

BIOLOGY (US)

Paper 0438/07
Coursework

General Comments

It is important that Centres include all of the required paperwork with their coursework samples. External moderators need to be able to check the experiment form, the mark schemes, the marks awarded to each candidate for each piece of work and understand any changes made by internal moderation.

Most Centres provide a carefully constructed Experiment Form, with the tasks listed and numbered, so that it is possible to cross-reference these against each piece of sampled work and the marks awarded for it. Where there is more than one teaching set, it makes it much easier to ensure total comparability across the sets if every teacher uses the same set of worksheets. If these differ, then there needs to be very thorough internal moderation, and the way in which this has been done must be communicated to the external moderator. Some Centres provided more than one Experiment Form, with different lists of tasks for each teaching set, so that there was more than one task named “Experiment 1”, for example. This made it difficult to match up the work of the candidates against the relevant experiment, and raises concerns that the assessment of all candidates has not been done to exactly the same standards.

Mark schemes were presented in a variety of ways. The most important feature is that they are carefully matched against the generic criteria, so that the candidates’ performances can be reliably marked, ensuring that all aspects of the criteria are taken into account.

One of the requirements of the coursework sample is that the work should be visibly marked by the teacher. Please see **section (f)** on page 54 in the Coursework Handbook. This handbook also contains many samples of work that have been carefully marked by the teacher, e.g. on pages 67-69 and 82-90. Many Centres did not do this. Adding comments to the work is very helpful to the candidate, to the teacher (in helping them to focus clearly on all the relevant aspects of the work) and to the external moderators.

Please ensure that all information about each piece of work in the sample is clearly shown on the piece of work itself. This should include the name of the candidate, the experiment from the experiment form, and the marks awarded for that assessed skill on that piece of work. Please group together all the work from each candidate. This can be done with paperclips, but it is better to slip them inside a lightweight folder (even a folded piece of paper will do), so that the external moderator can easily leaf through the separate sheets of paper.

Note that, for coursework assessment, each candidate must work alone. This is the only way in which you can guarantee that the work is purely the work of that candidate.

In general, graphing skills are not as accomplished as would be expected of candidates at this level. It is very important that candidates are equipped with the correct tools for the task and this includes suitable graph paper. Cambridge uses a 2mm grid, and it is strongly recommended that you supply this for your candidates. It appears that it is difficult to obtain this for many Centres, but you can find numerous samples on the internet that you can download and print off as required. Using this type of graph paper, rather than grids made up of relatively large squares, encourages precise and careful plotting. It is important that candidates appreciate that the purpose of a graph is to display the results in a form that shows patterns in the results, or for calculations to be made relating to how one variable affects another, and that constructing these with care is important.

For C4, note that candidates achieving a mark of six need to demonstrate their ability to identify important variables to be controlled (kept constant) and to evaluate their method and suggest or implement improvements. With a very simple C4 task, such as investigating the effect of exercise on heart rate, a high degree of insight into the limitations of the method must be shown; if maximum credit is to be achieved. Very few candidates recognise that a single set of readings is rarely sufficient to be able to draw a safe conclusion and very few doing this task mentioned the control of any variables.

For C3, it is expected that IGCSE candidates will be able to cope with analysing results where the independent variable (the variable that was changed) shows a range of values. For example, in an osmosis investigation, they should be immersing tissues in at least five different solutions (including water as 0 concentration) of water or salt solution. This then enables the construction of a line graph and opens up far more possibilities for drawing conclusions, identifying anomalous results and discussing sources of experimental error, than if only two or three solutions are used.

BIOLOGY (US)

Paper 0438/13
Multiple Choice

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

General comments

The paper provided a balance of questions and sufficient challenge for candidates working at this level. One misconception was that breathing and respiration are the same. Some topics proved to be challenging for some candidates. These included the differences between osmosis and diffusion, the differences between plant and animal cells, the distribution of phloem in leaves and roots, the identification of the coronary artery, the structure of a flower and the uses of meiosis and mitosis. Candidates showed a good understanding of the use of dichotomous keys, the water cycle and what is involved in genetic engineering.

Comments on specific questions

Question 1

While most candidates gave the correct response, a large number believed that breathing is a characteristic of all living organisms.

Question 2

Many candidates opted for the correct response but some identified the structure as a cell wall instead of a membrane. Some candidates did not appreciate that having two adjacent cells would mean that two cell membranes are present.

Question 4

While many candidates selected the correct option, some did not, suggesting a less secure knowledge of the levels of organisation in plants.

Question 5

This proved to be a challenging question. Many candidates did not appreciate that although the process of osmosis requires a partially permeable membrane, diffusion does not.

Question 7

While many candidates correctly identified the enzyme, some incorrectly identified the substrate as the enzyme.

Question 8

Some candidates selected the correct option. It was not appreciated by most candidates, that in the dark, both the snail and the aquatic plant will produce carbon dioxide.

Question 9

Some candidates were able to identify the guard cell but many were not.

Question 10

Many candidates were not aware that it is nitrates that are used in the production of proteins.

Question 12

Most candidates selected the correct option, but some thought that meat products are the main source of fibre in a human diet.

Question 14

Although many candidates answered this well, some candidates seemed unaware that hydrochloric acid kills bacteria.

Question 15

Only some candidates correctly identified the phloem in both the root and the leaf.

Question 17

Similar numbers of candidates chose each option, suggesting that the location of the coronary artery was not well known.

Question 18

Although many candidates identified which blood vessel was an artery, a similar number opted for the blood vessel which transported 'oxygen from the lungs to the left atrium,' not appreciating that since this blood vessel is transporting blood towards one of the chambers of the heart, it must be a vein.

Question 19

Many candidates wrongly identified antibody production as a chemical barrier, although some correctly realised that it is the mucus lining in the airways that is the chemical barrier.

Question 21

Few candidates selected the correct option. There appeared to be some confusion regarding the differences between aerobic and anaerobic respiration in humans.

Question 22

While many candidates correctly identified where urea is produced in the body, they were uncertain about where it is broken down and therefore did not select the correct option.

Question 23

Although many candidates correctly identified the retina as the light sensitive part of the eye, some opted for the iris.

Questions 24, 29 and 38

Candidates showed a good understanding of the topics covered in these questions, with the majority of candidates selecting the correct options.

Question 28

A few candidates demonstrated a secure knowledge of the structure of a flower.

Question 30

While many candidates selected the correct option, some thought that abstinence from sex is a barrier method of birth control.

Question 32

The majority of candidates seemed unclear about the functions of meiosis and mitosis.

Questions 33

This question required the interpretation of graphical data. While some candidates identified the correct option, many found it difficult to apply their knowledge of variation to the context used in this question.

Question 34

Many candidates were aware that cutting down large areas of forest increases the concentration of carbon dioxide in the atmosphere. A small number of candidates believed that it had the opposite effect.

Question 37

Most candidates answered well, although a few used the wrong curve (the prey curve) to answer the question.

Question 39

Only a few candidates were aware that yeast is used in bread-making because produces carbon dioxide.

Question 40

Most candidates found it difficult to apply their knowledge to graphical data. The bacteria use up dissolved oxygen to digest the sewage and release mineral ions in the process. The sewage must enter the river before the oxygen begins to decline and the level of mineral ions in water begins to increase.

BIOLOGY (US)

Paper 0438/23
Multiple Choice

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

General comments

The paper provided a balance of questions and sufficient challenge for candidates working at this level. Common misconceptions included the idea that breathing and respiration are the same and there was a lack of clarity regarding the differences between osmosis and diffusion in some cases. The interpretation of graphical data also proved to be challenging in some cases. Candidates showed a good understanding of photosynthesis, the effect of temperature on enzymes, the use of nitrate ions, the stages in the development of cholera, the meaning of phototropism and protein production.

Comments on specific questions

Question 1

While most candidates answered correctly, a large number believed that breathing is a characteristic of living organisms.

Question 2

Many candidates opted for the correct response but some identified the structure as a cell wall instead of a membrane. Some candidates did not appreciate that having two adjacent cells would mean that two cell membranes are present.

Question 3

While many candidates realised that metabolism was associated with mitochondria, some candidates opted for ribosomes being present in large numbers in cells with high rates of metabolism, instead of mitochondria.

Question 4

While many candidates selected the correct option, some did not, suggesting a less secure knowledge of the levels of organisation in plants.

Question 5

This proved to be a challenging question. Many candidates did not appreciate that although the process of osmosis requires a partially permeable membrane, diffusion does not.

Question 8

Some candidates selected the correct option. It was not appreciated by most candidates, that in the dark, both the snail and the aquatic plant will produce carbon dioxide.

Question 9

While many candidates were able to recognise a guard cell, a similar number of candidates could not.

Question 13

The majority of candidates showed a good understanding of the functions of teeth.

Question 14

This question required the interpretation of graphical data. While some candidates identified the correct option, many found it difficult to apply their knowledge of enzymes to the context used in this question.

Question 15

While some candidates answered correctly, this proved to be a challenging question with many candidates unable to relate the structures of a villus to their functions.

Question 16

Only some candidates appreciated that amino acids move out of the leaves to the rest of the plant in the phloem.

Question 17

Many candidates were aware that the pulmonary vein carries oxygenated blood to the heart, although some were less certain of what is carried and in which direction.

Question 19

Many candidates were aware that an injection of antibodies will provide passive immunity against some pathogens. However, some candidates were less clear about the differences between passive and active immunity.

Question 20

Although many candidates selected the correct option, some were unable to relate the pressure in the thorax to the actions of the internal and external intercostal muscles and that of the diaphragm.

Question 24

While many candidates selected the correct option, some thought that the light sensitive part of the eye is the iris.

Questions 25, 26, 35, 36 and 38

Candidates showed a good understanding of the topics covered in these questions, with the majority of candidates selecting the correct options.

Question 30

While many candidates answered well, some thought that inserting sperm into the vagina of a woman from a donor was *in vitro* fertilisation (IVF) rather than artificial insemination (AI).

Question 31

Many candidates were aware that it is the lymphocytes that are destroyed in people who are HIV positive, although some opted for phagocytes.

Question 34

While many candidates were aware that blood groups show discontinuous variation, some candidates thought that they show continuous variation.

Question 37

Most candidates answered well, although a few used the wrong curve (the prey curve) to answer the question.

Question 39

While many candidates knew that yeast is used in bread-making because it produces carbon dioxide, some believed that it is used because it uses up oxygen or sugar, or because it produces alcohol.

Question 40

While some candidates identified the correct answer, many found it difficult to apply knowledge to graphical data.

BIOLOGY (US)

Paper 0438/33
Theory (Core)

Key Messages

Candidates should ensure that they understand the type of response required for command words such as state, describe and explain.

General Comments

A good level of knowledge and understanding was seen for many syllabus topics.

Learning the definitions of key terms remains an important skill.

Comments on Specific Questions

Question 1

- (a) (i) The majority of candidates were able to name the correct process.
- (ii) Many candidates found completing the word equation for photosynthesis challenging. A common error was to give the word equation for respiration.
- (iii) Some candidates found this question challenging. Some responses provided specific adaptations such as having a large surface area; others lacked detail, for example, stating that leaves were big which was insufficient.
- (b) (i) Most candidates were able to use the key successfully.
- (ii) Many candidates were able to produce a suitable sentence for the key. A common error was to create a question which gave the answer the wrong way round, e.g. they asked a question to which the answer was yes for leaf *Fraxinus excelsior*.

Question 2

- (a) (i) This was well answered by the majority of candidates.
- (ii) While many candidates gave the correct response, some found this challenging.
- (iii) Many candidates were able to give suitable responses for this question.
- (b) (i) Few responses correctly identified the coronary artery.
- (ii) There are many factors that can increase the risk of developing a blockage and most candidates provided good examples.
- (iii) A common error was to give the name of a specific blood vessel, such as those quoted in question 2(b)(i), rather than the particular type of blood vessel.
- (c) (i) Some candidates were able to identify the structure correctly.
- (ii) While some candidates were able to state the function of valves many found this question challenging.

- (iii) A few candidates were able to name the structure.

Question 3

This proved to be a challenging question for some candidates.

- (a) (i) Some candidates were able to name the group correctly.
- (ii) Few candidates knew the sources of all three hormones.
- (iii) Some candidates were able to identify the relevant glands.
- (iv) Some candidates were able to state the functions of both hormones.
- (b) Some candidates were able to provide two effects.

Question 4

- (a)(i) Some candidates could recall the definition specified in the syllabus.
- (b) (i) and (ii) Many candidates found this challenging. A few could recall the enzyme involved and the product of starch digestion.
- (c) (i) The majority of candidates correctly identified the structures. A common wrong answer was **E**.
- (ii) Some candidates correctly identified the structure. A common misconception was that absorption of food molecules occurs in the large intestine.
- (d) While some candidates gave correct responses. A number of responses did not answer the question asked and instead provided a description of ingestion. A common error was to state enzymes that are not active in the stomach.

Question 5

Many candidates were able to extract information and use graphical data accurately and this question was answered well by the majority of candidates.

- (a) (i) The majority of candidates were able to accurately extract data from the graph.
- (ii) The majority of candidates were able to calculate the time correctly.
- (iii) This was well-answered by the most candidates.
- (b) (i) Many candidates were able to recall part of the definition. Some responses were also able to make the link between the breakdown of nutrients and the release of energy.
- (ii) While many were able to state a useful product. Many stated alcohol which was in the question and was therefore not accepted.
- (iii) Some candidates were able to give two differences.

Question 6

- (a) (i) While some candidates gave a correct response many responses did not answer the question and it was possible that some had not read the introductory sentence that described the conditions in which the plant had been grown, i.e. in the dark.
- (b) (i) This proved challenging for many candidates, a few were able to give the correct stimulus.
- (ii) Some candidates knew the correct response.
- (c) (i) Again some candidates knew the correct response.

- (ii) While some candidates were able to provide a good response to this question, many found it challenging. A common error was to repeat the description given in the question and to omit the explanation as to why the shoots bent towards the light.

Question 7

- (a) It was pleasing to see that many candidates answered this question well.
- (b) Candidates found this question challenging. A few candidates were able to successfully describe the stages involved in selective breeding. The best responses realised that sexual reproduction would be used in selective breeding, asexual reproduction. Some responses were less successful in applying their knowledge to a novel context.
- (c) This question proved to be challenging for most candidates. A few responses gave valid examples and successfully explained what genetic engineering is.
- (d) The majority of candidates were able to give suitable examples.

Question 8

- (a) (i) Some candidates were able to put all of the statements into the correct sequence in the flow chart. Many found this challenging.
 - (ii) A few candidates were able to state how new alleles are formed.
 - (iii) A few candidates knew a factor that increases the rate of new allele formation.
- (b) (i) The majority of candidates were able to define the term successfully.
 - (ii) Many candidates were able to give two visible features. A common error was to give features that were not visible in Fig. 8.1.
 - (iii) Many were able to give features of mammals that are not visible. A common error was to give a feature that is common to all vertebrates rather than just mammals.

Question 9

- (a) This question was answered well by nearly all candidates.
- (b) (i) Many candidates gave correct structural differences. A common error was to give differences in function rather than structure.
 - (ii) Nearly all candidates knew the purpose of a blood clot.

BIOLOGY (US)

Paper 0438/43
Theory (Extended)

Key Messages

Candidates who find that they do not have enough space to complete their responses should always indicate clearly where they have continued their responses.

Candidates should always read the stimulus material provided for each question very carefully. They should also know how to respond to the different command words, particularly describe, explain and suggest. It was evident that not all were confident of the differences in meaning, particularly in questions **2 (d)(ii)** and **(iii)**.

Responses need to be precise. In question **2 (d)(i)** some wrote about concentration but did not specify that it was the concentration of the substrate. Similarly in question **4(a)** reference was made to eggs rather than hard-shelled eggs.

The syllabus includes definitions of key biological terms, such as gene and population, learning definitions is an important skill.

Candidates should always show the working in their calculations. Marks may be available for correct working if the final answer is incorrectly expressed, for example omitting to round a value to the nearest whole number.

General Comments

A relatively common error was not including units with quoted data or not including relevant data from the question. Candidates should be reminded of the importance of using data in their responses.

Comments on Specific Questions

Question 1

- (a) (i)** Almost all candidates drew an arrow on the correct side of the heart; however, many did not use an arrow showing the complete path from vein to ventricle and some continued their arrow past the ventricle into the artery. Some also annotated the diagram of the heart to help them with the subsequent questions. This showed good use of the source material.
- (ii)** Many knew both the location and the name of the blood vessel that carries blood at highest pressure. Many knew that it was blood vessel **C**, but were not able to recall the name of the blood vessel. The most common incorrect responses were **D** and the vena cava.
- (b) (i)** This was a challenging question because candidates were required to think about what *causes* the closing mechanism, not the *function* of the valves. Candidates who did attempt to discuss the mechanism often described what caused the valve to open rather than close.
- (ii)** The function of the heart valves was well known. The most common error was to suggest that the valves prevented the mixing of oxygenated and deoxygenated blood. Some candidates wrote about this in **(b)(i)**.

- (c) The majority of candidates were able to describe the correct pathway. More candidates could have used the labels on the diagram to help them. Many identified the pulmonary artery, but very few used the term semilunar valve in their answers. Those that did sometimes confused the semilunar valve with the atrioventricular valve. Similarly, a high proportion of the candidates reversed the terms ventricles and atria. Very few described pressure changes in the heart. Some candidates extended their responses to describe what happens after the blood reaches the lung even though this was not required by the question.
- (d) Many candidates either identified the structure as the septum or stated its function, but surprisingly few candidates did both. Many gave other scientific terms that begin with an “s” such as sternum, steroid and stent. A common misconception was to suggest that the septum is used to push blood through the heart.

Question 2

- (a) Most candidates gave a common feature of dicotyledonous plants. The most common correct response referred to the idea that they have branched leaf venation and two cotyledons in their seeds. The most common errors were to give the wrong number flower parts or to suggest that the plant, rather than the flower, was found in multiples of four or five. Other candidates incorrectly gave features of monocotyledonous plants.
- (b)(i) Some excellent definitions of the term *gene* were seen but many seem to draw on their general knowledge rather than the syllabus definition. For example, candidates often discussed the coding of a “trait” or “characteristic” rather than a protein. Some used the terms DNA and protein interchangeably suggesting that they were not confident about the difference between these molecules.
- (ii) Almost all candidates gave one difference in the structure of the two proteins in the diagrams, but fewer gave two differences. Most described the overall shape of the proteins, fewer discussed the difference in the specific amino acids or order of the amino acids in each sequence. It was not uncommon for candidates to suggest that the proteins were of different lengths, even though the diagrams show exactly the same number of amino acids. This suggests that perhaps candidates knew that this is a common difference, but were not using the source material as directed by the question.
- (c) The role of the ribosome was generally better described than the role of mRNA. This question required a precise explanation and some responses lacked detail. Common misconceptions were to describe DNA as a copy of mRNA or to describe mRNA as a protein. Some responses described the location of mRNA and ribosomes within cells, even though this information was not required.
- (d)(i) Temperature was the most common factor given. A common error was to describe factors that affect plant growth rather than enzyme activity. Some responses were not sufficiently detailed, for example, stating ‘concentration’ rather than enzyme (or substrate) concentration.
- (ii) Most candidates gave detailed descriptions of the graph. However, some went further and gave an explanation of denaturing which was not required. A large number of responses referred to temperature rather than pH, even though there was no mention of temperature in the question.
- (iii) Candidates found it more challenging to explain the differences in the enzyme activity at pH 4 and pH 7. The majority stated that pH 4 was the optimum pH and that the enzyme was denatured at pH 7, but far fewer gave an explanation as to how denaturation would affect enzyme activity. Nevertheless, some very confident responses were seen, with correct references to active sites, enzyme-substrate complexes and successful collisions. As in the previous question, some referred to temperature rather than pH.

Question 3

- (a) Many candidates were able to apply their knowledge and use the information in the flow diagram to describe how red blood cells are produced excellent responses to this question. Almost all candidates described the sequence of events, with the best responses making use of appropriate terminology, such as mitosis and protein synthesis and haemoglobin. The description of the red blood cell shape was often incorrectly given as concave or doughnut-shaped and only a few

mentioned the breakdown of the mitochondria. Some also realised that only one of the two stem cells had become specialised. Most candidates included an explanation in their response. The most common points included reference to the large surface area and the transport of oxygen.

- (b) Most candidates knew that the liquid part of the blood is plasma. Common errors include cytoplasm and haemoglobin.
- (c) Some excellent suggestions as to why stem cells are found in the skin were given. Some were less certain of the role of stem cells suggesting protection, acquiring oxygen through the skin or the clotting of blood.
- (d)(i) Many candidates knew that iron deficiency causes anaemia. A small minority referred to vitamins or other minerals such as calcium and magnesium.
- (ii) Almost all candidates gave at least one symptom of anaemia with fatigue and weakness being the most common. A few gave symptoms of haemophilia or rickets.
- (e) The genetic cause of sickle-cell anaemia was generally well known. In some contexts it is acceptable to use the term “gene” or “allele”, but in most cases it is advisable to avoid interchanging these terms and choose the correct one. Those candidates who made use of the commonly-used symbols, Hb^S and Hb^A, often provide less ambiguous responses than those who did not. A common misconception was to refer to haemoglobin, rather than the red blood cell, as being sickle-shaped. Some responses discussed the relationship between sickle-cell anaemia and malaria even though this was not required by the question.

Question 4

- (a) Almost all candidates could identify the group correctly. Fewer gave two correct features that were relevant only to birds.
- (b) The definition of a population was well known. However, some responses did not specify that a population refers to a single species and very few mentioned that it is the group of organisms found at the same time.
- (c) A number of candidates made good use of the source information and gave appropriate suggestions. The most astute noticed that the less successful captive breeding programme occurred almost 10 years earlier and suggested that lessons were learnt from that experience that improved the success of the later programme. A common misconception was that the yellow-shouldered Amazon parrots were released in Arizona and that the lack of success was due to that fact that they did not adapt to a very different environment.
- (d) Many candidates successfully outlined the disadvantages. Most realised that with small numbers, genetic diversity would be low and explained the consequences of this.
- (e) Many candidates show a good understanding of the advantages. A wide variety of answers were seen with many excellent examples of the environmental consequences. Fewer candidates made reference to the impact on economic, educational or ethical reasons.

Question 5

- (a)(i) Many candidates calculated the difference in yields. For some there was confusion by some as to which number to use as the denominator - some using the fertiliser plot data and others using an average or the sum of the two. Candidates need to show their working.
- (ii) Some responses provided sufficient details of the particular nutrients in the fertiliser. Most explained that nutrients had been added, but very few described the effect of each compound on the plant.
- (iii) Almost all candidates stated the correct name of the process. Common incorrect terms given included “run-off”, “pollution”, and “nitrification”.
- (b) While many candidates gave confident descriptions, some responses lacked sufficient detail. A common error was to refer to the wrong group when describing the information in the graph.

- (c) Few candidates suggested why some grasslands plants survive better than others in sufficient detail. Many candidates linked their response to the previous parts of the question by relating this answer to fertilisers. For example, they stated that “some plants could use the fertilisers better” or that “some plants were adapted to the fertilisers”. A few responses discussed animal survival on the grassland rather than plants.

Question 6

- (a) Although it was evident that many candidates knew what is meant by a transmissible disease, few gave a precise definition. The term bacteria was used instead of pathogen in some responses.
- (b) Similarly, the definition of a nerve impulse was not sufficiently precise in some cases. Many described a reflex arc instead of a nerve impulse, and others described the transmission of the impulse across a synapse.
- (c) (i) Some very good responses were seen. However, the term vaccine was not always accurately described. For example, some referred to a small dose of a pathogen rather than a weakened or dead form of a pathogen. For a minority there was also a lack of clarity regarding the differences between active and passive immunity.
- (ii) Insightful explanations as to why vaccinations need to be continued even after a disease, such as meningitis, disappears were given by some candidates. The most common suggestion was the arrival of visitors, such as tourists or migrants, to the country. Many candidates only gave one suggestion even though there were two marks available for this question. Nearly all candidates stated that the pathogen could return, the best responses were able to explain how this might happen.
- (d) (i) This proved to be a challenging question for many candidates. The best responses were able to apply their knowledge of digestion to the context given.
- (ii) Some good explanations were seen. However, many candidates found this challenging and responses were frequently limited to a simple statement regarding the temporary nature of antibodies with no further explanation given. Some candidates suggested the use of regular injections of antibodies to overcome mutations in the pathogen rather than the value of an active immune response.