UNIVERSITY OF CAMBRIDGE INTERNATIONAL EXAMINATIONS

International General Certificate of Secondary Education

MARK SCHEME for the October/November 2011 question paper for the guidance of teachers

0680 ENVIRONMENTAL MANAGEMENT

0680/22 Paper 2, maximum raw mark 80

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1 (a) (i) attempt to shade or colour in the plate boundary in the middle of the Atlantic Ocean.; [1]

(ii) in the north / countries next to the Mediterranean Sea;
closest to the destructive plate boundary;
further information about what happens at destructive boundaries to cause earthquakes;
most of Africa located in the middle of the plates away from activity zones;

Three points made along these lines. 3 @ 1 mark [3]

(iii) magma from the mantle reaches the surface;
in the crack / fault / space between plates as they move apart;
builds up mountain ranges / forms volcanoes / rift valleys;
new rocks / new land formed (hence the name constructive);

Two points like these showing understanding and no confusion with destructive. 2 @ 1 mark [2]

(b) (i) direct map evidence relevant to the answer –
to the south is the major plate boundary where Eurasian and African plates meet;
fault lines run north-south and east-west through the Apennine mountains;
locations shown for six major earthquakes since 1908 / in the last 100 years;
shown in most parts of Italy / widespread throughout the country;

Three relevant statements like these. 3 @ 1 mark [3]

(ii) immediately after the main shock –
people hit by falling debris from collapsing buildings, bridges etc.;
people trapped alive but unable to be rescued under weight of fallen debris;
fires spread due to explosions from gas pipes / damage to electrical wires;
mud flows / landslides triggered off engulfing houses / villages / all in their path;
out at sea trigger off tsunamis which destroy low lying coastal regions;

in the following days and weeks –
further after shocks may cause already weakened structure to collapse;
spread of diseases from disruption of water supplies / sewage systems;
examples of water related diseases leading to epidemics such as cholera, typhoid;
inadequate food / relief operations outside major urban areas;

Four points such as these. Minimum one mark for each of immediate and following. 4 @ 1 mark [4]

(c) (i) at the place where north/south and east/west fault lines cross; [1]

(ii) where – the old centre of L'Aquila;
why – old buildings either frail because of their age or unlikely to have been built using techniques to make buildings earthquake-proof;

2 @ 1 mark [2]

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(iii) sniffer dogs – to smell people still alive but trapped under the debris, so that rescuers know where to concentrate efforts;

chemical toilets – to reduce the risk of the spread of disease, high with so many people (18 000) concentrated in one place;

One mark for each. [2]

(iv) Responses to earthquake are much more like those of a developed country –

- massive scale of the search and rescue operation, ready with what was needed for an earthquake such as sniffer dogs, heavy lifting gear, blood plasma and planes
- great scale of relief operations, for as many as 18,000 people; accommodation, and transport elsewhere, soon provided
- government could afford to set an emergency fund as big as US$40 million.

Comment – all of these suggest what would be expected from a developed country, ready and prepared, which had the organisation / infrastructure and money to put plans into effect. Indications could be given about how things would be different in developing countries.

Effects of earthquake – possible to argue that these were sufficiently severe for a 6.3 earthquake to be more like those expected in a developing country.

Mainly direct use of information about responses, with minimum of comment in terms of likelihood for developing and developed countries, or an entirely developing country answer with support = 1 or 2 marks.
Information selected forms the basis for comment, well directed towards differences between developed and developing world earthquake responses (i.e. the theme of the question) = 3 or 4 marks. [4]

(d) (i) steel structures within the frame of the building for reinforcement;
damping and bracing systems to help absorb shocks;
foundation piles made out of alternate layers of steel and rubber for flexibility;
tall skyscrapers built in pyramid-like shapes;
use of high quality steel and building materials;
existence of building regulations which are enforced;

Three points made along these lines. 3 @ 1 mark [3]

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(ii) Can have all the know-how about making buildings earthquake-proof, but unless they are put into practice by builders and monitored by the authorities, people will try to save money, because earthquake-proof methods involve extra costs of construction. This is why with side by side buildings, one collapses, the other remains standing, all due to human nature and greed. One comment suggests that doing things by the rules is not the norm, even in a developed country like Italy. People believing that it won't happen to them is a common human attitude.

Some earthquakes can be so strong, especially those above 7.5 magnitude, that some damage will occur anyway, even in places with well constructed buildings. Also buildings directly on fault lines where the ground opens up / splits apart stand less chance of surviving big movements.

Many old buildings still exist in developed world cities; these may have been weakened by age or previous earth movements.

Although buildings are well constructed, they may not have been effectively zoned from other land uses, e.g. industrial units like oil refineries which explode / catch fire, which spreads to affect them.

Reasons used such as these; reward elaboration and answer development. At least two different reasons needed for answers worth more than three marks. [4]

(iii) points that can be made:

- it is impossible to predict exact location / time / strength of an earthquake
- sometimes light shocks relieve the tension of movement along the faults and no major quake occurs; in this example they seemed to indicate something bigger was going to happen but who knows?
- however, it is possible to predict places at high risk of a major earthquake like L'Aquila, which is perhaps why the Italian rescue and relief authorities were prepared.

Marks for explanation rather than candidate opinion.
Well explained / good understanding = 2 marks.
Some explanation, but not full or clear enough for both marks = 1 mark. [2]

(e) (i) likely reasons and possible elaborations:

- fertile soils; lava / ash constantly being weathered to release new minerals;
- mineral deposits such as sulphur;
- tourist potential: hot springs, mud pools; special attractions such as preserved old Roman cities;
- geothermal power; industrial potential for smelting metals;

Reasons stated and elaborated on along these lines. Fertile soils is the most important. Generally a minimum of two reasons needed for full marks, but a well elaborated and exampled 'soil' answer might be worth all three marks. [3]

(ii) warning signs such as:
temperature increases in and around the cone;
increased emissions of steam and gases from cone / top of volcano;
small earthquake shocks felt in surrounding areas;

Any one. [1]

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(f) (i) Disadvantages of Policy A – could go to enormous cost / create massive disruption to normal life, all for nothing. Houses etc. left behind might be looted. Getting people to cooperate before an event is very difficult. Can the expense and inconvenience be justified just by warning signs, not a definite prediction?

Disadvantages of Policy B – half a million people is too many to move within hours, and to provide rescue and relief services (numbers can be compared with the 18 000 homeless in L'Aquila earthquake).

(ii) Policy A – it should save lives and stop a repeat of the massive losses of life that resulted after the eruption in year 79. Loss of life could be much greater with half a million people now living here.

Policy B – only responding after the known event, and can prepare for evacuation with practice drills and education / increasing awareness of residents in the area.

Mark both parts together.
Briefly stated advantages and disadvantages. View about which one is better weakly explained, whatever the view = 1–3 marks.
At least one advantage clearly stated for each of policies A and B. View clear and well supported with explanation = 4–5 marks. [5]

[Total: 40]

2 (a) (i) Accurate plot of pie graph = 2 marks.
Only one (or two) sectors correct = 1 mark.
Key completed to match pie graph = 1 mark. [3]

(ii) 6 figures, or 6 figures and about one quarter of another, filled in = 1 mark. [1]

(b) (i) differences –

- main water use: developing continents agriculture, developed industry;
- more domestic consumption in developed although size of difference between developed and developing is less marked than for agriculture;
- significantly greater industry use in developed than developing;

Two differences = 2 marks.
Supporting and relevant use of values for at least one of them = 1 mark. [3]

(ii) for example in Africa and Asia only up to 15% of water is consumed in other sectors or similar;

Any use of values for the three continents together, or for one individual continent, which emphasises dominance of use for agriculture for 1 mark. [1]

(iii) many people / more than half workforce in many countries are farmers;
most are subsistence farmers needing to feed big / increasing families;
need to grow two or more crops per year including one in the dry season;
some of the developing continents have large desert areas (e.g. Sahara in Africa);
economies of many developing countries rely on export of crops to developed world;
population pressure / droughts increasing the need to use more irrigation water;
any named examples which support points mentioned above;

Three points made along these lines. 3 @ 1 mark [3]

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(c) (i) Attempt to shade in the areas of sandstone and limestone below the indicated water table levels on both diagrams = 1 mark.

Shading / colouring used on diagrams shown in the box in the key, provided that some part of the shading on the diagram matches question need = 1 mark. [2]

(ii) Permeable rocks (limestone and sandstone) are surrounded by impermeable rocks (clay, and clay and granite) / permeable have impermeable rocks above and below them,
significance of this explained such as water stored in the spaces in permeable rocks cannot escape because of layers of rocks which do not allow water to pass through.

Layers of permeable rock outcrop on the surface so that they can be filled with rainwater, perhaps a suggestion that they are higher / upland areas likely to receive more rainfall.

Rocks are downfolded or slope at an angle allowing rainwater to flow deeper underground through the spaces (until trapped by impermeable layers).

One mark for identifying a way in which the rock lay out favours water store formation. Further mark (or possibly marks) for describing more fully how for each one. Any combination of one and two mark answers about lay out up to four marks. [4]

(iii) it is the only way that the permeable layers can be filled up / replenished;
elsewhere rainwater falling on the impermeable rocks will runoff over surface;
so water table levels would keep falling with use without this new rainwater;

Understood and clearly explained = 2 marks.
Some understanding without a full explanation = 1 mark. [2]

(iv) The general answer is yes – so all the marks are for explanation.

yes because:
at the deepest water point in the rock in the centre of the downfold;
almost at deepest point in the second diagram but not too deep;
well would need to be longer / deeper if sunk at the end of permeable layer;
water taken out will flow down to bottom / will stay below the water table longest;
relatively shallow wells in relation to amount / reliability of water supply obtained;

Points made along these lines. 3 @ 1 mark [3]

(d) (i) 25 metres; [1]

(ii) new well is 40 metres deeper than the old well;
more expensive to construct (100 000 rupees spent in 2007);
also more costly to obtain the water out of the well because of its depth which is why a diesel pump needed to be installed;

Two explanatory points along these lines demonstrating understanding. [2]

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(iii) Most of the evidence points towards unsustainable:

- having to go deeper and deeper to reach water supplies suggesting rate of water use is greater than rate of replenishment = basic answer
- if many other rice farmers are doing the same, then how long will the new well last?
- there could also be comment about the high water needs of growing a crop such as rice.

An answer of sustainable can achieve at best 1 mark for comment on the great depth which might provide enough water for at least the next generation.

Answer clearly explained showing understanding = 2 marks.
Some, but not full, explanation for chosen answer = 1 mark. [2]

(e) (i) relief – narrow, deep, steep sided valley is ideal, often found in the mountains, natural lake present;
climate – wet, high total rainfall, heavy rainfall, melting ice / snow for surface runoff / low rates of evaporation;
river – large river with a much water from its many tributaries;

Three physical advantages stated – all three could be for relief or climate. 3 @ 1 mark [3]

(ii) best farmland / houses / villages found on valley floor which will be flooded;
economic disadvantages such as loss of best farmland / livelihoods;
social disadvantages such as forced movement / break-up of communities;
promises about new homes, farms etc. not always kept;
dam and its water supply are often of no advantage to people living nearby;

Accept other possible lines of answering provided that they relate to local people, e.g. loss of ecosystems for human use but not for wildlife or broader environmental concerns.

Three points made along these lines. 3 @ 1 mark [3]

(iii) information capable of being used to support the prediction:
India for its population size is not water rich (14.5% of world population compared with only 4% of world total water flows);
another statistic which reflects this is that it has only about a quarter of the renewable water resources per head compared with the world average;
yet its water use at 93% for agriculture is higher than all the previously quoted sector percentages for continents at the start of the question;
and the bulk of its population which continues to increase relies on farming;

Strong case made with appropriate comment for indicated prediction strength = 3 marks.
Less strong case but still with appropriate comment = 2 marks.
Reliance on information given without meaningful comment = 1 mark. [3]

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(iv) one way is use of irrigation methods that consume less water such as trickle drip and clay pot – With further details can be worth up to 3 marks.

another is to change to crops which need less water, e.g. from rice towards other cereals or dry rice, or to use seeds which need less water to grow, e.g. drought GM varieties – Well described up to 3 marks.

use some dry farming techniques so that available water can be spread to cultivate crops over a wider area – With further details up to 3 marks.

Mark other suggestions about ways on their merit, provided that they match question needs – some may only be worth only up to 2 marks. Breadth from two ways needed for four marks. Point mark for ways and information about them up to three marks per way. [4]

[Total: 40]

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