

# BIOLOGY

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**Paper 0610/12**  
**Multiple Choice**

<i>Question Number</i>	<i>Key</i>	<i>Question Number</i>	<i>Key</i>
1	<b>B</b>	21	<b>A</b>
2	<b>C</b>	22	<b>D</b>
3	<b>B</b>	23	<b>D</b>
4	<b>A</b>	24	<b>B</b>
5	<b>B</b>	25	<b>C</b>
6	<b>B</b>	26	<b>B</b>
7	<b>C</b>	27	<b>C</b>
8	<b>A</b>	28	<b>A</b>
9	<b>D</b>	29	<b>B</b>
10	<b>A</b>	30	<b>A</b>
11	<b>C</b>	31	<b>A</b>
12	<b>A</b>	32	<b>A</b>
13	<b>B</b>	33	<b>D</b>
14	<b>B</b>	34	<b>D</b>
15	<b>B</b>	35	<b>B</b>
16	<b>C</b>	36	<b>D</b>
17	<b>A</b>	37	<b>C</b>
18	<b>B</b>	38	<b>D</b>
19	<b>D</b>	39	<b>B</b>
20	<b>A</b>	40	<b>A</b>

## General Comments

The paper was a standard compilation of questions of varying difficulty, but a most creditably high percentage of candidates scored extremely well. It was noticeable that questions that required an ability to correctly interpret graphs proved to be the most demanding.

## Comments on Specific Questions

### **Question 1**

This was a straightforward opening question, but there was a need to read it carefully since it was phrased in the negative. Such questions often pose problems for those who do not read the question carefully before answering. In this case, the majority of candidates were successful.

### Question 5

This question was also answered correctly by the vast majority of candidates, even though it required candidates to know that the green colour of plants is due to the presence of chlorophyll, and that the pigment is found in chloroplasts. It is common to find that, when an understanding of more than one fact is necessary before a question can be correctly answered, mistakes occur – clearly not so here.

### Question 13

Candidates commonly become confused with exactly which food test is used for each food substance. Again, candidates were very secure in their knowledge of food tests and answered this question extremely well.

### Question 14

One of the commonest confusions at this level is between xylem and phloem and exactly what it is that each carries. Despite being given options that would differentiate between those who were not clear, almost all candidates succeeded in selecting the correct answer.

### Question 19

A misconception was exposed by this question since a large proportion of candidates were of the opinion that carbon dioxide is released when glucose is converted into lactic acid during anaerobic respiration in muscles.

### Question 20

There appeared to be a degree of uncertainty here over the ill effects of smoking. A significant number of candidates appeared to believe that smoking is unlikely to decrease the surface area of the lungs, but in so doing they implied that they also erroneously thought that tar would be deposited in a smoker's arteries.

### Question 22

A number of candidates suggested that urea is removed from the body as insoluble waste, an apparent confusion with defecation from many candidates who were accurate in their knowledge of generally more searching topics.

### Question 26

The graph clearly shows that the uterus lining is at maximum thickness before progesterone levels rise and that it remains as such until after the progesterone levels begin to fall. However, a significant number of candidates opted for suggesting that an increase in progesterone resulted in thickening of the uterus lining. This was certainly not what was indicated by the graph.

### Question 34

This proved to be the most difficult question on the paper. It would seem unlikely that there was a mathematical problem in counting up to three or five, but much more likely that candidates did not allow for the fact that producers represent the first trophic level in a food chain.

### Question 35

This was again a question requiring accurate graph interpretation, and again a significant number had problems. In this case, candidates failed to realise that organisms further along a food chain have a lower biomass than those nearer to its beginning.

# BIOLOGY

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Paper 0610/22  
Core Theory

## Key Messages

It is vital that candidates read each question carefully and carry out the task required taking note of the command words used. For example, “state” and “explain” require different types of response.

Candidates should learn the definitions that are in the syllabus. Many candidates lose credit for trying to state a definition in their own words.

It is helpful to check the credit allocation for each question as this is an indication of the number of distinct points required in the answer.

## General Comments

Although a few candidates performed very well, the majority had difficulty answering some of the questions adequately. The standard of English was very good. There was no evidence that candidates were short of time. There were some areas where specific improvements could have been made.

## Comments on Specific Questions

### Question 1

- (a) Many candidates used the key proficiently and gained full credit. The most common area of uncertainty was the difference between the two types of neurone.
- (b)(i) Nearly all candidates gave an incomplete answer, such as “to trap sunlight” or “to make chlorophyll”, rather than specifying photosynthesis or naming the products of this process.
- (ii) The majority of candidates correctly stated that the cells contain chloroplasts in order to absorb light energy, but few cited the shape of the palisade cells or were aware of the significance of this.

### Question 2

- (a) This part was answered well.
- (b)(i) Very few candidates used the information given in the question to explain exactly how lack of magnesium or nitrogen would result in poor growth. The majority simply re-stated that the plants lacked either magnesium or nitrogen. Very few candidates referred to the fact that if a plant cannot photosynthesise, it will also lack the energy for growth.
- (ii) Most candidates knew that the plants would be shorter, but few stated that the leaf colour would be pale green or yellow.

### Question 3

- (a) The trachea and the diaphragm were identified correctly by most candidates. There was uncertainty about naming the bronchus and the alveoli with many candidates giving bronchioles for both structures.
- (b)(i) This was well answered.

- (ii) The more able candidates answered this correctly.
  - (iii) Many candidates could not explain the reason for the increased water vapour in expired air. Even the more able candidates merely referred to the fact that the water vapour came “from the body cells”.
- (c) (i) Nearly all candidates made the link between increased activity and increased oxygen uptake. Only the more able candidates realised that oxygen uptake reached a maximum rate. Candidates should be encouraged to manipulate figures given to them in order to strengthen their responses.
- (ii) This was well answered.
  - (iii) This more difficult calculation caused problems for the weaker candidates. Candidates should be reminded that where the working is shown, partial credit can be given for their method, even if the final answer is incorrect. A significant number of candidates gained partial credit for showing their working.

#### Question 4

- (a) The question was fairly well answered with most candidates correctly identifying two useful characteristics that had been selected during breeding.
- (b) Knowledge of artificial selection needs to be reinforced and distinguished from the process of genetic engineering. Almost all candidates gave answers that referred to gene transfer, selection of chromosomes or breeding with another species.
- (c) Some candidates answered this accurately and obviously understood the format of genetic diagrams. A number were confused and wrote down apparently random letters with little understanding. This is an area of the syllabus that could be emphasised. It should be noted that genetic diagrams contain mathematical symbols  $\times$  and  $+$ . Even the more able candidates did not realise that these were absent and therefore did not add them as part of their answer.

#### Question 5

- (a) Most candidates could name two gaseous pollutants, but were less clear about the effect the pollutants have on the environment. Some candidates confused carbon monoxide with carbon dioxide.
- (b) The negative effects of deforestation were fairly well understood. Some candidates explained one or two effects in detail but omitted a third effect. It needs emphasising that deforestation does not result in a shortage of oxygen for respiration. A small increase in the level of atmospheric carbon dioxide has a marked effect on global warming.

#### Question 6

- (a) Although the answer to this question involved repeating information given in Fig. 6.1, the majority of candidates did not answer correctly.
- (b) (i) This was accurately answered by most candidates.
  - (ii) Only a few candidates gave both dates correctly and many weaker candidates appeared to give random dates.
- (c) The link between the loss of blood and the symptoms of anaemia was not appreciated by the majority of candidates. Most answers repeated the information given in the stem of the question. Only a few candidates gave answers that attempted to give an explanation.
- (d) The majority of candidates correctly stated two substances that passed from the mother to the fetus, the most common answers being water and oxygen. The question asked for the names of specific substances, and so answers such as “food” or “nutrients” did not gain any credit.

- (e) (i) This was correctly answered by most candidates.
- (ii) Many candidates misinterpreted this question and gave an explanation of how the seeds in the fruit would pass out in the faeces of the animal that had eaten the fruit. Candidates who had understood the question typically gave only one advantage, usually the colonisation of new areas.

#### Question 7

- (a) The sites of ingestion and egestion were well known. Fewer candidates could identify where bile was stored or where fat digestion took place.
- (b) This was answered incorrectly by many candidates, with most giving the answer as “digestion” or “egestion”.
- (c) (i) Only the most able candidates knew that fats are digested to produce fatty acids and that this accounted for the decrease in pH.
- (ii) Many candidates did not understand that bile emulsifies fats to give a larger surface area for lipase action.
- (d) Most candidates knew that enzymes are denatured by high temperatures, but few followed the instructions to use information from the experiment in their answer.
- (e) Almost all candidates gave at least one ill effect of eating too much fat.

#### Question 8

- (a) (i) This was answered correctly by almost all candidates.
- (ii) Almost all candidates completed the food chain correctly, although a few gave the food chain in the reverse order.
- (b) (i) This was fairly well answered although some candidates did not appreciate that all the organisms in a population have to be of the same species.
- (ii) Most candidates gave very muddled definitions and many did not follow the instruction to use an example from Fig. 8.1.
- (c) (i) The majority of candidates correctly named a decomposer. Some weaker candidates named earthworms or beetles.
- (ii) Very few candidates could explain how the decomposition of the leaves would benefit the tree.

# BIOLOGY

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Paper 0610/32  
Extended Theory

## Key Messages

A high standard of biological knowledge and understanding was displayed by many of the candidates, who gave clear, articulate and accurate responses.

Some candidates were not able to gain full credit due to misinterpretation of some questions. Candidates should be reminded of the importance of the differences between command words, particularly 'describe' and 'explain' and should also be reminded to read and follow instructions carefully. Some candidates gave responses which although biologically correct did not answer the question and so could not be credited.

## General Comments

Candidates showed a good understanding of biological processes and mechanisms. They were generally able to communicate their responses clearly. There was evidence of a wide variety of knowledge and understanding of all parts of the syllabus and an ability to apply different skills depending on the demands of the question.

Some candidates were awarded only partial credit due to their responses not answering the question completely. Candidates should be reminded to read the stimulus material and each question carefully, and to complete all the instructions contained within the question in order to access the maximum available credit.

## Comments on Specific Questions

### Question 1

- (a)(i) Many candidates correctly identified tissue **A** as the palisade tissue, with a few candidates referring to it as mesophyll tissue, which was also acceptable. Many candidates also correctly identified cell **B** as a guard cell. The most common incorrect answer given was identifying this cell as the stomata or stoma. Candidates should be reminded to read instructions carefully, as the label and the instruction asked candidates to identify the cell rather than the space between the guard cells.
- (ii) Most candidates were awarded at least partial credit and all marking points were seen. Again, candidates should be reminded to read instructions carefully, as the most common incorrect answer referred to adaptations of leaves in general, for example having a large surface area, rather than adaptations of the palisade tissue. Some candidates identified the presence of chloroplasts; whilst this is true, the question asks for adaptation for maximum photosynthesis. The correct answer in this case would be that tissue **A** contained many chloroplasts.
- (b)(i) The majority of candidates were able to accurately describe where carbon dioxide enters the leaf. Most of these candidates also described the mechanism of diffusion to describe how carbon dioxide enters the leaf. Fewer candidates went on to describe the process of diffusion as the movement of carbon dioxide from an area of high concentration to an area of low concentration. The best answers described the changes to the turgidity and shape of the stomata before describing the mechanism and movement of carbon dioxide into the leaf.
- (ii) The only answer that was accepted was glucose and oxygen. A significant number gave the wrong products for photosynthesis, the most common incorrect answers being carbon dioxide and/or water.

- (c) A wide variety of adaptations were acceptable for this question. However, the explanation had to be linked to the correct adaptation in order to achieve credit. It was common for candidates to identify a correct adaptation but then not gain credit for the explanation. The most common answers were stomata on the upper surface only, in order for gas exchange and numerous air spaces to enable buoyancy. Candidates should be reminded to be specific in their responses; answers such as 'they have a big surface area' were not credited. The correct response here should have been 'leaves have a large surface area'. Another common misconception which was not credited was that stomata are present on both sides of the leaf.

## Question 2

- (a)(i) Most candidates had a good understanding of *codominance* with many able to gain at least partial credit for this question. Some answers were too vague. Responses such as 'both alleles have an effect' and 'both alleles are dominant' were not creditworthy. A small number of candidates referred to genes instead of alleles, which did not gain any credit.
- (ii) This question was answered particularly well, with the majority of candidates gaining at least partial credit. A small minority of candidates included the inheritance of sex in their response, which did not gain credit. Many candidates identified the correct ratio as 1 : 2 : 1 but only the best responses linked the ratio to the correct phenotypes.
- (b)(i) Many candidates confused artificial selection with genetic engineering. Candidates should be reminded of the differences between artificial selection, artificial insemination and genetic engineering. A minority of candidates incorrectly referred to natural selection. Some candidates tried to introduce other favourable traits to the cows such as meat yield or disease resistance, which was not asked for. Many candidates were able to identify that a cow with increased milk yield should first be selected and then bred or artificially inseminated. The best responses identified that this process should be repeated with further generations. There was some confusion about semen coming from the cows rather than the bulls.
- (ii) Many candidates were able to suggest reasonable additional qualities for which a farmer might wish to select. Common acceptable responses included increased meat yield and resistance to disease. Vague statements such as size of cow were not credited.
- (c) Most candidates were able to gain at least partial credit. The most common correct answers identified health issues in the cow such as increased risk of mastitis and consumer concerns about BST hormone contamination in the milk. Fewer were able to identify possible side effects in humans, or that some countries already produce an excess of milk, so administering BST is unnecessary. The best responses gave specific health impacts on humans and/or cows. Vague statements referring to an effect on the health of cows/humans were not credited. A minority of candidates confused udders with bladders.

## Question 3

- (a) Many candidates gave the correct answers of urea and carbon dioxide. Some candidates gave other answers including uric acid, excess water and excess salts; whilst these products are excreted, they are not the main excretory products and so were not credited. A minority of candidates provided more than the two products requested. Candidates should be reminded to read and follow all instructions carefully.
- (b) This question proved challenging to many candidates. A wide variety of incorrect values were given, the most common of which was  $83 \text{ (g dm}^{-3}\text{)}$ . A minority of candidates predicted the incorrect value but gave the correct explanation of protein molecules being too large to pass through the capillary wall; these responses gained partial credit. The most common misconception was that no protein appears in the urine as all of the protein is reabsorbed or broken down to amino acids.
- (c) The majority of candidates were awarded at least partial credit for this question. The best responses included the movement of urea, excess water and excess salts by diffusion from the blood to the dialysis fluid, and the idea that there was no net loss of glucose. A minority of candidates incorrectly referred to the dialysis fluid and the blood from the patient mixing.
- (d) Many candidates were able to give a disadvantage of having a kidney transplant. Common answers included tissue rejection and the necessity for taking immunosuppressant drugs. Vague



statements, such as 'the body might attack the kidney' were not credited. Fewer candidates were able to identify an advantage to having a kidney transplant. The most common correct answer was that less time would be spent in hospital for dialysis treatment. References to cost were not credited.

- (e)(i) A variety of excellent responses were seen for this question. Many candidates correctly referred to bile production, deamination and maintenance of glucose concentration of the blood. Candidates should be reminded to refer to blood glucose concentration, rather than blood sugar levels.
- (ii) Again a variety of good responses were seen for this question. Many candidates referred to liver cirrhosis, liver/kidney damage, brain damage and addiction. Some candidates referred to short-term effects of alcohol abuse, such as loss of coordination and increased reaction times, rather than the long-term effects specified in the question; these responses were not credited.
- (iii) Many candidates were able to provide reasonable suggestions for the social implications of alcohol abuse. Common correct responses included references to drink driving and an increase in crime. Candidates should be reminded to be specific in their responses. Some candidates responded only with the word 'accidents', which was not creditworthy.

#### Question 4

- (a) Many candidates answered this question well, following instructions and using the labelled features to help them to identify the distinguishing feature of each fish. Fish **A** was the fish for which candidates found it most difficult to identify a distinguishing feature. The best responses identified that the lower mandible extends beyond the upper mandible. Fish **B** has a joint dorsal, caudal and anal fin. Responses were seen that identified the joint caudal and dorsal fin, joint caudal and anal fin and joint caudal, dorsal and anal fin; all of these responses were credited. Some candidates referred to the distinguishing feature for fish **C** as being spotted skin. Candidates needed to be more precise as this is also a feature of fish **B** and is not a labelled feature in Fig. 4.1. The correct response here would have been 'spotted fins'. Fish **D** was the fish whose distinguishing feature was most commonly identified. Candidates should be reminded to follow instructions and use the features labelled on the figure. Responses that referred to the presence of a long nose were not credited. Some candidates were able to identify a feature but did not state how this feature could distinguish between the different types of fish pictured. For example, when identifying a distinguishing feature for fish **D**, some candidates gave the feature as 'upper mandible', rather than 'elongated upper mandible'.
- (b)(i) The vast majority of candidates correctly gave the compound sulfur dioxide. Nitrogen oxide(s) was also an acceptable response.
- (ii) Some candidates appeared to have difficulty with this data analysis question, perhaps because it was in a bar chart format rather than a line graph. Candidates should be able to analyse data from a wide variety of sources including different graph formats and tables of data. Many candidates referred to the data as 'number of fish', rather than 'mean number of fish species'. These candidates were only awarded partial credit for this question. Most candidates correctly identified the general trend and at which pH the most and fewest species of fish were present. Candidates should be reminded to quote figures accurately. Responses that referred to mean number of species being just above/below/around a particular number were not credited.
- (iii) Many candidates scored highly on this question by identifying several effects of acid rain on the environment. Common answers included reducing the pH of lakes and killing fish. Damage caused to statues or buildings was only credited if candidates qualified this by saying that the statues/building were made of limestone. A significant minority of candidates described acid rain as increasing the pH of lakes or the soil.

#### Question 5

- (a)(i) Most candidates were able to give a good definition of *asexual reproduction*. Many gave the definition of asexual reproduction as offspring coming from one parent. Some candidates lost credit for describing the offspring as being identical or similar, rather than genetically identical.
- (ii) Many candidates were able to give an advantage and a disadvantage of asexual reproduction. More candidates were able to provide a correct disadvantage than a correct advantage of asexual



reproduction. Common advantages given were that asexual reproduction is fast and that only one parent is required. Some candidates referred to offspring inheriting good traits from the parent; these were only credited if the beneficial traits were linked to the offspring or parental environment. Many candidates gave no variation as a disadvantage. Some candidates gave no dispersal as a disadvantage, but did not refer to the competition that would result due to lack of dispersal; these responses were not credited.

- (b)(i) Many candidates gave a very good definition of *growth*, with most of these gaining the full credit. A small minority of candidates incorrectly referred to an increase in complexity.
- (ii) This question proved challenging, with many unable to gain credit. Many candidates referred to growth of the tuber by asexual reproduction. Few referred to the translocation of sucrose. Those who did mention sucrose generally scored highly, many gaining full credit. The best responses described the source of the sucrose, how it is transported to the stems and how the sucrose is converted and used to form the tuber. A small number of candidates incorrectly referred to the translocation of glucose or starch.
- (c)(i) The majority of candidates were able to quote a correct value for the change in mass, with most gaining full credit. A very small number of candidates did not indicate that the given value was negative, and so lost credit. Candidates should be reminded to quote a single figure if instructed to, rather than giving a range of figures.
- (ii) A wide range of levels of response were seen here. Many candidates were unable to answer the question appropriately. Some of the candidates described the results but omitted to give an explanation of the results as required by the question. A common source of error was to use the term 'concentration gradient', rather than 'water potential'. Candidates who correctly explained the results at  $0.4 \text{ mol dm}^{-3}$  and  $0.4 - 1.0 \text{ mol dm}^{-3}$  often did not gain any credit for the explanation of results at  $0.0 - 0.4 \text{ mol dm}^{-3}$  because they stated that the potato tuber was losing mass. However, there were some very good answers where candidates achieved full credit for explaining in detail the reason for movement of water molecules and the results of this movement between  $0.0 - 0.4 \text{ mol dm}^{-3}$ . A few candidates incorrectly referred to the movement of sucrose, rather than the movement of water molecules. A common misconception was that there was no osmosis at  $0.4 \text{ mol dm}^{-3}$ , rather than no net movement of water molecules.
- (d)(i) Many candidates gave two correct structural adaptations of flowering plants for wind pollination. Many referred to anthers/stamens hanging outside the flower without mentioning exposure to the wind; credit was awarded for this, as the question specified a structural adaptation. Some candidates suggested that lots of pollen was produced, but this was not credited as it is not a structural adaptation.
- (ii) Most candidates were able to differentiate between self-pollination and cross-pollination. As the question asked how these two types of pollination differ, there was no need for candidates to provide a description of both types of pollination. These responses were, however, credited if they were correct. A few candidates were confused with the difference between pollination and fertilisation. Candidates should be reminded that these two processes are different. A few candidates also gave cross-pollination as the transfer of pollen between different flowers rather than different plants, and were not awarded credit.
- (iii) Some candidates confused the advantages of asexual reproduction with the advantages of self-pollination. Candidates should be reminded of the differences between the types of pollination, fertilisation and reproduction. Some candidates were able to refer to the lack of necessity for pollinators or the likelihood of less wastage of pollen. Some candidates suggested that good traits were passed on from parent to offspring. These were only credited if this was linked to being beneficial for their environment.

## Question 6

- (a)(i) The question asked candidates to state and explain two ways in which modern technology has resulted in increased food production. Many candidates correctly stated fertilisers, pesticides and herbicides, but fewer explained how the use of these would result in increased food production. Candidates should be reminded to read the question carefully and complete all of the instructions given. The most common, best responses stated that fertilisers provide mineral ions to improve crop yield, and that pesticides destroy pests that damage crops and so improve crop yield.

- (ii) Many candidates suggested that the rapid increase in human population was due to improved quality/provision of medical care. Some candidates suggested that the population increase was due to increased birth rate; this did not gain any credit.
- (b) Some candidates were awarded full credit for this question. Some misinterpreted the question and discussed the nutritional quality of fruit and vegetables in comparison to meat; these responses generally gained no credit. Candidates who understood the question scored well. Most were awarded credit for stating that there is a loss of energy at each trophic level. Some candidates explained this further by stating that less energy is available to humans if they consume meat from a higher trophic level rather than eating fruit and vegetables, which are producers on the first trophic level. Many candidates confused less energy being available at the consumer trophic level with less energy contained within consumers (meat) and producers (fruit and vegetables).
- (c) There were many excellent answers given to this question and the majority of candidates were awarded at least partial credit. Many candidates gave several reasonable effects of deforestation, including soil erosion, loss of habitat, desertification and species extinction. Some candidates outlined the effects of global warming on the environment, which was not credited. A minority of candidates also confused the effects of deforestation with the effects of acid rain and eutrophication; these responses were also not creditworthy.

# BIOLOGY

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**Paper 0610/52**  
**Practical Test**

## Key Messages

It is essential that candidates experience as much practical work as possible during their programme of study so that they develop confidence in applying these skills.

Candidates should:

- read questions carefully before starting to answer and give only the number of responses required for questions that ask for a specific number – incorrect additional responses may cancel a correct response;
- know which SI units to use for measurements, in particular time and distance, and the correct abbreviations;
- know how to draw tables that display data clearly, using suitable column and row headings, and appropriate units;
- be able to present a biological drawing with a clear unbroken outline, without any shading or artistic finishes – the proportion should be accurate and the label lines should be drawn with a ruler and make contact with the intended structure;
- read and follow the command instructions for every question.

## General Comments

The quality of work showed that candidates were well prepared for this paper as there were many examples of clear, well-presented answers.

In **Question 1** there were some excellent examples of tables drawn carefully with a ruler and with units in the table headings. Poorer tables were drawn with irregular lines, and included the units in the body of the table instead of in the headings. Some tables had inadequate columns and cells in which to record the indicator changes with time.

In **Question 2** candidates were presented a half specimen of a ripe strawberry fruit to observe, to make two accurate, labelled drawings of the cut surface and the outer surface. Drawings were variable in quality, with some excellent examples showing clear outlines in pencil and occupying most of the space provided, while others were drawn with crossed out lines or sketchy artistic outlines and occupied less than half of the space. The guide line for the label must make contact with the structure intended to be identified. Careful observation is essential so that the drawing has the correct proportions and shows the main visible features. It is important that candidates use a sharp HB pencil for drawings, so that any errors can be erased. Drawings should be made with clear, continuous lines and have no shading.

The Supervisor's Report is very important in ensuring that candidates are credited appropriately when materials have to be substituted for those specified in the Confidential Instructions. Supervisors should trial practical materials, as required in the Confidential Instructions, some time in advance of the actual examination. This gives time, if any difficulties arise, to seek advice about alternative materials, using the contact information on the Confidential Instructions. In cases where a substitution is made, the Supervisor's Report should include as much detail as possible to allow Examiners to assess the candidates' answers appropriately.

### Comments on Specific Questions

#### Question 1

(a) (i) Most candidates were able to follow the instructions and recorded the initial appearance of the colour of the hydrogencarbonate indicator and the yeast cultures.

(ii) Candidates generally constructed suitable results tables, with ruled lines and an appropriate number of columns and cells to record the colour of the indicator solution and the number of bubbles released from the respiring yeast cultures.

Many candidates appeared not to have read the instructions to record the number of bubbles released in one minute at each time interval after five and ten minutes; others did not include spaces to record the initial set up at zero minutes. The column headings frequently omitted the reference to 'number of bubbles released in one minute'. Poorly constructed tables showed inadequate number of columns and cells to record both the bubbles and the colours.

(iii) The results recorded showed that most yeast cultures were active and released many bubbles in each timed interval. Considerable variation was noted between the different Centres regarding the level of activity of the yeast, and reference was made to the Supervisor's Report and the recorded temperature in the laboratories. The changes in the colour of the indicator solution varied between Centres; some indicator solutions become paler in redness and others turned yellow.

(iv) The comparison of the yeast cultures varied. Sometimes the cultures were still active and in others the bubbling had slowed.

(v) This question had two commands – describe and explain. Many candidates covered both parts describing their individual results and explaining the colour change with reference to release of carbon dioxide and its acidic nature for the colour change of the indicator solution. Others described their results but without any explanation.

(b) (i) Candidates found it easy to explain why the yeast culture was stirred at the beginning of the investigation.

(ii) Some candidates explained the use of oil in test-tube **B** as a barrier to exclude the oxygen, but many did not.

(iii) Some good explanations were given for the use of a container of warm water in which to keep the test-tubes of yeast culture.

(c) Errors and improvements were clearly given by many candidates. The most commonly suggested errors were based on the difficulty of counting bubbles that may be of different sizes and the cooling of water in the container. Suggested improvements involved measuring the volume of gas released or using two people to count the number of released bubbles, and replenishing the warm water at intervals or using a controlled heater for the water bath. Other suggestions involved the use of air-tight apparatus, adding more oil to form a complete layer, and using a colorimeter to assist with determining the indicator colours.

(d) (i) Most recognised that the photomicrograph showed yeast cells that were reproducing asexually.

(ii) Based on the photomicrograph of the dividing yeast cell, candidates were able to measure the length of the line correctly in millimetres. Very few measurements were incorrect or recorded using different units. The calculation of actual length was correctly completed by most candidates.

#### Question 2

(a) (i) Candidates were presented with half of a ripe strawberry fruit. Two drawings were required – one from the cut surface and the second with the half fruit turned to expose the outer surface. As there was only one half of the fruit provided, the two drawings should have been of equal proportions. Better drawings had a clear outline drawn with a sharp pencil, without any gaps or shading, clear details of the inside, without shading, and the arrangement of the seeds on the outside of the fruit clearly shown.

Poorer drawings of the inner structures were often heavily shaded or drawn with short, sketchy lines. Candidates should be encouraged to use most of the space provided, but not to draw over the print. Most candidates were awarded credit for a label to a seed or to the site where sepals are attached. Poorly placed labelling lines that did not make contact with the area were not credited. Candidates should be encouraged to draw labelling lines in pencil, with a ruler, and to make sure that the line touches the feature being identified. Lines should not have arrow heads and brackets should not be used.

- (ii) The candidates' suggestions for dispersal of the seeds to new areas were mainly based on the edible nature, smell and attractive appearance of the brightly coloured fruit. The seeds were protected from being digested during the passage through the alimentary canal and egested (not excreted) in other areas. Poor answers referred incorrectly to agents such as insects or wind, confusing seed dispersal with pollination.
- (b) (i) Most candidates clearly described the reducing sugar test, including several safety procedures. The expected change in colour to show the presence of reducing sugar was required.

Some candidates confused the reducing sugar test with that for non-reducing sugar and described the addition of an acid. In order to show the colour change, the resulting mixture must be neutralised before re-testing with Benedict's solution.

- (ii) Although many candidates accurately described the biuret test for proteins, other procedures were confused. Unlike the reducing sugar test using Benedict's reagent, the test for protein does not require the specimen to be heated. Again the appropriate colour change was expected to be included in the description.
- (iii) The candidates were able to carry out these two food tests on samples of the fresh fruit, and most recorded their own observations and conclusions to complete the given table. The fruit used showed variation between the Centres; some showed from the results that the fruit did not contain protein and others showed that protein was present.

# BIOLOGY

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**Paper 0610/62**  
**Alternative to Practical**

## Key Messages

- Candidates require sufficient experience with the practical procedures outlined in the syllabus in order to be able to successfully answer this paper.
- Candidates should be reminded to read the questions carefully, paying particular attention to the information given to them in text and tables, as well as the command words in the questions. They should also read through their answers to avoid careless mistakes.
- Candidates should use a sharp HB pencil for drawings and graphs; any incorrect lines should be erased completely.
- Candidates should avoid the use of felt tip pens as the ink can obscure answers on the other side of the page. Writing answers in pencil and then overwriting in pen should be avoided as any pencil markings that are missed in this process are likely to be difficult to read. Any crossing out should be done neatly and new answers should be written above or below the original answer. Where the original answer has been written over, it is often too ambiguous or unclear for credit to be awarded.
- If an answer is to be continued in another space, this continuation must be clearly numbered. There should also be some indication in the answer space provided that the answer is continued elsewhere. If only the end of a phrase is required, this can be written immediately underneath the last answer line rather than on a blank page or additional sheet.
- Candidates should be reminded to use units appropriately when quoting data, drawing graphs and tables and performing calculations.
- Candidates should give no more than the specified number of responses.

## General Comments

Many very carefully considered answers were seen and the vast majority of the candidates were able to draw on their experience in practical work to answer this question paper confidently. Those candidates who did not use the information provided about the experiment and specimens in the question paper tended to perform less well. A number of candidates did not realise that the experiment in **Question 1** involved respiration in yeast even though this was stated. Others did not make two drawings of the strawberry in **Question 2**, even though this was clearly stated in the question.

## Comments on Specific Questions

### Question 1

- (a) (i) The vast majority of candidates correctly chose to construct a scatter graph, plotting both sets of data on the same axes. The most common errors were to omit or give incomplete axis labels, or omit the zero at the origin. Some poorly drawn lines were seen and not credited. A number of candidates did not identify plots at the origin.
- (ii) Although some excellent answers were seen, many candidates did not give both a description and an explanation. It was not uncommon for candidates to gain credit for the description only; the involvement of aerobic or anaerobic respiration or the release of carbon dioxide were required for the explanation.

- (iii) Most well-prepared candidates correctly suggested that after 24 hours there would no longer be sufficient glucose for the yeast to respire. A few also realised that the water would cool down. Responses lacking clarity were not credited, for example references to 'loss of nutrients'. Some common inaccuracies included references to yeast, oxygen or carbon dioxide being 'used up'.
- (b) (i) Most candidates were able to suggest an explanation for stirring the yeast culture before the investigation; mixing was the common correct answer. Some candidates incorrectly thought that stirring started the reaction. References to yeast 'dissolving' were seen and not credited.
- (ii) Fewer candidates realised the purpose of placing a layer of oil on top of the yeast culture in test-tube B. The most common incorrect response was that the oil layer stopped carbon dioxide from escaping.
- (iii) A wide variety of reasons were offered. Many candidates did not realise that the rate of the reaction was faster if the temperature was increased.
- (c) (i) Those candidates who seemed to have had experience in planning and conducting investigations were able to identify the independent variable as the presence or absence of oil and thus oxygen. Many incorrect answers were given, including lists of numerous variables.
- (ii) This question was mostly answered well.
- (d) Although most candidates knew that some measure of respiration needed to be recorded, only the more able candidates realised the necessity to measure this variable over a period of time to determine a rate.
- (e) (i) Most recognised that the photomicrograph showed yeast cells that were reproducing asexually. Common errors included unqualified references to reproduction, respiration and even magnification.
- (ii) The vast majority of candidates measured the length of the line accurately and carried out the calculation correctly.

## Question 2

Many excellent drawings were seen and most candidates were also familiar with the food tests. Slightly fewer candidates were able to confidently describe their observations when asked to compare images of two fruits from different species of strawberry.

- (a) (i) Some excellent drawings with correct labels were seen. Sometimes credit was lost for shading or lack of detail on the cut surface diagram. Label lines did not always make contact with the structure being labelled and so lost credit.
- (ii) Many vague answers discussing seed dispersal were seen. Reference was often made to wind dispersal and sometimes methods of pollination were incorrectly described. Good answers were characterised by clear links to animals eating the fruit, the indigestibility of the seeds and egestion of the seeds. References to excretion were not credited.
- (b) (i) Most candidates correctly described the procedure to test for a reducing sugar, although sometimes heat or safety procedures were omitted. Very few stated an incorrect reagent.
- (ii) Most candidates were able to confidently describe the test for protein, often including the solutions that make up the Biuret reagent.
- (c) (i) The most commonly credited visible similarities between the two strawberry fruits were the presence of sepals and seeds on the outer surface. Many candidates gained full credit.
- (ii) Some detailed descriptions of the differences between the two fruits were seen. Candidates were more accurate in describing the different shapes of the fruit than they were in describing the differences between the seeds. Some answers lacked accurate descriptions of the shapes of the two fruits and their seeds.