ENVIRONMENTAL MANAGEMENT

Paper 5014/12
Paper 1 Theory

Key messages

- Candidates should read questions with care and respond to the command verb to maximise the credit achieved.
- Candidates should attempt all questions in the paper as it may be possible for weaker candidates to gain some credit even if they are less familiar with the topic. It is not necessary for candidates to repeat the question in their answer. This does not gain credit and avoiding the practice allows best use of examination time.
- The six-mark, level of response question requires candidates to look at the given topic broadly. The use of appropriate examples to support their views is beneficial. This question benefits from a level of planning which was evident is some of the scripts seen.

General comments

Candidates generally demonstrated a broad range of knowledge with few topics unanswered, although sometimes the responses were not contextualised to the question posed, for example, in **Question 2(b)**, the role of fish farming in the regeneration of wild fish stocks was required, rather than merely the benefits of fish farming.

Other topics which showed some weakness, were an understanding of population changes and examples of pronatalist policies.

The six-mark, level of response question at the end of the paper was attempted by most candidates. The structure of many responses was improved over previous series. Scripts often included evidence of the answers being planned more extensively.

Candidates showed confidence in completing the mathematical activities within this paper and were generally able to form valid conclusions. Graph drawing was generally neat, although the use of a sharp pencil, ruler and eraser would have allowed for greater clarity in some cases.

There was a general weakness in the interpretation of the population graph.

Comments on specific questions

Section A

Question 1

(a) (i)   The majority of candidates were able to correctly identify the gas missing from the key as Nitrogen with most responses also able to complete the calculation linked to the pie chart.

(ii)   A wide variety of gases were given credit, although many cited examples which are present in extremely small volumes rather than those that are more common such as carbon dioxide, water vapour or argon.

(b)   While short responses gained the credit, there were a few examples where candidates gave detailed responses linked to photosynthesis in plants. There were a small number of examples of candidates incorrectly citing respiration in plants.

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Question 2

(a) (i)   This question required candidates to apply the stated scale to the diagram to make a measurement. While a range of responses were given credit, a number of answers incorrectly measured the height of the continental shelf from the bottom of the diagram rather than to sea level as shown in the image.

(ii)   Most candidates attempted this question, with many being partially successful; the more able candidates managed to connect all the relevant issues to gain full credit. For example, many responses identified that the continental shelf was suitable for plankton growth and needed to go on to identify this as being a food source for fish.

(iii)   While attempted by most candidates, this question proved to be more challenging for many who identified that there were greater populations of fish on the continental shelf without relating this to the greater level of depletion. Stronger responses identified the ease of access close to the shore, or that smaller sized nets could be used in shallower water. Suggestions such as an increased level of pollution from the land were also given credit.

(b)   Many candidates showed considerable knowledge about fish farming, although limited their responses to the advantages of this method. These responses did not address the question posed, namely how fish farming would reduce the impact on wild fish stocks. The strongest answers identified that there was less fishing of the wild stocks which enabled time for breeding and the replenishment of the population.

Question 3

(a) (i)   The majority of candidates were able to correctly read the data from the graph to achieve an answer of 460.

(ii)   Most candidates attempted this more challenging question, many incorrectly assuming that the question required the observation of the decade, meaning they started their 10 year period at the year 2000.

(b)   Many responses correctly identified that natural disasters are random in their occurrence. The stronger responses also explained that disasters differ in intensity or duration which also impacts on the number of deaths that result. Weaker answers incorrectly attempted to describe how technological and medical advances meant there has been less impact in more recent years.

(c)   Most candidates were able to name at least one example of a disaster caused by tectonic plate movement with similar numbers giving volcanic eruptions, earthquakes or tsunamis.

Section B

Question 4

(a) (i)   A significant majority of candidates showed the appropriate skills in completing the bar graph; both plotting the bar at the correct height and also maintaining the width of the bars already present on the graph.

(ii)   Candidates showed good skills in ordering the data correctly and obtained full credit.

(b)   Most responses identified that the increase in agriculture would mean that more water would be needed for irrigation, and a few went on to explain that as the water is a finite resource, this would impact the availability of water for drinking. Many others also correctly identified the issues with pesticides and fertilisers leaching into the water system.

(c)   Trickle drip and clay pot irrigation were popular answers and responses generally showed a good knowledge of this subject area with no common misconceptions.

Question 5

(a) (i) The task of completing the graph was accessible to most candidates, showing accuracy in plotting and the need to join the plots to the others on the graph.

(ii) Most responses correctly identified that there had been an increase in energy use, although a number of candidates were inaccurate in reading the data from the graph.

(iii) Many responses correctly identified that some countries had a smaller supply infrastructure or their populations did not have the income to afford electricity or electrical devices. Some candidates needed to take into account that the data related to electricity use per person and instead referred to the size of the population or using renewable sources for energy generation in their answers, which were not given credit.

(b) It was important for the candidate to read and understand the focus of the question. Many answers referred to governmental actions rather than those which could be applied in a domestic environment. Similarly, the use of renewable sources would not reduce the overall use of energy in the home. Good responses included switching off devices when not in use, the use of more energy efficient devices and the use of insulation.

Question 6

(a) This question required candidates to interpret the information in the text to form conclusions and demonstrate understanding of the unfamiliar scenario. This was completed with various levels of success. Some weaker answers copied information from the text, which was not awarded credit, whereas those who expanded on this information were able to achieve well. Many identified that lionfish would disrupt the food chain by eating smaller organisms and some identified that as a non-native species in the area, there were less predators.

(b) This question, which required a description of the distribution of lionfish, was generally well attempted; many identifying the coastal locations and where these were in relation to the countries. A few candidates were able to describe the range of the distributions. The most common error was a confusion between East and West which had a large impact on describing a location. Credit was not awarded for stating areas where the lionfish were absent.

(c) Most responses correctly identified that targeted fishing would reduce the risk of bycatch. Fewer responses identified that spear fishing would not damage the seabed or corals, whereas the use of nets was likely to cause this damage.

Question 7

(a) (i) This question was very well answered with most candidates correctly calculating the maximum birth rate of 36.

(ii) Fewer candidates were able to identify the areas on the graph that show when there was an increase in population. Several responses shaded part of the quartiles shown on the graph and needed to complete these for credit to be awarded.

(iii) Only the most able candidates were able to access this challenging question and understand the processes within the graph to correctly position the **X**.

(b) Candidates were generally well prepared for this question and wrote confidently. Most cited improvements to healthcare as being the main reason for a decrease in death rate.

(c) A significant proportion of candidates answered in terms of antinatalist policies rather than pronatalist policies that were the focus of this question. Answers such as 'incentives' needed to be qualified with an example.

(d) Candidates often correctly recognised that the large percentage of older people and decreasing proportions of the working age groups were problems and gave reasons for this. Many other candidates needed to understand that a population pyramid represents percentages of the total population and not specific numbers.

Question 8

(a) (i)   This question proved to be very accessible across the ability range of candidates. The skills were present to interpret the diagram and formulate clear reasons why the proposed site, A, would be unsuitable.

(ii)   Slightly more challenging, candidates tended to score well on this question, identifying the technical difficulty in deeper extraction and the reduced cost benefit with the smaller size of the mineral reserves.

(b)   Generally well understood, the majority of answers provided two distinct reasons why the mine might be beneficial to the local population, although a few focused on the benefits of subsequent land restoration, which was not given credit.

(c) (i)   Most candidates were able to use the information correctly and calculate the predicted year that reserves of zinc would be depleted, 2100.

(ii)   Most candidates interpreted the data correctly to be able to provide tin as the answer.

(iii)   Some candidates were able to quote answers clearly and concisely and these responses achieved full credit.

(iv)   The six-mark, level of response question requires a longer answer and allows candidates to draw together much of their knowledge of environmental management. The strongest responses address the question presented, ideally look at both sides of the argument and come to a clear conclusion. These arguments are often supported with specific examples.

There was significant evidence in many scripts that candidates had taken time to plan their answers to ensure they were logical and covered a range of viewpoints. The strongest responses attempted to balance the need to conserve resources or use them wisely, with the impact this would have on economic growth. Whilst the discussion topic will vary with each examination session, candidates continue to show improvement in their preparation for this style of question.

ENVIRONMENTAL MANAGEMENT

Paper 5014/22
Paper 2 Management in Context

Key messages

- Candidates are not required to state the question in their answer. For example, 'It is difficult to grow vegetables in Málaga because…'. Avoiding this repetition allows candidates to make best use of examination time.
- The mark allocation for each question should be used as a guide by candidates to indicate the number of separate marking points that are required in each response.
- The use of bullet points in responses may help candidates produce concise answers that address a sufficient number of points.

General comments

Candidates should avoid vague statements such as 'causes harm', 'causes pollution', 'affects the environment', 'causes death'; these unspecific statements are unlikely to gain credit.

Candidates should be encouraged to check their question paper to ensure they have attempted every question.

Pie charts should be drawn with a sharp pencil and ruler. The sectors should be drawn in rank order, with the largest first, beginning at the top and proceeding clockwise. The key should match the sectors in the pie chart.

It is not advisable to use pen for any diagram, graph or chart. Errors are more difficult to correct if pen is used. A ruler and sharp pencil should always be used for a graph.

A number of candidates appeared unfamiliar with pitfall traps and transects.

There were a number of part questions where no responses were given.

Comments on specific questions

Question 1

(a) (i) Most responses correctly determined 4.2 as the percentage of the population working in the agricultural industry in 2020.

(ii) Many candidates found it challenging to determine the expected number of people living in urban Spain using the rate of increase provided. It was common for responses to omit the use of 'million' in their final answer, e.g. '40.5 people'.

(iii) Good suggestions for the effects of increasing urbanisation were seen. 'Deforestation' and 'a reduction in land available for food production' were common correct answers. Some candidates would have benefitted from using bullet points in their answer to ensure they gave a suitable number of effects.

(iv) This was well answered and explanations were detailed and usually concise. Most responses recognised that safe drinking water reduces diseases and many included examples such as cholera.

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(b) (i) Many candidates were able to interpret the population pyramid successfully. Weaker responses referred to the shape without comparing the population of males and females.

(ii) Most responses stated that a wide middle in the population pyramid indicated a large working age population and a narrow base showed a low number of children. Weaker responses focused on descriptions of the pyramid and the percentage of the population in each section rather than explaining what the shape indicated.

(iii) Weaker answers stated the name of the type of policy rather than describing the effect on the population. Most responses stated that the population would increase. Good responses linked an increase in births to an increase in risk to overall maternal health.

Question 2

(a) (i) Most candidates stated that precipitation is low throughout the year. Very few went on to suggest why this makes it difficult to grow vegetables and few referred to photosynthesis and an increase in the risk of drought.

(ii) The majority could determine the range correctly and gave the answer 121. A few weaker responses did not calculate a range and simply gave the maximum and minimum values.

(iii) Some candidates found this a challenging question and gave answers that were too vague to gain credit.

(iv) Most responses gave a correct factor. A few stated 'soil quality' which had already been given in the question.

(b) (i) A minority incorrectly stated fertiliser 3 instead of the correct answer of 2.

(ii) Most candidates realised that the high percentage of nitrate and the low percentage of phosphate made fertiliser 1 unsuitable for soil B.

(iii) Good suggestions were generally seen. Weaker responses stated that 'no fertiliser had been added', despite the question stating that the photograph was after fertiliser addition.

(iv) Candidates struggled to express their answers clearly on this question and the characteristics of clay soil were not well known. Often, contradictory statements were given such as 'good draining as the soil is waterlogged'.

(c) Most responses included some explanation of why trickle drip irrigation is efficient but relatively few gave a full response. Candidates may have benefitted from using bullet points in their response so they could clearly see the separate points they were making.

(d) The majority recognised that regular flooding can deposit silt onto soil and therefore increase its fertility.

Question 3

(a) (i) Many candidates found working with the scale challenging. The weakest responses stated that the factory cannot be built at **X** but gave no calculation to support this statement, which had already been given in the question.

(ii) There was a general confusion between random and systematic sampling.

(iii) The majority could give one limitation about the questionnaire, but fewer gave two. Most repeated their first limitation using alternate wording.

(iv) Some responses were too vague to gain credit, such as 'does it pollute?' or 'does it harm the environment?'. Examples of good responses included 'how will waste be disposed of?', and 'how will air pollution be dealt with?'. Some candidates repeated the information in the stem and stated 'report on local people's views', which was not credited.

(b)   Good responses focused on the comparative proximity of P to the salt conditions of the ocean. Weaker responses suggested that the climate would be different at Q; at a distance of less than 100 m this is very unlikely. Few suggested that vegetation at P could experience more trampling.

(c)   Some good suggestions were seen for the benefits to the town of the sand dune including 'tourism' and 'protection from waves'. Weaker responses suggested 'extraction of the sand for building' but as the sand dune is a reserve, the area is protected.

Question 4

(a)   Candidates found it challenging to suggest why there was a difference in electricity consumption and production. Good responses suggested 'to deal with surges in demand'. Weaker answers suggested 'the population had decreased'.

(b)(i)   Candidates found drawing the pie chart challenging. Many were drawn in pen and when errors were made, this made correcting those errors very difficult. Rulers were often not used. The largest sector frequently did not start at the top and sectors were not in rank order. Plotting was sometimes correct and generally the key matched the sectors.

(ii)   This was well answered and the majority knew advantages and disadvantages of using solar energy compared with using fossil fuels.

(c)(i)   The power provided was usually correctly calculated and the answer of 2.2 was given.

(ii)   Some vague responses were seen that simply repeated the information in the question. Good responses identified that there would be a reduction in the use of fossil fuels which would reduce the depletion of fossil fuel reserves. Some commented on a reduction in cost, without specifying what this cost was. A minority correctly referred to a reduced risk of a stated pollution effect due to waste oil disposal.

(d)(i)   There was some confusion with the remains of animals and plants being deposited on land rather than on the sea floor. A few descriptions needed to include heat as a requirement for the process. A minority of responses incorrectly referred to fractional distillation and cracking.

(ii)   Sulfur dioxide was well known.

(iii)   Some good explanations were seen that referred to the formation of acid rain and the transport of toxic gases via air being blown by wind.

Question 5

(a)   Two correct reasons for why land is cleared of forest were usually given. Weaker responses repeated the information in the question and stated 'for power lines'.

(b)(i)   Candidates found this challenging. Many sampled only one side of the forest. Others needed to include 10 sample sites and make correct use of the key. A large number did not use the scale.

(ii)   Most candidates could correctly use a tally; a minority did not show 19 correctly or miscounted and gave 14.

(iii)   A common error was to leave the answer as 11.8 and not round to two significant figures.

(iv)   Most responses suggested that repeating with more transect lines enables an average to be determined. Vague responses referred to accuracy.

(v)   A large number of candidates were not familiar with a limitation of using transect lines.

(vi)   The use of pitfall traps was not well known.

(c)(i)   Many correct strategies were suggested and good explanations that supported the stated strategy were also given. Weaker responses stated 'captive breeding' as a correct strategy but then repeated this as an explanation 'to enable captive breeding'. Stronger responses suggested

captive breeding can 'increase the genetic diversity of offspring' and 'ensures the health of mother and young with good animal health care'.

(ii) Candidates found it challenging to suggest why international agreements are needed. Good responses explained that these enable global monitoring and enforcement.