit, this is where the radiant energy output is greater than the input meaning there is a negative energy balance in that part of the year.

As above, a comparison of long wave and short wave radiation is acceptable.

(b) Describe what is happening at Z and state the latitude. [2]

Z is the radiation balance, occurring at latitude 37 degrees (allow 35–40).

(c) Using Fig. 2B, describe and account for the nature of atmospheric circulation and how it contributes to the transfer of heat around the Earth's surface. [6]

At 0 degrees, there is low pressure at ITCZ as air rises, transferring heat to higher latitudes. At 0 degrees, ITCZ, 2 subtropical air masses converge and air rises forming low pressure. Air rises, cools, condenses and forms convectional rainfall all year. At 30 degrees, warm air sinking, causing high pressure at sub-tropical high. At 30 warm air sinks and creates high pressure. Air sinks, dries and warms. The sub-tropical high created. Above 60 polar air is circulating and is transferred back towards to equator in the polar cell.

Overall movement of warm air from equator to poles, and return of colder air causes transfer of heat around the earth's surface.

Rocks and weathering

3 Fig. 3 shows the relationship between moisture conditions, speed and the type of mass movement.

(a) Using Fig. 3 identify which type of mass movement is most likely to occur:

(i) at a fast speed, when conditions are wet, [1]

Mudflow.

(ii) at a slow speed, when conditions are dry. [1]

Creep.

(b) Describe one of the mass movements you identified in (a). [2]

Mudflow – high moisture content as material is saturated with water means lack of friction, increased lubrication and so resulting mass moves down slope when volume and weight of water added to soil. Rapid movements occur on steep slopes, after period of intense rainfall.

Soil creep – low moisture content and slow. Main process is that of heave through wetting/drying or freeze/thaw. Low angle slopes.

(c) Explain the impact that human activities can have on slope stability. [6]

Slope failure in populated areas is often increased through thoughtlessness or lack of sensible planning. The syllabus refers to quarrying, mining, dumping material and deforestation. The effects of road construction and building are acceptable. Reference to 2 or more can be expected here. There may be mention of Aberfan disaster in 1966 when heavy rain added water to waste material in spoil tips constructed over a spring on slopes of 25^{o} above the town. Internal cohesion was reduced and the spoil heap moved downslope rapidly as a mudflow. The Vaiont dam disaster is another good example. Human activities may also seek to stabilise slopes.

Population

4 Fig. 4 shows a model of the relationship between population and resources.

(a) Describe the trend for population shown in Fig. 4. [2]

Population rises gradually at first until about half the time (1) and then at a rapid rate (1). Mentioning exponential alone is worth 2 marks.

(b) Describe two possible consequences of population reaching A in Fig. 4 [3]

Most will probably suggest aspects of population collapse as per Malthus, e.g. famine, disease, war, etc. while others may suggest a development of resources so raising the ceiling for population. Others might look at population reactions such as outmigration or rationing.

1 mark per valid consequence and 3rd for clear cause/effect linkage to population exceeding resources.

(c) Explain how countries might delay or avoid reaching A in Fig. 4. [5]

Most will probably focus on population control such as:

- Birth control
- Delayed marriage
- Encouragement of out migration
- Increased education especially of females
- Reduce economic and/or cultural reasons for a high birth rate

But equally aspects of resource development are valid:
- Intensify farming or extend cultivation
- Industrialise
- Find new resources for power
- Improve transport to better supply resources
- Ration resources
- Other

Suggest **max 4** if only examine one aspect of the balance.

Migration

5 Fig. 5 shows the main destinations of refugees from Somalia in 2010.

(a) Identify <u>two</u> features of the migration shown in Fig. 5. [2]

This migration is very local or short distance to neighbouring countries (1 mark). Other mark for either contrasting relative size of movement, e.g. Kenya 5× that of Ethiopia or referring to LEDC V MEDC numbers. If only figures are stated maximum 1 mark.

(b) Suggest <u>two</u> reasons for the features identified in <u>(a)</u>. [4]

Answers could look at this as a whole or take it feature by feature:
- Idea of distance decay so go to nearest
- Flee to more stable safer countries hence Kenya/Ethiopia contrast
- Travel to areas/countries with resources to cope, e.g. UK
- Cultural, tribal or historical links, e.g. Kenya
- Travel to countries that will accept them, e.g. Kenya/Ethiopia contrast; visas acceptable
- Many may link the reason to push and pull forces
- Cost

1 mark per reason with 2nd for detail of explanation.

(c) Explain the impacts of large numbers of refugees on <u>one</u> named receiving area. [4]

Most will probably focus on the short term impacts such as refugee camps, cost, food supplies, health issues, friction with local population.

Longer term impacts may be covered such as impact on the labour supply, need for international aid, population growth, destabilisation of the country – political unrest.

Those that see impacts not always being negative suggest a high level candidate, e.g. refugees often have the resources and education to flee so bring benefits to the receiving area. Thus impact often depends on the nature of the refugees and the existing nature of the area.

If no attempt at example then **max 3.**

Settlement dynamics

6 Table 1 shows selected indicators for households in an inner city area of an MEDC in 2001 and 2011.

(a) Describe the changes in <u>two</u> of the indicators shown in Table 1. Support your answer with data. [2]

They may treat these together in sense of two rises and two declines (1):

2nd mark for those that point out the relative rate of change – % with those with degree changed the most and household size the least.

Alternatively they may just state each change with supporting data – would need both for max – change (1) data (1).

(b) Suggest reasons for the changes described in <u>(a)</u>. [3]

Reasons for two changes 3 marks. Mark on clarity of cause/effect.

(c) Explain why large scale urban renewal has taken place in many cities in MEDCs. [5]

Most will probably suggest it is due to urban decay of older buildings or where functions have changed, e.g. de-industrialisation. Others may look at the city as a whole and conclude there is a need to halt urban sprawl, supply more housing (as demand spirals upwards due to various forces), be more efficient in use of resources, reduce pollution, etc.

Section B: The Physical Core

Hydrology and fluvial geomorphology

7 (a) (i) Define the terms *porosity* and *permeability* as they apply to drainage basin soils. [4]

Porosity depends on the texture of the rock and the size, shape and arrangement of its mineral particles. Areas between the particles are called pore spaces and their size and alignment determine how much water can be absorbed and stored by the rock. Porosity is usually greatest in rocks which are coarse-grained such as gravels, sands.

Permeability is the rate and ease with which water may be transmitted within a rock or the rate with which is able to pass through it.

(ii) Briefly describe what is meant by drainage density. [3]

This is found by measuring the total length of all the streams within the basin (L) and dividing by the area of the whole basin (A). It is the average length of stream within each unit area.

L/A = drainage density.

(b) Using a diagram, show how river velocity and sediment characteristics influence the transportation and deposition of sediment in a river. [8]

Hjulstrom's diagram to illustrate small to large sediment size characteristics, and river velocity, is probably the best approach. At least 2–3 sediment size characteristics should be compared to show the general relationship between velocity and sediment characteristics. Also there may be detail about the role of cohesion and the velocity required for the entrainment of clay.

Diagrams of meanders and river cross-sections if transport and deposition of different sediments sizes are related to velocity are acceptable.

(c) Describe the processes of fluvial erosion and discuss the extent to which they contribute to channel landforms. [10]

Question focuses on channel landforms and not valley landforms so care is needed to include relevant landforms only. The process of erosion is the wearing away of the bed and banks. Candidates should include abrasion, attrition, hydraulic action, cavitation and solution.

Channel landforms of erosion include waterfalls, rapids and gorges. Candidates should acknowledge the landforms resulting from combined erosion and deposition, riffles, pools, meanders, point bars and ox-bow lakes.

Two approaches for evaluation are relevant, i.e. the relative importance of the different erosion processes or the extent to which erosion contributes to landforms.

Level 3
Good knowledge of the processes of erosion with an understanding of their role in the formation of channel landforms. Acknowledgment of the combined role of erosion and deposition in channel landforms. A range of erosion landforms included with possible use of detailed diagrams. **[8–10]**

Level 2
Accurate diagrams and knowledge of landforms but with weak assessment of the extent of the role of erosion. **[5–7]**

Level 1
A catalogue of landforms, perhaps without appreciating those that are channel or valley landforms. Only description of landforms given, with passing reference to erosion. May include landforms of deposition. **[0–4]**

Atmosphere and weather

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

Condensation is the process by which vapour changes into a liquid form by cooling below its dew point.

Sublimation is the process whereby a solid is converted into a vapour (or vice versa).

(ii) Briefly describe what is meant by temperature inversion at the Earth's surface. [3]

Normally air temperature decreases with increasing altitude but under certain weather conditions, the opposite occurs and temperature increases with height so that a layer of warmer air overlies a colder layer.

(b) With the aid of a diagram, explain how urban areas affect temperatures in comparison with surrounding rural areas. [8]

Expect a cross-section diagram through an urban area, showing the heat island effect. Large cities experience different temperature conditions from the surrounding countryside. Differing specific heat capacities of urban areas and albedos are important. Urban areas have more dust particles and condensation nuclei, they create more heat. The term urban heat island shows that temperatures are warmest in the centre of the urban area, and decrease towards the suburbs and countryside. Candidates should be able to quote actual figures, such as day temperatures on average are 0.6 °C warmer, night may be 3–4 °C warmer as dust and clouds act as a blanket, wind velocities may be 30% lower. Reference should be made to temperature; relative humidity, cloud cover and precipitation are not expected. For good marks, there should be comparison with the surrounding rural areas.

Max 6 if no diagram.

(c) Describe the factors that influence local energy budgets and discuss the resulting weather phenomena of mist, fog, dew and land and sea breezes. [10]

Candidates should mention at least 2/3 factors such as solar insolation – latitude, cloud cover, land surface type – moisture content, wind speed and direction.

Rapid heating of the land surface with strong solar radiation may result in evaporation of surface moisture into the lower atmosphere causing the formation of fog. Fog also forms when warm moist air passes over a cool surface and condensation occurs. Dew is condensation on a ground surface.

If solar radiation heats the land and sea, the land and sea will heat up at different rates causing pressure differences in the air masses above the land and sea surfaces. The pressure gradient causes a sea breeze (sea to land) in the morning; in the evening the breeze reverses to blow from land to sea because the sea retains (heat capacity) heat longer than the land.

Level 3
Good description of at least 2/3 factors that influence local energy budgets. Good knowledge of resulting weather phenomena. **[8–10]**

Level 2
A general grasp of the factors influencing local energy budgets, but only a vague appreciation of weather phenomena. **[5–7]**

Level 1
Little beyond a vague appreciation of the weather types with poor understanding of the factors influencing local energy budgets. **[0–4]**

Rocks and weathering

9 (a) (i) Define the terms *hydration* and *carbonation* as they apply to weathering processes. [4]

Certain rocks are able to absorb water into their structure, causing them to swell and become susceptible to further breakdown.

Rainwater contains carbon dioxide in solution, forming carbonic acid, a weak acid which reacts with calcium carbonate rocks such as limestone.

(ii) Briefly describe how temperature affects chemical weathering processes. [3]

As temperature increases, the rate of chemical weathering doubles with every 10°C temperature increase. Chemical weathering acts best with increases in temperature but rainfall is needed for the chemical processes to operate.

(b) Describe the factors influencing physical weathering in different climates. [8]

Types of physical weathering include frost shattering, salt weathering, thermal expansion or insolation weathering, pressure release, biological weathering. Candidates should refer to the factors influencing physical weathering as outlined on Peltier diagram – for example physical weathering will not take place if temperatures are too warm and there is insufficient moisture, or if temperatures are too high and there is too much vegetation which acts as a protective cover. Rock type is also an important factor.

(c) With the aid of diagrams, discuss the role of sea floor spreading in the formation of tectonic landforms. [10]

Expect cross-section diagrams showing divergent margins with the landforms shown. Good quality diagrams can contribute to high marks, but annotation is necessary and a discussion of their formation is required.

When plates diverge, new oceanic crust is formed. Convection currents in the mantle move the plates apart. Upwelling of magma causes mid-ocean ridge formation.

Ocean trenches represent the opposite side of an oceanic plate, which is a destructive margin where crust is being subducted back into the lithosphere. The subducted crust descends beneath another continental plate.

Max 6 if no diagram.

Level 3
Attention to divergent plate margins is expected. Good use of well annotated diagrams, with good explanation of the role of sea floor spreading in the formation of the landforms. **[8–10]**

Level 2
Better detail, but possibly divergent or convergent margins drawn, therefore omitting one or more of the landforms. Description of landforms, with little link to the mechanism of sea floor spreading. **[5–7]**

Level 1
Very basic diagrams with incomplete labelling or no diagrams, and lack of detail of formation of landforms. **[0–4]**

Section C: The Human Core

Population

10 (a) (i) Give the meaning of the term *dependency ratio.* [2]

1 mark for simple – working population v non working. 2nd mark for development with use of ages: Pop under 15/16 + pop over 60/65 divided by pop aged 15(16) to 60(65).

(ii) Outline the main reasons why the dependency ratio may increase over time. [5]

This may be due to an increase in the dependent elements due to:
An ageing population as people live longer.
A high birth rate, due to a youthful population.
Both ideas explained max of 4 – one only then max 3.
5th mark for those that suggest other reasons – for example: working population may decrease, e.g. due to outmigration or increased death rate, e.g. war.

(b) Describe the possible consequences of increased aged dependency in an area. [8]

Clearly this creates economic issues (especially in terms of the tax base) but also social/cultural and even political consequences.

If large number of elderly dependents consequences may include:
- Cost of pensions, hospitals, etc. so taxes rise
- Need for specialist housing
- A conservative population – promotion difficult in jobs
- Change in consumer patterns, e.g. food, entertainment etc.
- Mobility change
- Impact on other elements of the population, e.g. 'fossilisation' of job market, taxation/ pension changes

Higher level answers will see consequences not just as negatives.
Bear in mind the three bands of marks in order to differentiate responses**.**

(c) To what extent can a country alter its population structure? Use examples to support your answer. [10]

Candidates will probably focus on aspects such as pro or anti natal policies and migration controls or incentives.

Higher level responses will focus on the extent element – it is much harder to reduce the older element and with improved medical care, etc. this is likely to continue to increase hence the need to raise retirement ages and alter pension arrangements – the classic MEDC issue. It is easier to influence younger sections of the population via employment, housing etc. Others may legitimately consider other elements of population structure such as gender or ethnicity.

Candidates will probably:

Level 3
Make a response from detailed knowledge and strong conceptual understanding. Provide an effective assessment. Use examples in detail. **[8–10]**

Level 2
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]**

Level 1
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 / Settlement dynamics

11 (a) Describe the role of push factors and pull factors in migration. **[7]**

Answers may be unbalanced but if either push or pull are clearly missing then **max 4.**

Their roles are as motivators to move. Push are the perceived disadvantages of the origin and pull the perceived advantages of the destination. Credit the development of ideas such as if they make the point that push factors are highly directional (away from the origin) but pull factors offer a range of destinations. Push factors are stronger motivators to move. Perception is a key consideration.

(b) Use examples to explain how constraints and barriers limit migration. [8]

The specification refers to constraints, obstacles and barriers – they are different:

Constraints include those factors that limit the persons ability to move, e.g. inertia, sale of house, health, wealth to pay for the move, mobility, knowledge of the destination, costs of moving, etc.

Barriers include those factors that block or prevent the movement such as borders (and controls), physical geography, insecurity or hostile areas.

A high level answer may see them as physical, economic, social and political in nature.

If clearly either constraints or barriers missing then **max 5.**
If no use of examples then **max 5.**

(c) Assess the impacts of rural-urban migration on one or more urban settlements. [10]

'One or more urban settlements' is open to wide interpretation in terms of scale. Many will take the typical issues raised by the creation of shanty towns in LEDCs. A simple account of the growth of a shanty town is unlikely to get above Level 2.

Answers should clearly focus on the urban end of the rural-urban migration and impacts can be positive and negative and may cover a range of environmental, economic, social and political impacts.

Candidates will probably:

Level 3
Make a response from detailed knowledge and strong conceptual understanding. Provide an effective assessment. Use example in detail. **[8–10]**

Level 2
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]**

Level 1
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 (a) With the help of a diagram, show how bid-rent results in different zones in urban settlements. [7]

A simple idea of the function that bids the most rent gets the area is unlikely to be worth more than 2 marks. A clear link to zones (probably circular as in the Burgess model but not necessarily as bid-rent figures in other models) of functions (or other types of zone) is expected with clear cause and effect, i.e. why do large retail out bid housing. Most will offer the typical diagram to illustrate the process but the details may vary in relevance and accuracy.

(b) Explain how factors, other than bid-rent, cause zonation in urban settlements. [8]

Other factors are a myriad including:
- Environmental/physical, e.g. relief, rivers, wind direction, etc.
- Economic, e.g. transport routes, linkages, complementarity, etc.
- Social, e.g. life cycle, ethnic or cultural clustering, reputation, etc.
- Political, e.g. planning controls, green belts, taxes/rates, etc.

If only one set of factors then **max 5**. Better answers will link the factor to clear functional zones, e.g. port zone along the river for ease of transport of bulk cargoes.

(c) Evaluate the success of LEDCs in managing urban settlements. [10]

Success may vary over time – short v long term, or between sections of the community, e.g. industry, or with different aspects of the planning, e.g. economic v environmental v social. How success is measured and who makes the judgements of this may be considered.

Many will suggest that it is impossible to manage urban areas due to the rapid growth of LEDC cities and their lack of resources but this approach is unlikely to get beyond L2. Some management has been very successful in LEDCs but often it is piecemeal.

Candidates will probably:

Level 3
Make a response from detailed knowledge and strong conceptual understanding. Provide an effective assessment. Use example(s) in detail. **[8–10]**

Level 2
Make a reasonable attempt, which may contain good points, but which remains partial. Offer a valid, but limited assessment. Refer briefly to example(s). **[5–7]**

Level 1
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(s). **[1–4]**