CAMBRIDGE INTERNATIONAL EXAMINATIONS

GCE Ordinary Level

MARK SCHEME for the October/November 2013 series

5014 ENVIRONMENTAL MANAGEMENT

5014/12 Paper 1 maximum raw mark 120

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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CAMBRIDGE
International Examinations

Section A

1 (a) (i) more types of energy used in SCA (5) than in ME (4),
nuclear only in SCA,
(virtually) all fossil fuel use in ME,
a little more oil used in ME,
but much more natural gas in ME than in SCA,
more coal / HEP use in SCA
use of values which support a valid difference

3 @ 1 mark **[3]**

(ii) general reference to hydro-electric power needing specific physical conditions,
further details about these such as plentiful rainfall, big river, steep slopes,
comment about why more likely to exist in SCA than in ME / less likely in ME,
great quantities of oil and gas obtained in ME,
cheaper and easier to use local / one's own natural resources

3 @ 1 mark **[3]**

(b) (i) environmental impacts:

air pollution / dirty air results from release of smoke particles,
carbon dioxide emissions increase the greenhouse effect,
sulfur dioxide / oxides of nitrogen cause acid rain
further environmental consequences of any of these,
land destruction /loss of habitats during mining,
pollution from oil spills during transport

min. 1 mark, max. 3 marks

(ii) economy in the future:

exhaustion of finite / non-renewable resources,
industries reliant on them will decline / close down / loss of export income,
alternatives are likely to be more expensive,
also positive view about oil and gas deposits leading to economic development / income from exporting

min. 1 mark, max. 2 marks

4 @ 1 mark **[4]**

[Total: 10]

2 (a) (i) 1990: 6% 2008: 18% **[1]**

(ii) 68% **[1]**

(iii) little change in the size of the big gap between them up to 1995,
since 1995 the size of the difference between them has been increasing,
showing more marked improvements in urban than in rural areas,
12% increase in rural sanitation compared with 28% for urban

2 @ 1 mark **[2]**

(b) (i) rural areas:
remoteness / away from political centre of country,
population more spread out / difficulties of access ,
leading to increased / high costs of improved sanitation,
shortage of water supplies in the area / water needed for other purposes e.g. irrigation,
lack of infrastructure / materials / trained people in rural areas

min. 1 mark, max. 2 marks

(ii) urban squatter settlements:
great size and scale of the problem / problem of numbers,
problem of ever growing numbers / massive and continuing urban growth,
illegal settlements / lack of title to the land / locations keep changing

min. 1 mark, max. 2 marks
3 @ 1 mark **[3]**

(c) lack of sanitation means that rivers / lakes are contaminated with dirty water,
cholera is a water-borne disease,
caught by people drinking / washing etc. in contaminated water,
disease easily spreads causing epidemics,
often associated with aftermath of natural / human disasters,
absence of medical facilities to control its spread

three points like these 3 @ 1 mark **[3]**

[Total: 10]

3 (a) (i) rain gauge **[1]**

(ii) to keep it upright / for stability / reduce water loss from evaporation **[1]**

(iii) away from trees; trees can intercept or block rainfall / dripping rainwater can increase amount

away from buildings; to prevent shelter so that rainfall amount is under-recorded / stop excess rainfall or rainwater coming off buildings

2 @ 1 mark **[2]**

(b) (i) accurate plots for both height and width **[1]**

(ii) period of mainly below average rainfall,
in only two of the eleven years (2000 and 2010) was rainfall above average,
greatest different from the average in 2002 (under 270 mm, about 160 mm less)

2 @ 1 mark **[2]**

(iii) poor / insufficient pastures in dry years,
several drier than average years together reduce pastures even more,
can lead to overgrazing and soil erosion,
quality and worth of livestock decreases,
forced to sell or kill animals / move animals,
increased expense of needing to buy in additional feed / water for pastures,
dangers of floods in years such as 2010 from excess rains

3 @ 1 mark **[3]**

[Total: 10]

4 (a) (i) 1: photosynthesis
2 and 3: (either order)
respiration / decay / decomposition
combustion / burning of wood / plants (releasing carbon dioxide to the air) **[3]**

(ii) A Lithosphere **[1]**

(iii) 4: fossilisation of plants as they are buried and turned into carbon, coal and oil

5: is release of carbon dioxide when fossil fuels are burnt

1 mark for each of 4 and 5 = 2 marks
3rd mark for elaboration or precision of the description, most likely for 4 = 1 mark **[3]**

(b) protection / conservation of ecosystems / preserving habitats for wildlife,
maintaining biodiversity,
preserving genes for the future,
encourages sustainable use of natural places / eco-tourism,
allows for research / monitoring of environmental issues,
provide education / training about environmental issues

3 @ 1 mark **[3]**

[Total: 10]

Section B

5 (a) (i) 1800 **[1]**

(ii) persistent but steady increase until 1900, noticeable increase in rate / speed of population growth between 1900 and 1950,
population take-off from 1950/60 onwards, this very rapid growth continued to 2011 to take the population to 7 billion,
use of values which support acceptable statements such as from 3 to 7 billion from 1960 to 2011 / more the doubled in 50 years

3 @ 1 mark **[3]**

(b) (i) **A** continuation of current high rates of growth / no let-up in high rates of growth, taking total population to 15 billion
B continued high rates of growth until about 2050/60, then signs of a slow down so that the population only reaches 10 billion by 2100
C population peaks around 2030/40 and then goes into decline so that it falls below the current value / down to 6 billion by 2100.

totals in 2100 given without any supporting description = 1 mark
description of lines without reference to population totals, or
accurate totals with limited descriptive support = max. 2 marks
mixture of description and use of totals = up to 3 marks **[3]**

(ii) general point(s) made about them all being estimates and nothing more, no one really knows what is going to happen to fertility rates in future;

more specific points about the assumptions on which the three estimates are based; **A** based on the assumption that the trend of high rates of natural increase seen from 1960 will carry on throughout the next 90 years

B based on the knowledge that there are already signs in some developing countries of family size coming down, especially those making progress with economic development, much in the same way that happened previously in developed countries (hence the stages in the Demographic Transition Model),

C relies upon some change / catastrophe causing a great increase in death rates, such as crop failures, massive droughts, significant climate change or new infections in the way that AIDS / HIV once threatened to increase mortality rates significantly

mark on the basis of understanding shown and coverage; simple statements showing some understanding, perhaps more general than specific, or concentrating on only one of the estimates without a broader understanding being shown 1 or 2 marks

clear understanding about what these population estimates are showing and that estimates / opinions vary 3 marks **[3]**

(iii) **B:** because it is more closely related to what has been seen to be happening already; in global terms fertility rates / birth rates are coming down, and there is even natural decrease in a few countries in Europe

A: optimistic assumptions about increases in world food supply and technological breakthroughs to allow so many people to be supported on the Earth's surface by its natural resources

C: suggestions would be needed for what will force the reversal of all recent previous trends – disasters could be tectonic, climatic, disease related for either crops or people or both, exhaustion of natural resources.

no marks for choice; both marks for explaining why **[2]**

(c) (i) 40 years **[1]**

(ii) improved medical treatment; examples of primary and secondary healthcare can be given to support this, leading to a great reduction in death rates worldwide.
1 mark for choice, 2nd mark for some further explanation

wealth/poverty; medical treatment. **[2]**

(iii) if not used in **(ii),** wealth and poverty which control access to medical care; also wealth increases access to better diet, clean water and sanitation, and improved living conditions; where these do not exist, notably in rural areas of poor developing countries, death rates tend to be high

other factors to explain low life expectancies include:
wars / civil & political unrest, which disrupt normal living, faming, access to clean water supplies, make worse the effects of natural disasters; e.g. Somalia with civil wars and drought
diseases for which treatment is not available or cannot be afforded, such as HIV/AIDS, which has greatly reduced life expectancies in many southern African countries such as Botswana and South Africa.
special factors such as high rates of alcohol consumption in Russia and some of the other old Soviet Republics

Points made along these lines; references needed to at least a second cause for all three marks **[3]**

(d) (i) Japan's pyramid is taller / Nigeria's is shorter,
Japan's is more straight up and down / rectangular overall / bottom and top well represented, Nigeria's is more of a pyramid / has a wide base and narrow top

Descriptions such as these about overall shape, as opposed to variations within the shape;

two valid differences in shape 2 @ 1 mark **[2]**

(ii) both males and females needed to be shaded in both graphs. **[1]**

(iii) old and young are the non-working population / they are dependants,
15–64 year olds are working population / the independent population,
they provide the revenue / pay taxes to pay for pensions and schools for 65+ and under 15.

some understanding = 1 mark
clearer and fuller understanding of the difference = 2 marks **[2]**

(iv) 42% **[1]**

(v) disadvantages: young are expensive in terms of their needs for public services, such as health and education
young people grow up and marry / reach child bearing age; large numbers of them mean that population increase is likely to continue in the country for many more years, increasing the pressure of numbers
problem of numbers puts a great strain on a country's economic resources; food output, services and industry need to increase just to keep the country and its people on the same economic level as previously; in rural areas large numbers of young people to feed increases pressure on the land and natural environment
maintains the poverty trap among poor people in rural areas

advantages: today's young are tomorrow's human resources for a country; their effort and energy will be needed for future economic development; young are more likely to be willing to change, and adopt new technology as it becomes available; many a country benefits from remittances from young people reaching working age and going overseas to work; also possible that might allow a country's empty areas to be settled and their resources developed

minimum of 1 mark reserved for advantages and disadvantages
otherwise 4 @ 1 mark. **[4]**

(vi) disadvantage: finite resources of a country need to be shared between greater numbers of people; mature population structures in economically developed countries mean a larger share of the economic cake for all their people and therefore greater wealth

advantage: need for young people to generate the future wealth of a country; a big problem in developed countries is not enough children to support their ageing populations by creating the wealth and paying the taxes needed for state pensions; some governments still believe that big total population numbers increase a country's international status and power e.g. the big populations in China and India mean that they cannot be ignored internationally

no mark for the view – up to 2 marks for how well the view is supported. **[2]**

(e) (i) increasing percentage of old people (65+) in a country/
idea of large numbers / proportion must be included **[1]**

(ii) bars divided up correctly for stated percentages – 2 @ 1 mark
sectors identified in the bars and key – 1 mark **[3]**

(iii) tradition in developed countries that people are given pensions once they retire from work; many pensions are paid by governments; money that governments have mainly comes from taxes; as the percentage of retired people increases, the percentage of those working and paying taxes decreases i.e. less money is coming when more needs to be paid out. health and other care costs increase as people get older and live longer; for many old people this means reliance on government provision; forecasts about future population structures in Japan and Europe suggest that future economic problems are set to worsen;
3 points made along these lines 3 @ 1 mark **[3]**

(iv) candidates could sit on a fence, or even argue in favour of the UK, from the point of view of population structure in 2010; both have the same percentages above 60 and the UK has 4% fewer of its population of working age
maximum 1 mark for this

the key evidence which supports the answer Japan is the much lower fertility and birth rates, also lower percentage of under 15s already in 2010 (4% lower); population data suggests a progressive decrease in the percentage of potentially economically productive 15–60 year olds during the next 15 years, who are the key economic providers for government costs to support old people

credit comment along these lines in the terms of the future, as well as use of the data in support of the answer
up to 3 marks for this **[3]**

[Total: 40]

6 (a) (i) **D** condensation **E** precipitation **F** percolation
G groundwater flow **H** surface run-off **I** evaporation
J transpiration

all 7 correct = 3 marks
4–6 correct = 2 marks
2–3 correct = 1 mark **[3]**

(ii) rocks below level of water table are saturated,
may be useful for underground / groundwater sources of water such as aquifers / wells,
supplies clean water for drinking / fresh water for irrigation,
if it touches the surface spring water may reach the surface naturally,
if surface is saturated in lowland areas may lead to surface flooding,
adverse consequences of this for people

2 @ 1 mark **[2]**

(iii) rainfall /precipitation **[1]**

(iv) steep sided / narrow / mountain valley,
explanation why this is better for dam building and reservoir construction,
steep slopes around it for fast surface run-off of rainfall,
mountain references in terms of higher precipitation / melting snow

two explanatory points 2 @ 1 mark **[2]**

(b) (i) name of dam and its location, anywhere in world. Most likely examples include Aswan High Dam in Egypt, one of the large dams in the west of the USA such as the Hoover Dam, large dams on the upper Indus in Pakistan such as Tarbela Dam, Three Gorges dam on the Yangtse in China. **[1]**

(ii) source of fresh water supplies / domestic uses,
recreational activities such as sailing / tourist activities,
food source from fishing.

two uses 2 @ 1 mark **[2]**

(iii) hydro-electric power / electricity **[1]**

(iv) for irrigation / growing crops,
with further details about it such as reference to the canal and regular pattern of water channels leading the water into the fields

2 @ 1 mark **[2]**

(c) (i) lost their farmland and thus their source of income / livelihoods,
often given replacement land elsewhere which is of inferior quality,
land on valley floors is often the flattest and most fertile land in the valley,
living community of people broken up / destroyed / forced to move,
may be forced to move a long distance from known people / places

minimum of 1 mark reserved for each of economic and social problems
otherwise 3 points made along these lines 3 @ 1 mark **[3]**

(ii) loss of land in valley floor / on lower slopes will lead to greater use of land higher up the valley sides, this is steeper / less productive land naturally more at risk from soil erosion, pressure of people looking for farmland in the same area will lead to over-use, over-cultivation / overgrazing / clearance of vegetation all speed up soil erosion, soil sediment / pollution waste / fertilisers will enter mountain streams and be transferred downslope to the reservoir.

three points such as these showing understanding of the possible knock-on effects
3 @ 1 mark **[3]**

(iii) the clue to answering is given in boxes R & S about the dam being a solid wall traps all the sediment behind it, whereas previously it was progressively carried downstream by the river and deposited in the sea. The dams interfere with natural river processes. Accumulation of sediments behind the dam, resulting reductions with time in the volume of water that can be held in the reservoir, life expectancy reduced even faster if catchment areas for the streams are over-used by people leading to increased surface run-off.

understood (however expressed) and well explained = 2 marks
some understanding, but probably with a great dependence on the content of boxes R & S= 1 mark **[2]**

(d) (i) environmental:
many river channels / water everywhere (total width 5 km) in 1980, compared with just one water channel in 2010 (only 300 m wide, many times less); water replaced by deposits of sand where river channels used to be; soil characteristics have changed; silt soils, kept fertile by constant renewal, have been replaced by brackish soils; falling water levels in the soil.

economic:
livelihoods of delta dwellers have disappeared; no more income from river fishing; only chance is to go out to sea to fish; water no longer available for crop farming, not enough river water and water levels too low for pumps to work; most crops will not grow in salty soils; forced into less profitable alternatives such as collecting firewood

marking:
incomplete / part answer; relies on direct use made of information given in the table; content selected not always successfully arranged under the headings environmental and economic; 1 or 2 marks

complete answer in terms of use of what is in the table and correctly arranged under the headings environmental and economic; 3 marks

not only complete, but better described in terms of using headings or language which helps to emphasis the scale and range of the problems caused; 4 marks **[4]**

(ii) population decrease (from 15 000 to 3000) **[1]**

(iii) the clearest push factor is the loss of employment with the disappearance of jobs in river fishing, and difficulties if farming after the loss in water supplies, future for farming looks gloomy after loss of regular fertile silt deposits and soils being affected by higher salt content, collecting firewood is a sign of how bad things are / not likely to be a sustainable activity and all the consequences that follow from loss of livelihoods

there are always going to be the pull factors of the cities which can offer things that the countryside cannot – such as better services (education / medical), more chances of electricity and access to clean water, more variety and greater range of job types

general answers or answers limited to only one push factor = 1 mark
answers specific to this example including fuller references to push factors = 2 marks
answers which support the view that push factors are likely to be dominant in this example, backed up strongly or in a balanced way with comment; comment may also refer to increasing attractiveness of the city = 3 marks **[3]**

(iv) the easiest view to support is highly likely due to further knock-on effects such as deteriorating soils, falling water supplies, over-use of firewood resources

also since the dams are in place much further north outside the region there doesn't seems much chance that more water will be released into the Indus – seems more chance that there might be even less

once the community disappears, more likely to leave; some will now have relatives and friends in the cities to make the move easier; community itself likely to be ageing after people of working age have migrated

support for unlikely to decline further is less obvious; but the 3000 might represent the number that can be supported by current resources and activities like sea fishing and collecting firewood; all those with any desire to migrate have already done so

view expressed but weakly supported = 1 mark
view expressed and more strongly supported = 2 marks **[2]**

(e) (i) the obvious focus is on squatter settlements / slum housing / shanty towns, self-help housing using mixed 'building materials', high density / haphazard layout, lacking in essential public services such as water supply, overcrowded / easy spread of disease, located in inferior locations not already used for formal housing.

possible also to refer to the high costs of modern housing such as apartment blocks supposedly built for the poor;

points made along these lines; credit any references to specific examples;
3 @ 1 mark **[3]**

(ii) example from a big city in the country where the candidate lives, examples such as Chennai and the Housing and Slum Clearance Boards, the Orangi Pilot Project in Karachi involving the communities in self-help schemes, and the 'new settlement' policy in Greater Cairo

most strategies for improving housing are of the ASH (aided self-help) type, giving legal titles to the land, providing essential services, offering loans and providing technical help. Less successful are those that involve clearance and housing redevelopment (usually high-rise) in another part of the city, often some distance away. Even worse of bulldozing without any new provision

answer about strategies for managing housing problems; many will be general in nature and weakly related to a city even when one is named
maximum 3 marks for these answers, with the mark within the range dependent on the dependent on amount given or range of points made; general answers

answers that contain direct and identifiable references to a named city
up to 5 marks with adequate supporting detail; city specific answers **[5]**

[Total: 40]