CAMBRIDGE INTERNATIONAL EXAMINATIONS

International General Certificate of Secondary Education

MARK SCHEME for the October/November 2

0680 ENVIRONMENTAL MANAGEMENT

0680/23 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.

Cambridge will not enter into discussions about these mark schemes.

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

1 (a) (i) 0.039

(ii) used by plants for photosynthesis,
supported by further details – up to 2 marks

absorbs long wave radiation / heat from Earth's surface,
supported by further details about stopping the Eart
up to 2 marks

(b) (i) no difference

(ii) more heat trapped / less heat loss into space

(iii) more / thicker layer of carbon dioxide

2 correct = 1 mark All 3 correct = 2 marks [2]

(iv) light from the sun passes through the atmosphere and heats the Earth's surface by day,
different effect at night because some of the surface heat is trapped by greenhouse gases,
this keeps more warmth trapped within the Earth's atmosphere,

well explained and clearly understood = 2 marks
part explanation; some understanding = 1 mark [2]

(c) (i) 5 times longer [1]

(ii) **1** percentage contribution of carbon dioxide is around 65% (64% plotted) / clearly more than half,
the remaining 35% (36%) is shared between three other gases showing the size of carbon dioxide alone / largest percentage contribution of any of the others is under 20% (18% for methane),
it stays in the atmosphere for a long time / 200 years,
only CFCs with 1000 years stay longer.

minimum 2 marks, maximum 3 marks

2 CFCs percentage contribution is only 14% / third in the list / 50% less than from carbon dioxide,
key point is that it remains in the atmosphere for such a long time 1000 years,
five times longer than carbon dioxide means that it will still be there to have an effect when the other greenhouse gases have been absorbed.

minimum 2 marks, maximum 3 marks [4]

(d) (i) carbon dioxide: factories burning fossil fuels
car engines running on petrol

methane: livestock farmers keeping cattle
decomposition of waste in landfill

CFCs: refrigeration and air conditioning
use of aerosol sprays

nitrogen oxides: crop farming using chemical fertilisers
exhaust emissions from old trucks and buses

6 – 8 correctly placed sources = 3 marks
4 – 5 = 2 marks
2 – 3 = 1 mark
if question interpreted so that only one source per box is entered,
then two correct without any incorrect additional sources = 1 mark,
three correct = 2 marks
four correct = 3 marks [3]

(ii) deforestation [1]

(iii) true: includes farming, factories, transport and domestic, which means that it must apply to everyone; all must make some contribution, no matter how small, even a poor subsistence farmer keeping animals living in a remote rural area without electricity and modern transport; perhaps only tribes in remote places with little or no contact with outside, such as in the Amazon, may be exceptions

what matters is the amount released per head which rises significantly with higher levels of economic development, more people living and working in urban areas, higher domestic levels of consumption and access to private transport; developed countries are the centres of consumption

about high output per head in North America compared with others countries; greatest national output of carbon dioxide is now from China (but still relatively low per head) because of its rapid industrial growth

basic answer: simple statements, probably confined to just one aspect of the question (a narrow view), without much in the way of exemplification. = 1 or 2 marks

stronger answer: the view expressed is explained in a way showing candidate understanding. Likely to emphasise the greater importance of emissions per head, and their considerable variations between countries. = 3 or 4 marks [4]

(iv) ozone layer is a relatively thin layer at the top of the stratosphere / the least dense part of the atmosphere,
absorbs is the sun's UV radiation,
the top of the ozone layer is warmest as a result,
but the proportion of the total solar radiation that is absorbed is tiny, having little effect on the amount of short wave / light radiation that reaches the surface

two points, which show that the role of the ozone layer is understood.
2 @ 1 mark [2]

(v) ozone layer acts as a shield stopping damaging UV rays
prevents 97% of the sun's UV light from reaching Earth's
UV light is linked to increases in skin cancer and cataract
and to a reduction in immunity to disease

two points made along these lines.
2 @ 1 mark

(e) (i) plot – all correct = 2 marks
at least 4 correct = 1 mark
plots joined with a line = 1 mark [3]

(ii) kept on increasing throughout / large increase from 1860 to 2000
rate of increase has speeded up over time / faster increase from 1960 onwards

1 mark each for identifying these are the two most important things shown.
3rd mark for quoting from graph about steepness of the line or values which directly support one or both of these. [3]

(iii) some additional information about the three international meetings named may be given, such as Kyoto set targets which only applied to developed countries, then the USA (the largest polluter) refused to sign; developing countries participated in the later two, where China and other developing countries felt that they were being asked to pay too high a price for past and present emissions from developed countries

reasons why it is difficult to reach agreement over emissions reductions:

- reducing emissions costs money; world economic development has been based on carbon burning fossil fuels, the cheapest and easiest way to obtain energy, but also the dirtiest; developing countries want to have their share of economic growth like the developed countries have already done, so that their emissions are increasing
- most alternative energy sources are more expensive than using fossil fuels; improvements in technology to make them more economic have been slower than predicted; often there are other objections to non-fossil fuels such as damage from big dams for HEP, dangers of radiation leaks from nuclear power; solar limited by high costs of PVs
- governments of the world have different interests and priorities; differences in attitude between developed and developing countries; but also between developing and between developed e.g. industrial China and Asian countries at risk from rising sea levels such as Bangladesh / Maldives
  e.g. private enterprise USA compared with EU where the influence of the environmental lobby on governments tend to be stronger
- more general point – how do you get almost 200 countries in the world to agree about anything?

concentration on one reason or one line of argument
Simple statements made with limited further development
General points only with limited total coverage. = 1 or 2 marks
at least two different reasons referred to in the answer; one of them may have been developed and / or exemplified by reference to countries or world regions = 3 or 4 marks

more than one reason elaborated upon; precise answer supported by references to world regions and / or countries; comment included which links well to the question = 5 marks [5]

(iv) nations most at risk are low lying island nations, many in especially coral islands such as the Maldives which are above current sea levels; also at high risk are delta nati cannot afford coastal protection works like richer delta na

reference to candidate's home country and its attitude wo
– could refer to the attractions of low lying coastal areas
– not an issue for landlocked countries, most big count coastal lowlands

explanation about why and why different – up to 2 marks without references to examples of countries
explanation about why and why different with names and related information about one or more countries – up to 4 marks [4]

[Total: 40]

2 (a) (i) - - - - - cold current ——— warm current [1]

(ii) on the map, the cold currents are:
Atlantic Ocean – Labrador, Canaries, Benguela, Falkland
Pacific Ocean – Kurile, Californian, Peruvian (Humboldt)
Indian Ocean – West Australian
on the map, the warm currents are:
Atlantic Ocean – Gulf Stream, North Atlantic Drift, Brazilian
Pacific Ocean – Kuro Siwo, North Pacific Drift, East Australian
Indian Ocean – Mozambique

one warm and one cold current identified and named
2 @ 1 mark [2]

(iii) letters placed off Newfoundland and off Kamchatka Peninsula, guided by meeting of warm and cold currents.
both needed for the mark. [1]

(iv) ocean currents carry nutrients,
constantly replenished they support great amounts of phytoplankton,
cold water currents with upwelling from sea bed particularly rich,
warm and cold currents meeting benefit from mixing of different nutrients,
phytoplankton support a rich food chain leading to great fish shoals.

two points such as these 2 @ 1 mark [2]

(v) wide expanses of continental shelves / shallow coastal w
located examples or contrast with steep continental slope
shallow waters (with more light and nutrients) are rich in

close to many well populated coastal regions with food re
fish is a traditional part of the diet in many northern count
developed countries able to afford larger boats using late

three points such as these, preferably at least one physic
answers need to be precise and exemplified by referenc
all three points to be only physical or only human
3 @ 1 mark [3]

(b) (i) pie graph plot = 1 mark
key that matches pie graph plot = 1 mark [2]

(ii) 80% fished up to or beyond fishing potential / only 20% fished below what fish numbers could take,
the clear conclusion is that there is little room for further / increased fishing or that most ocean resources are being exploited to or beyond their potential.

values quoted and used, but with minimum or no comment answering the question = 1 mark
supporting values used for comment expressed in candidate's own words which answer the question = 2 marks [2]

(c) (i) massive / catastrophic decrease (not just decrease without an adjective or supporting values from 1 600 000 to 20 000),
greatest drop from 1960 to 1965 when stocks halved / from 1 600 000 to 800 000,
other smaller sharp falls from 1970 to 1975 / from 1985 to 1990,
only increase was from 1975 to 1980 to interrupt pattern of decrease,
uniformly very low (around 20 000) from 1995 to 2005

Three points like these picking out the significant rather than the minor.
Max 1 mark for answers without use of values related to dates.
3 @ 1 mark [3]

(ii) fish stocks have remained very low at around 20 000 tonnes / have not recovered,
looks like the fishing grounds were closed too late to allow recovery of stocks,
suggests that stocks were over-fished including immature / young fish,
numbers below the biological limits needed for breeding and stock replacement,
cod were fished beyond their sustainable limits,
other causes such as illegal fishing, marine pollution and disease.

three points made along these lines which demonstrate understanding of what happened
3 @ 1 mark [3]

(iii) after 1994 a marked recovery in haddock occurred from
not yet back up to the peak of previous numbers (180 00
but had climbed back up to levels not previously seen sin
showing that the measures introduced seem to have be
before haddock numbers had fallen below their sustainab

three points made along these lines showing understandi
3 @ 1 mark

(iv) quotas; annual limits set for amount and type of fis
prohibited once fishing limit reached; limits need to be policed to be effective.

net limits; on types and sizes; allowing young fish to swim through the nets; leaving them to grow to maturity and reproduce.

closed season for fishing; during the main breeding season each year and restricting fishing in areas of the fishing grounds where the fish are known to breed.

two of these – 1 mark for identifying method and 1 mark for further description
mostly 2 + 2 marks = 4 marks
allow 3 + 1 if deserved for particularly full description of one of them [4]

(d) (i) after remaining relatively stable since 1960 (only small fluctuations in total numbers), a marked drop in numbers was observed between 2000 and 2005 to half previous numbers.

One mark for noticing the decline and giving it a context by using values or comparing it with what went before. [1]

(ii) suggests for the first time that there is a real risk of them being over-fished,
this could repeat the pattern seen with Newfoundland cod (1960–65) and Georges Bank haddock (1965–70),
would suggest that fishing restrictions are urgently needed.

2 explanatory points such as these, or 1 mark for full description and 1 mark for explanation
2 @ 1 mark [2]

(e) (i) food chain beginning with plankton
then the plankton consumers, sardines, anchovies, herrin
then the predator, fish cod, tuna, sharks

partly complete food chain – 1 mark
example of one complete food chain – 2 marks
complete food chain using the variety of species named i

(ii) yes: fishermen are more likely to turn their attention to c
will be a bigger market; this would relieve the pressur
chance for stocks to recover.

no: increased fishing of sardines would take away one of the food sources for cod and tuna, especially if fishing was large scale. This would then clear out another layer in the food chain, increasing the over-use of ocean resources.

Explanation which supports both views is acceptable.
Mark on quality of the explanation and understanding shown. [2]

(f) (i) name of area or tanker / well responsible for spill or leak = 1 mark
If insufficiently precise for the mark, carry forward as the named area without having awarded the mark here. The answers to parts **(ii)** and **(iii)** can still claim all five marks.
examples: BP Macondo well / Deepwater Horizon in Gulf of Mexico (2010) / Fukushima nuclear power station (2011) and Prestige tanker off NW Spain in 2002 [1]

(ii) likely causes include well blowout or explosion, tanker hitting rocks or breaking up in a storm, or leak from onshore oil refinery, or offshore / downriver from a big city in the developing world with inadequate sewage treatment works, or radioactive leaks from nuclear power stations, or more generally around mouths of the world's big rivers.

impacts on wildlife, coastal ecosystems, coastal human activities such as fishing and beach based tourism.

minimum of 2 marks; maximum of 4 marks

(iii) oil spills, especially those close to populated areas and in developed countries, tend to be dealt using such as detergent sprays, skimmers and oil booms; possible to call on the services of trained experts so that effects tend to be quite short-term.

others such as from industrial, agricultural and urban wastes in developing countries need controls at source, which involve organisation, money and the political will, all of which can be in short supply; little or nothing may be done; as also with nuclear leaks, humans depend on nature to do the clean-up job in its own timescale; with nuclear, everything needs to be done to stop it happening, although people can be given iodine tablets to reduce cancer risks

minimum 1 mark; maximum 3 marks

If no valid named example in **(i)**, maximum 2 marks for general points made relevant to parts **(ii)** and **(iii)**. [5]

[Total: 40]