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**ENVIRONMENTAL MANAGEMENT**

**0680/22**

Paper 2

**May/June 2018**

MARK SCHEME

Maximum Mark: 80

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**Published**

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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**PUBLISHED****Generic Marking Principles**

These general marking principles must be applied by all examiners when marking candidate answers. They should be applied alongside the specific content of the mark scheme or generic level descriptors for a question. Each question paper and mark scheme will also comply with these marking principles.

**GENERIC MARKING PRINCIPLE 1:**

Marks must be awarded in line with:

- the specific content of the mark scheme or the generic level descriptors for the question
- the specific skills defined in the mark scheme or in the generic level descriptors for the question
- the standard of response required by a candidate as exemplified by the standardisation scripts.

**GENERIC MARKING PRINCIPLE 2:**

Marks awarded are always **whole marks** (not half marks, or other fractions).

**GENERIC MARKING PRINCIPLE 3:**

Marks must be awarded **positively**:

- marks are awarded for correct/valid answers, as defined in the mark scheme. However, credit is given for valid answers which go beyond the scope of the syllabus and mark scheme, referring to your Team Leader as appropriate
- marks are awarded when candidates clearly demonstrate what they know and can do
- marks are not deducted for errors
- marks are not deducted for omissions
- answers should only be judged on the quality of spelling, punctuation and grammar when these features are specifically assessed by the question as indicated by the mark scheme. The meaning, however, should be unambiguous.

**GENERIC MARKING PRINCIPLE 4:**

Rules must be applied consistently e.g. in situations where candidates have not followed instructions or in the application of generic level descriptors.

**GENERIC MARKING PRINCIPLE 5:**

Marks should be awarded using the full range of marks defined in the mark scheme for the question (however; the use of the full mark range may be limited according to the quality of the candidate responses seen).

**GENERIC MARKING PRINCIPLE 6:**

Marks awarded are based solely on the requirements as defined in the mark scheme. Marks should not be awarded with grade thresholds or grade descriptors in mind.

Question	Answer	Marks
1(a)(i)	16 (km); –74 (°C);	<b>2</b>
1(a)(ii)	<i>any three from:</i> temperature increases, to the stratopause / in the stratosphere / to 50 km / –74°C to –19°C; temperature decreases, to the mesopause / in the mesosphere / to 85 or 86 km / –19°C to –95°C; temperature increases, in thermosphere / –95°C to +80°C; (initial) further (small) decrease in temperature, in thermosphere / to 91 km;	<b>3</b>
1(a)(iii)	any indication across diagram between 20 and 30 km;	<b>1</b>
1(a)(iv)	<i>any two from:</i> ozone layer absorbs / protects, from UV radiation / light; which is damaging / harmful, to organisms; which causes, <u>skin</u> cancer / mutations / cataracts;	<b>2</b>
1(a)(v)	<i>any four from:</i> CFCs / halons (released into atmosphere); from, spray cans / aerosols / fridges / air conditioning / fire extinguishers; travel to / winds carry CFCs, to Antarctica; where they accumulate; reacts / act as catalysts destroying ozone; reaction of O <sub>3</sub> to O <sub>2</sub> ; exist in atmosphere for a long time;	<b>4</b>
1(b)(i)	sun heats Earth's surface, <u>which heats air above it</u> ;	<b>1</b>
1(b)(ii)	<i>any two from:</i> normally temperatures decrease with height; in temperature inversion, temperature increases with height; to create a warm layer at height / warm layer trapped between cold layers;	<b>2</b>

Question	Answer	Marks
1(b)(iii)	<p><i>any three from:</i>  pollutants from city released into atmosphere;  inversion / warm layer, stops air rising;  so pollutants, trapped / can't escape / reflected back;  while more pollutants, are added over time / accumulate;</p>	<b>3</b>
1(c)(i)	bar drawn to correct length (21.0%);	<b>1</b>
1(c)(ii)	15.6(%)	<b>1</b>
1(c)(iii)	<p><i>both electricity generation and agriculture must be covered for maximum credit:</i></p> <p>carbon dioxide;  methane;  is a / are, greenhouse gas(es);</p> <p><i>electricity generation:</i>  <u>burn</u>, carbon-based fuels / fossil fuels / coal / oil / gas;</p> <p><i>agriculture:</i>  rice growing / decaying vegetation, gives off methane;  cattle / other livestock, give off methane;  tractors / trucks for transport of farm produce, burn petrol / diesel / oil;  burning of, forest / crop residues;</p>	<b>5</b>
1(c)(iv)	<p><i>any three from:</i>  increased use of, renewables / alternative sources;  solar / wind / HEP / geothermal / other example;  increased use of nuclear power;  improving energy efficiency / example of;  reducing energy wastage;  legislation;  education;</p>	<b>3</b>
1(d)(i)	(pH) 5.0–5.6;	<b>1</b>

Question	Answer	Marks
1(d)(ii)	<p><i>any three from:</i>            in 1990 most of the country had rainfall of pH greater than 7.0;            by 2005, general decrease (in pH) / <u>rain is more acidic</u>;            larger area affected by acid rain;            SE / NE / NW pH has fallen to less than 5.0;            largest area less than 5.0 on SE;            no change in, West / North;</p>	<b>3</b>
1(d)(iii)	<p><i>any two from:</i>            increase in industry;            increase in vehicles;            increase in electricity generation;            increase in release of SO<sub>2</sub>;            increase in release of nitrogen oxides;</p>	<b>2</b>
1(e)	<p><i>Level of response marked question:</i>            Level 3 [5–6 marks]            The response will reach a conclusion that will agree with the statement. The answer will provide details of actions that may be taken internationally, supported with relevant examples or demonstrate an understanding of the difficulties in developing international implementation.</p> <p>Level 2 [3–4 marks]            The response will agree with the statement and describe how atmospheric pollution is an international problem, identify examples of air pollution sources or impacts, but lack additional detail.</p> <p>Level 1 [1–2 marks]            Basic descriptive points with little or no reasoning. May just be a list of for and / or against. Answers at this level may include discussion of some of the causes of air pollution and / or may suggest basic information on resolving the problems.</p> <p>No response or no creditable response [0].</p> <p><i>Level of response marking indicative content:</i>            Candidates will most likely discuss sources of atmospheric pollution. Better answers will look at how atmospheric pollution spreads from source areas through winds and so reach a conclusion that it is necessary to have international cooperation to overcome the problems. Examples of the problems are likely to include global warming, CFCs and the ozone layer, and acid rain. The best answers will include ideas on actions that can be taken at an international level and include examples.</p>	<b>6</b>

Question	Answer	Marks
2(a)(i)	PCBs <b>and</b> flame retardants;	<b>1</b>
2(a)(ii)	accumulation of toxins within the body of an animal; when predator in the food chain feeds on prey the toxin is amplified;	<b>2</b>
2(a)(iii)	<i>any two from:</i> from, factories / domestic / agriculture; washed into oceans via, rivers / groundwater / drains; from airborne toxins washed out of atmosphere by rain; from, ships / oil rigs;	<b>2</b>
2(b)(i)	Peru (current);	<b>1</b>
2(b)(ii)	<i>any three from:</i> circular motion in, North Atlantic / South Atlantic; circulate clockwise (N); anticlockwise (S); further details such as name <u>and</u> direction of currents; Equatorial currents run East-West / parallel to Equator; warm currents flow towards poles; cold currents flow toward Equator;	<b>3</b>
2(b)(iii)	<i>any two from:</i> via Somali current; N. Equatorial current; and Agulhas current; from ships transporting oil from Middle East;	<b>2</b>
2(b)(iv)	<i>any two from:</i> lowers temperature; low rainfall; coastal fog / mist;	<b>2</b>
2(c)(i)	10 (m);	<b>1</b>

Question	Answer	Marks
2(c)(ii)	<i>any three from:</i> water flows (through turbines / floodgates), into lagoon / from sea (after low tide); water flows (through turbines / floodgates), from lagoon / into sea (after high tide); turns the turbines; which turn generators;	<b>3</b>
2(c)(iii)	tides / water always present; can be used over and over again / tides always move;	<b>2</b>
2(c)(iv)	155 000 (homes);	<b>1</b>
2(c)(v)	<i>any three from:</i> rivers carry silt; which will fill the lagoon; and clog turbines; reducing power generated; require lots of dredging; shorten life of scheme; would stop boats moving, up / down stream; impact on fish, movement / breeding; flooding of lower parts of river valleys;	<b>3</b>
2(c)(vi)	<i>any four from:</i> fish may get killed in turbines; species trapped in lagoon; leading to inbreeding; damage to habitats during construction; loss of habitats; changes to currents / tides, may damage habitats; possible erosion of beaches; food chain disrupted; specific pollution during construction – qualified;	<b>4</b>
2(d)(i)	both plotted points and line correct;	<b>1</b>



<b>Question</b>	<b>Answer</b>	<b>Marks</b>
2(d)(ii)	<i>any three from:</i> increased 1960 to 1968; from 1.1 to 1.9 (million tonnes); decreased until 1977; to 0.45 (million tonnes); up and down (a little) until 1990; decreased to 0.03 (million tonnes) by 1994 / 5;	<b>3</b>
2(d)(iii)	<i>any one from:</i> overfishing; fish stocks so depleted they cannot recover;	<b>1</b>
2(d)(iv)	the interaction of; living organisms (biotic) in conjunction with the physical environment (abiotic) components;	<b>2</b>

Question	Answer	Marks
2(e)	<p><i>Level of response marked question:</i></p> <p>Level 3 [5–6 marks] A detailed and balanced response covering plastics, raw sewage and heavy metals, resulting in a valid conclusion.</p> <p>Level 2 [3–4 marks] May discuss at least two of the pollutants, with some detail. The response might focus on plastics or another pollutant providing justification and detail.</p> <p>Level 1 [1–2 marks] Concentrates on one of the pollutants (not necessarily plastics) giving some detail of the dangers posed. Alternatively answers may include some descriptive points from a range of pollutants with little detail. May just be a list of risks.</p> <p>No response or no creditable response [0].</p> <p><i>Level of response marking indicative content:</i> The better answers will compare the impact of plastics, raw sewage and heavy metals. Fully comprehensive answers are not expected. Many candidates will agree with the statement and then try to justify this. Credit damage to marine ecosystems. There is no correct answer, but assess on the quality of the response. The following give examples of damage caused.</p> <p><i>Plastics:</i> swallowed by many creatures – build up can block digestive system killing the creature. Organisms can get entangled. Microplastics may clog gills. Ingestion by filter feeders and scavengers damages gut and plastics accumulate in stomachs of predators reducing food intake.</p> <p><i>Raw sewage:</i> can cause eutrophication. Shellfish and filter feeders consuming poisons – bioaccumulation up the food chain.</p> <p><i>Heavy metals:</i> these are poisonous above low levels and while some creatures seem to be unaffected, predators are more likely to suffer effects through bioaccumulation – possibly linked to marine mammals decreasing in number, and beaching themselves.</p>	6