

ENVIRONMENTAL MANAGEMENT

Paper 5014/11
Paper 1

Key messages

All teachers should take special care to prepare their candidates for the extended writing questions, where six marks are available for a knowledgeable, balanced and carefully considered answer. It is vital that the candidate reads the question carefully and understands the question before answering.

General comments

Most candidates made a commendable effort in this paper. Almost all candidates finished all the questions, although some candidates did not complete the graphs or attempt the final part of each question. An important item for instruction is the drawing of line graphs, including the choice of a suitable scale to display the data. Another item for instruction is practice in the selection of comparisons, such as the tree and shrub savannas on this paper.

Comments on specific questions

Section A

Question 1

- (a) (i) Most candidates identified the type of mining correctly.
- (ii) Most candidates gained credit for describing the impact of the pool of water, waste heaps, and bare ground.
- (b) Candidates linked the tundra location with the absence of people and its poor future economic value. Lack of money to restore the landscape was another factor.
- (c) Candidates suggested that recycling, efficient usage and use of alternative materials were good strategies for reducing mining.

Question 2

- (a) (i) Candidates understood this map and correctly identified the main difference between the North and South American continents.
- (ii) Candidates were able to use the key to name the countries correctly.
- (b) The main reasons for the varying success in reducing the incidence of malaria were given as the availability of finance for health care, education and reducing the occurrence of suitable breeding grounds for the vectors.
- (c) Candidates answered this question with reference to the reduction of sickness and death, thus enabling the population to keep working and earn income.

Question 3

- (a) (i) Most candidates plotted the values and used the key correctly.

- (ii) Candidates found this question more challenging, some failed to understand that the aim of the programme was to breed a variety of rice that would give a large yield in a short period of time.
- (b) This was a challenging question for some candidates. Those who attempted the question referred only to the cost.
- (c) (i) It was apparent that some candidates did not understand that this was a system to minimise pesticide use, although some candidates showed knowledge of natural pest control and genetic modification of some species.
 - (ii) Candidates found it difficult to explain why integrated pest control is thought to be sustainable.

Question 4

- (a) Candidates generally identified the three main changes correctly, and ignored the small change in the sector of the rest of the world.
- (b) Most candidates could not list four valid measures of poverty.
- (c) This question was answered well by most candidates; however, there were some unrealistic ideas of how foreign aid was used to improve the economy in developing countries without reference to breaking the cycle of poverty.

Section B

Question 5

- (a) Many candidates gave five correct answers. Occasional errors occurred when stating the correct hemisphere and the annual range of temperature, where some candidates stated the maximum temperature instead of the range of temperature in error.
- (b) (i) Some candidates found it difficult to make a comparison between the two types of savanna. Good answers described the difference in height, density and variety of species in the two savanna types. Candidates would benefit from practice in such questions which require a comparison.
 - (ii) Only about half the number of candidates correctly stated that it is grass that grows between the trees in tree savanna.
 - (iii) Most candidates had some idea of the causes of desertification. Many explained that a combination of drought and removal of trees and vegetation leaves the soil open to erosion.
- (c) Almost all the candidates matched the terms to the definitions correctly.
- (d) (i) Most candidates identified the sea, beach and mountains as providing a good location to build a tourist resort. Climatic factors were also relevant, but candidates should be reminded that references to specific climatic factors such as temperature, sunshine or rainfall are needed to gain credit. Some candidates referred wrongly to the buildings and infrastructure that would have developed as a result of the development of the resort.
 - (ii) Some candidates misinterpreted this question and did not refer in their answer to the impacts of building a resort. There was much that could have been suggested, such as destruction of the natural vegetation and its effects on wildlife and natural drainage, as well as various types of pollution caused by the construction works.

- (iii) The challenges posed in this question were familiar to candidates, but their ideas for managing them were somewhat limited. For example, the reduction of water use for swimming pools can only be done by planning controls on future developments, or enabling the use of sea water. Good answers suggested that an inexpensive means of reduction would be to make tourists aware of the problems and encouraged to save water and reduce waste. Other answers suggested the local authorities should make plans for recycling or re-use of water and waste. Many candidates showed a good knowledge of how new supplies of water can be developed such as aquifers and desalination, and also better facilities for sewage, waste and water treatment; however, these developments can only be built at a cost.
- (iv) Most candidates explained that the arrival of tourists and their activities during the holiday will burn fossil fuels, especially where traffic congestion occurs. A smaller number of candidates continued to explain tourists' high demands on electricity generation and smoke-producing activities such as barbecues. Suggestions that were not credited were the extra carbon dioxide produced by breathing and the loss of trees as a carbon sink; the effects of these would not be localised.
- (e) A number of candidates did not draw a line graph correctly. Although the axes were generally labelled correctly the choice of scale was often poor. A few candidates did not use a correct scale for the number of tourists per million on the y-axis, and others chose a scale that was too small to plot. Many did not plot the 2014 point correctly, placing it on the line that should represent 2016. A very small number of candidates drew a bar chart, not a line graph as stated in the question.
- (f) An extended response (six-mark) question marked using a level of response scheme rather than a points-based scheme. This question, by its phrase 'How far do you agree?' required an understanding of the reasons both for and against benefits to the economy and damage to the planet. There was much that candidates could recount from their earlier answers, but more able candidates went further, explaining the costs of providing and maintaining the quality of tourist facilities, and the benefits of ecotourism in making tourists more aware of their detrimental effects to the planet and how these can be improved in the future.

Question 6

- (a) (i) Most candidates understood the diagram but some were uncertain about how it worked, in particular the importance of moving the net along the sea-floor to trap the fish.
- (ii) Many candidates described the effect of trawling on coral and vegetation growing on the sea-floor. Few candidates considered that this is long-term damage, from which the ecosystem takes a long time to recover.
- (iii) Some candidates did not fully understand that overfishing is a result of catching more fish than can be replaced by natural breeding, it is not necessarily due to catching a lot of fish.
- (iv) The reasons for overfishing were well known by candidates. Most achieved maximum credit for explaining that human population increase and their increased demands, in addition to better technology such as sonar for locating shoals of fish, and freezer ships that can stay out at sea for several weeks, increase the total size of the fish catch. The lack of regulation and policing of the fishing industry, and subsidising of fuel and other costs by some countries was also relevant.
- (v) Most candidates answered this well. They had a good understanding of a marine food web.
- (b) (i) Almost all candidates read the line graph correctly.
- (ii) Most candidates understood what the graph showed and stated that the number of fish species not overfished was constant from 2005 to 2007, then rose continuously to 2014. Candidates should be encouraged to quote data from the resource for questions such as this. Better answers included reference to the small increase from 2007 to 2009 becoming steeper from 2009 to 2014.
- (c) (i) Most candidates stated the quota correctly.
- (ii) Almost all candidates read the bar chart correctly and used data from this to calculate the increase in the quota from 2011 to 2015.

- (iii) Less than half of the candidates appeared to understand that the quota was increased because plaice stocks were recovering and increasing in numbers in the sea. Some appeared to misunderstand the question, thinking that an increased quota meant that fewer fish could be caught.
 - (iv) Most candidates described ways of managing fish stocks by limiting areas and seasons of fishing to avoid reducing their replacement levels. There was little reference to enforcement of these means by legislation and policing.
- (d)
- (i) Most candidates correctly stated the year with the lowest cost of damage.
 - (ii) A few candidates appeared not to understand the meaning of the term 'three-year period', and listed the three years that had the highest number of cyclones instead of three consecutive years with the most cyclones.
 - (iii) Almost all candidates calculated the average number of cyclones correctly.
 - (iv) Many candidates referred to the strength of the winds, and that cyclones that reach land do greater damage than those that do not, especially if they move back to the sea between coasts where they can build more energy again. Other reasons that were given related to the cost of damage, which may depend on the state of development, the size of the population of the area and the preparation for such a natural disaster. Some candidates considered the shape of the land, in particular the presence of large low-lying areas by the coast. A few candidates failed to recognise that cyclones do not move far inland.
 - (v) Almost all candidates marked the correct data point with a cross on the graph.
 - (vi) Most candidates correctly used the graph or their answers to parts (i) and (ii) to show that there was no relationship between the number of cyclones and the cost of damage.
 - (vii) The causes of cyclones was a subject of which few candidates showed a sufficient knowledge. A good answer described that a warm ocean surface, of above 27°C was required, producing energy to warm the air above and causing it to rise. This creates a centre of low pressure that draws in air from all around, causing it to spin due to the rotation of the Earth. The increased energy in the atmosphere due to global warming can cause more numbers of more intense cyclones.
- (e) An extended response (six-mark) question marked using a level of response scheme rather than a points-based scheme. The question posed here gave candidates the chance to explain both the ways in which oceanic pollution can be reduced and the problems that limit their effectiveness. Many candidates listed ways in which the water is polluted such as oil leaks, plastic waste, sewage and agricultural run-off, and the means by which all of these can be prevented or controlled to a certain extent. Some candidates went further, explaining that most waters of the seas and oceans are interlinked and uncontrolled, but some countries fail to restrict effluents and solids entering the seas by their coast. Thus the problem is so big that any reduction in one area may be cancelled out by an increase in another. In addition, the rising population and the rates of development in many countries are increasing sources of pollution as fast as measures are implemented to reduce them.

ENVIRONMENTAL MANAGEMENT

Paper 5014/12
Paper 1

Key messages

Most candidates attempted all the questions; however some candidates did not read the question accurately and provided information that although correct, was not creditworthy within the context of the question. This was particular the case when the question required the application of a particular factor (such as an environmental or economic factor). Candidates sometimes missed the opportunity to explain their context fully or provide examples to support the justification being made.

Candidates were able to use appropriate technical terms, however they were not always able to define terms accurately.

Graphs were generally completed with accuracy, although candidates must ensure that they follow conventions or information already within the graph when adding their information.

The quality of responses within the extended writing (six mark) questions was generally good, candidates demonstrated skills in developing a reasoned response, and this is a skill that should be further encouraged in centres.

General comments

Centres appeared to have prepared their candidates well for this paper. Key concepts were understood and were articulated well within specific questions. Responses were sometimes weaker when candidates had to apply these concepts or give appropriate examples.

There were some examples of candidates failing to read the questions carefully, thus missing out on the requirements of the task or question. Candidates should be reminded to read the question carefully.

The quality of writing for the extended response questions was good, with few candidates responding with a simple list of bullet points. This is good practice and provides scope to meet the higher demands of some of these questions.

Comments on specific questions

Section A

Question 1

- (a) (i) This first question required the use of the graph presented within the paper. Most candidates correctly stated the quantity of oil used within a day.
- (ii) The instruction within this question was to compare the trends in the use for industry and electricity generation. Unless this comparison was made it was not possible to gain credit. Some candidates described the trends in one of these uses in detail but failed to compare to the other use.
- (iii) The command word 'suggest' allows for a number of different valid responses to be credited. Most answers included references to the use of alternative energy sources.
- (iv) There were numerous creditworthy responses to this question. Most candidates identified the increase in car ownership and use.

- (b) (i) Most candidates achieved full credit with a simple description of oil formation.
- (ii) This question proved to be more challenging for a number of candidates, who did not provide sufficient detail for their responses to be given credit.

Question 2

- (a) (i) For this question, candidates were required to complete a pie graph. Most candidates attempted the task and were successful with both accurate plotting and also application of the key provided.
- (ii) A slightly more challenging question, requiring the candidates to read the information carefully.
- (iii) This was a topic that was generally well understood; candidates provided a broad range of reasons within a typical answer. These reasons often included technological developments as well as an increased demand.
- (b) (i) Many of the candidates demonstrated an accurate knowledge of the way in which quotas work - by limiting the amount of fish that may be caught so that enough are left to enable stocks to replenish.
- (ii) While candidates understood the principles of the use of quotas, they were less able to identify valid reasons why they can be harmful to fish stocks. Some responses focussed on the refusal to abide by the quotas, these responses did not gain credit.

Question 3

- (a) (i) This question proved to be challenging for a number of candidates. The photograph provided visual clues to potential valid answers, such as large open spaces and gentle gradients. Many candidates identified the lack of a village or a town as a reason why machinery must be used rather than why the area would be suitable.
- (ii) Most candidates were able to provide a valid reason for the decrease in yield, often linked to the decrease in fertility or use of the same nutrients by each successive crop. Only some candidates identified the potential for build-up of pests or disease.
- (iii) The photograph only showed a small number of trees, which would have limited impact on soil erosion to such an extensive farm, thus this idea was not given credit in this context. Stronger responses identified the benefits to the farm building inhabitants (such as shade, a source of food or firewood).
- (iv) This question required the candidates to circle all three appropriate descriptive terms. A number of candidates incorrectly described this form of farming as being subsistence.
- (v) This concept appeared to be well understood by the cohort. Most candidates were able to provide a suitable economic factor. The most common error was to define a physical factor.
- (b) The concept of mixed cropping was poorly understood by a number of candidates. The best responses identified the impact mixed cropping may have on soil fertility, the potential to reduce soil erosion and the spreading of risk in the case of a crop failure in one crop.

Question 4

- (a) (i) This question required candidates to plot the data on the grid following the format already laid out. This was completed accurately by most of the candidates, however, the most common error was failure to apply the key accurately, particularly the use of the dashed line for percentage of populations lost since 1970.
- (ii) Most candidates were able to read the percentage from the land-based organisms graph correctly.
- (b) Candidates wrote enthusiastically about the reasons why some people disagreed with wildlife protection. The best responses provided a range of reasons and achieved full credit.
- (c) Candidates needed to provide four different strategies for full credit. This question was tackled well by most candidates. The most common error was the lack of four different strategies; some candidates re-phrased or re-stated the same strategies.

Section B

Question 5

- (a) (i) Most candidates correctly identified the altitude and temperature at the tropopause. The most common error was to omit the minus symbol when stating the temperature.
- (ii) The changes in temperature at different points above the troposphere were described in a variety of valid ways. It was important that the candidates stated the changes rather than simply the temperature at different altitudes.
- (iii) Candidates were required to draw the ozone layer between the limits described. This was completed in a variety of valid ways; however, a number of candidates did not complete this question, perhaps failing to read the question carefully.
- (iv) Most candidates were able to give reasons for the importance of the ozone layer to life. Weaker responses tended to be vague with respect to the diseases caused by UV radiation.
- (v) There was significant variance in the quality of responses within this question. More able candidates typically understood the causes and sources of ozone depleting substances and in many cases also cited the chemical reaction. Weaker responses gained some credit for listing CFCs or halons with little additional detail.
- (b) (i) This question proved challenging for many candidates who identified that the Earth's surface was heated by the Sun but failed to link this to a subsequent heating of the air as a result. A number of ways of describing this process correctly were given credit.
- (ii) A number of candidates failed to read this question carefully and provided responses which linked to the development of smog rather than describing temperature inversion.
- (iii) Attempted by most candidates, responses used the information within the diagrams to support their answers, although some did not include all the details. Many candidates did not include detail of the pollutant or its source, which were creditworthy.
- (c) (i) This question required candidates to plot an additional bar on the graph. This was successfully completed by most candidates. The most common error was failure to draw a bar of the same width as the others already plotted.
- (ii) Most candidates were able to correctly interpret the scale on the graph and give the correct answer.

- (iii) Candidates were required to explain how two activities; electricity generation and agriculture, contributed to the production of greenhouse gases. Some responses showed good preparation and understanding of the question and achieved maximum credit; citing the gases concerned and their sources. Weaker responses were more vague, particularly in relation to agriculture, focussing on aspects such as pesticide use rather than methane or carbon dioxide production.
- (iv) There was a range of success in answering this question; the best responses identified the role of renewable energy sources in reducing emissions of greenhouse gases as well as the development of public transport, for example. A number of candidates focussed on the use of catalytic converters for vehicles. While these do reduce emissions of some noxious substances they do not prevent the production of carbon dioxide which is the main greenhouse gas.
- (d) (i) This question used a different approach to presenting data, namely the pH of rainfall on a map. Most candidates correctly identified the lowest pH was in the range 5.0–5.6. Credit was given to either a value within this range or stating the range itself.
 - (ii) Describing the changes that occurred across the country proved challenging for most candidates, few gaining full credit. Many candidates gained some credit for identifying a general decrease in the pH of the rain, although they were more vague when describing changes across the country and its regions. Only a small number of candidates showed an incorrect understanding of the pH scale.
 - (iii) A good number of responses identified that the changes in rain pH were due to an increase in industry and use of vehicles. Credit was also given to responses that described an increase in sulfur dioxide release or an increase in nitrogen oxides.
- (e) An extended response (six-mark) question allowing candidates to write about the topic more extensively. This question was marked according to the level of response provided and allowed candidates to write in depth about a limited number of aspects or develop an answer which provided a broader overview of a topic with many facets. The best responses from candidates included specific examples to support their point of view. Weaker responses tended to focus on one issue, such as the ability of countries to afford to combat pollution. The structuring of answers was generally good, with very few responses consisting of a simple list.

Question 6

- (a) (i) Most candidates were able to use the newspaper article to correctly identify the toxins causing the death of whales.
 - (ii) This question proved challenging for a number of candidates, relatively few described the idea of accumulation. Many candidates thought that the issue was due to whales eating more toxins as they were larger animals.
 - (iii) Most candidates correctly identified a source of the pollution but some failed to describe how the pollutant eventually reached the ocean. Relatively few responses described airborne pollutants, which is a potential route.
- (b) (i) Most candidates successfully interpreted the map and identified the correct answer.
 - (ii) This question proved more challenging for many candidates. A number of candidates correctly identified the circular motion of currents or the difference in direction of movement in the North Atlantic and South Atlantic, but did not describe all of this. While details of specific currents also received credit, relatively few responses achieved full credit.
 - (iii) Candidates showed good use of the information within the map and plausible routes for oil movement into Antarctica. A number of candidates cited the role of ship transportation, which was also creditworthy.

- (iv) Responses showed that candidates correctly identified the source and temperature of the Benguela current, but did not always successfully use this information to describe the resultant climate on the west coast. Some candidates described the impact on fishing, which was not required by the question.
- (c) (i) Most responses correctly stated the tidal range within Swansea Bay from the information provided.
- (ii) Describing the generation of energy by the barrage proved more difficult for some candidates. While most identified the role of turbine rotation in the process, many did not link this to a generator or were unclear about the process of water flow which caused the turbine to turn.
- (iii) This was completed with varying success, the most common error was to focus on the lack of carbon dioxide production, rather than the fact that the resources are not used up and the tide is dependable.
- (iv) Most candidates correctly stated the number of homes that could be supplied by the scheme.
- (v) Only some candidates correctly identified the issues that would be caused by allowing the rivers to flow into the barrage, most notably the risk of silt build up and the prevention of fish migration. Many candidates suggested that additional water from the rivers would mean the barrage would already be full of water and prevent it from operating, which was incorrect.
- (vi) The environmental impact of the scheme was partially understood by candidates but few were successful in gaining maximum credit. Responses tended to focus on one aspect rather than consider a range of impacts.
- (d) (i) Most candidates completed the graph correctly.
- (ii) Most candidates provided a description of the trends within the stated timescale. Credit was not awarded for stating dates and figures without covering the trends that had occurred between them. Generally this question was answered well by the cohort.
- (iii) Many candidates correctly identified the impact that previous overfishing had had on fish stocks preventing large quantities being caught.
- (iv) While expressed in a variety of ways, candidates showed a good general understanding of the term ecosystem. Candidates were not required to link their answer specifically to the Atlantic Ocean.
- (e) An extended response (six-mark) question marked using a level of response scheme rather than a points-based scheme. As with the other extended response question, candidates generally structured their answers well, rather than producing a list or bullet points which would limit the potential credit achieved.

The phrasing of the question required candidates to form an opinion and provide evidence to justify this. The best candidates were able to do this and provided a good comparison of the impact of the range of pollutants in the question. Weaker responses lacked supporting evidence to back up their statements and in many cases only focussed on the impact of plastics, scarcely covering raw sewage and heavy metals.

ENVIRONMENTAL MANAGEMENT

Paper 5014/21
Paper 2

Key messages

- The source material and the question must be read carefully.
- Data from either graphs or tables should be used to help describe trends or patterns.
- Both axes of any graph should be fully labelled with units.

General comments

This paper invited candidates to consider environmental issues and methods of gathering and interpreting data in the context of one state of the United States of America. Many candidates understood and made good use of the source material and their written responses were clearly expressed.

The mathematical and graphical questions did pose some difficulties for a small number of candidates.

Candidates had no problems completing the paper in the time available.

Comments on specific questions

Question 1

- (a) Many answers were in the acceptable range. These candidates clearly used a ruler to measure the distance and used the scale provided on the map.
- (b) (i) Most candidates correctly calculated the total estimated population of the four islands for 2020.
- (ii) Many candidates did not follow the instruction to give the answer to one decimal place.
- (iii) Nearly all candidates arranged the islands in the correct order.
- (c) (i) Most candidates gained some credit for the table. All the headings were needed for maximum credit to be awarded.
- (ii) Most responses gained some credit for this part question.
- (iii) Most candidates were able to explain why catching female fish would reduce the marlin population.
- (iv) Most answers described an appropriate order of events and so gained maximum credit. Only a small number of candidates did not use the information given to help produce clear answers to this question.
- (v) Many candidates gave detailed accounts of measures to control fishing activity. On this occasion the information given stated that this sport fishing used a rod and line; comments about nets were not given credit.
- (d) (i) Candidates regularly made all the suggestions shown on the mark scheme as to why site 20 was the least damaged dive site.
- (ii) The term biodiversity was only clearly defined by a small number of candidates. A suitable comment about the number of different species in an area was expected.

- (iii) Most candidates had a clear understanding of this question and gave good answers. A very small number of candidates incorrectly suggested toxic fish could be fed to animals.
- (iv) Many answers revealed a good understanding of the strategies for environmental management of the peacock grouper. All of the points on the mark scheme were suggested by candidates who made good use of the information provided.

Question 2

- (a) (i) Most candidates completed the table correctly.
- (ii) Most candidates presented a bar graph that gained some credit. However, the y-axis was frequently not given a complete label. In some cases, candidates selected the wrong data to plot.
- (iii) Many candidates gave answers that lacked the precision needed to gain all of the credit available. Stated conclusions should always relate specifically to the data being commented on.
- (b) (i) Most candidates calculated the percentage increase in wind speed correctly.
- (ii) Many candidates suggested two sensible reasons why an increase in average wind speed would have reduced the birds' ability to breed.
- (iii) Candidates did not find it easy to clearly suggest a reason for the increase in average wind speed.
- (c) (i) Most candidates suggested reasons why more bottle tops were found than plastic bottles. However, very few candidates suggested that the tops were made of a different plastic that may have taken longer to break down.
- (ii) Only a small number of candidates stated that this was a systematic method of sampling.
- (iii) This was a demanding calculation. However, many candidates were able to use the information provided and gain full credit.
- (iv) Most candidates found it difficult to clearly state the correct direction the wind was blowing. This meant that most candidates could not relate wind direction to the distribution of plastic on the beaches.
- (v) Candidates usually suggested more people visited one beach and left more litter.
- (vi) Candidates usually identified at least one suitable method of plastic disposal.
- (d) Many candidates gave quite good accounts of how microplastics would accumulate along a food chain. Almost all responses could be awarded some credit for this question.
- (e) Most candidates gave good reasons as to why the problem of plastic waste would be difficult to reduce by 2030. A small number of candidates gave very vague generic answers that could not be credited.

ENVIRONMENTAL MANAGEMENT

Paper 5014/22
Paper 2

Key messages

- The source material and the question must be read carefully.
- Data from either graphs or tables should be used to help describe trends or patterns.
- Both axes of any graph should be fully labelled with units.

General comments

This paper invited candidates to consider environmental issues and methods of gathering and interpreting data in the context of one state of the United States of America. Many candidates understood and made good use of the source material and their written responses were clearly expressed.

The mathematical and graphical questions did pose some difficulties for a small number of candidates.

Candidates had no problems completing the paper in the time available.

Comments on specific questions

Question 1

- (a) Many answers were in the acceptable range. These candidates clearly used a ruler to measure the distance and used the scale provided on the map.
- (b) (i) Most candidates correctly calculated the total population of the four islands.
(ii) Many candidates did not follow the instruction to give the answer to one decimal place.
- (c) (i) About half the candidates gave the correct temperature range. Others wrote down the first step towards the answer, the highest temperature and lowest temperature, but did not do the calculation. Others worked out the average temperature.
(ii) Most candidates correctly named the driest and wettest months.
- (d) Very few candidates made full use of the information in the table in their suggestions. Very few mentioned low rainfall. Statements about temperature were often imprecise. The most successful use of the information from the table was often with reference to humidity.
- (e) All the points listed in the mark scheme were seen. Deforestation was frequently suggested, usually linked with habitat destruction and sometimes with loss of biodiversity. Many answers included references to litter.
- (f) (i) Some candidates only circled one area when the question asked for two so could not gain credit.
(ii) Candidates usually made reference to sites in the chosen area being close to Honolulu.
(iii) There were frequent references to the various ways coral could be damaged by divers, water pollution and to plastic being discarded.

- (g) (i)** There were many good answers explaining the various ways the fish collector licence would lead to the reduction in fish numbers. There were frequent references to overfishing, the depletion of fish stocks, fewer fish available to breed and the extinction of some species.
- (ii)** Many answers revealed a good understanding of the strategies for the sustainable harvesting of ocean fisheries, with references to conservation laws, quotas, net size, mesh size, breeding areas and seasons. There were fewer references to marine reserves. Increasing the cost of the fish collector licence or ensuring the fish collectors had some education or training were popular strategies.
- (h) (i)** A number of candidates missed the significance of asking the same question.
- (ii)** Few candidates were able to explain clearly that asking more boat captains on more days made plan two better than plan one.
- (iii)** The most common mistake was not including the fish in any heading of the table.

Question 2

- (a) (i)** Many candidates followed the instructions and gained full credit. A small number of candidates did not do this or did not attempt to answer the question.
- (ii)** Few candidates could identify the type of sampling method being used.
- (iii)** Many candidates identified the distance and direction of the anomalous result correctly.
- (iv)** Some candidates wrote about the data on the sample lines instead of describing the pattern. Those who described the pattern often omitted to mention that it was true for all four sample lines.
- (v)** Although many candidates wrote about comparing the samples of sand, only a small number of candidates mentioned the concept of a control.
- (b) (i)** Some candidates did not answer the question, instead they wrote about the diagram's value as a technique for displaying data. Others did not understand that wind direction is reported by the direction the wind is blowing from. Those who showed they understood wind direction usually gained full credit.
- (ii)** Most candidates knew that lead is toxic. Many wrote about how a small amount of lead could kill the chick because it is very young. Few used the word bioaccumulation in their explanation.
- (iii)** There were some good reasons suggested for why there are no plans to remove the source of lead contamination from Midway Island. These included the cost, the fact that no people lived there, that it was a long way from Hawaii and it would be difficult to remove the lead without disturbing the nesting albatrosses. A small number of candidates mistakenly referred to plants in their answers to this question.
- (c) (i)** Nearly all candidates presented a line graph that was plotted correctly. There were some graphs with no axis labels, some with incomplete axis labels and some that plotted the wrong data.
- (ii)** Most candidates were able to describe how the average leaf area decreased with increasing mass of lead nitrate.
- (iii)** A few candidates incorrectly described each pot in the experiment having different conditions. The details provided for instruction 5 were often the most successful and those for instruction 4 the least successful.
- (iv)** There were some confused ideas for experiments to find out more about the effect of lead on plant growth. The better suggestions referred to using other plants and other concentrations of lead nitrate and/or measuring mass, height, number of leaves or crop produced.
- (d)** Most suggestions for why many countries have laws to control the release of lead from fuels into the atmosphere made reference to lead either being toxic or causing death or brain damage. There were some incorrect statements suggesting lead could cause climate change and acid rain.