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Environmental Science 44401H

(Specification 4440)

Unit 1: Topics in Environmental Science (Higher)

Report on the Examination

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General

As this is the first time this specification has been examined it was pleasing to see a good spread of responses by candidates demonstrating good subject knowledge. Candidates scored well on those core topics that have been examined for some time, but many struggled with some of the newer topics such as biofuels.

As in previous years there were a number of candidates entered for the Higher tier who would have been better served if they had been encouraged to sit the Foundation tier paper.

Question 1 (common with Question 10 Foundation Tier)

Several candidates identified food miles as relating to trade between different countries but then failed to relate it to the distance the food has to travel, concentrating on fuel consumed or carbon dioxide produced. In part 1(b) a common error was to discuss the energy used in food production rather than in transporting. Candidates listing resources rather than describing the resources gained no credit.

Candidates were able to make good use of the stimulus material in part 1(c)(i) to suggest how 'Planet Thanet' uses natural resources. In part 1(c)(ii) a lot of candidates thought that increasing heat caused greater photosynthesis. Better candidates were able to discus the concept of optimum temperatures and rate limiting factors in photosynthesis.

In part 1(d) most candidates understood the need for additional energy in the form of heat to grow tropical plants in the UK but a few went down the route of the need to transport crops or fertiliser application. In part 1(e) most candidates were able to make at least one sensible suggestion. Common misconceptions related to global warming and the cost of transporting crops to MEDCs.

Question 2 (common with Question 10 Foundation Tier)

It was pleasing to see many candidates giving full answers rather than giving one word responses.

Candidates found part 2(c) the most challenging. Any suitably described survey technique was acceptable but just saying carry out a survey was not. Part 2(d) produced better answers.

Question 3 (common with Question 11 Foundation Tier)

The concept of biofuels was poorly understood even by Higher tier candidates. Better candidates understood that all biofuels rely on photosynthesis either directly or indirectly.

Many weaker candidates thought that cattle might be a good source of methane as a fuel, and while cows produce a lot of methane, we are unaware of a method to successfully harness this!

Many candidates thought carbon neutral meant that the fuels did no produce carbon dioxide . In part 3(d) candidates frequently ignored the word 'growing' in the question and wrote about pollution caused by fuel conversion or transport.

In part 3(e), which was only on the Higher tier paper, most candidates achieved the first mark for saying that biofuels generally have a lower energy density than fossil fuels, but very few were able to go on to explain that some biofuels such as biogas and alcohol can have energy densities that are equivalent to their fossil fuel alternatives.

Question 4

Many candidates thought the aim of the Earth Hour was to reduce energy consumption or carbon footprint for that hour rather than to educate, to change behaviour long-term or to raise awareness. The importance of the greenhouse effect for life on Earth was better understood with the majority of candidates able to explain its importance in terms of temperature regulation.

The concept of carbon licences covered in part 4(e)(ii) was not well understood by the majority of candidates.

Question 5

Part 5(a) caused few problems for candidates with all but the weakest scoring well. In part 5(b) many candidates were able to give one correct reason but few achieved both marks. Any answers relating to the impracticality or the technical problems involved in harvesting all the available energy were acceptable.

In part 5(c) candidates made sensible suggestions as to why energy demand fluctuates in any 24 hours, although a few discussed supply rather than demand. However fewer candidates were able to go onto explain how the mix of energies available in California could be used to meet its changing demand.

Only better candidates covered all four energy sources in an appropriate way. Many candidates covered solar and wind but ignored geothermal and HEP. Better candidates often covered all four sources but did not relate them to each other. Many candidates thought HEP was caused by tides.

A common misconception in 5(d)(i) was that wind and waves were in the same section because they both used turbines, rather than that the wind is what creates waves.
A significant number of candidates were unaware that wind is caused by solar heating, and therefore gave it as an incorrect answer to part 5(d)(ii). Better candidates were able to give two valid suggestions for 5(d)(iii), the majority suggesting the lack of sites and environmental impact as the reasons to explain why the contribution of HEP is unlikely to increase significantly.

Question 6

Question 6(a) was very well answered with candidates correctly identifying the USA as having the largest deposits of Oil Shale. Section 6(c) produced mixed responses with 6(c)(i) and 6(c)(iii) being the most challenging for candidates.

6(d) produced some very good responses with most candidate achieving 3 or 4 marks. It was pleasing to see that many candidates did not rely solely on the stimulus material but included their own knowledge of the different impacts of drilling and open-cast mining.

Question 7

7(a) was very well answered with the majority of candidates achieving the maximum 3 marks. In part 7(b) many candidates seemed to confuse aerobic with anaerobic. In part 7(c) several candidates lost marks by giving nitrogen and phosphorus as their answer rather than nitrates or phosphates. A common error in 7(d) was that the increase in algae/plant growth reduced oxygen levels rather than their subsequent death and decay.

Question 8

8(a)(i) was very well answered. The only common error was for the relationship to be given the wrong way around ie 'as the number of animal extinctions increased the human population increased'. In 8(a)(ii) several candidates attempted to describe further rather than explain the relationship. Centres could help candidates by explaining the various command words used in questions.

Several candidates described ways to protect species such as captive breeding which are not environmental management techniques in their responses to 8(b). In part 8(c), which was simple recall, disappointingly only a minority of candidates were able to give credit worthy answers.

Question 9

Parts 9(a)(i) and 9(a)(ii) were well answered but in part 9(a)(iii) many candidates struggled to give credit-worthy answers. What was expected was some reference to the management of the environment in intensive systems to increase productivity. In part 9(b) many candidates were able to explain why intensive agriculture needs high energy inputs but were then unable to apply their knowledge to say why this might be unsustainable.

In 9(c) the area where most candidates failed to gain marks was in the possible links between intensive agricultures and soil erosion, with many candidates linking soil erosion with a loss of nutrients rather than damage to soil structure.

While many candidates understood the principles of GM and its possible environmental consequences, only better candidates were able to explain why farmers might use GM in the scenario suggested.

Question 10

Part 10(a) gave candidates the opportunity to discuss in depth their understanding of the decline in fish stocks. As a question it discriminated well with better candidates achieving all 6 marks and a clear distribution down to the few weakest candidates who were unable to obtain a mark. Most candidates concentrated on improved fishing technology but a few more able candidates expanded into habitat damage and pollution as causes of fish decline. Several candidates wasted time repeating the question rather than getting down to answering it straight away.

In 10(b) several candidates explained what the terms meant rather than explaining their importance in making fishing more sustainable- again an example of how centres could help candidates by teaching them to recognise command terms in questions.

A good answer for 10(c) would have suggested that the Antarctic Convention was concerned with protecting the whole food chain of the Antarctic, while Common Fisheries Policy, tried to protect individual fish species by setting quotas.

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