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**Cambridge International Examinations**
Cambridge International General Certificate of Secondary Education

**ENVIRONMENTAL MANAGEMENT** **0680/21**

Paper 2 **May/June 2016**

MARK SCHEME

Maximum Mark: 80

**Published**

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| Question | Answer | Marks |
|---|---|---|
| 1(a)(i) | both divisions correct;;<br>(one division correct;)<br>key completed to match pie chart; | 3 |
| 1(a)(ii) | *air*<br>respiration for soil organisms:<br>respiration for plants;<br>needed for decomposition;<br>oxygen / respiration for roots;<br><br>*water*<br>needed for photosynthesis;<br>dissolves minerals / nutrients for take up by plants;<br>prevents wilting / hydrates plants;<br><br>max 2 on either air or water | 3 |
| 1(a)(iii) | *any 4 of:*<br>decomposition;<br>of (dead) plant material;<br>of (dead) fauna);<br>and turn them into nutrients / humus / minerals;<br>worms aerate the soil;<br>move down / mix organic material through the soil;<br>role of organisms in: carbon cycle, nitrogen cycle, sulfur cycle; | 4 |
| 1(b)(i) | 2.5–3.0 times; | 1 |
| 1(b)(ii) | correct scale on x and y axes;<br>correct labelling of y axis;<br>5 or 6 points plotted correctly;;<br>(3 or 4 points plotted correctly;)<br><br>± half small square tolerance on plotting | 4 |

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| Question | Answer | Marks |
|---|---|---|
| 1(b)(iii) | *any 1 of:*<br>cheaper meat;<br>from agricultural intensification / more meat available;<br>increased wealth (in developing countries) – however indicated;<br>growth of fast food chains; | **1** |
| 1(c)(i) | Africa; | **1** |
| 1(c)(ii) | North America and Oceania; | **1** |
| 1(c)(iii) | *any 2 of:*<br>tradition / beliefs;<br>wealth explained / less developed explained / too expensive;<br>infrastructure such as transport, refrigeration;<br>suitability of land / climate for crop growing / animal rearing;<br>much meat exported;<br>other sources of protein; | **2** |

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| Question | Answer | Marks |
|---|---|---|
| 1(c)(iv) | *soil erosion*<br>trampling destroys vegetation;<br>trampling compacts soil;<br>overgrazing;<br>animals pull roots from soil;<br>soil becomes exposed to wind / water;<br>gets blown / washed away;<br><br>*water pollution*<br>produce (a lot of) waste / faeces;<br>can add pathogens / harmful bacteria / viruses;<br>fertilisers added (to fodder crops);<br>gets washed into groundwater / streams / rivers;<br>(or) animals defecate in water;<br>nitrates increase in water;<br>leading to eutrophication;<br><br>allow development marks, for example on impact of compacting soil, nutrients in water, etc.<br>max 3 on either soil erosion or water pollution. | **5** |
| 1(d)(i) | 6.5; | **1** |
| 1(d)(ii) | 1000 times; | **1** |
| 1(d)(iii) | *any 3 of:*<br>cattle produce (large amounts of) methane;<br>methane is a greenhouse gas;<br>which has much greater effect per molecule than carbon dioxide;<br><br>forests cleared to create cattle farms;<br>burning forests give off carbon dioxide / reduces carbon dioxide uptake;<br>carbon dioxide is a greenhouse gas;<br><br>so could lead to (enhanced) global warming;<br>explanation of how greenhouse gases trap heat to max 1; | **3** |

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| Question | Answer | Marks |
|---|---|---|
| 1(e)(i) | 1; | **1** |
| 1(e)(ii) | *any 3 of:*<br>new pesticides less toxic;<br>smaller amounts applied;<br>laws to restrict / ban use of pesticides;<br>restrictions on most hazardous / dieldrin and lindane; | **3** |
| 1(f) | *Indicative content*<br>excess fertilisers washed into water courses leading to algal blooms and eutrophication, with effects of plant and animal life in the water;<br>controlled application to limit excess fertilisers and possibly use of organic fertilisers;<br>clearance of algal blooms, oxygenation of water courses affected;<br><br>Level 3 5–6 marks<br>answers the question and provides detailed explanation of how fertilisers can damage the environment and then how those impacts can be reduced.<br><br>Level 2 3–4 marks<br>some detail of how fertilisers can damage the environment with some explanation of reduction of damage.<br>OR<br>provides detailed explanation of how fertilisers can damage the environment, but nothing worthy of credit on reduction or vice versa. Would need the one good part to be very good to achieve top of the level.<br><br>Level 1 1–2 marks<br>basic descriptive points with little or no explanation. May just be a list with little or no answer to the part on reduction.<br><br>no response or no creditable response, 0. | **6** |

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| Question | Answer | Marks |
|---|---|---|
| 2(a)(i) | *any 2 of:*<br>same amount of heat / energy in both rays;<br>smaller area to heat up at Equator / larger area to heat at Arctic Circle / high angle of incidence at Equator, low angle at Arctic Circle;<br>lower albedo at Equator / owtte;<br>less energy loss at Equator as shorter distance through atmosphere; | **2** |
| 2(a)(ii) | *any 2 of:*<br>snow and ice have higher albedo / forests have lower albedo;<br>so ice and snow reflect back most of solar energy;<br>forests darker so absorb more solar energy;<br>photosynthesis will absorb energy in forests / energy needed for growth; | **2** |
| 2(b) | November;<br>Bruce ;<br>Christine;<br>3;<br>April;<br>204; | **6** |
| 2(c)(i) | 16; | **1** |
| 2(c)(ii) | 5; | **1** |
| 2(c)(iii) | 6–7; | **1** |
| 2(c)(iv) | *onto land*<br>need warm water (to provide energy);<br>mention of role of latent heat;<br>so energy source cut off;<br><br>*south*<br>oceans become cooler;<br>so less energy to power the cyclone;<br><br>max 2 on land or south | **3** |

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| Question | Answer | Marks |
|---|---|---|
| 2(c)(v) | *any 4 of:*<br>cyclones at their strongest at the coast;<br>many coastal areas densely populated;<br>low-lying areas liable to flooding from heavy rainfall;<br>low-lying areas liable to flooding from storm surges;<br>as strong winds create large waves;<br>and low pressure raises sea level;<br><br>allow flooding for 1 mark even if no cause given; | **4** |
| 2(c)(vi) | *any 3 of:*<br>less educated about coping with a cyclone;<br>houses less strong;<br>technology for advance warning less advanced;<br>warnings may not get through to people;<br>fewer (if any) cyclone shelters;<br>search, rescue, medical facilities less good;<br>poor communication system;<br>evacuation less likely;<br><br>medium and/or long-term effects to max. 2;; | **3** |
| 2(d)(i) | *any 3 of:*<br>easterly winds weaken;<br>warm water current moves eastward / towards Peru;<br>rather than the usual westward direction / towards Australia;<br>cold Peruvian current blocked / replaced by warm water; | **3** |
| 2(d)(ii) | *any 2 of:*<br>warm water off the coast;<br>so more evaporation;<br>warm air (by ocean) likely to rise;<br>leading to condensation / cloud / rain; | **2** |
| 2(d)(iii) | heavy rain improves agriculture (or similar); | **1** |

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| Question | Answer | Marks |
|---|---|---|
| 2(e)(i) | phytoplankton;<br>zooplankton;<br>fish;<br><br>all correct = [2]<br>1 or 2 correct = [1] | **2** |
| 2(e)(ii) | *any 3 of:*<br>less food for fish / whales so their numbers reduce;<br>less fish for seals and penguins so their numbers reduce;<br>less seals and penguins so shark numbers reduce;<br>if no specifics can award 1 mark for general comment on reduction of all species in higher trophic levels;<br>phytoplankton will start to increase; | **3** |

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| Question | Answer | Marks |
|---|---|---|
| 2(f) | *Indicative content*<br>droughts tend to last longer and affect larger areas than floods or cyclones;<br>floods and cyclones cause more damage to property than droughts;<br>all can lead to soil erosion and loss of crops / animals;<br>cyclones and floods are short-term and may require emergency rescue, shelter, food, etc.;<br>effects of drought, being longer term, can be planned for, but can cause far more deaths than the others if no food aid, etc.;<br><br>most environments recover from such disasters;<br>it will depend on the severity of each disaster as to environmental effects, though flooding and cyclones more likely to result in pollutants being washed into water courses or the sea;<br><br>Level 3 5–6 marks<br>must communicate the features of at least one other climatic hazard besides droughts. Answers the question with detailed consideration of climatic hazards. Must look at both sides of the argument, so must be some discussion of floods and/or cyclones as well as droughts and their relative impacts.<br><br>Level 2 3–4 marks<br>Considers both sides (i.e. other climatic hazards besides droughts) with some details<br>OR<br>detailed consideration of one climatic hazard (probably droughts)<br><br>Level 1 1–2 marks<br>basic descriptive points with little or no reasoning. May just be a list of impacts of cyclones and an agreement without mention of other climatic hazards.<br><br>no response or no creditable response, 0. | **6** |

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