MARINE SCIENCE

Paper 9693/01
AS Structured Questions

Key messages

- Candidates should be reminded to use the correct scientific vocabulary when describing and explaining phenomena.
- It is important that candidates are able to show their understanding of the meaning of key terms outlined in the syllabus.
- Candidates should be reminded to take care when reading from graphs to ensure accuracy and should remember to include units for any figures they quote.

General comments

Many of the candidates displayed a high standard of scientific knowledge and understanding. There were many clear, articulate and accurate responses and most candidates attempted all questions. However, some candidates did not answer the questions completely and so could not be awarded full credit. These candidates needed to read the stimulus material and question more carefully.

Some candidates appeared not to understand how to respond to the questions set. Candidates should practise identifying the command word and other key words in the question, either by highlighting or underlining them. Candidates should know the differences between the meanings of command words. In particular the meaning of the command words “describe” and “explain” were frequently confused.

Comments on specific questions

Question 1

(a) Most candidates could describe the conditions required for a tropical cyclone to form. Some candidates described how a cyclone was formed rather than the conditions required. This was unnecessary but did not disadvantage the candidates.

(b) Many candidates provided accurate descriptions of how the wind speed varies with distance from the centre of the cyclone. Occasionally inaccuracies in reading of the graph prevented candidates from achieving full credit. Candidates should be reminded in questions such as these to quote data from the stimulus material, including the units.

(c) There were many good answers seen, with many candidates scoring highly. However, a common response was to provide three disadvantages to ecosystems of storm surge rather than also including how this would affect the communities on the coast.

Question 2

(a) (i) The question was generally well answered with many candidates giving suitable reasons for how artificial reefs increase marine populations.

(ii) Candidates were able to apply their knowledge about coral reefs to suggest that artificial coral reefs could help to reduce wave energy.

(iii) Many candidates misunderstood this question. There was some confusion between the words "properties" and "materials". There were numerous suggestions of materials such as concrete and plastic rather than the properties the artificial reef modules would need.

(b) (i) Most candidates recognised that the modules all had internal voids. Fewer were able to identify a second common visible feature. Weaker candidates did not realise that features had to be visible and instead suggested suitable properties for the modules such as non-toxicity, which was not acceptable.

(ii) Candidates described the sandy sea bed as being unstable and liable to move, causing the module to also move. A few candidates suggested the module would sink into the unstable sand, which was also acceptable.

(iii) The strongest candidates were able to answer this question well. Many candidates did not recognise that they had to suggest reasons for the lack of difference in species numbers between four and eight modules. Most candidates gave suggestions of why there were few species in all the modules generally. Only the strongest candidates were able to suggest that species may be territorial or that the modules were in the same area.

Question 3

(a) Most candidates were able to draw a correct food chain from the information given. A minority attempted to draw a pyramid of biomass. A small number of candidates drew correct organisms in their food chain with arrows pointing in the wrong direction.

(b) (i) This question was very well answered. Candidates showed good knowledge of parasitic relationships and were able to describe the relationship accurately with reference to the example provided.

(ii) Candidates were able to analyse the data to give good descriptions of the distribution of nematodes. Some candidates did not read the stimulus material carefully enough as the headings in the table provided some important information that would have helped them to gain further credit.

(iii) Candidates who understood the meaning of a parasitic relationship were able to say why the biomass of the tuna would decrease.

(c) Almost all candidates identified the correct type of relationship as mutualism.

Question 4

(a) (i) The process of evaporation was well known. Most candidates stated that salinity would increase. A fairly common error was to state that seawater would evaporate rather than just the water. Only the strongest candidates gained full credit by also explaining that salt would not evaporate.

(ii) This was well answered with most candidates able to name at least one process that would decrease the salinity of sea water.

(b) (i) Most candidates identified a biological use for carbon and magnesium.

(ii) Most candidates were able to use their knowledge of nutrient cycles to state that producers would take up magnesium in the surface layer. Candidates should be reminded to be specific in their responses. "Uptake by general organisms" was not detailed enough for credit. A common error was to state that magnesium was used as one of the reactants in the process of photosynthesis.

(iii) Most candidates gave one way that magnesium in the surface area of the ocean would be replenished.

(c) There were many clear and detailed responses for this question. Candidates were able to apply their knowledge of nutrient cycles to a nutrient that they had little knowledge of. Most candidates were able to describe how sulfur would be cycled through a marine ecosystem. Some candidates gave additional information about how sulfur would enter and leave the ecosystem. This was unnecessary but did not disadvantage the candidates. A small number of candidates suggested that sulfur was present in nitrate ions

Question 5

(a) Most candidates were able to calculate the percentage change. Candidates should be reminded that if it is a decrease, a negative sign should be used in front of the figure calculated to indicate this.

(b) Many candidates described how dissolved oxygen concentration varies with depth. Some candidates were not detailed enough in their responses and didn't recognise that the concentration of dissolved oxygen initially increased before decreasing at 150 m in depth. Some candidates struggled to describe the results of this graph as it was presented in a style that perhaps they are not used to. It would be useful for candidates to practise analysing unfamiliar data and unusual data sets to improve this skill.

(c) Most candidates made some correct reference to changes in rate of photosynthesis and respiration and could relate these to the differences in dissolved oxygen concentration. Fewer candidates included explanations including wave action and diffusion at the surface. Some candidate referred to an increase in pressure and a decrease in temperature increasing the oxygen solubility. Very few candidates linked all these ideas together to gain full credit.

Question 6

(a) (i) Most candidates identified the plate boundaries. A minority of candidates got these the wrong way around.

(ii) Most candidates identified the correct plate boundary.

(b) (i) Most candidates provided good descriptions of how underwater earthquakes were formed. A few answers suggested that divergent boundaries were responsible and these could not be awarded credit. There was sometimes confusion between the pressure building up between the plates, friction and energy release.

(ii) Some candidates repeated their response to **(i)**. The key idea for this question was that there is a displacement of a large volume of water. Some candidates did not include the idea of displacement. Most candidates recognised a wave was created.

Question 7

(a) (i) Most candidates provided a good definition of the term "niche".

(ii) This question was answered well with candidates able to describe what specialised and generalised niche mean in terms of habitat and food sources and with reference to the examples provided.

(b) Very few candidates identified that these organisms had separate niches. Most were able to describe that differences in food source and depth would lead to less competition. Very few candidates could adequately describe the reason for different colourings of the fish.

(c) (i) Most candidates identified two correct examples.

(ii) This question was well answered with most candidates able to provide a definition of the term "biodiversity".

(iii) Some candidates provided very specific examples to answer this question and often described the environment of hydrothermal vents or sandy shores. Candidates gained some credit for this but many did not give a full explanation relating to productivity of these habitats.

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Paper 9693/02
AS Data-Handling and Free-Response

Key messages

- Candidates would benefit from improving their skills in the synthesis of information from more than one area of the specification.
- Candidates should be encouraged to learn definitions for keywords within the specification.

General comments

Many candidates demonstrated a good knowledge of the basic concepts from the specification and some skills in the theory and application of scientific investigation. **Question 1(b)(iii)** demonstrated the need for candidates to develop their skills in the formation of a hypothesis.

Comments on specific questions

Section A

Question 1

(a) Many candidates were able to analyse the information provided to explain why *L. pertusa* is white. Some candidates thought coral bleaching had occurred, rather than that the conditions were never suitable for symbiotic zooxanthellae to be present. Weaker candidates were not able to give an explanation, and some stated that zooxanthellae would not be present.

(b) (i) Most candidates were able to give at least one, and mostly two, properties of water that needed to be controlled. Some stated volume, and others light intensity, which are not properties of the water. Candidates should be encouraged to read the questions carefully to ensure they are answering the question as asked.

(ii) Candidates usually answered this question on the axes labelling well, with units and relevant scale applied, demonstrating accurate plotting of the data points. Many candidates clearly identified the zooplankton and phytoplankton results separately, either by dividing the graph in two, and labelling one side as phytoplankton and the other as zooplankton, or by using a key for the bars. However, a significant number of candidates did not use clear labels.

(iii) Many candidates were able to write a reasonable hypothesis for the investigation. However, others focused on only the phytoplankton or only the zooplankton, or gave the conclusion of the investigation. Candidates needed to consider what information was being collected to ensure they wrote a hypothesis that covered the reason for all the different data collected.

(iv) This question was challenging for many candidates. Candidates often stated that the medium flow rate would provide most rapid growth rate, but then made vague statements, such as “both phytoplankton and zooplankton were caught at this flow rate” or “more phytoplankton and zooplankton were caught at this flow rate”. Candidates needed to either use a comparative, or state more total food was captured at medium flow rate than at slow or fast flow rates.

Question 2

(a) Many candidates answered this well with most choosing to use a quadrat. However, the size of some quadrants would have made counting quite difficult due to the size of area selected. Others looked at the photograph and gave a quadrat size similar to that of the photograph, recognising the difficulties. Credit was given to candidates who used a larger quadrat, but subdivided it and used a

random number generator to select a number of squares within that to count and find the mean. Some candidates were also able to discuss the use of a transect to ensure systematic sampling in each area, whilst others made a transect to move from the tourist area to the non-tourist area, all of which were suitable methods.

(b) Many candidates gave a correct response of 2 m or 4 m, but a significant number of candidates gave 6 m. This distance above high tide had the greatest total number of organisms, but only two species. Candidates needed to be able to distinguish between greatest number and greatest biodiversity by assessing the number of different species at a site. No knowledge of a biodiversity index was required.

(c) Some candidates did not understand that the distance was the distance above the tide line and discussed the depth of water the species were found in, rather than the ability of different species to withstand desiccation / predation / wave action. Candidates needed to view the whole scenario to start with, i.e. which area of the shore each species preferentially settled and grew in, and then consider what would be different at each part of the shore that may affect the different species. Weaker candidates often gave a numerical comparison, or a description of which barnacles were located at each depth, which was not sufficient for credit.

Question 3

(a) Candidates were generally very familiar with the Darwin-Dana-Daly theory and gave excellent descriptions of the formation of an atoll. A few candidates were a little confused about the order different reefs occurred in, and some discussed only water level rising as the cause of the island starting to sink, rather than the subsidence of the volcanic island.

(b) Most candidates were able to give some reasons for the transition from coral reef growth to reef erosion, with stronger candidates able to give several reasons for the change.

(c) Many candidates answered this question well, recognising that the coral reef would act as a breakwater, reducing the energy of the waves and so reducing shore erosion. Some weaker candidates stated that it acted as a barrier to the waves or stopped the waves reaching shore. These candidates needed a greater understanding of the difference between reducing the wave energy and completely stopping the waves.

Question 4

(a) (i) Many candidates gained partial credit here, but often had difficulty expressing the whole meaning of the term “community”. Some candidates stated it was the biotic and abiotic factors, others forgot that it was time related, and some did not mention that the location or area was common to all the organisms. A few candidates incorrectly stated that it was different organisms, but not that they were of different species, or that they were the same species living together.

(ii) Candidates usually understood the formation of hydrothermal vents. Some candidates did not gain full credit as they were vague regarding the dissolution of minerals, and just stated the water “picked up” minerals or nutrients. Stronger candidates were able to state that the minerals precipitated once they reached the cold water, forming the vent itself. A few candidates discussed hydrothermal vents in general terms, stating where they were, what conditions were like, or what organisms may be found there, which did not answer the question.

(b) Most candidates gained at least partial credit here, with stronger candidates gaining full credit. Candidates were generally more able to discuss similarities than differences. The majority of candidates discussed the type of relationships each pair had and identified which was photosynthetic and chemosynthetic. However, some candidates described the relationship between zooxanthellae and coral as parasitism. Most also discussed the symbiont living inside the host and that the symbiont supplied the host with nutrients. Stronger candidates discussed the use of carbon dioxide to produce organic material and that the symbionts were producers. Weaker candidates mentioned light and chemicals but did not state the organisms utilised the energy from the light or chemicals. Few candidates mentioned the differences in the length of food chains in either environment.

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Paper 9693/03
A2 Structured Questions

Key messages

- Candidates should be reminded to read and process all the information in the question before attempting their answers. Although context may be unfamiliar, the underlying principles should not be.
- Candidates should avoid vague terminology such as "pollutes the water" or "affects coral reef" and should know the difference between respiration and ventilation.
- Candidates would benefit from further practice analysing both graphs and tables and should use the data provided to support their answers.

General comments

There were some very good answers from stronger candidates who showed a good knowledge of the syllabus and used their knowledge to interpret information provided in the question. Many candidates answered well on factually based questions such as **1(a)**, **2(a)** and **(b)**, **3(a)** and **7(a)**, **(b)** and **(c)**. Questions requiring processing of information, **1(b)** and most of **Questions 4**, **5** and **6,** were less well answered.

Comments on specific questions

Question 1

(a) (i) Most candidates gained at least partial credit for this question, usually for stating that "chlorophyll traps light" and that "glucose is produced". Although most candidates stated that carbon dioxide and water were required, their answers needed to include the idea of "conversion" or "fixing carbon". Few candidates mentioned the role of enzymes. Some answers were too vague to gain credit e.g. "light is absorbed by plants", or "light energy is used to make food".

(ii) Most candidates correctly stated that phosphorus is required to make DNA. Incorrect answers included magnesium and carbon dioxide.

(b) (i) Stronger candidates were able to interpret the graph correctly. Few answers referred to "rougher water" or that "more light was absorbed by part **A**". Many answers repeated information in the question e.g. "there is more productivity in part **A**" instead of explaining what is meant by productivity.

(ii) The majority of candidates gained partial credit, usually for the idea that there was less light, so less photosynthesis. To gain further credit, candidates needed to refer to slower population growth of producers and the effect on consumers. Few candidates mentioned that light was a limiting factor. Many weaker candidates answered in terms of wavelength of light.

Question 2

(a) (i) Stronger candidates were able to complete the word equation correctly. Incorrect answers included a word equation for photosynthesis or energy replacing water.

(ii) There were some excellent answers e.g. "to release energy for movement or muscle contraction". However, many candidates stated that respiration produces energy, which did not gain credit. A significant number of candidates confused respiration with breathing and gave answers in terms of gas exchange and supplying oxygen to the body.

(b) Almost all candidates answered this question well and usually stated that flatworms have a large surface area to volume ratio and that they rely on diffusion. To gain credit, candidates needed to state "thin" rather than just quoting 1 mm from the diagram. Some candidates incorrectly thought that the gills were important for obtaining food.

(c) Many candidates gained partial credit, usually for stating that the oxygen concentration in the burrow was lower. However, only the strongest candidates answered fully correctly. Answers were often too vague, e.g. "little wave action". Candidates needed to add a statement about how this contributed to increasing the oxygen concentration of the water. Few answers compared the surface area to volume ratio of lugworms to flatworms.

Question 3

(a) (i) Almost all candidates were able to state that oysters carry out external fertilization.

(ii) Only stronger candidates gained full credit. The most common incorrect answer was "no parental care".

(iii) Few candidates gained full credit for the order in which the larvae develop as **C** was often confused with **A**.

(iv) Only stronger candidates gained full credit. Many candidates needed to give a more precise answer. For example, a common disadvantage given was that the larvae were at risk from predation. To gain credit, the idea that the larvae were more at risk from predation was required.

(b) (i) Those candidates who had studied the graph carefully often gained full credit. Some candidates just quoted figures from the graph. Therefore, common answers were that the proportion of larvae settlement at **X** was 0.58, at **Y**, 0.48 and at **Z** 0.46. To gain credit candidates were required to calculate the difference in settlement and note where most or least settlement had taken place.

(ii) Only stronger candidates gained any credit for this question. Few answers stated that oysters were more likely to settle on reefs and then provided a reason why this was advantageous. Some answers were too vague to gain credit e.g. "the reef provides suitable conditions".

Question 4

(a) Only the very strongest candidates answered this question correctly. There was a misconception that sonar was used to attract fish and that different frequencies attracted different species of fish.

(b) Most candidates gave correct answers for type **A** and correctly stated that the concrete block held the FAD in place in rough weather. Reference to type **A** being below the waves or that type **B** had a curved rope so that the buoy could float in rough weather were less common. Many candidates just described each FAD instead of answering the question as it had been set.

(c) This was generally answered correctly. Incorrect answers stated that the palm frond attracts more fish as it is a food source or that it is easily digested.

(d) (i) Stronger candidates who had processed the information provided were able to answer in terms of there being less fishing pressure on coral reefs and seagrass beds, so more juveniles survive to adulthood. Most candidates were able to state that there would be more fish, but did not state the benefit. Few references were made to sustainability.

(ii) To gain credit, answers needed to focus on the benefit to the community. Many answers focused either on fishing restrictions or the general benefits of FADs.

Question 5

(a) Most candidates answered this question partially correctly and usually either stated the increase in human population or increased demand, or that it prevents overfishing of wild stocks. Some candidates believed that all fish raised by aquaculture are GM.

(b) (i) There were some strong, full answers for this question. However, some candidates just repeated information in the passage e.g. “clearing mangroves”. Other answers were too vague to gain any credit e.g. just stating that aquaculture caused pollution or that ‘’aquaculture spreads disease’’.

(ii) Most candidates focused only on the negative impacts (poverty increase) and there were only a few references made to the improvement in economy. The most common answers were the loss of income for fishermen due either to habitat removal or were related to the price of fish raised by aquaculture. Many answers were too vague to obtain credit e.g. “affects local community”.

(c) Most candidates gained credit for stating that the sea urchins ate fish waste and that kelp absorbed the nitrogen produced by decomposition of the waste. Few candidates went on to mention that there would be less decomposition by bacteria and the effect on oxygen content.

(d) This question was generally answered well and many candidates gained full credit. Some candidates could have given fuller answers by stating that more carbon dioxide would be dissolved in sea water and by being clearer about the effect of a lower pH on shells. Answers such as “damages” or “affects shells” or “shellfish die” did not gain credit.

Question 6

(a) Almost all candidates correctly stated that there would be more herbivores to eat the algae on the reef. Stronger candidates went on to explain how this could benefit coral growth. A few candidates misunderstood the information and suggested advantages of having an overgrowth of algae for corals.

(b) The most common answer was that nitrogen was used for increased growth. To gain credit, the increased nitrogen had to be linked to its use in making proteins or amino acids for growth.

(c) (i) Only the strongest candidates identified 1994 as the correct year.

(ii) Only the strongest candidates gained full credit. Most candidates did not process all of the information provided and did not relate their answers to this information. A common misconception was that waste water was deliberately released from the storage well instead of escaping into groundwater. Many candidates described the benefits of this nitrogen-rich water to the coral reef.

(d) Many candidates were able to calculate the correct percentage. The most common error was to subtract 382.78 from 922.76 and then to divide this answer by 922.76, giving a percentage of 58.5%.

(e) Most candidates gained at least partial credit, usually for the idea that less money would have to be spent on fresh water. To gain further credit candidates needed to relate their answers to the economic benefit. Answers stating that recycled water could be used to water the golf course and gardens needed to be linked to saving fertiliser costs or the idea that greener gardens or golf courses could increase tourism.

Question 7

(a) Many candidates gave a correct definition of a gene. In some cases the definition was too vague or incomplete to gain credit e.g. “a section of DNA” or “DNA that codes for characteristics”.

(b) (i) Most candidates named the growth gene, but fewer stated the promoter gene. Common errors included a gene for disease resistance or sterility.

(ii) Some candidates were confused by the terms phenotype and genotype, but most gained full credit for the idea that the GM salmon would be larger in size.

(c) Stronger candidates gave a correct definition of the term, but a few answers needed to add “to identify the risks to humans/the environment” to their answers to gain credit. Most candidates gained some credit by stating that GM salmon were sterile or that they were kept in land-based tanks.

(d) The majority of candidates gave a correct economic advantage of GM salmon production over non-GM salmon.

(e) Full credit was very rare as most answers did not focus on sustainability. Typical answers included the idea that more salmon would be produced but this was not linked to demand. Many answers were incomplete, with candidates stating that less wild salmon would be caught, but this was not linked to increased survival and subsequent population recovery.

MARINE SCIENCE

Paper 9693/04
A2 Data-Handling and Free-Response

Key messages

- Candidates should be reminded to consider data presented in questions thoroughly.
- Many candidates were unfamiliar with the use of standard deviation and it is important for candidates to consider the mathematical requirements of the syllabus.
- Some candidates confused the different requirements of command words. Each question has a command word such as “describe” or “explain”. It is important that candidates understand the different meanings of these words.

General comments

The standard of answers was generally very high. Factual knowledge of topics such as the impacts of oil spillage and effects of releasing organisms raised in aquaculture was very good. Candidates were also confident when using key scientific terminology. Graph plotting skills were very good and many candidates planned valid experiments.

Comments on specific questions

Section A

Question 1

(a) (i) Only stronger candidates fully understood the use of standard deviation. Many simply described the data and how the mean catch varied throughout the years. Where candidates gained full credit, they often explained that the standard deviation showed the variation in catch between the different years, and explained that standard deviation is a measure of the spread of data about the mean.

(ii) Many outstanding graphs were seen that often gained full credit. Most candidates were able to construct two appropriate linear scales, label them accurately and plot the points correctly. Where candidates did not gain full credit, it was often due to selecting inappropriate increments on the scales (and so miss-plotting the points) and/or not using two separate scales. Other errors included: inaccurate lines, not labelling axes and/or not adding some form of a key.

(b) Most candidates were able to correctly calculate the catch per unit effort. Where candidates did not gain credit, it was often due to incorrect rounding of decimals.

(c) Many candidates found this question demanding although a significant number were able to correctly conclude that the fishing was sustainable and then gave evidence to support their conclusion. Very few candidates gave a counter argument against the sustainability of the fishing such as a change in fishing methods. It is important for candidates to explore all aspects of a problem when asked to discuss evidence.

Question 2

(a) (i) Most candidates correctly calculated the mean number of mouth openings per minute. Where candidates did not gain credit, it was usually for giving the mean number per 30 seconds.

(ii) Many candidates found this question demanding. Most were able to state that the data demonstrated that the rate of mouth opening increased with temperature, but only stronger

candidates gave more detail. Where candidates gained full credit, it was usually for recognising that the rate decreased at 25 °C for one fish and that 30 seconds was a very short time to record data over. Candidates should look carefully at all data when considering conclusions and not just the overall trends. The strength of a conclusion can be affected by patterns within the raw data.

(b) This question was well answered. Experimental planning skills were generally very good with many candidates gaining full credit. Most candidates showed a very good understanding of how to plan experiments that are controlled and valid. Candidates should try to give at least five suggested values for the independent variable and practical details explaining how they could measure all variables. Biotic and abiotic controls should be given along with suggested methods for their control. Experiments should include replicates and candidates should state how they would process their data.

Section B

Question 3

(a) Most candidates had a very good understanding of how oil would reduce the penetration of light into the water and so reduce the rate of photosynthesis by phytoplankton. Many other candidates also correctly explained how toxins in the oil could bioaccumulate through food chains and so affect apex predators. Fewer candidates recognised that dissolution of gases would be affected. Weaker candidates tended to give general answers that listed all the effects of oil spills on the environment, such as damage to feathers of birds and the effects of burning off the oil on the surface of the water.

(b) This question also generated many excellent answers. Most candidates understood the important roles of seagrass and mangroves as breeding and nursery grounds and gave detailed, well considered answers. Many explained how mangroves stabilise the coast and prevent erosion and how seagrass stabilises the sea bed. A few candidates repeated their answer to **(a)**, giving food chain effects. It was important for candidates to read questions fully, as this question was focused upon effects "other than the effects on food webs". Most candidates gained at least partial credit and demonstrated a good understanding of this topic area.

(c) Similarly to **(a)** and **(b)**, most candidates had some understanding of the role of bacteria in the breakdown of oil. Many candidates gained full credit and gave detailed accounts of the breakdown of oil into harmless substances by bacteria. Where candidates did not gain credit, they tended to give answers about the roles of biotechnology in general, rather than considering its application to the removal of oil.

Question 4

(a) Most candidates correctly understood that conservation aims to preserve species for future generations. A few weaker candidates gave vaguer answers such as, "protecting organisms". To gain credit, candidates needed to give precise answers.

(b) (i) This question generated a range of responses. Many excellent answers were seen that correctly described the aquaculture of giant clams in detail. Strong answers often explained how spawning is induced, how clams are transferred into tanks and cages at different stages, how they are fed and that they are transferred into cages in open water. Weaker answers often confused giant clam aquaculture with oyster aquaculture, did not correctly describe when clams of different stages are transferred to different tanks, and sometimes gave general accounts of fish aquaculture.

(ii) This question was well answered by many candidates. Most were able to give at least one example of a risk associated with releasing giant clams from aquaculture, but many did not give a linked explanation. Common answers that were seen focused on the effects on food webs and the effects on the gene pool of wild clams.

(c) Many candidates found this question challenging, but there were some excellent, detailed answers. Some answers confused osmoregulators with osmoconformers, and others did not consider the movement of water by osmosis. Some candidates incorrectly discussed the mechanisms of osmoregulation in fish, such as salmon, giving detailed accounts of salt pumping across gills. Stronger answers correctly defined the term osmoconformer and went on to explain how high and low salinity water would affect osmosis in terms of water movement.