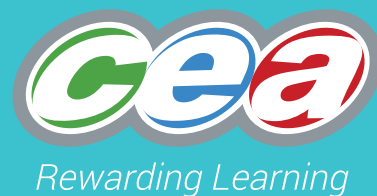


GCSE



# Chief Examiner's Report Biology

Summer Series 2022





## Foreword

This booklet outlines the performance of candidates in all aspects of this specification for the Summer 2022 series.

CCEA hopes that the Chief Examiner's and/or Principal Moderator's report(s) will be viewed as a helpful and constructive medium to further support teachers and the learning process.

This booklet forms part of the suite of support materials for the specification. Further materials are available from the specification's microsite on our website at [www.ccea.org.uk](http://www.ccea.org.uk).



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# GCSE Biology

## Chief Examiner's Report

### Subject Overview

A large range of topics from different areas of the specification were examined across the suite of papers. Candidates of differing abilities were provided with the opportunity to demonstrate a variety of skills and respond positively to the questions posed. Some good discriminatory questions throughout allowed for good differentiation and subsequently a good range of marks.

Overall, the level of written communication was good, although in some instances poor handwriting meant the marking of some scripts proved difficult. There is much room for improvement in respect of the spelling of key words. Some candidates who required the use of extra paper for writing answers needed to carefully record each part of the question in the margin. This was lacking in some instances.

Some issues regarding examination technique still need addressing. Some candidates still do not read questions carefully enough, often misinterpreting questions or repeating what has been provided for them in the stems of questions. The use of clear instructions to use evidence or data goes unnoticed by candidates who subsequently lose vital marks. It should be noted that the simple listing of data and evidence, when more comparative language is appropriate and required, will not gain credit. More guidance to candidates in this respect could be considered.

The use of scaffolding, helped candidates access questions, particularly where QWC was being examined.

## Assessment Unit 1      Cells, Living Processes and Biodiversity

### Foundation Tier

#### Unit Overview

Candidates achieved a good range of marks in this question paper. There was a wide range of questions covering different topics. Candidates of differing abilities were able to respond to the questions with varied success, suggesting there was good differentiation in the questions. It was felt that the language was appropriate for the candidates throughout the paper. The use of diagrams and the layout of the paper was effective in providing guidance for candidates and helped them access the questions. There was no evidence to suggest that candidates had insufficient time to complete the paper.

**Q1** The majority of candidates answered Part (a) well, demonstrating a good knowledge of how cells are organized in multicellular organisms. In Part (b), however, some candidates incorrectly named organs rather than giving examples of organ systems.

**Q2** Generally, candidates showed a good understanding of energy flow through a food web. In Part (a), many candidates placed the correct organisms in the boxes, but neglected to insert arrows, a teaching point that still requires some addressing.

Whilst Part (c) was well answered overall, some candidates only achieved one mark by not linking the death of the rabbits to a lack of food for the foxes.

In Part (d), many candidates correctly answered sunlight/sun. 'Grass' and 'producers' were the most common incorrect answers.

- Q3** In Part (a), candidates demonstrated a mixed knowledge of the processes of the carbon cycle, either getting them wrong or mixed up. As a result, the full range of marks were achieved in this question.

Part (b) proved to be a good discriminatory question. Many candidates were not able to apply their knowledge to the situation which was presented. Some stated that wind turbines used electricity rather than generating it, not recognising wind as a renewable energy source and an alternative to burning fossil fuels.

- Q4** This was a successful question with many candidates achieving most of the marks.

While Part (a) was generally well answered, a small number of candidates confused cell membrane with cell wall.

In Part (b), many candidates correctly identified the direction of movement of the oxygen molecules with arrows.

In Part (c), some candidates demonstrated a correct knowledge of diffusion. Others misinterpreted the question and stated why the cell required the oxygen.

This proved to be a good discriminator because some candidates did not qualify the factors by using the terms larger/increased/greater, but instead, just stated temperature/concentration gradient.

- Q5** Part (a)(i) was generally well answered, although some candidates mixed up oxygen and carbon dioxide and placed them on the wrong side of the equation.

In (a)(ii) many correctly gave the answers stated in the specification. Other answers were considered too vague.

In Part (b), some candidates mixed up aerobic and anaerobic respiration.

- Q6** Part (a)(i) demonstrated a lack of knowledge in some candidates with respect to 'messaging.'

Part (a)(ii) was well answered, especially the 'speed of response' column.

While Part (b)(i) was well answered, Part (ii) showed a high degree of differentiation in candidate responses. Some correctly identified the salivary glands as the effector while some incorrectly stated the effect of the stimulus rather than the effector, others gave answers that were incorrect or too vague, for example, nose, brain, mouth and smell of cooking.

- Q7** Part (a)(i) was well answered, but the performance in Part (ii) was mixed, 'protection' without any qualification being a common wrong answer.

In Part (b), while the feature and the adaptation were not always correctly matched, overall, candidates demonstrated a good knowledge of leaf structure in relation to photosynthesis.

- Q8** Part (a) was well answered, with many candidates achieving full marks.

In Part (b)(i), many candidates gave the correct values, but some incorrectly stated the maximum breathing rates of the students.

In Part (b)(ii), only candidates who had read this question carefully enough secured full marks. Some referred to the students' heart rates instead of breathing rates and others did not use data to support their answers.

Only a small number of candidates answered this question correctly, difference in the type of exercise being a common mistake.



**Q9** Many candidates achieved the mark in Part (a), but some did not know the correct answer, perhaps highlighting a lack of practical work in this area of the specification. There were no acceptable answers other than ‘quadrat.’

Generally, in Part (b), candidates demonstrated a poor knowledge of biodiversity and its definition. Many incorrectly focused on grass, probably because of its high numbers or the fact that the percentage cover in the two areas totalled 100.

Only the more able candidates successfully answered Part (c), correctly identifying moss and providing correct and comparative evidence.

Many candidates achieved the Mark in Part (d), although some wrong answers were given, some of which were already given in table 2.

**Q10** Whilst Part (a)(i) was generally well answered, ‘roots’ was a common incorrect answer.

All possible answers were given in Part (a)(ii), including active transport/uptake, absorption and diffusion. Many Foundation candidates were familiar with the terms active transport/uptake, even though these are specific only to the Higher Tier.

Part (b)(i) proved to be a good discriminatory question with only the more able candidates achieving full marks by using the appropriate method of working out. However, those that did not follow the correct steps were able to secure some of the marks.

Many candidates only achieved one of the two marks in part (b)(ii). They did not mention the data levelling off beyond 80kg.

Many incorrect answers were given in Part (b)(iii) including reference to nutrients and the crop still having water and sunlight and so could carry out photosynthesis.

In Part (b)(iv), some candidates did not secure full marks because they did not include a reference to cost.

**Q11** Part (a)(i) was poorly answered. Many candidates did not know the correct term ‘saprophytes’ or if they did, the spelling was incorrect.

In Part (a)(ii), many answers lacked sufficient detail.

Whilst many candidates correctly identified the best conditions for decomposition in Part (b)(i), they did not refer to only 38% of leaves remaining, the least percentage remaining or the most decomposition.

In Part (b)(ii), some candidates did not link the high temperature to the denaturation of the decomposing enzymes.

## Higher Tier

### Unit Overview

This question paper allowed candidates of differing abilities the opportunity to respond positively to the questions posed. Skills tested included factual recall, QWC, comparison, numerical, tabular and graphical analysis, interpretation, definitions, trends and labelling. The paper covered a good range of topics and allowed candidates to demonstrate their knowledge and understanding of these different areas in this part of the specification. Some good discriminatory questions allowed for differentiation in candidate responses. As a result, a wide range of marks was obtained.

**Q1** Many candidates were able to recall information about root hair cells using the correct terminology in Part (a).

In Part (b)(i), while many candidates successfully completed the calculation using different methods, some were unable to successfully apply their transferrable mathematical skills. Incorrect numerators and/or denominators were used by some to calculate percentage change.

In Part (b)(ii), candidates were asked to describe a trend. Some did not gain full marks as responses did not describe where the trend changed, ignoring the fact that the yield levelled off after 80kg of fertilizer was applied.

In Part (b)(iii), candidates did not gain credit for referring to nutrients rather than minerals.

The economics of fertiliser application rates was generally well understood in (b) (iv). Some candidates, despite being given a prompt about fertilisers being expensive, did not use this information in their responses.

**Q2** Part (a)(i) proved to be a good discriminator as a number of incorrect answers were given. Some leniency was given in respect of the spelling of 'saprophytes.'

Candidates generally demonstrated a good knowledge of saprophytic digestion in Part (a)(ii) using correct terminology in detailed answers.

Part (b)(i) was answered well by many candidates, who correctly used the information in the table to identify the best conditions for decomposition and then used appropriate language to emphasise only 38% of leaf mass remained, the least mass of leaves remained or the most decomposition took place.

Part (b)(ii) provided mixed responses. Some correctly linked the high temperature to the denaturation of the decomposing enzymes, others didn't. References to microorganisms being denatured or enzymes killed did not gain credit.

**Q3** This question was answered well by many candidates. Only a minority of candidates failed to give the correct function of mitochondria and a surprising number could not describe the function of cytoplasm. It was disappointing to read some Key Stage 3 terminology like 'powerhouse' and 'brain' of the cell, not appropriate at this level. Also, a vague reference to 'things' moving in and out of a cell did not gain credit in respect of the function of the cell membrane.

**Q4** In Part (a), the parts of the eye were generally well known, although vitreous humour and aqueous humour were sometimes confused. However, as a result candidates who made this mistake were able to gain one mark by stating the correct function.

In Part (b), only the more able candidates knew the term 'accommodation.' Refraction, dilation and focusing were common mistakes. Candidates generally demonstrated a good knowledge of focusing on a distant object. Those that lost marks either did not read the question carefully enough and described the process of focusing on a near object or used the incorrect terminology. Some candidates were careless in the use of correct language when describing ciliary muscle action and suspensory ligament state.

**Q5** In Part (a), the term chemical 'messenger' was required to distinguish between the term 'transmitter' which is used in the description of a synapse and 'protein' used in the definition of enzymes. Even without using this term, there was ample opportunity for candidates to gain full marks from a good range of available points. The majority of candidates correctly identified the hormone insulin.

In Part (b)(i), the range for normal blood glucose concentration was correctly read off the graph by many candidates. Part (b)(ii) was a question that required candidates to compare the two graphs and make a comparison between persons A and B. Many candidates lost marks due to a lack of comparative language. Whilst correct information about person A and/or B was often given, marks were not awarded because a direct comparison was not made.

The long-term effects of diabetes were generally well known in Part (b)(iii).

**Q6** Optimum temperature was well understood in Part (a)(i) and Part (a)(ii).

In Part (b)(i), the calculation was generally well done as candidates had used the information about enzyme B as guidance. Others, however, used incorrect numerators and/or denominators.

In Part (b)(ii), many candidates lost marks for failing to compare the activity of the two enzymes and instead simply described one enzyme. Some candidates also misinterpreted the graph and stated the optimum temperature for enzyme B was lower.

In Part (c), glycerol is a term which continues to be confused with glycogen and glucagon.

In Part (d), candidates did not gain credit for describing optimum temperatures.

**Q7** Overall, a very good, detailed knowledge of ileum adaptations was demonstrated by candidates with many excellent six-mark answers.

**Q8** Part (a) was generally well answered, but some candidates did not obtain full marks in (b) because they did not include the required data in their answers.

In Part (c), most candidates demonstrated a good knowledge of compensation point, although some listed all the changes in carbon dioxide level from 6am to 6pm rather than explaining the values at these times.

**Q9** This question proved to be an excellent discriminator at the end of the paper. In many instances, candidates did not use the evidence provided in the diagrams and the stems of questions. Many answers were just a recall of the common answers from previous phototropism questions or were responses that were too vague, displaying a lack of detailed understanding of this topic.

The question required candidates to apply their knowledge in an unfamiliar context. In Part (a), the hormone auxin was correctly identified by many candidates.

In Part (b), many candidates simply described the process of phototropism without reference to this particular experiment. Only the more able candidates were able to describe the diffusion of auxin into the agar block in diagram A and the subsequent effect of this asymmetric distribution in diagram B.

A common mistake in Part (c) was describing block 1 as being closer to the light rather than closer to the tip where auxin is made. Many appreciated that the seedling with block 2 would bend less, although a significant number did not gain credit for suggesting this seedling would not grow at all or grow straight up.

## Assessment Unit 2      Body Systems, Genetics, Microorganisms and Health

### Foundation Tier

#### Unit Overview

There was a range of topics covered and the varying standard of answers indicated good differentiation. It was noted that the use of diagrams and the layout of the paper was effective in providing guidance for the candidates as well as helping them access the questions. There was no sign of candidates running out of time as questions at the end of the paper were completed to a fairly high standard in many cases.

Overall, the quality of grammar and legibility of handwriting was good.

- Q1** Candidates completed this introductory question linking structure and function very well with most attaining full marks. It provided candidates with a positive introduction to the paper.
- Q2** In Part (a), a significant number of candidates were unable to define ‘fertilisation’ with many obtaining only one of the two available marks and many mistakenly gave ovary or uterus rather than oviduct as the site of fertilisation.
- In Part (b), the role of the flagellum was well known but the candidates were less familiar with the adaptation of the head region and many vague answers were given.
- Q3** The effects of nicotine on the body were not widely known with few candidates gaining full marks. The chemical in tobacco smoke, tar, was accurately recalled in most cases.
- In Part (a)(iii), carbon monoxide was often confused with carbon dioxide.
- In Part (b), definitions of binge drinking were often too vague. The bar chart was accurately plotted and trends were nearly all correctly described.
- Q4** This question on adaptations of blood vessels was generally well done and most candidates attempted to describe the three types of blood vessel required to access the top marks.
- Q5** In Part (a), most candidates struggled to accurately describe the meaning of variation, although many correctly recognised coat colour as discontinuous.
- In Part (b), the trend in the distribution of the mice was described well although many dropped at least one mark in applying their knowledge of natural selection to the example of the deer mice as required in Part (ii).
- Q6** Many candidates demonstrated a lack of knowledge of the heart and blood vessels.
- In Part (a), only a small number of candidates correctly identified the blood vessels on the heart diagram and a significant number were unable to accurately describe the pathway of blood through the heart.
- Part (b) was challenging for some candidates but many were able to successfully apply their knowledge of the functioning of the aorta to obtain at least two out of the three marks available.
- Q7** Many candidates were able to define cancer correctly. The mathematical element in Part (b) was well done with the vast majority of the candidates completing the calculation correctly. The importance of screening programmes was well known with most candidates achieving at least two out of the three marks available.

In Part (c), the comparison of cancer cells with normal cells was well done by some but many not did refer to the diagram for their answer as requested. The role of the HPV vaccine in Part (ii) was less well understood with many vague answers given with very few candidates achieving full marks.

- Q8** The adaptations of the placenta and role of the amniotic fluid were fairly well described, but a large number of candidates were unable to accurately name substances which are transported between the mother and baby. Vague references to nutrients and waste products were not rewarded.
- Q9** Many candidates scored high marks in this genetics question. Most candidates understood the term genotype but very few were able to correctly give the offspring phenotype. The Punnett square was completed to a high standard although the spelling of 'Punnett' often presented difficulties. Only a minority of candidates continue to confuse proportions with ratios and homozygous dominant with homozygous recessive.
- Q10** Many candidates could recall the term 'antigen', however, incorrect answers like fungi and bacteria were also given. Many candidates failed to obtain both marks for explaining why weakened microorganisms are used in a vaccine. Some confusion exists between active and passive immunity and in Part (iv), lymphocytes were often confused with phagocytes. Some candidates circled the wrong type of antibody in Part (v), showing they had not correctly read this skills question. The functioning of antibodies was attempted by most candidates with differing degrees of success.

In Part (b), the differences between the two viruses were well identified by many candidates but most lost marks in Part (ii) for failing to explain the significance of the different shape of antigens identified in Part (i).

- Q11** The vast majority of candidates lost marks in Part (a) because they did not use evidence from the diagram as requested. Textbook definitions which were not evidence based were not credited since this was a skills question.

In Part (b), descriptions of a genome were very often vague and failed to any gain marks. In the interpretation of the diagram, many confused the size of the genome with the range in the size of the genome. An encouraging number were able to select the appropriate evidence and explain it in sufficient detail to obtain one or both marks in Part (iv).

## Higher Tier

### Unit Overview

A wide range of marks were obtained by candidates. This would indicate that the paper allowed candidates of differing abilities to respond positively to the questions posed. The different styles of questions in the paper gave all candidates an opportunity to demonstrate their knowledge and understanding of the different topics in this area of the specification. Only the more able candidates were able to access the more difficult and challenging marks available. The paper contained a number of discriminating questions which allow for a good level of discrimination.

In general, the whole paper was attempted by the vast majority of the candidates within the time available.

- Q1** This opening question was accessible to candidates of all abilities and was generally answered well.

In Part (a), only a minority of candidates were unable to identify antigens though many lost a mark in (ii) for failing to explain that viruses used in vaccines need to be weakened to prevent causing the disease. Most candidates were able to recognise active immunity, name lymphocytes and identify the complementary antibody. However, in Part (iv), some candidates incorrectly focused on what happens after clumping takes place rather than explaining how the action of the antibodies leads to clumping. Some candidates confused antigen-antibody complex with enzyme action and used inappropriate active site terminology.

In Part (b), most candidates were able to correctly describe differences in the two strains of virus but a significant number failed to use the diagram as prompted in the question, and therefore made no reference to the shape of the antigen no longer being complementary to the original antibody.

- Q2** A large number of candidates lost marks in Part (a) because they did not use evidence from the diagram - text book definitions which were not evidence based were not rewarded since this was a skills question.

In Part (b) descriptions of a genome were often vague and failed to gain both marks. In the interpretation of the diagram, many confused the size of the genome with the range in the size of the genome. An encouraging number were able to select the appropriate evidence and explain it in sufficient detail to obtain one or both marks in Part (iv).

- Q3 (a)** Part (i) and Part (ii) were answered very well. Most could name and give the function of the red blood cell. In Part (iii), a disappointing number of candidates failed to read the question carefully and were not given credit for naming urea as a waste product, since it was given in the stem of the question.
- (b)** The process and function of blood clotting was well known though some candidates were unable to accurately name fibrinogen or correctly describe its conversion to fibrin.

- Q4** In Part (a), most candidates were able to correctly identify the ovaries as the site of oestrogen production though a large number were unable to accurately name progesterone as another female sex hormone. Spellings such as 'proestrogen' which looked like a mixture of oestrogen and progesterone were not rewarded.

In Part (b), a disappointing number of candidates were unable to accurately read the values from the graph though most went on to suggest why low oestrogen levels may cause difficulty in becoming pregnant and how such infertility could be treated.

- Q5** Some parts of this question proved challenging for a significant number of candidates. Many candidates were able to give an acceptable description of transpiration for Part (a). However, some mixed up the sequence of evaporation and diffusion and unfortunately lost one mark.

Part (b) was not answered well with many candidates naming cell X as the stomata. In Part (c)(i), marks were frequently lost for failing to use data and for incorrectly referring to plant species A having the least number of stomata on both upper and lower epidermis. The majority of candidates gained at least one mark for appreciating the need to conserve water in hot climates. In contrast, Part (ii) was well done with many candidates able to select the appropriate species and explain its adaptations.

- Q6 (a)** Most candidates were able to identify the diagram representing meiosis but marks were often lost for giving theoretical descriptions of meiosis rather than using evidence given in the diagram. While most were able to name the testes as the site of meiosis in males, some contradicted themselves by quoting 'testes / sperm'. Only a minority of candidates were able to correctly identify independent assortment as the source of genetic variation.

- (b)** Was generally answered well though in Part (iii), the usual answers of ‘growth and repair’ were often embellished and quite a few candidates gave ‘replace old cells’ and ‘repair damaged cells’ which were the same marking point and worth just one mark.
- Q7 (a) (i)** Surprisingly, these photographs were not well known by candidates. The vein was often named as a capillary and the artery identified as a vein.
- (ii)** Some candidates did not gain credit as they did not use any comparative terms to describe the differences in the two vessels. Another common error was to describe the artery as having a thicker cell wall.
- (b) (i)** Most were able to use the graph to describe the change in the rate of blood flow but not all were able to suggest an explanation for the change.
- (ii)** Many candidates correctly described the role of the capillary in exchange but only the more able candidates appreciated that the reduced rate of flow would provide more time for diffusion.
- Q8** In Part (a), variation was very poorly described, with few appreciating that variation represents differences within the same species/population. In Part (ii), many confused not only the types of variation as continuous or discontinuous but also the type of variation with the possible causes of variation (genetic or environmental). Despite this, most were able to identify the two examples of the same type of variation in Part (iii).
- In Part (b)(i), very few candidates achieved all four marks in this calculation as they did not correctly identify that the change was a minus/decrease and seemed unfamiliar with the concept of two significant figures. However, the structuring of the mark scheme allowed candidates to access marks for attempting the calculation in a variety of ways with the result that most candidates achieved two or three of the available four marks. In Part (ii), most candidates were able to interpret the data to provide evidence for an environmental cause of this example of variation.
- Q9** The vast majority of candidates answered this question well. While a disappointing number were unable to name a test (back) cross, almost all candidates were able to complete the Punnett squares correctly and use these to explain how the genotype of the black dog could be identified. Some candidates lost marks for misuse of the terms heterozygous and homozygous.
- Q10 (a)** The structure of DNA was well known and described to a high standard though a small number of candidates seem to confuse base pairing with base triplets.
- (b)** The unique nature of an individual’s DNA was not always described correctly with many candidates losing the mark for vague references to different bases or ambiguous references to different base pairings.
- (c)** This QWC question allowed a range of marks to be achieved. Candidates seemed to appreciate the scaffolding offered by the bullet points and many who followed them obtained all the available marks. Those who did not obtain full marks often failed to select the appropriate evidence from the tables to support their answer, simply listing all four codons in the two DNA strands did not gain credit.

## Assessment Unit 3

## Practical Skills

### Booklet A

### Foundation Tier

### Unit Overview

Despite the small candidature, a good range of marks was obtained. Overall, the candidates responded well to the demands of the paper. Differentiation was evident as candidates were able to access all parts of the paper with varying levels of success.

### Task 1

- Q1**
- (a) Was well answered with most candidates achieving full marks. Any marks lost were mainly due to candidates writing units in the main body of the table.
  - (b) Was answered well with most candidates achieving full marks.
  - (c) Was answered well with many candidates able to realise the significance of two decimal places.
  - (d) Overall, candidates demonstrated an excellent standard of skills in respect of drawing a bar chart. Although not common, some mistakes were made by mixing up the labels of the axes and using inappropriate scaling on the y-axis which subsequently made plotting difficult.
  - (e) Proved to be a good discriminatory question. Some candidates failed to read the question properly and did not describe and explain the difference in the results between the whole shoot and the one-third shoot.

### Task 2

- (a) The table was successfully filled in by all candidates.
- (b) Some candidates did not read the column heading in table 1 carefully enough to identify the dependent variable. 'Time' and 'time for colour change' were common mistakes.
- (c) Was generally answered well.
- (d) Proved to be a good discriminator. It was often incorrectly suggested by candidates that the temperature in the water bath was the optimum temperature or that this temperature was needed to make the enzyme work.
- (e) Many candidates only achieved one out of the two marks by not stating to repeat the experiment and calculate an average.
- (f) As in Task 1, the standard of graph drawing was excellent.
- (g) When describing the trend shown in the line graph, some candidates did not mention the graph levelling off, thereby only achieving one mark.
- (h) Was well answered.



## Higher Tier

### Unit Overview

Generally, candidates performed well in this paper, with many scoring equally well on both tasks. A good range of marks were obtained with some candidates achieving full marks.

### Task 1

- Q1**
- (a) Was answered well with accurate calculations. A minority of candidates were penalised for including units throughout the main body of the table.
  - (b) Proved to be a good discriminatory question. Many candidates simply referred to accuracy, despite this being given in the question stem. Only the more able candidates appreciated the need to use two decimal places in order to detect small changes in mass.
  - (c) The function of the oil was generally well understood, although some referred to it keeping gases out of the boiling tube.
  - (d) The bar chart was completed accurately by the majority of candidates, although inaccurate scaling by some meant inaccurate plotting.
  - (e) Was often poorly answered with many candidates not linking the introduction of the plastic bag to humidity. The explanation of the effect of humidity showed wide variations in the quality of the responses. Many appreciated that the loss in mass would decrease and were awarded one mark. Only the most able candidates fully explained this using the appropriate scientific terminology required to access all three marks.

### Task 2

- Q1**
- (a) The table was successfully filled in.
  - (b) Some vague descriptions of the dependent variable were not given credit. A significant number of candidates failed to appreciate that what was being measured was the time for no colour change, even though this was clearly stated in the column heading in the table.
  - (c) The concept of allowing reactants to equilibrate to the starting temperature was well understood.
  - (d) Like Task 1, the graph was well done, although a small number of candidates lost marks for incorrect completion of the scale on the y-axis or for extrapolating the line beyond a concentration of 2.5% amylase.
  - (e) Generally, a good knowledge of enzyme action was demonstrated, with many detailed descriptions of the effect of increasing the temperature from 20 to 30°C given, although some were penalised for describing amylase denaturing at 30°C.
  - (f) While some candidates forgot to include units in their answer, there appeared to be a good understanding of the commercial advantages of using the lowest concentration of reactants which gives the maximum yield of product.

## Booklet B

### Foundation Tier

#### Unit Overview

Despite the small candidature, a good range of marks was obtained. Candidates who achieved marks in the lower range often did not attempt questions or failed to follow key commands of the questions. It was felt that the language was appropriate for the candidates throughout the paper. There was no evidence to suggest that candidates had insufficient time to complete the paper.

**Q1** Most candidates were familiar with food tests and were able to gain full marks.

**Q2** This question was challenging for some candidates.

In Part (a), very few were able to gain this mark, incorrectly naming other ecological terms. Most candidates could count the daisies in the quadrat. However, some of these candidates then had difficulty in the two subsequent calculations.

In Part (c)(ii), many candidates gained one mark for stating this would be more reliable, if they did not conflict their answer by stating another term like valid, accurate etc. Very few candidates achieved the second mark.

**Q3** Most candidates were able to achieve marks across all parts of the question.

In Part (b)(i), despite being told in the stem that these were cheek cells some candidates incorrectly labelled B as the cell wall. In general, candidates displayed good drawing skills in Part (b)(ii). Some candidates chose to draw only one cell and were penalised accordingly. The most common reason why candidates were penalised was due to sketchy line style.

In Part (b)(ii), while many candidates were able to correctly identify one reason, often their second reason was just a variation of the first.

**Q4** This question was well answered by most candidates.

**Q5** This question proved difficult for candidates. Most of the candidates did not achieve any marks in the calculation question, some neglected to answer it and others just copied down information that was already in the table. In Part (a)(ii), many candidates did not get this mark as answers were too vague, simply stating 'reliable'.

In Part (a)(iii), candidates were mostly able to describe the difference in percentage loss. However, they did not adequately explain the difference.

In Part (b)(i), only some candidates were able to achieve this mark. Part (b)(ii), only some candidates were able to achieve marks either due to an adequate description or explanation, however, both rarely appeared together. Part (b)(iii) was poorly answered as candidates simply stated things that had already been mentioned. The question asked for two other things. In Part (b)(iv), the vast majority of candidates did not achieve this mark as they instead gave an abiotic factor or an irrelevant piece of information.

**Q6** This was a highly successful QWC question for candidates. All candidates achieved two, four or six marks. This demonstrates that the quality of written communication in all answers given was high.

**Q7** This was a common question on the paper. In general, only the less able candidates found this question challenging. Part (a)(ii) was the most incorrectly answered question with some candidates giving the names of apparatus which would not be appropriate to use to accurately measure a fine scale.

- Q8** Candidates found this question challenging. If the candidature had been larger it would have been a good discriminator.

## Higher Tier

### Unit Overview

A wide range of marks was obtained indicating a large variation in candidate responses to the questions posed. The paper allowed candidates of differing abilities to answer the questions, but only the more able candidates were able to access the more difficult and challenging marks available. It was felt that the language was appropriate for the candidates throughout the paper. There was no evidence to suggest that candidates had insufficient time to complete the paper.

- Q1** This was a very accessible question. The names of apparatus were well known in part (a) and the calculation and identification of the independent variable were equally well known in Part (b). However, in Part (b)(iii) many candidates did not gain credit for using terms such as, reliability, accuracy and validity incorrectly.

In Part (c) candidates were able to make appropriate observations from the data but some failed to make any comparison between the energy content of the three different types of food.

- Q2** Most candidates were able to name the gas collecting in the test tube. Most were unable to explain the function of the glass sheet as a heat shield.

The interpretation of the data in Part (b) was well done and most candidates showed some understanding of the inaccuracies associated with counting bubbles, obtaining at least one of the two marks available.

In Part (d) very few candidates were able to describe and explain the need for a suitable control experiment; the majority of candidates confused a control experiment with a control variable and so lost marks.

- Q3** The parts of a microscope were fairly well known though a disappointing number of candidates used vague terms for the labels and did not gain credit. The majority of candidates were able to describe the use of a stain to highlight cell parts.

The skill of estimating the height of a cell proved difficult for many candidates, who ended up trying to use accurate measurements instead. Candidates need to be given opportunities to practise this skill in a variety of contexts. Calculating the length of the cell in micrometres proved a very discriminating question. Most candidates who attempted this question were able to access the marks for measuring and dividing by the magnification. Difficulties arose in converting the units to micrometres, particularly when candidates measured in cm rather than mm. Candidates should be encouraged to use SI units at all times.

- Q4** Measurements of growth and the role of minerals were well known. The only area of common weakness was in sequencing the answer to make the link between magnesium's role in chlorophyll synthesis reducing the absorption of light, thus reducing photosynthesis and consequently growth.

- Q5** The starch test is a practical all candidates usually complete both in Key Stage 3 and as part of the GCSE course. Most candidates knew how to destarch a leaf but not all were able to accurately recall the precise colour change of iodine solution as outlined in the specification.

In Part (c), candidates struggled to distinguish between the terms hazard and risk. Many candidates failed to make use of the example provided in the question and simply listed basic laboratory hazards, risks and mitigations, rather than those specific to this experiment. A common error was to give just a hazard or a risk but not both, all too often the appropriate mitigation could not be described.

**Q6** Most candidates were able to successfully interpret the heart rate data and list two variables which should have been controlled. However, in Part (c), there was some confusion between short and long term effects of exercise on the body.

**Q7 (a)** Those candidates who did not have the opportunity to complete any of the practical work in this section of the course were still able to access the marks around what an antibiotic is and how it works. Although many candidates are still using vague terms such as fight, combat or treat bacteria and therefore lose marks.

**(b)** Very few candidates were able to fully explain why agar plates are inoculated beside a lit Bunsen burner though most knew it to be an aseptic technique.

In Part (c) although many candidates were able to give an appropriate incubation temperature, few were able to explain why temperatures above or below this are unsuitable to use.

In Part (d)(i), most candidates understood that the clear zone was an area devoid of bacteria but only a minority described the diffusion of the antibiotic through agar. In Part (ii) many correctly identified unsuitable concentrations and described that they were ineffective but often failed to explain that they concluded this because there was no clear zone.

**Q8** The definition of selectively permeable was often not well known. Many candidates were penalised for not making reference to size or molecules.

Explanations of the results of the experiment were generally well done but marks were often lost for ambiguous descriptions of the concentration gradient.

## Contact details

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