

MARK SCHEME for the May/June 2015 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.

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.

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SECTION A

- 1 (a) (i) it is dragged along the sea bed;
it is very heavy;
the skids scrape along the bed/creates ridges/OWTTE;
heavy chains rip into the sea bed;
destroys seabed habitats; [2]
- (ii) the net is very large;
other creatures also live on/near/just above/just below the sea bed; [1]
- (b) *Accept any sensible suggestions, such as:*
- (depletes fish population so) reproduction does not replace the lost fish;
loss of food for organisms higher up the food chain;
species becoming endangered/extinct;
biodiversity effects explained;
- unemployment/loss of income;
shops in fishing ports do less trade/close;
poverty (area or individual);
shortage of protein/food in the diet;
catch is insufficient to feed the (growing) population;
cost of fish increases;
less fish for future generations;
international conflicts;
- Max. three for either group.* [4]
- (c) quotas exceeded;
use of net sizes smaller than allowed;
fishing in exclusion zones;
fish in by-catch die;
no laws out of territorial waters;
difficult to make/keep to international agreements;
difficult to police such large areas/high cost of policing;
short-term profit motives;
corruption; [3]

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- 2 (a) (i) it increases (with increased depth)/decreases nearer the surface; [1]
- (ii) water heated by contact with hot rocks;
water changed to steam;
steam turns the/turbines/generators; [2]
- (iii) geothermal; [1]
- (iv) renewable/sustainable;
constant generation unlike solar/wind power;
clean/little/no pollution; [2]
- (v) igneous/hot rocks not near the surface;
lack the finance/expensive to construct;
lack the technology; [1]
- (iv) earthquake; [1]
- (b) magma/lava/molten rock;
cools/cooling/solidifies; [2]
- 3 (a) (i) increase to 15/16 km;
decrease above 15/16 km; [2]
- (ii) 13/14/15 to 19/20/21; [1]
- (b) use of CFCs/halons/sulfur dioxide (much smaller impact than chlorine);
in air conditioning/refrigerators/aerosols/hairspray/insect sprays/detergent sprays etc.;
compounds containing chlorine/chlorine gas released into the atmosphere;
moves up to the ozone;
chlorine atoms catalyse/cause break down of ozone (molecules); [3]
- (c) (i) pollutants are spread round the Earth by its rotation;
carried by wind/owtte; [1]
- (ii) the gases that destroy are stable/remain for a long time;
old equipment/appliances/example of are still being used;
such a large problem will take a long time to repair itself; [1]
- (iii) skin cancer;
cataracts; [2]

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- 4 (a) (i) completion of bar at 60 000; [1]
- (ii) any from 45–49 to 90–94; [1]
- (iii) 225 000 to 235 000; [1]
- (iv) it reduced; [1]
- (v) *Accept current problems of population structure such as:*
- small working population to support large under 20 group;
- unemployed young workers;
- pressure on maternity services / lack of midwives;
- pressure on high schools / polytechnics / universities (any aspect, e.g. shortage of buildings / places / lecturers);
- unemployment of primary teachers / unused primary school buildings;
- future problems, such as:
- shortage of workers in future;
- unemployed teachers / lecturers / unused higher education buildings in future;
- large proportion of population of reproductive age so future population will grow quickly; [2]

(b) *Accept any sensible suggestion such as:*

- birth control / contraception;
- education / campaigns about family planning;
- education about benefits of reducing family size;
- more education for women;
- improve the standing in society of women;
- provide more jobs for women;
- encourage later marriage;
- laws against polygamy;
- reduce the desire for more children by better health care / food supplies;
- any special policy, e.g. China's one child policy / sterilisation;
- paying allowance for the first one / two children only;
- educating against traditional / cultural beliefs for large families;
- reduce immigration; [4]

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SECTION B

- 5 (a) (i) up then down;
 very low Jan to May;
 starts increasing (rapidly) in June;
 reaches peak in August;
 then declines (rapidly);
 max. two marks for quoting data from the graph: peak ca.36 000, lowest <1000, below 2500 Jan to May etc.;; [4]
- (ii) discharge increase with rainfall/positive relationship;
 peak a month later than peak rainfall;
 because water takes time to reach / flow down the river; [2]
- (iii) end of / mid July; to start of / mid October;
 August and September; [2]
- (iv) *Allow one mark per point plus one mark for development where appropriate.*
- loss of life;
 crops / livestock destroyed;
 lack of food / malnutrition / starvation;
 water supplies contaminated;
 may lead to cholera / typhoid;
 stagnant water for breeding mosquitoes;
 increasing risk of malaria;
 houses and contents damaged / lost;
 homelessness;
 infrastructure / transport disrupted;
 cost to government;
 businesses damaged;
 people out of work;
 loss of income;
 food costs increase;
 time / effort / cost of restoration when floods recede; [5]

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- (b) (i) 3% [1]
- (ii) $1390 \times \frac{3}{100}$ (million)
41.7 million km³
Accept ECF from (b)(i). [2]
- (iii) most water not available for use;
as it is in glaciers and ice caps;
or deep underground;
only small amount in rivers;
water not evenly spread over the Earth/wide variations in rainfall;
rapid population growth;
increasing demand for industry/irrigation/etc.;
rivers/lakes polluted; [4]
- (c) (i) 2; [1]
- (ii) *Max. one mark for a list of where. Requires some description of clustering, so two clusters described and a list of others would give max. three marks.*
not evenly spread;
mainly close to coasts;
some clusters such as south of N America (Gulf of Mexico); W Europe;
a few on W coast of Africa;
most in N hemisphere;
many/most in Atlantic (includes Gulf of Mexico); [3]
- (iii) mainly on shipping routes;
more likely near to where oil produced;
or where it is to be used; [3]
- (iv) oil poisons marine life;
reduces ability of gills to absorb oxygen;
and causes them to die;
oil penetrates feathers of sea birds;
so they no longer insulate birds/cannot fly;
can blind birds/fish/sea mammals; so they cannot find their prey;
affects ability to smell; so cannot find prey;
blocks filter feeding apparatus, e.g. corals;
layer on surface blocks sunlight;
so reducing photosynthesis;
and reducing gaseous exchange/oxygenation;
disrupts food chain; [4]
- (d) Two marks for accurate pie graph.
One mark if one or two sectors inaccurate.
One mark for correctly completed key. [3]

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(e) Indicative content:

Wide variety of ideas to be explored, such as:

Ocean currents and winds cause pollution to spread (required for top level).

Pollution caused by all nations bordering oceans and by landlocked countries via rivers and wind.

Outside territorial waters there is no individual country ownership of or responsibility for the ocean/sea.

Ships often under 'flags of convenience' so little control by that nation.

Often hard to identify polluter so all need to take responsibility.

Many nations need the oceans resources of fish so all need to work together to preserve environment.

Do not expect Level 3 answers to cover all aspects. Mark on quality of response.

Level 3 5–6 marks

Answers the question and provides at least two reasons explained well or three in less detail.

Must cover the fact that pollution is spread to all parts of the oceans no matter where it originates.

Level 2 3–4 marks

Some detail of at least two reasons with some explanation. If both done well the answer will reach the top of the level.

Level 1 1–2 marks

Basic descriptive points with little or no explanation. May just be a list or one good point.

No response or no creditable response scores zero marks.

[6]

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- 6 (a) (i) 380–390 ppm [1]
- (ii) temperature: 20 °C;
how long ago it occurred: 125 000 to 130 000 years ago; [2]
- (iii) similar shapes/when one goes up or down so does the other;
recent increase in CO₂ not matched by such a large temperature increase; [2]
- (b) (i) Two marks for all four correct.
One mark for two or three correct. [2]
- (ii) largely dependent on fossil fuels/example of a fossil fuel;
which contain a large amount of carbon;
which when burnt produces CO₂.
- May answer in terms of why renewables/nuclear unable to provide sufficient electricity,
or are costly for max. two marks.* [3]
- (c) (i) doubled/4 billion tonnes/from 4 to 8 billion tonnes; [1]
- (ii) all increased;
largest/massive increase in Asian emissions;
small increase in Europe and/or in N America;
others more than doubled;
S America and Oceania and Africa still small emissions but much larger than in 1970;
- Max. one mark on data.
Max. one mark if just a list with no comparisons.* [4]
- (iii) *Must be able to be seen as possible strategies. Allow development marks.*
- change to renewables/nuclear for electricity generation;
increased efficiency of engines;
insulation to reduce heat loss and energy demand;
recycling materials uses less energy than primary processing;
public transport policy;
banning of old vehicles;
policy for reducing deforestation;
etc.
- Two points well explained can achieve all four marks.* [4]
- (d) (i) fuel derived from prehistoric/ancient plants and animals;
formed by anaerobic decay/heat/pressure;
carbon (hydrocarbon) based; [2]
- (ii) two from oil (petroleum), coal, gas; [1]

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- (e) (i) soil/overburden stripped away;
loosened by explosives;
mineral extracted using diggers/mechanical shovels/etc.;
taken away by trucks; [2]
- (ii) visual pollution;
waste heaps;
noise pollution from blasting/machinery;
loss of habitat/wildlife;
atmospheric pollution/dust;
transport of mineral causing air pollution;
pollutants seeping into groundwater/lake/rivers; [4]
- (f) (i) does not produce carbon dioxide/contribute to enhanced greenhouse effect;
less transport of fuel needed; [2]
- (ii) in favour because:
provides employment;
and social/economic benefits as a result;
provides power supply;
- against because:
risk of leaks/accidents;
so releasing radioactive materials/radiation;
radioactive waste problem;
which may cause cancer/illness/death;
- Max. three marks on either side of the debate.* [4]

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- (g) Indicative content for:
 Long lasting supplies.
 Fossil fuels diminishing rapidly.
 Renewables such as solar or wind not reliable.
 Access to resources not a limiting factor for siting.
 Biofuels cannot meet demand.

Indicative content against:
 No solution to waste problems.
 Risk of leak, accidents, terrorism.
 Expensive to build and decommission.

Do not expect Level 3 answers to cover all aspects. Mark on quality of response.

Level 3 5–6 marks

Answers the question and provides at least two reasons explained well or three in less detail.
 Must look at both sides of the argument.

Level 2 3–4 marks

Some detail of at least two reasons for and/or against. May answer the question but provide only reasons with limited development.

Level 1 1–2 marks

Basic descriptive points with little or no reasoning. May just be a list of for and/or against

No response or no creditable response scores zero marks.

[6]

[Total: 120]