GCSE EXAMINERS' REPORTS

BIOLOGY
GCSE

SUMMER 2023

Introduction

Our Principal examiners' reports offer valuable feedback on the recent assessment series. They are written by our Principal Examiners and Principal Moderators after the completion of marking and moderation, and detail how candidates have performed.

This report offers an overall summary of candidates' performance, including the assessment objectives/skills/topics/themes being tested, and highlights the characteristics of successful performance and where performance could be improved. It goes on to look in detail at each question/section of each unit, pinpointing aspects that proved challenging to some candidates and suggesting some reasons as to why that might be.[i]

The information found in this report can provide invaluable insight for practitioners to support their teaching and learning activity. We would also encourage practitioners to share this document – in its entirety or in part – with their learners to help with exam preparation, to understand how to avoid pitfalls and to add to their revision toolbox.

Further support

Document	Description	Link
Professional Learning / CPD	WJEC offers an extensive annual programme of online and face-to-face Professional Learning events. Access interactive feedback, review example candidate responses, gain practical ideas for the classroom and put questions to our dedicated team by registering for one of our events here.	https://www.wjec.co.uk/home/professional-learning/
Past papers	Access the bank of past papers for this qualification, including the most recent assessments. Please note that we do not make past papers available on the public website until 6 months after the examination.	www.wjecservices.co.uk or on the WJEC subject page
Grade boundary information	Grade boundaries are the minimum number of marks needed to achieve each grade. For unitised specifications grade boundaries are expressed on a Uniform Mark Scale (UMS). UMS grade boundaries remain the same every year as the range of UMS mark percentages allocated to a particular grade does not change. UMS grade boundaries are published at overall subject and unit level. For linear specifications, a single grade is awarded for the overall subject, rather than for each unit that contributes towards the overall grade. Grade boundaries are published on results day.	For unitised specifications click here: Results, Grade Boundaries and PRS (wjec.co.uk)

Exam Results Analysis	WJEC provides information to examination centres via the WJEC secure website. This is restricted to centre staff only. Access is granted to centre staff by the Examinations Officer at the centre.	www.wjecservices.co.uk
Classroom Resources	Access our extensive range of FREE classroom resources, including blended learning materials, exam walk-throughs and knowledge organisers to support teaching and learning.	https://resources.wjec.co.uk/
Bank of Professional Learning materials	Access our bank of Professional Learning materials from previous events from our secure website and additional pre-recorded materials available in the public domain.	www.wjecservices.co.uk or on the WJEC subject page.
Become an examiner with WJEC.	We are always looking to recruit new examiners or moderators. These opportunities can provide you with invaluable insight into the assessment process, enhance your skill set, increase your understanding of your subject and inform your teaching.	Become an Examiner | WJEC

Subject Officer's Executive Summary

Advance information was provided for all theory units in 2023. The sub-topic areas were listed in rank order, it was mentioned that for some units this had aided revision.

Although performance had generally improved there were several issues highlighted across all of the papers.
Recall of knowledge was a problem for many. This has been an issue for several years but prevents candidates from accessing a number of questions.

Maths skills showed some improvement this year although single stage calculations were managed much better than multi-stage calculations. Converting units continues to be an issue.

Candidates are still not using the information given to them in the stems of questions. In many cases they write all they know about a topic, but do not apply it to the context in which it is asked. This means they are unable to gain full credit. In addition to this they need to take note of the command words used and the number of marks available as this will indicate the depth of response required.

There is a slight difference of approach in terms of the questions asked as QERs in foundation and higher tier papers. Foundation tier QER questions in more recent papers tend to give more stimulus material for candidates to use. This has seen an increase in the mean mark for these which is pleasing. Higher tier QER tend to contain less scaffolding and so candidates are more dependent on having recall knowledge to be able to apply to the question. This year the QER on both higher tier papers required knowledge of higher tier only content – Unit 1 – nitrogen cycle and Unit 2 – monoclonal antibodies. Candidates always find the nitrogen cycle challenging, but the QER responses on Unit 2 were very pleasing and shows that centres are teaching this new area of the specification well.

Handwriting was noted as being an issue in previous series and this appears to becoming even more of an issue. It is difficult for examiners to give credit to answers which are illegible.

Questions assessing practical skills in the theory papers were generally reasonably well answered. However, where questions are set in unfamiliar practical contexts candidates struggle with far more with these than those set in familiar contexts. Risk assessments still cause issues for the majority of candidates.

Areas for improvement	Classroom resources	Brief description of resource
Improving Recall and AO1 skills	Knowledge organisers	A collection of sample knowledge organisers to support the learning of GCSE Biology.
Improving responses to different command words and using information given in the stem of the question	Exam walk through	These resources offer practical hints and tips on how to effectively approach questions in the examination paper. Available for all units, the PTs with audio help and audio script in the notes will walk candidates through mock examination papers, helping them revise and practise useful exam techniques.
Improve knowledge of topic areas	Blended learning	The blended learning resources contains interactive self-study content covering all topics. Candidates may find this useful either as a recap or in flipped learning

BIOLOGY

GCSE

Summer 2023

UNIT 1: CELLS, ORGAN SYSTEMS AND ECOSYSTEMS – FOUNDATION TIER

Overview of the Unit

This Unit 1 Foundation Tier paper tested topics relating to the biology of cells, organ systems in the human body and ecological and environmental aspects of the specification. Some questions required the recall of biological information, others tested mathematical skills including one and two stage calculations and graph drawing, and there were questions set in practical contexts which tested aspects of working scientifically. The paper consisted in the main of short, structured questions with values of between one and three marks, but one question, worth six marks, needed a longer extended response.

Some of questions required candidates to recall information by recognising key scientific terminology and features labelled on diagrams, while others required the unprompted recall of factual knowledge. This presented greater difficulty and It is likely that more thorough revision by candidates would result in improved responses. Answers to single -stage mathematical tasks were completed correctly but marks were often lost in two- step calculations, such as those involving the conversion of units. In the practical questions many candidates showed a pleasing confidence in understanding fair testing, the control of variables and in drawing conclusions but difficulties did arise when reasons and explanations were required.

In general, the performance of candidates on this paper was broadly similar to that of recent years. Candidates would be well advised to read questions carefully and to attend to the quality of handwriting, including digits in calculations as marks are frequently and unnecessarily lost for this reason.

Comments on individual questions/sections

Q.1 This dealt with food chains and webs and presented a challenge to candidates. Despite being able to identify the tertiary consumers in a diagram of a grassland food web, few were able to give a correct reason for their choices. There was more success, however, in the completion of the table, with many gaining full marks for the calculations of biomass. Marks were lost in construction the pyramid of numbers in part (b)(ii) because of failure to read the question carefully, but it was pleasing to see numerous references to respiration and waste in relation to energy loss.

Q.2 The sections of question 2, on human blood, which required the recall of the functions of blood and types of blood cells were answered well by almost all candidates, indicating good revision of terminology. More difficulty was encountered when they were required to complete a drawing from a photomicrograph and then calculate the magnification, but most were able to make an accurate measurement and to apply the formula provided.

Q.3 This question showed that most candidates were confident in identifying the components of the human respiratory system on diagrams. Knowledge of functioning was less evident, with fewer answers giving correct descriptions of the movements, pressure and volume changes associated with breathing.

Q.4 This assessed knowledge of the digestive system. Candidates were well able to recognise the salient structures of a diagram, although they were less adept at writing about function and recalling features from their own knowledge. Most answers correctly included the importance of the gall bladder which was labelled on the diagram but could not refer to the role of the bile duct. For the part of the question set in a practical context relating to an enzyme experiment, most candidates were able to calculate a straightforward ratio and plot a bar graph with satisfactory accuracy. They could interpret the results correctly in terms of enzyme activity, but many struggled to note the change in pH value and were unable to identify or state the purpose of the experimental control.

Q.5 This presented the candidates with a good deal of information about rock pools, but only a few were able use the tabulated data to calculate the fall in oxygen concentration of sea water as the temperature rose. On the other hand, the answers to tabulated statements relating to the physiology of sea anemones were done better, with many responses displaying sound understanding of diffusion and osmosis.

Q.6 Many candidates had little trouble in analysing the data in the results table for this question assessing practical skills. They were able to recognise the fruits which broke down the gelatine protein, although explaining their conclusions did prove to be more difficult for them. There were many good answers when it came to evaluating the validity of the method. Suggestions for improvements and also for the control of variables were appropriate in most cases.

Q.7 This tested the quality of candidates extended responses. This type of question always poses a challenge to Foundation candidates but, even so, there were a number of worthy responses with many answers scoring in the Middle Band of the mark scheme and a small proportion in the Higher Band. Most responses gave correct statements about the processes which affected the level of carbon dioxide in the air and the problems of fossil fuels. Despite some irrelevance about pollution in general, there were plenty of references to a range of renewable sources of energy and suggestions for small changes in human behaviour which could help to combat global warming. In general, most answers were clearly written and some were well-sequenced.

Q.8 This question also appeared on the Higher Tier paper and, not unexpectedly, proved a hard task for many Foundation candidates. Only a few were able to give a larger surface area as the reason for increased uptake of water in a root and to recognise and label xylem on a diagram of a section through a leaf. Similarly, the control of water loss by the leaf was not well understood. Apart from making some worthwhile suggestions for ensuring fair testing, the sections which dealt with an experiment on water loss from a plant were not well answered, although a number correctly stated transpiration when asked to give the scientific term for this water loss.

Q.9 A good deal of textual, graphical and tabulated numerical data on the subject of poultry production was provided in question 9, which also appeared on the Higher Tier paper. Part (a) which consisted of mathematical tasks was not well answered. Many candidates failed to complete a two-stage calculation of mass and also struggled with a subtraction based on graph reading. The latter parts of this question required written, qualitative answers, dealing with environmental damage and chicken welfare based on analysis of the data provided. These responses were often of good quality.

BIOLOGY

GCSE

Summer 2023

UNIT 1: CELLS, ORGAN SYSTEMS AND ECOSYSTEMS – HIGHER TIER

Overview of the Unit

This year's paper covered all six sections of the Biology specification. The questions were a mix of familiar topics, specified practical work, alongside novel contemporary topics and unfamiliar practical work. All supporting images and graphs required to answer questions were clearly identified, e.g. "**Image 6**" to assist candidates in retrieval of information or data, A range of mathematical skills were tested with candidates succeeding to gain marks in most areas.
Evaluation of practical work, both familiar and unfamiliar, posed a challenge for many candidates.
Candidates attempted to answer most questions. The QER had a lower attempt rate than previous years which suggests that candidates found the applied nature of the question difficult.

Comments on individual questions/sections

Q.1 Many candidates failed to gain a mark in (a) because they did not compare Zone **A** and Zone **B**. A "larger" or "bigger" surface area was needed rather than "large" or "big".

It was quite common to see part (b)(i) left unanswered. This could be due to candidates missing the question rather than being unable to answer.

In part (c)(ii), better candidates used the information provided in **Image 1.3** to identify a variable that needed to be controlled. A common error was stating that air speed should be kept constant, even though it was stated below the diagram that different air speeds were used. Part (iii) challenged many. The majority described the relationship correctly but not many identified a difference in the gradient of the graph from 3.2m/s onwards.

Q.2 Higher candidates managed to use the stem of the question to answer both parts of (b) correctly. Some candidates suggested that chickens would be cheaper to buy, which is an advantage to the consumer rather than the farmer.

Many good answers were seen to part (c) with candidates using a wide range of information provided to elicit good answers. Some candidates lost marks here by not referring to the features of intensive farming, as stated in the question or not qualifying their use of data, e.g. "there is 37% of broken bones"**.** Without the inclusion of data for free-range farming it is not possible for us to determine whether this figure is a cause for concern.

Q.3 Part (a) was well answered. Some candidates lost a mark by labelling A as "pancrease".

Most candidates identified Benedict's as the correct reagent in (b). There also seemed to be more understanding the importance of heating the Benedict's as part of the procedure.

Some very good answers were seen in (c). A common response seen was, "Small intestine – this is where food is absorbed". In this example, the mark for the explanation was lost as the reference to "food" is not detailed enough. A reference to "products of digestion" or a named molecule such as "amino acids" was required.

Q.4 Candidates who had learnt their work were able to recall the correct answers in part (a)

In part (b), it is still surprising that so many higher tier candidates struggle with the use of a ruler to measure. Candidates overall do seem to take account of the units provided on the answer line (mm) and therefore not as many answers as in previous years were given in cm.
Candidates who failed to correctly calculate the magnification still managed to gain one mark if evidence of conversion from mm to um (or *vice versa*) was seen. This underlines the importance of showing working out clearly, and the use of units in the workings.

Part (c)(i) challenged most candidates. Instructions were given to use the information in **Graphs 4.1** and **4.2**, however they did not use the titles or the labels provided on the axes to help them. For example, on **Graph 4.1** the y-axis clearly stated, "**mean** cilia length", but most answers seen referred to, "smokers having shorter cilia", which from the evidence in **Graph 4.2** is incorrect. The title of **Graph 4.2** stated, "variation in cilia length", which could have clued candidates to the second conclusion. It was rare to see a correct answer for the second conclusion.
In part (ii), the best responses used the information in the stem of the question as a clue to discuss increasing sample size. Generic responses referring to, "repeat the test", gained no credit.

Q.5 In part (b)(i), most candidates did not link the lack of oxygen with its effect on respiration as the cause of cell death. The first two marking points were most commonly seen for this item. For part (iv) a wide range of interesting responses were provided here. To gain the mark, candidates needed to provide a valid action by the Welsh government linked to a healthier lifestyle.

Q.6 Most candidates correctly identified oxygen as the correct gas in part (b) with a large number also explaining diffusion as the method of gas exchange. It was rare to see data being used to help explain how oxygen moves by diffusion despite the question clearly asking candidates to use data from Image 6. Candidates should appreciate that if a question asks for data to be used then it will be an expected part of the answer.

Q.7 The challenge of higher tier papers is in the detail required by examiners in candidates' answers. This is exemplified in part (b)(ii) as most candidates suggested that, "not enough energy is left to be passed on to the fourth stage consumer". Detailed study of **Image 7** clearly shows that there is **no energy** left to be passed on as it has all gone to either the decomposers or last as heat.

Q.8 In part (a) Graph 8 challenged candidates to use relevant data to form a conclusion. The percentage change in human population was left in as a distraction. Most candidates did manage to link the significance of increasing food production with a very small increased percentage change in land used. Where candidates did identify this trend, many failed to gain a second mark because they did not then use it to form a conclusion, i.e. efficiency has therefore increased.

Part (b) of this question was the QER question. The nitrogen cycle is almost the most complicated process that students need to learn for the Biology 1 unit making this a challenging QER. The applied nature of the question also added to the challenge. Many candidates who achieved a middle band answer provided a straightforward account of the nitrogen cycle without reference to how farmers increase yield. To gain the top band, candidates needed to state what farmers were doing to affect the nitrogen cycle, thus increasing yield. Unfortunately, top band answers were rarely seen.

Q.9 As stated in previous reports, the terms required to answer parts (a)(i) and (ii) now seem grounded in the teaching of enzymes at GCSE level.

Question (b) included a lot of information in the form of images, text and data spread over several pages. This can be challenging to some candidates.
The best answers seen in part (i) managed to structure their response according to the command words. Firstly, they described the data in flask **A**, recognising there were two parts to the trend. Secondly, they explained both parts of the trend. Less successful candidates did not use the information provided in the stem to help explain that the gas present in the cylinder was due to hydrogen peroxide being broken down. Several mentioned, “bubbles of gas”, despite volume being clearly labelled in **Table 9.5**. This once again underlines the importance of studying the labels in all tables and graphs carefully.
For part (iii), it would have been possible for candidates to gain 2 of the 3 marks by using **Image 9.2** as directed in the question. Candidates who gained 1 mark recognised the significance of copper sulphate binding to the enzyme. The third marking point was the least accessible.

In part (c)(i), there was evidence of some improvement in the importance of a control. However, it appears that there is some confusion between the terms “control”, “control variable”, and “control measure”.
In part (ii), many gave “volume” of H_2O/$CuSO_4$/H_2O_2 even though these values are provided in the **Image 9.3**. This suggests that candidates do not appreciate the difference between the meaning of “**should** have been controlled” and “**were** controlled”.
Part (iii) was poorly answered. Most candidates referred to repeatability or reproducibility here indicating a lack of understanding of the idea of how to increase accuracy in an investigation.

The overall response to part (c) suggest that many centres need to spend time in the Autumn of 2023 in improving candidates understanding of the language of measurement in practical investigations.

BIOLOGY

GCSE

Summer 2023

UNIT 2: VARIATION, HOMEOSTASIS AND MICRO-ORGANISMS – FOUNDATION TIER

Overview of the Unit

This Unit 2 Foundation Tier paper tested topics related to response and control in humans and plants, DNA and genes, as well as aspects of the specification dealing with microbiology. Some questions required the recall of biological information, others tested mathematical skills including one and two stage calculations, the application of formulae, and work with graphs. Questions set in practical contexts tested aspects of methodology, working scientifically and risk assessment. The paper consisted in the main of short structured questions with values of between one and three marks, but one question, worth six marks, needed a longer extended response.

Some of questions required candidates to recall factual information by recognising and selecting key scientific terms from material provided and this was done well. Others required them to recall information from their own knowledge and this posed greater difficulty. It is probable that more thorough revision by candidates would result in more marks being gained. Mathematical tasks were usually, completed correctly, including the use of a formula and conversions between numbers and percentages. Most candidates read and drew graphs with competence. With the practical questions, it was disappointing that many candidates showed some lack of knowledge of the details of techniques and the essential features of risk assessment. Generally, they were able to reach appropriate conclusions from results, even if they were not always able to explain them clearly.

In general, the performance of candidates on this paper was broadly similar to that of recent past years. Candidates would be well advised to read questions carefully and to attend to the quality of handwriting, including digits in calculations as marks are frequently and unnecessarily lost for this reason.

Comments on individual questions/sections

Q.1 This dealt with the nervous system. The majority of candidates had little trouble in identifying the key scientific terms involved in the blink reflex, gaining good marks for part(a). Far fewer were, in the last part of question, able to recall the general properties of reflex actions from their own knowledge.

Q.2 In Question 2, on plant responses, most candidates showed a sound understanding of phototropism, could recognise the correct hormone involved and direction of light in a given example. The requirement to complete to a drawing showing negative geotropism in a root presented a greater challenge but there were some good efforts which gained full marks.

Q.3 It was clear that most candidates were familiar with the structure of DNA and could select key molecules, from a list, to label a diagram Unfortunately marks were lost when the three terms were wrongly placed, indicating a lack of precision in recall.

Many candidates succeeded in analysing DNA profiles in an example of identifying paternity, but some did struggle to give a full explanation for their choice of a particular individual.

Q.4 This question provided information and numerical data relating to the import of terrapins into the UK. In the first part of the question, significant numbers of candidates failed to compete the classification of the given example and there were some incorrect calculations of growth. In parts (c) and (d) of the question, however, it is was pleasing to see that large numbers of candidates scored well in responding to a list of statements about terrapins, showing a sound understanding of terms such as biodiversity and alien species. Most were aware of the value of scientific names.

Q.5 In general, a poor grasp of the changes in chromosome number during mitosis and meiosis was evident but the vast majority of candidates correctly recognised genes as the cause of differences in the physical appearance of species.

Q.6 This was set in the practical context of an experiment to compare the effectiveness of four antibiotics in killing bacteria. When asked about aseptic techniques, there were some good answers, but many candidates did not score well here. Most, however, were able to apply the given formula to calculate the circular area of a clear zone in a dish of agar. The bar chart which followed was constructed well in almost all cases and the most effective antibiotic was identified correctly. Candidates were much less confident when asked to give explanations of results and making suggestions about testing reproducibility and extending the study.

Q.7 It was disappointing that a large proportion of candidates did not gain full marks adding labels to a standard diagram of skin structure. The answers to the latter part of the question, on the functioning the of the skin in temperature control was somewhat better answered, despite the fact that a response in extended writing was required, which posed an additional challenge. The tabulated stimulus data was used quite well, with some accounts being placed in the Middle Band of the mark scheme and a few in the Higher Band.

Q.8 This question on the kidney, also appeared on the Higher Tier paper and it was not surprising that it presented a challenge to Foundation candidates. In the first parts of the question there were some sound answers which correctly identified structures on a diagram. A table of substances in urine was often completed accurately with the following question, including the identification of diabetes, answered correctly. Parts (b)(ii) and (iii) and (c) dealt with the use of chemical tests to identify glucose and protein and were worth a total of six marks. In the majority of responses, although Benedict`s reagent and the Biuret test were stated, the details of practical methods were confused and expected results wrongly identified. Very few candidates completed the risk assessment table appropriately and failed to link an identified risk to an action in the method. Consequently, many marks were lost on these sections.

Q.9 This was also on the Higher Tier paper and dealt with the Human Immuno-deficiency Virus (HIV) and AIDS. Most candidates struggled to compare the structure of HIV with other viruses but showed very good knowledge of behavioural measures to control the spread of the virus and this was encouraging. Answers were generally satisfactory when it came to interpreting graphical information about the world-wide use of an anti-viral drug for HIV**.** Likewise, most candidates completed calculations based on a pie chart of HIV infections in the UK, correctly and could use the chart to quote evidence in support of campaigns.

BIOLOGY

GCSE

Summer 2023

UNIT 2: VARIATION, HOMEOSTASIS AND MICRO-ORGANISMS – HIGHER TIER

Overview of the Unit

This year's paper covered all eight sections of the Biology specification. The questions were a mix of familiar topics, specified practical work and topics set in applied or contemporary contexts. All supporting images and graphs required to answer questions were clearly identified, e.g. "**Table 7.3**" to assist candidates in retrieval of information or data.

A range of mathematical skills were tested, with candidates succeeding to gain marks in most areas.

The return of the practical assessment in the Spring 2023 term led to an improvement in responses related to the working scientifically skills.

Better candidates gained many marks by recall. The overall response to the QER question was similar to last years question.

A lack of structure and brevity in answering questions with an extended response was a general theme. Candidates should be taught to use the command words to guide the structure of their answers, and to use shorter sentences.

Many candidates also failed to read the stem in detail and either gave answers in direct contradiction to what was stated in the question or did not include data in their reasoning.

Comments on individual questions/sections

Q.1 / Q.2 These caused few problems for higher tier candidates

Q.3 Candidates could identify the part of the skin in (a)(iii) and how it responds to decrease body temperature, e.g. vasodilation or erector muscle relax. What candidates found difficult was linking this physiological response to heat loss. This is a standard question and therefore use of past questions could be useful to help candidates with the second mark point.

Q.4 Most candidates could recall both parts of (a).

Part (b) asked candidates to explain the growth observed. It is worth teaching candidates to start answering questions where they are asked to explain an observation by firstly describing the observation before proceeding to explain. This will help them to structure their responses. Some excellent responses were seen here showing that the topic had been taught in detail in some centres. It was evident that some candidates had not read the stem of the question above **Image 4.2** because many responses referring to the growth of seedlings being affected by light were seen.

Q.5 Parts (i) and (ii) rewarded candidates who could recall the knowledge. Even though the question in part (iii) asks about the advantages of using adult stem cells, most responses tended to focus on the ethical issues surrounding the use of embryonic stem cells. Even though the context of the bioreactor in this question was unfamiliar, most candidates in part (iv) managed to apply their learning to identify at least one variable that needed to be controlled. Some candidates referred to controlling the "nutrition solution" without qualifying their answer, e.g. the concentration of nutrients in the nutrition solution.

Most candidates could state a reasonable ethical objection in part (b).

Q.6 Candidates should have an opportunity to carry out or observe a range of different microbiological techniques to understand how relevant aseptic techniques are used in different contexts. Part (a)(i) was a variation on the specified practical work, however many candidates recalled from a list of aseptic techniques without applying them to the context of the question. Answers were seen which referred to not opening the petri dishes, even though the question ask about aseptic techniques specific to placing the discs on the plates.

For questions such as part (ii), candidates should be reminded to always study the context of a microbiological experiment. The question stem stated that the plates were incubated in a school laboratory. Most incorrect answers tended to give the body temperature, 36.6-37.5^{o}C.

Q.7 When examination questions are written, examiners try and signpost the required knowledge in the stem. Successful candidates in part (a) could recognise and recall the correct technique to measure **abundance and distribution**. Candidates who referred to use of random quadrats lost the second marking point, whilst those who referenced capture recapture lost the first mark point.

Many good answers in part (b) were seen, however a significant number of those failed to get a mark because they did not use data to support their answer, as required by the question. Some candidates did not address both parts of the hypothesis, for example referring to the presence of *C. stellatus* and the absence of *S. balanoides*, but then making no reference to the low water mark. Highlighting the hypothesis would have been useful to candidates here to ensure that all parts of the hypothesis was responded to in the answer.

Q.8 Part (a) was purely recall and benefited candidates who were suitably prepared for the exam. Some good responses were seen in part (b) with more able candidates able to apply GCSE level knowledge of protein synthesis. This aspect of the specification has improved over the years.

Punnett squares have been a staple diet of genetics questions for a long time. The increased demand of part (c) compared to previous exam series was its requirement for candidates to determine the phenotype using an unfamiliar biological context. The mark scheme reflects the wide range of possible responses looked for and accepted.

The stem of this part (d) explicitly signposted the candidates to apply their knowledge of natural selection, and many candidates found this a challenge. Natural selection questions are always in an applied context and there are countless examples available to practice application of this theory by candidates.

Q.9 The calculation in part (a)(i) was answered correctly by most. Good answers were also seen in part (ii). The common errors included not comparing the different groups of drugs or stating that the “drugs were less effective” without qualifying the term effective. In part (iv) a common response was, “people who have had the placebo would die”. This answer showed a lack of comprehension of the stem, where it was written that only 1900 out of 2831 confirmed cases died. This is obviously not a 100% mortality rate.

The topic assessed in part (b) is new to the current specification and this was the first example of it appearing as a QER. It appears that this topic has been taught well in most centres. Good answers were seen with the mean response in the middle band. A common misunderstanding involved candidates describing antibodies fusing with a myeloma. Also, many were penalised for stating that “humans/people/volunteers” were used in the pre-clinical trials rather than healthy volunteers. The indicative points that were mostly missed were the references to hybridomas forming large numbers of clones, and hybridomas producing monoclonal antibodies of specific antibodies.

BIOLOGY

GCSE

Summer 2023

UNIT 3: PRACTICAL ASSESSMENT

Overview of the Unit

In this unit candidates are assessed on their practical skills including, forming hypothesises, recognising and preventing hazards and risks, recording and presenting data, understanding the variables that are involved in experiments, evaluating the the success of the experiment and planning improvements.

The tasks all proved to be accessible for most candidates who usually attempted all sections of the tasks. Certain tasks proved more popular than others within the suite in particular the resistance of the wire task probably due to the familiarity with the experiment itself.

Comments on individual questions/sections

Section A - Hypotheses and risk assessments

Most candidates were able to make a sensible hypothesis in each of the 9 tasks, which linked the independent and dependent variables. In producing risk assessments, the most successful candidates linked the risk with a particular action in the method, such as spilling chemicals onto skin whilst pouring, and were able to suggest a sensible control measure for that risk. Less successful candidates often did not link the risk to an action or referred to chemicals splashing into eyes which could not be credited. In the springs task and in the yeast task it was rare to see no significant risk as a response and many spurious risks were seen.

Section A - Tables of results

Most candidates produced well organised tables of results and recorded all their data. It was pleasing to see that most candidates included units in the table headings and not in the body of the table. Although not commonplace, incorrect units or use of incorrect abbreviations of units (e.g. secs for s / seconds) were seen. In some cases, headings lacked detail and could not be credited. In the sodium thiosulfate task, many candidates simply had the heading concentration and did not refer to sodium thiosulfate. This was required to distinguish between this and hydrochloric acid. There was evidence that candidates often do not read the instructions provided, for example in the springs task candidates were instructed to record the length at 0 g which many failed to do. Where required, means were generally calculated correctly. In the spring task, some candidates calculated and recorded extensions which was not required of them.

Section B – Variables

Each of the 9 tasks included a section on variables. Candidates were able to identify the independent and dependent variables across all the tasks and most were able to state the range of these variables. Less successful candidates simply listed all the values of the variable when asked for a range, but this was seen less often than in previous series.

One area for development that was noted was the resolution of the instruments used. Where this was asked it was common to see incorrect values given. Many of the tasks explored either how or why certain variables were controlled, and this was less well-answered than other areas of the section on variables. For example, in the sodium thiosulfate task, candidates were required to explain how the volume of the sodium thiosulfate was controlled but most candidates didn't state either the volume of the of the solution used or the instrument used to measure this volume. In the resistance in a wire task, candidates were asked to explain why the thickness of the wire was controlled. This was poorly answered with most candidates not linking a change in thickness with a change in resistance and current.

Section B – Graphs

Graphs continue to produce a mixture of results with the same errors consistently appearing:

- Axes labels missing or without units or with incorrect units (see tables above);
- Less than half the graph paper area being used for scales, the origin left blank, using scales with multiples of 3 or 7, (this was not enforced for the x-axis in the resistance of the wire practical).
- Line of best fit was varied in standard with thick or wispy lines common place.

The subsequent description of the graphs was generally well answered when a basic description of the relationship between independent and dependent variables was required. However, when a second mark was sought for a more detailed description of the curve many candidates found this more difficult and often did not attempt to do so.

Section B - Calculations

Across all the tasks, where candidates were asked to use equations, calculations were answered well by most candidates, this included calculations of spring constants, resistance, power, RQ values, heat energy released and uncertainty.

Section B – Analysis and evaluation of results

Compared to previous series, it was far more common to see candidates describing their data in detail. In the resistance in a wire task, many were able to describe the current decreasing at a decreasing rate. Similarly, the meaning of the term proportional was better understood, with a pleasing number of candidates able to analyse data from the same task to determine if two quantities were proportional. In the sodium thiosulfate task, many candidates were able to select and use appropriate data to evaluate a claim about reaction time halving as concentration doubles. Similarly, in the best responses candidates were able to sensibly compare spring constants in series and in parallel. Weaker candidates tended to be vague in their responses and needed to consider the specific factor by which variables change in relation to each other to make valid conclusions.

Section B – Improvements

Many candidates were able to suggest suitable improvements, for example using a thermostatically controlled water bath to control temperature in the sodium thiosulfate task or ensuring that they work at eye level when measuring a spring. Where candidates were less successful, they suggested invalid improvements such as only measure the spring when it has stopped moving, which they should have done anyway or referencing controlling the temperature of the entire room in the rates of reaction task.

Section B – Use of practical terms

Most candidates demonstrated clear understanding of practical terms such as repeatability, reproducibility, and accuracy. Similarly, candidates were confident in identifying anomalous results. Other terms, such as systematic error, were not well understood and most candidates had difficulty in clearly explaining the effect of a systematic error. The glossary of practical terms is a good reference that candidates should use when revising for these tasks.

Section B – Planning

The most effective responses to questions that asked candidates to plan another experiment, included: investigating the effect of a different variable, a list of apparatus, controlled variables and a clear and valid method that could be followed. Less successful attempts at this type of question provided more of a narrative response and frequently did not identify how the independent variable was to be changed and did not state the variables to be controlled and it would not have produced valid data. Simply stating ‘repeat the experiment from section A’ and then stating one change is not detailed enough to be credited. Candidates should be encouraged to include a chronological list of steps, including stated values of the independent variable, along with reference to what measurements are required.

Section B - Science theory

Theory based questions, such as those involving collision theory in the rates of reaction and enzyme tasks, were often not well answered. Although candidates had a broad understanding, they often didn’t use detail and correct terminology in the answers to gain credit. For example, the distinction between collisions and successful collisions was not clearly distinguished or understood.

Supporting you

Useful contacts and links

Our friendly subject team are on hand to support you between 8.30am and 5.30pm, Monday to Friday.
Tel: 029 2240 4252
Email: science@wjec.co.uk
Qualification webpage: GCSE Biology (wjec.co.uk)

See other useful contacts here: Useful Contacts | WJEC

CPD Training / Professional Learning

Access our popular, free online CPD/PL courses to receive exam feedback and put questions to our subject team, and attend one of our face-to-face events, focused on enhancing teaching and learning, providing practical classroom ideas and developing understanding of marking and assessment.

Please find details for all our courses here: https://www.wjec.co.uk/home/professional-learning/

WJEC Qualifications

As Wales' largest awarding body, at WJEC we provide trusted bilingual qualifications, straight-forward specialist support, and reliable assessment to schools and colleges across the country. With more than 70 years' experience, we are also amongst the leading providers in both England and Northern Ireland.

We support our education communities by providing trusted qualifications and specialist support, to allow our learners the opportunity to reach their full potential.

WJEC
245 Western Avenue
Cardiff CF5 2YX
Tel No 029 2026 5000
Fax 029 2057 5994
E-mail: exams@wjec.co.uk
website: www.wjec.co.uk

[i] ***Please note that where overall performance on a question/question part was considered good, with no particular areas to highlight, these questions have not been included in the report.***