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**CAMBRIDGE INTERNATIONAL EXAMINATIONS**

**International General Certificate of Secondary Education**

# MARK SCHEME for the October/November 2012 series

# 0680 ENVIRONMENTAL MANAGEMENT

**0680/22** Paper 2, maximum raw mark 80

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.

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**1 (a) (i)** 12 [1]

**(ii)** 3.2 [1]

**(iii)** The most used energy source at all three dates (however expressed), actual values stated from the graph to show high use (3.3 in 1990, 4.0 in 2010 and 4.5 in 2030) – up to 2 marks with comment / proper context / more than a list

Some idea of size of oil use relative to the total / about one third of total percentage of total expected to reduce slightly by 2030 (closer to one quarter than to one third of the total).

Three points such as these.
3 @ 1 mark [3]

**(b) (i)** Transport;
Oil is the basis for petrol / diesel / jet fuel used for motor vehicles, trains and aircraft, despite electric trains, some electric cars and some biofuels there is no substitute as widely available, cheap and easy to use,
Modern transport growth directly linked with oil based fuels.

Understood and clearly explained (whatever line of argument is used) = 2 marks
Some understanding but less strong explanation = 1 mark [2]

**(ii)** Other alternatives for making electricity are more widely available and some have been in use for a long time,
Before oil electricity was widely generated from burning coal,
Coal most widely used in countries with large deposits of the mineral such as China,
Gas is cleaner to burn than coal and oil which explains increasing use for electricity,
Good physical conditions exist for even cleaner renewables such as HEP in some countries,
Some are more environmentally friendly / sustainable ways of generating electricity.

Valid reasons such as these.
3 @ 1 mark
Maximum of 2 marks for answers without some comment included within them towards the general theme of much lower for electricity than transport. [3]

**(c) (i)** Global warming

**(ii)** Breathing problems / specific example such as asthma

**(iii)** Sulfur dioxide

3 @ 1 mark [3]

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**(iv)** Examples of local effects – soot and dirt leading to breathing problems, also discolouring brickwork and stonework, some acid rain is precipitated in the local area with damaging effects on plant life / rotting brickwork and stonework.

Examples of international effects – gases and acid rain can be transferred by winds to other countries / don't stop at country borders, especially where large industrial areas are located close to national borders.

Examples of global effects – most obvious is the increasing accumulation of carbon dioxide in the atmosphere, with subsequent effects of global warming such as rising sea levels, melting glaciers and increases in natural climatic hazards, examples of locations most at risk from the global impacts.

1 mark for distinguishing between examples of effects at all three levels / appreciation of the three different scales.
Remaining 3 marks for further description of how the effects operate at the different scales. [4]

**(v)** One bus can carry the same number of people as 40 cars with much lower carbon dioxide emissions into the atmosphere (only 1.5%)

Message to get people to give up their cars and use public transport.

Clear answers for both questions, showing a full understanding = 2 marks
Answers more dependent on direct use of information given, enough to display a basic understanding = 1 mark [2]

**(vi)** 'Another way' means that the option of more use of public transport cannot be used, unless it is clearly different from the Dubai example used in the question, such as underground metro systems to replace surface traffic e.g. in Cairo.

Choice of other ways includes:

Reducing vehicle emissions either by using catalytic converters on exhausts, using cleaner fuels like CNG, biofuels, CBG (cleaner burning gasoline in LA); description could take the form of examples such as CNG to drive Indian tuk-tuks.
Traffic management schemes such as banning vehicles from city centres, prohibiting entry of cars on certain days according to registration numbers.

One other valid way such as these identified and described = 2 marks. [2]

**(d) (i)** Obvious choices are China among the countries and Los Angeles, Santiago and Beijing among the cities.

Award one separate mark for naming a country or city if it is a well known air pollution hotspot.

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**(ii)** Factors which influence the level of air pollution include:

Physical such as dominance of high pressure and sinking air, low average wind speeds, little rainfall, and valley / plateau between higher mountain peaks where inversions of temperature can help trap the pollutants
Existence of or level of regulation for control of emissions from factories and vehicles degree of enforcement of these regulations
Wealth of the country since reducing emissions costs money for individuals, companies and governments; also amount of industrial development and economic activity

Valid name in **(i)** = 1 mark
Mark the two parts of the answer together.

General answers; general factors without anything specific for the named country or city or even none named maximum of 3 marks for answers about factors which cause some places to be more badly affected by air pollution than others. Three mark answers are most likely for candidates who refer to both physical and human factors = 1 to 3 marks

Answers with something specific for a named country or city; reference to both physical and human factors = 4 to 5 marks [5]

**(e) (i)** Use of fossil fuels – values taken from the graph

1990 7.2 out of 8.8 = 82% of total
2010 9.7 out of 12.0 = 81% of total
2030 12.8 out of 16.8 = 76% of total

Clear recognition (either from a statement or from graph use) that oil, coal and natural gas are the fossil fuels, realisation that their relative importance is expected to fall slightly by 2030, as a result of slight increases in each of the other four alternative sources, but without fossil fuels losing their great importance / dominance, use of values from the graph to support statements made along these lines.

3 @ 1 mark in line with the above guidance for marking. [3]

**(ii)** Vertical line accurately placed half way between 70 and 80 on graph. [1]

**(iii)** Costs of setting up power plants can vary for a variety of reasons such as:

How good are the natural advantages of the location
How easy is access for construction and operation
Costs of labour and materials in one country compared with another
Need or otherwise to import the materials, equipment and technology

The difference in costs shown between offshore and onshore wind electricity production suggests ease of access and operation for land wind farms.

Some basic understanding why the cost of setting up power plants is not going to be the same everywhere (in all countries and types of locations) = 1 mark
Valid reasons for this suggested along the lines indicated above = 2 marks [2]

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**(iv)** The graph helps by showing that:

Of the three power types, only onshore wind is cost competitive with oil at the world oil price prevailing in mid-2010
Most of them are significantly more costly; for example, offshore wind production can be double the cost
Building new nuclear power stations needs an oil price above 90 to make it cost competitive

Knowledge of wind power and nuclear might be used to make points such as these:

There are no carbon dioxide emissions from nuclear and wind power, and the importance of this
Wind in particular is a renewable and environmentally friendly alternative to fossil fuels
Some governments are working to targets to reduce their emissions so they offer financial support to companies, thereby reducing their costs of construction
Not everywhere is suitable for wind power and there can be local opposition
Not every country has the technology and money needed to set up nuclear power stations

The evidence suggests that companies are not too likely to be setting up large numbers of wind and nuclear power plants with a world oil price of 75 dollars, as in mid-2010.
The financial incentive is not there.
However, a candidate can come to another conclusion provided it is justified, such as by stressing that economic factors can be less important than political factors, or referring to variations in oil prices and possible / likely future increases in prices.

Answer not well organised and/or incomplete. Basic points only made.
Any views expressed weakly supported by graph use or knowledge = 1 or 2 marks

Clear focus on the likelihood or otherwise of building new wind and nuclear power plants; explanation based upon both graph evidence and knowledge = 3 or 4 marks [4]

**(f) (i)** Nuclear indicated in a clear way to the exclusion of the others. [1]

**(ii)** Possible to answer on an individual point basis, either directly for nuclear or comparatively for how it is different from one or both of the others.

Examples:
Not renewable since uses uranium as its raw material, whereas wind is because it uses the weather
Not safe because dangers of radiation and its consequences for living things
Wind is weather dependent which rules it out
Oil has carbon dioxide emissions which rules it out.

Also possible to answer it on a general basis, for instance giving additional details of the characteristics of nuclear power which match up with the assessment.

3 @ 1 mark for explanation [3]

**[Total: 40]**

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**2 (a) (i)** 1990 – 2010 [1]

**(ii)** Basic change from a higher percentage in developed in 1950 to a much higher percentage in developing in 2010,
References to percentages to illustrate this such as 1950 ratio 62% : 38%, compared with 25% : 75% by 2010,
Change in distribution between developed and developing occurred between 1970 and 1990,
Every 20 year period shows an increased percentage in developing / smaller percentage in developed.

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

**(iii)** Bar graph accurately completed in terms of numbers plotted and attempt to use the same type of shading.

3 @ 1 mark each for 1970, 1990 and 2010 [3]

**(iv)** The best definition for urbanisation is the increasing percentage of people living in urban areas; therefore the most conclusive evidence from the graphs is the persistent increase in the proportions of total world population living in cities, to the point where by 2010 more than half the world's population was urban.

Answer along these lines showing understanding = 2 marks
Part answer emphasising urban growth rather than proportions = 1 mark [2]

**(b)** High rates of natural increase:
Big differences between high birth rates and low death rates,
most likely supported by reasons for high birth rates such as poverty, traditions, value of children as workers, role of women

Possible also to mention why death rates have gone down due to spread of rudimentary health care and extinction of major killer diseases like smallpox.

Rural to urban migration:
Big differences in wealth, service provision and perceived opportunities between rural and urban areas, much bigger than in developed countries where personal mobility is greater and essential services such as water and electricity are supplied in all but the most remote rural areas.

Essentially 2 + 3 marks (for either element).

In all cases limit of 3 marks for answers without some comparative references to why higher and greater in developing than in developed world countries. [5]

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**(c) (i)** **S** marked on the cross section in one of the empty spaces – either on the steep sloped left of the river, or on the flat land next to it on the right, or on the steeper land on the right side. [1]

**(ii)** Advantages – provides the unused urban or near urban land on which poor rural can build shelters/homes; new in-migrants cannot afford the rents for already built city housing. Comment could also be made about the closeness of the location to the city and the opportunities to find work (formal or informal). Depending on the location used, this could be for city centre jobs or nearness to the factories. A location chosen left of the river might be less good in this respect.

Disadvantages – steep locations at risk from landslides etc, especially after heavy rain, or events such as earthquakes. Floodplain location prone to flooding; also stagnant water might be breeding grounds for mosquitoes. In other words, land not already built on was probably left for a good reason. All will lack essential services, at least at first, because they are not part of the already built-up area. Increasing distances to work would be an additional factor for locations higher up the slope on the right.

No valid location on section; general points only = maximum 1 mark
Location valid, but limited range of points; valid points may be all advantages or all disadvantages = 2 marks
Answer well related to the chosen location, with a healthy mixture of advantages and disadvantages = 3 marks 3]

**(d) (i)** Relevant content from the newspaper account – ramshackle houses, made from wood and corrugated iron, separated by open sewers, drug dealers ruling streets, police raids, high murder rates In other words, typical appearance and social problems that are widespread in many shanty towns.

One or two descriptive points = 1 mark
Fuller choice of points and / or with a short comment directing the answer towards the question theme = 2 marks [2]

**(ii)** Services provided / infrastructure improved – paved roads, street lighting, libraries and cultural centre built, sports centre, bus services with a link to the rail system.
Drug dealers cleared out.
Commercial life – cafes, fruit stalls and beauty parlours along the main street.

Evidence – up to 2 marks based on completeness or how well it is arranged.
Some comment about how these shows a stable low income neighbourhood for the 3rd mark.

2 + 1 mark = 3 marks [3]

**(iii)** Workers' Party took control of the local administration and provided essential services.
NGOs and local businesses supported the changes and financed some new amenities such as the sports centre.
The police took an interest and cleared out the drug dealers.

These are main reasons directly stated in the newspaper account. A reasonable inference would also be that people are more likely to be in work from improved transport links to Sao Paulo city centre.

Any two of these. [2]

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**(e) (i)** Rivers polluted, used as dust bins for human waste and litter
Polluted lakes and seas from lack of sanitation, destroying all signs of plant and fish life
Overuse of underground water stores, present use much greater than rate of natural replenishment
City growth and sprawl destroy woodland and natural habitats
Air pollution from congested roads / factories

Three types of environmental damage identified; allow other valid suggestions = 3 @ 1 mark.
4th and 5th marks for some further description either related to either cause or effects, and / or use of an example. [5]

**(ii)** The basic point is that despite increasing its population by 10%, Freiburg has managed to reduce its carbon dioxide emissions by an even larger 14%.
Here population growth is not leading to increased emissions and a greater contribution to world atmospheric pollution, which is why its growth can be described as more sustainable.

Well understood, and probably answered with the support of values from the graph = 2 marks
Some understanding, but description how could have been more complete = 1 mark answer [2]

**(f) (i)** The sketch includes:

Provision of public transport links to other cities to reduce use of private car for work etc.
Plenty of cycle tracks and walkways linking to the shopping centre, again avoiding need for car use
Plentiful green spaces around houses and lake provide open spaces for recreation and play, improve appearance, offer natural habitats, absorb rain water reducing risk of excessive runoff leading to flooding, improve quality of life
Eco-friendly / energy efficient buildings with insulation etc. to stop either heat loss or reduce outside heat from entering. Eco-friendly could also include the use of natural or recycled building materials
Renewable energy sources on roof sketch shows wind turbines and solar panels for clean, renewable energy supplies
Water treatment works sustainable cleaning / reuse of clean water.

Mark amount and quality of the description towards the theme of sustainable living. Most likely is a divide 2 + 2 marks, but allow 3 + 1 if deserved. [4]

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**(ii)** One clue in the sketch to trigger off the answer is the presence of the water treatment works on one side of the lake. Prevents all the disadvantages to the environment from the disposal of raw sewage, plus can supply recycled clean water for reuse; water is a precious resource for many cities.

For other wastes such as domestic, commercial and industrial it is best if using landfill can be avoided with its high environmental impacts in favour of reusing (e.g. glass bottles), and recycling (e.g. paper and plastics) as well as reducing waste by separating out organic waste for composting or bio-digesting.

Expect most of the answer to be about how impacts on the environment can be reduced, but allow some credit for references to environmental impacts of untreated wastes.

Four valid points relevant to the question theme.
4 @ 1 mark [4]

**[Total: 40]**

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