ENVIRONMENTAL MANAGEMENT **8291/22**

Paper 2 **May/June 2019**

MARK SCHEME

Maximum Mark: 80

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.

Cambridge International will not enter into discussions about these mark schemes.

Cambridge International is publishing the mark schemes for the May/June 2019 series for most Cambridge IGCSE™, Cambridge International A and AS Level and Cambridge Pre-U components, and some Cambridge O Level components.

[Turn over

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)	(evapo)transpiration	**1**
1(a)(ii)	increased surface run-off; reduced (evapo)transpiration; reduced interception; reduced infiltration;	**max 2**
1(a)(iii)	increased building / infrastructure (using non-porous materials); reduces absorption / increases surface run-off; loss of trees; reduces evapotranspiration; less roots to slow the movement of water; greater volume of water enters rivers; more rapidly; increased amount raises river level too rapidly;	**max 4**
1(b)(i)	*January 10th, 2017:* there are more areas experiencing drought conditions; the drought areas are more widespread across the states; drought conditions are moving eastwards; drought conditions have spread south; there are more areas with the most extreme droughts; the area with the most extreme drought in 2010 is no longer experiencing that;	**max 3**
1(b)(ii)	patterns in local climate change; precipitation decreases; storm tracks change; increased temperatures; increase evaporation;	**max 4**

Question	Answer	Marks
1(b)(iii)	uses of natural supplies and new technologies; storing runoff in reservoirs; diverting flows from water-abundant to water-scarce regions; extracting aquifer resources; water reuse / use of grey water; desalination; rainwater harvesting; reducing high losses / waste from water supply distribution systems / households; education;	**max 6**

Question	Answer	Marks
2(a)(i)	more areas of severe bleaching; previously affected areas (2016) are larger; damage spreading further north / south; southern area remains undamaged;	**max 2**
2(a)(ii)	diving; boating damage (contact); boating damage from nets / lines / anchors; pollution; named pollutant; coral mining; overfishing;	**max 2**
2(b)(i)	increased global warming / climate change; leads to rising sea temperatures; El Nino affects sea temperature; and leads to increased bleaching; complex chemical changes in the water lead to increased coral bleaching; acidification;	**max 2**
2(b)(ii)	satellite imaging; aerial photos; dive monitoring; monitoring of sea temperatures; colour chart testing;	**max 2**
2(c)(i)	increased phytoplankton; decreased zooplankton; reduction in small fish; reduction in molluscs; increased coral; food web becomes unbalanced; likely increase in top predators / reef shark / sea eagle;	**max 4**

Question	Answer	Marks
2(c)(ii)	damage / kill large areas of coral; reduce biodiversity of coral; less coral available for secondary consumers; reduction in species in the food web; named example; less food for top predators; loss of habitat / shelter for species in the food web;	**max 4**
2(c)(iii)	collection / removal by divers; allows reduction of numbers and provides opportunities to inspect the progress / state of the reef; kill by chemical injections; some concern over chemicals entering the food web; disrupt reproduction with hormones; population gradually declines as reproduction rate falls; introduce predatory fish; these eat the starfish but could interfere with the food web; a robot has been designed to catch and inject the starfish; less need for human interaction with the reef and the species there;	**max 4**

Question	Answer	Marks
B3(a)	*Advantages:* Conservation of habitats, increased biodiversity, reduction of run-off from high ground, reduction in flood peak level, prevention of flooding, protection of properties, and increased water storage. *Disadvantages:* Cost, overcoming political inertia, landowners need convincing, re-introduction of species such as the beaver is controversial, changes take time to be effective, and need to educate. **Please use level descriptors 1**	**10**
B3(b)	*The question requirements are:* • To show understanding of the need to protect wild areas • To understand the principles behind methods such as national parks • To assess the success of such schemes. A range of schemes considered to include national parks, conservation areas, SSSI, wildlife parks and marine parks. Details of the individual schemes and how they operate to include legislation, education, staffing and the nature of work carried out. The principles behind the schemes and methods used Assessment of the relative success of each scheme described linked to the effects on the habitats and species therein as well as the balance between conservation and the use by the human population. **Please use level descriptors 2**	**30**

Question	Answer	Marks
4(a)	Lake Chad has shrunk dramatically in size, with the rate of loss accelerating. The loss of water has been from the north and east. Human population relies on the lake for water to support and irrigate crops, for drinking water for animals and themselves, and for fishing (both for food and as a living). Loss of water has also led to increasing desertification in the area. **Please use level descriptors 1**	**10**
4(b)	*The question requirements are:* • To outline factors which lead to the reduction of water supplies and stores • To describe how the loss of water changes the ecosystem and affects the lives of the people • To suggest strategies to manage the conservation of such water resources. Causes include loss of flow in rivers due to dams which also increase silting, increase in human population leads to increased use of water for irrigation, water for livestock and human drinking water. The change in weather patterns such as monsoon rains which recharge the lake failing leading to drought conditions. Deforestation, over-extraction from aquifers, pollution including global warming leading to loss of ice stores. Strategies to include seeking international cooperation for the diversion of rivers to refill lakes, encourage HEP dams to release water in regular flows, improve dredging processes to prevent silt build up, build efficient irrigation systems for farms to reduce waste, education of the population in water conservation e.g. grey water/recycling water, rain-water collection, desalinisation. **Please use level descriptors 2**	**30**

Question	Answer	Marks
5(a)	Advantages include 'renewable' tag as water isn't consumed during the process, can generate power continually, can retain water for controlled release to allow generation during peak demand, and once constructed doesn't generate waste or polluting by-products, they also provide recreational possibilities. Disadvantages include risk of earthquake damage, loss of habitats because of flooding, loss of biodiversity, disruption of fish migration patterns, disruption of human habitation or activities such as farming, pollution including noise pollution during construction, the loss of water flow downstream leading to increased silting, and they are very expensive to construct. **Please use level descriptors 1**	10
5(b)	*The question requirements are:* • To understand the problems involved in constructing HEP dams • To distinguish between the problems faced by countries with different levels of economic development • To assess the relative impact of HEP schemes in countries with different levels of economic development. HEP dams are very expensive to set-up and countries with low economic development haven't the resources to build and often rely on other countries for the construction costs e.g. China are building a lot of dams in Africa in return for access to mineral resources. The power generated doesn't always benefit the local population, and often these are the people displaced by the construction. Jobs aren't always generated locally as overseas workers are used. Costs escalate and projects overrun leading to long term financial losses and further weakening the local economy often for decades e.g. Brazil's Itaipu Dam. More highly developed economies can afford the HEP costs but don't always have the natural resources to warrant the use of HEP dams. They usually finish construction on time and within budget reducing the financial overburden. These countries also can afford mixed supply sources including solar and wind power. **Please use level descriptors 2**	30

Section B descriptor levels:	

Descriptor	Award Mark
Consistently meets the level criteria	Mark at top of level
Meets the criteria, but with some inconsistency	Middle, mark to just below top mark
Meets most of level criteria, but not all convincingly	Just below middle, mark to just above bottom mark
On the borderline of this level and the one below	Mark at bottom of level

level descriptors 1

Level one, 8–10 marks
The response:
- contains few errors
- shows a very good understanding of the question
- shows a good use of data or the information provided, where appropriate
- provides a balanced answer

Level two, 5–7 marks
The response:
- may contain some errors
- shows an adequate understanding of the question
- shows some use of data or the information provided, where appropriate
- may lack balance

Level three, 1–4 marks
The response:
- may contain errors
- shows limited understanding of the question
- shows little or no use of data or the information, where appropriate
- lacks balance

Section B descriptor levels:

level descriptors 2

Responses:

Level one, 25–30 marks
- fulfil all the requirements of the question
- contain a very good understanding of the content required
- contain a very good balance of content
- contain substantial critical and supportive evaluations
- make accurate use of relevant vocabulary

Level two, 19–24 marks
- fulfil most of the requirements of the question
- contain a good understanding of the content required
- contain a good balance of content
- contain some critical and supportive evaluations
- make good use of relevant vocabulary

Level three, 13–18 marks
- fulfil some requirements of the question
- contain some understanding of the content required
- may contain some limited balance of content
- may contain brief evaluations
- make some use of relevant vocabulary

Level four, 6–12 marks
- fulfil limited requirements of the question
- contain limited understanding of the content required
- may contain a poor balance of content
- may not contain evaluations
- make limited use of relevant vocabulary

Section B descriptor levels:
Level five, 1–5 marks •   fulfil a few requirements of the question •   contain a very limited understanding of the content required •   are likely to be unbalanced and undeveloped •   evaluative statements are likely to be missing •   make no use of relevant vocabulary