

GCE A Level Examiners' Report

Biology

A Level

Summer 2024

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Introduction

Our Principal examiners' report provides valuable feedback on the recent assessment series. It has been written by our Principal Examiners and Principal Moderators after the completion of marking and moderation, and details how candidates have performed in each component.

This report opens with a 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 then looks in detail at each unit, pinpointing aspects that proved challenging to some candidates and suggesting some reasons as to why that might be.[1]

The information found in this report provides valuable 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	Eduqas offers an extensive 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.eduqas.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 12 months after the examination.	Portal by WJEC or on the Eduqas subject page
Grade boundary information	Grade boundaries are the minimum number of marks needed to achieve each grade. For linear specifications, a single grade is awarded for the subject, rather than for each component that contributes towards the overall grade. Grade boundaries are published on results day.	For unitised specifications click here: Results and Grade Boundaries and PRS (eduqas.co.uk)

[1] ***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.***

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Exam Results Analysis	Eduqas provides information to examination centres via the WJEC Portal. This is restricted to centre staff only. Access is granted to centre staff by the Examinations Officer at the centre.	Portal by WJEC
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.eduqas.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.	Portal by WJEC or on the Eduqas subject page.
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Executive Summary

Overall, the standard of candidates' responses to questions on all three components was good. However, there was a slight fluctuation in the means for the three components, with Component 1 and 3 decreasing slightly whist Component 2 increased. Many candidates demonstrated a sound ability to process, analyse and interpret data and information. More able candidates were able to express themselves well using appropriate scientific terminology. However, a significant minority of candidates were not able to recall the terminology required for AO1 questions.

Maths skills were generally good, although the ability to calculate a rate from a tangent, the calculation of a percentage and the understanding of the significance of a standard deviation were seen to be lacking in some candidates. Candidates should take care to express their answers in the way the question requests. This led to an unnecessary loss of marks for some.

Practical skills seemed to vary over the three components, being good in some topic areas but lacking in others. Understanding of microbiology and chromatography were particularly strong, but there was some confusion in fieldwork with regard to when transects as opposed to grids should be used. Candidates should be careful in their use and understanding of the terms control and controlled, many candidates appeared to think the terms are interchangeable. Another area where there was some confusion was evaluating the validity of data collection in novel contexts.

All assessments contain a mixture of assessment objectives and AO2 and AO3 style questions require candidates to use both their own knowledge and the information given. A particular issue this year was that candidates were not using the information given and so were not gaining all the credit available.

All components are required to assess synoptic elements from the other two components and also core concepts. It is vital that candidates understand this and revise the contents of the core concepts alongside each component. This was sadly lacking in many of the scripts seen.

In many cases throughout all three assessments marks were lost due to vague answers and a lack of scientific terminology. Candidates should be encouraged to read back their answers to make sure they make sense and answer the question that has been asked.

There was a general decrease in the quality of answers to the Option questions. Candidates should be reminded that this is the only section of the Component 3 paper which has a fixed tariff of marks and that all parts of the specification for each option will be assessed.

Areas for improvement	Classroom resources	Brief description of resource
Recall of scientific terminology	Knowledge organisers	A collection of sample knowledge organisers to support the learning of A level Biology.
Improving AO1 skills	Improving AO1 resource	Series of questions for every topic designed to help candidate revision.

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Practical skills	Experiments on film	Videos of every specified practical and questions to strengthen practical skills.
Correct 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 three components, 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.
Revision of Core Concept topics	Nucleic acids and their functions - Blended Learning (d3kp6tphcrvm0s.cloudfront.net)	This blended learning resource contains interactive self-study content covering Core concept – nucleic acids Candidates may find this useful either as a recap or in flipped learning
Revision of kidney function	Homeostasis and the kidney - Blended Learning (d3kp6tphcrvm0s.cloudfront.net)	This blended learning resource contains interactive self-study content covering Kidney function Candidates may find this useful either as a recap or in flipped learning
Revision of application of reproduction and genetics	Application and reproduction of genetics - Blended Learning (d3kp6tphcrvm0s.cloudfront.net)	This blended learning resource contains interactive self-study content covering the applications of reproduction and genetics. Candidates may find this useful either as a recap or in flipped learning

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BIOLOGY

GCE A level

Summer 2024

COMPONENT 1 ENERGY FOR LIFE

Overview of the Component

Component 1 tests candidates' knowledge and understanding of energy systems in animals and plants and the flow of energy in ecosystems. This component also covers topics on populations, microbes and human impact on ecosystems and the planet.

Questions on these topics tested candidates' ability to recall facts, apply knowledge and understanding and use a range of information to evaluate and reach conclusions. Most questions were set in a practical context and tested the use of mathematical skills in Biology.

Accessibility to questions seemed to be more varied this year compared to 2023 with some questions having very high facility functions while others presented problems to many candidates.

The following aspects of the assessment were well answered:

- Qu 6, the QER, on culturing and identifying bacteria
- Qu 4 on chromatography, especially calculation of an Rf value and identification of a photosynthetic pigment

The following aspects of the assessment were less well answered:

- Questions based on core concepts (1 a ATP, 1 b organelles and cell types, 3 c structural isomerism, 4 a ions and atoms, properties of lipids and cell membranes
- Calculation of a rate from a tangent (1c i)
- Calculation of a percentage (2 c ii)
- Use of information provided on the light dependent reaction (4 d iii)
- Questions testing synoptic content from other components (2 a i, 3 a i, 5 c i and ii)

Comments on individual questions/sections

Q. 1 This question mainly tested core content on ATP and other nucleotides. Most candidates could draw a simple diagram to show the structure of ATP, but many could not label the sugar as ribose or the base as adenine (not adenosine). Less well answered was the definition of universal energy currency. Both questions involve basic recall which is revisited in Component 1.1.
Recall of organelles and cell types also caused problems with many candidates unable to correctly compare the structure of bacteria, chloroplasts and mitochondria. Synoptic content on Domains (Component 2) was very poorly answered. Candidates are again reminded that each of the examinations for Components 1, 2 and 3 contain some synoptic content from the other components as well as Core Content.
Generally, mathematical skills are well answered. However, it was obvious that many candidates did not know how to use a tangent to a curve to calculate a rate. This skill is listed in Appendix C of the specification.

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Q.2 Part 1 a (i) again tested synoptic content from Component 3. Many candidates could not recall the types of nutrition of producers and consumers. Explanations and definitions of ecological terms from Component 1 were not well expressed.
Even though the word **both** was in bold, many candidates were unable to identify a density-independent factor that would affect BOTH arctic and desert regions. Low water availability or extreme temperature were the obvious answers, but many candidates' answers lacked detail. Relating NPP to photosynthesis also caused problems. Many candidates ignored the information provided and based their answers on water reflecting blue light. Many also misunderstood that water absorbing red-light does not mean that more red light is available for photosynthesis.
Most candidates were able to calculate the annual human consumption of organic matter using unfamiliar units and also the percentage of NPP wasted by humans. A surprising number, however, still find percentage calculations a challenge. Use of the information provided to justify the recommendation that humans should eat more plants than animals was very hit and miss. Few could use the information or their knowledge of food chains and trophic levels to gain all three marks available.

Q.3 This question tested knowledge and understanding of anaerobic respiration. The first part tested knowledge of nutrition from Component 3 and was again poorly answered. Saprotrophic digestion takes place outside of an organism's body, not just extracellularly.
The majority of candidates recognised that the diagram summarised anaerobic respiration, but a surprising number could not identify the molecules containing 1, 2 or 3 carbon atoms.
Part (b) of this question tested practical skills. Candidates should know that use of water bath at a particular temperature is not to provide optimum conditions but to control a variable that could otherwise affect the rate of reaction.
Part (c) required candidates to apply core content on disaccharide structure to respiration. Most could recall the definition of a structural isomer but recognising that sucrose would need to be hydrolysed to release glucose and fructose as respiratory substrates was poorly understood by many. Fewer appreciated that the lack of bubbles produced when using lactose indicates that yeast is unable to hydrolyse lactose.

Q.4 Part (a) of this question tested core content on cell membranes and phospholipids as applied to chlorophyll and thylakoid membranes. Most remembered that chlorophyll contained magnesium ions and could see from the image that chlorophyll contained oxygen and nitrogen atoms so could not be classified as a hydrocarbon. There was a lack of detail in most answers concerning the position of carotene in membranes. This required a knowledge of hydrophobic and hydrophilic properties as well as the structure of the phospholipid bilayer. Many could not suggest a function of carotene in membranes similar to that of cholesterol.
Parts (b) and (c) tested knowledge and understanding of the practical to extract and identify photosynthetic pigments. This was generally well answered. However, stating that pencil won't run did not gain the mark – pencil is insoluble so does not run would have gained the mark. The only issue with the Rf calculation was taking measurements from the chromatogram.
Part (d) presented candidates with an unfamiliar diagram of the light dependent stages of photosynthesis. Most candidates knew that particles of light energy are called photons and could identify ATP and reduced NADP as the products. Part (c)(iii) asked candidates to use **all** the information provided to explain how a reduction in carotene levels can lead to plant death. Unfortunately, most candidates gave a detailed explanation of damage being caused to chlorophyll a but did not apply this to the image to explain plant death.

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Q.5 Topics 5 and 6 of Component 1 cover ecosystems and human impact on the environment. This question provided stimulus material in the form of photograph of an avocado plantation. Mosty candidates made use of this image and identified how establishing an avocado plantation could affect various biotic and abiotic factors. Marks were lost due to lack of detail. Practical work to estimate biodiversity should have been straightforward but many candidates referred to use of a transect rather than a grid with randomly positioned quadrats. Most did not state that they would need to count the number of individuals or each species present or calculate a Biodiversity Index.
Few candidates could define genetic polymorphism or use their knowledge of genetics to suggest why attempts to breed new varieties of avocado are generally unsuccessful. Despite being told that infection with *P. cinnamomi* affects transpiration, many could not identify that xylem is the affected tissue. Few could give details as to why infected plants wilt.

Q.6 This quality of extended response question tested knowledge of culturing, identifying and counting bacteria. Many excellent answers were seen, especially regarding identifying and counting bacteria. Explaining the conditions for culturing bacteria was less well answered.

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BIOLOGY

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COMPONENT 2 CONTINUITY OF LIFE

Overview of the Component

The demand of the majority of the questions was comparable to those set previously. However, the QER seemed to be more challenging, even though much of it was recall (AO1). The assessment included content on pregnancy, classification, sex-linked genetics, seeds, mitosis and cancer, and genetic engineering. There were many good, concise answers to some of the longer questions.

The following aspects of the assessment were well answered.

- Calculations (Q1biii, Q4bi, Q6bii, Q6ci).
- Drawing conclusions from written information (AO2 and 3). (Q2dii, Q3ai, Q4biii, Q4c, Q5b).
- Concluding genotypes from family tree data (Q3biii)
- Using photographic images to identify structures (Q1ci, Q6ai)
- Synoptic assessment (Q1ci, Q5d)
- Making data comparable between individuals (Q4bii)
- Applying core biology to novel situations (Q5ci, Q5cii)

The following aspects of the assessment were less well answered.

- Assessing data when using standard deviation (Q1biv)
- Making data collection in a practical setting reliable and accurate (Q6bi)
- Understanding of use of mRNA to prepare a fragment of DNA containing a useful gene (Q7)
- Vague use of technical terms and language (Q1aii, 2ai, 2aii, 4biii, 4bv)

Comments on individual questions/sections

Q.1 The recall of effects for the hormones in (a)i and (d)i and ii were good, although references to production of lactate (instead of milk or lactation) were seen.
For (a)ii any reference to fewer barriers, layers or membranes were accepted as well as the mother's blood being in direct contact with the chorionic villi. These leading to a shorter diffusion distance.
For part (b) many candidates gave a reasonable definition of standard deviation and explained why it is used rather than range, although some were rather tortuous and over complicated which then often led to contradictions and losing a mark. The placental thickness was calculated well although sometimes the answer was not in cm (2500cm was a little excessive!). Full marks were rare for part (iv).

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Few candidates used the standard deviation data. Those that did, spotted that there was no overlap between trimester thickness, but that there was overlap between weekly thicknesses. Many candidates did spot that the weekly thickness did become thinner over certain time periods making the data less useful for gestational age. Part (c)i was a synoptic question and most candidates could tell the difference between an artery and a vein. Part (e) relied on the candidate knowing that the placenta is made up of cells from both the baby and mother.

Q.2 There were a lot of vague answers to (a)i which referred to unethical practices and rights of privacy which did not gain credit. Many candidates gained a mark for prevention of discrimination and many mentioned life insurance.
For (b)i as long as the polypeptides were bonded or joined together a mark was given. Other vague words such as folded or associated did not gain credit.
For (b)ii most candidates understood the difference between introns and exons, but many forgot that three nucleotide bases code for each amino acid and gave 35 as the answer to (c)i.
In (d)i mention of hydrolysis of the hydrogen bonds holding the two DNA strands together caused the loss of a mark.
Parts (d)ii and iii were well answered. In part (e) candidates who referred to the human cell wall not being made of cellulose did not gain the mark.

Q.3 Many candidates spotted that mitochondria are needed for oxidative phosphorylation and red blood cells don't contain mitochondria. This causes a lack of the co-enzyme (not the enzyme G6PD) that protects the cell membrane. Most could give two names for (a)ii. For part (b)i if environment was not given as one of the factors affecting phenotype, an environmental factor (e.g. diet, stress) was credited.
The best responses for (b)ii used examples from the image with a short explanation e.g. Parents 1 and 2 do not have the condition but offspring 6 does. The condition is sex linked but the candidate would still gain marks for that answer. There were many examples of candidates writing about offspring gaining an X chromosome from the mother and a Y chromosome from the father but not referring to whether they had the condition and so did not gain credit. A significant minority mixed up males (XY) and females (XX) in their answers to part iii. Both alternatives had to be written for individual 10.

Q.4 Part (a) asks for the next steps needed to show the two forms are the same species so breeding the two together again did not gain a mark. The offspring should be bred together, although breeding the offspring with one of the forms was also accepted. It was very pleasing to see that candidates gave the answer to (b)i to the same number of decimal places as that shown in the table.
The practical use of having oxygen demand per gram of fish was well explained by many candidates in (b)ii, but stating that kg was too big a unit did not gain a mark.
Advantages for energetic cost for eyes in the cave form were good: any use of the energy that was reasonable was given credit e.g. swimming, growing, searching for food.
Allopatric speciation was well understood in (b)iv, although candidates found genetic drift more difficult to define. Epigenetic effects were also well understood for (c).

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Q.5 Part (a)i was often answered correctly, but some candidates lost marks for not giving a comparable statement e.g. “saturated fatty acids have no carbon to carbon double bonds”. This answer does not give a difference. Also, just “double bonds” does not gain a mark as there is a double bond to oxygen in saturated and unsaturated fatty acids.

The answer to (a)ii needed the name of the reagent (Benedict’s was often given) and the result of the colour change. If the starting colour was incorrect (blue) the answer did not gain a mark.

In part (b) many candidates gained the mark for dispersal and many gave reducing competition. Protection from fire was often seen. Some candidates failed to read that the eliasomes are fed to the ant larvae and wrote about the proteins and lipids being used for plant growth.

Part (c)i asks for an explanation of how the cracking of the testa allowing the seed to start germinating so references to giving space for radicle and plumule to emerge were ignored.

Part (d) was synoptic and there were some very good answers that addressed the question. Unfortunately, some candidates just gave a description of eutrophication which is largely irrelevant.

Q.6 The first part of this question assessed recall and then moved on to AO2 and AO3 skills.

The vast majority identified metaphase for (a)i. Most gained at least 2 marks for (a)ii with many candidates giving more correct answers than the three asked for. Growth was ignored as this is due to more protein/ organelles/ cytoplasm.

Responses to (b)i were disappointing. Very few gained maximum marks with many candidates missing out due to poor phrasing of the answer. Repeating a count many times will not improve reliability as counting the same thing again and again should give the same answer. Responses which included stating that the field of view has to change or more cells counted and then a mean calculated gained two marks. Many gained a mark for the mean calculation, even if the start of the answer wasn’t precise. The most common marks for accuracy were using a higher magnification or resolution to allow for correct identification of stages. A more powerful or better microscope were not deemed acceptable.

Calculating the mitotic index in (b)ii was not a problem for most candidates. Many recognised that grade III tumours would be faster growing, so more cells would be in mitosis, therefore the mitotic index would be higher for (b)iii. Other factors contributing to the dog’s survival time included age, diet, fitness of the dog. Health was too vague as it could include all of those factors. Disease or other preconditions were creditworthy, as was the stage of diagnosis or treatment. Breed/ type/ variety gained a mark, but not species as they are all the same species. The site of tumour was ignored as the first line of the question stated that it was in the skin. Size did not gain a mark as breeds can be different sizes. The calculation for (c)i was good but a mark was often lost for giving a fraction of a cell.

The answer to (d)i relied upon the candidate recognising that the grade II tumour was growing faster, so would take up the most radioactive thymine. The candidate then had to say what that was used for to gain the second mark. Similarly, for (d)ii candidates had to recognise that thymine is only present in DNA and guanine is in DNA and RNA, so would not be useful.

In part (e) references to danger to the dog were ignored as the tumour is added to nutrient solution containing the radioactive thymine, therefore it is not in the dog. However, there could be a problem for the vet handling the material.

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Q.7 The QER question enabled the candidates to gain the full range of marks, although answers in the higher band were less common for this topic.

The first part asked for using mRNA from the jellyfish to synthesise A DNA molecule so references to PCR were irrelevant. Unfortunately, many candidates did not use the mRNA reference and went straight for cutting the gene out of the chromosome with restriction enzymes. Some cut the mRNA with restriction enzymes which is the wrong context and so failed to gain credit.
Many candidates failed to understand the contexts for the next two parts of the QER. The problems that are overcome are recall and are listed in 2.7(e) of the Teachers' Guide. Many students referred to the ethics of removing a gene from a jellyfish chromosome and had the poor creature unable to glow. Some had humans with genetic conditions glowing. It could be that they did not understand the use of a marker gene. Problems using an antibiotic resistance marker were often the only credit gained in the final section, although making plasmids resistant to antibiotics was not given credit. Those that understood the concept often wrote good, concise suggestions.

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BIOLOGY

GCE A level

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COMPONENT 3 REQUIREMENTS FOR LIFE

Overview of the Component

- All of the AOs were assessed within this paper
- Content included plant transport and gas exchange, digestion, enzymes, nervous system, homeostasis, gas exchange in humans.

The following aspects of the assessment were well answered.

- AO1 was assessed in most questions, with the majority of AO1 marks being in Questions 1, 3, 5 & 6.
- Most candidates were able to recall information well (Qu 1b/c, 2aiII, 3ai/ii/iii, 5c, 6 QER part relating to fish)
- Calculations (Qu 1aii I/II, 3c, 4c)

The following aspects of the assessment were less well answered:

- Identification of enzymes and their products (Qu2)
- Ability to follow instructions given in the question (Qu 4bi)
- Using correct scientific terminology (Qu 2bii, 4a, 5ai/ii)
- Using information given and their own knowledge (Qu 3bi, 4bii, 5bi/ii/iii)
- Interpreting data given (Qu 5bi/ii/iii)

Comments on individual questions/sections

Q.1 Many candidates could correctly identify the tissue layers in part (a) and gave clear labelling using lines within the tissue spaces. Many candidates could calculate the ratio correctly, but made errors in the second part when calculating the correct thickness.

Part (b) was answered well, but responses sometimes confused which adaptations were for absorption of light and which were for efficient diffusion of gases. Many stated that there were a large number of chloroplasts but failed to say where they were.

Many candidates were able to give correct functions of the vascular bundles in the plant in part (c). Weaker responses gave ‘structure’ but did not refer to strength or support. Some of the responses referred to maintaining a concentration gradient or transpiration, which did not gain marks.

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Q.2 In part a(i), many candidates did not specify the actual enzyme, rather using carbohydrase or proteases. Many candidates answered that the endopeptidases would produce amino acids, rather than shorter polypeptide chains or shorter chains of amino acids. Most were able to identify the bond as a peptide bond. Part (ii) proved challenging for some. Weaker responses did not state that the enzyme was more stable as it was located within the membrane of the cells. Many gained the mark for the enzymes being located close to the site of absorption.

There was some confusion in some answers to part (b). Some responses gave a detailed explanation of how the pH would change, but this did not answer the question. Some answered that the starch would change shape or that the enzyme was inhibited by the ethanoic acid.

Candidates were able to interpret the data given in the table in part c(i) and use this to spot differences in the relative volumes. Many could also link this to the diet of the cow or the dog. Weaker responses did not refer to protein or fat being present in the small intestine of the dog. Good responses provided one difference in each row of the table and clearly linked this to the diet. Fewer responses used the differences in the colon.

Some responses to part c (ii) were linked to lactose and lactase rather than the high protein content of the milk. There were some very good answers given which linked the abomasum to protein digestion.
Part c (iv) could be approached in two ways. Few responses were seen relating to the bacteria within the caecum of the horse – and the contribution to nitrogen containing compounds in the soil. Most responses related to the breakdown of cellulose – these did not then link this to the nitrogen compounds. Many responses referred to cellulose or glucose in the faeces or more vaguely, nutrients in the faeces.

Q.3 Part (a) was answered well by most candidates. Some responses confused the apoplast and symplast pathways.

Most candidates were able to identify that the trunk and xylem diameters would decrease in part b (i). Fewer could give full explanations of cohesion and adhesion to get those marking points. There seemed to be poor understanding of an increasing rate of transpiration causing an increase in column tension pulling the walls of the xylem inwards.

Many good responses were seen in part (ii). Weaker candidates gave a list of environmental factors which could only be awarded one mark.

Part c (i) was done well by most. Part (ii) caused more issues. Most candidates could correctly identify the trend, but some omitted to state that there was a plateau or failed to give values in their answer. In part (iii), a number of candidates confused accuracy and reliability with confidence. Some responses were poorly worded, and others restated the trend in different words.

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Q.4 Part (a) was well answered in the main. Many candidates were able to correctly identify all parts of the spinal cord. Some referred to dark or black matter or the spinal cord rather than the central canal.

Three arrows were need on the image in (b)(i), however, some candidates omitted them completely or did not have arrows on each neurone. Some had arrows in the wrong direction. Labels were generally good, but some did not have label lines. In part (ii), many correct answers were seen which referred to the long distance between the leg and the chest of the dog. However, fewer referred to the need for a long relay neurone to take the impulse down the spinal cord.

Most candidates were able to correctly calculate the rate in (c). However some conversion errors were seen.

Q.5 In part (a) (i) most could state that enzymes are biological catalysts, but many failed to refer to the active site in their explanations of the tertiary structure. Some candidates could state that a hormone came from an endocrine gland in part (ii), but fewer could explain the importance of the tertiary structure to the function. Good candidates could explain that the hormone would bind with a specific receptor on a target organ.

Part (b) required candidates to use their knowledge of nephron function to interpret the effect of increasing arterial blood pressure on renal blood flow and glomerular filtration rate. In part (i), good candidates were able to identify that an increase in renal blood flow resulted in a higher pressure in the glomeruli.

Part (ii) required candidates to describe and explain the GFR between 80 and 180mmHg. Very few candidates gained both available marks. Good responses could state that GFR stayed constant even with an increase in RBF. Fewer could link this to reduced blood flow into the glomerulus.

Part (iii) again proved very challenging for most candidates. There were a variety of incorrect responses given for this question part. Many responses did not appreciate that the water would be leaving the body. Some responses stated that more water would be reabsorbed. Some did not mention water but wrote about fluid, molecules or nutrients. Many answers stated negative feedback, or trying to maintain a constant internal environment or that homeostasis was happening. Many failed to mention water or urine in their answers.

Part (c) was answered well by many candidates. Good answers included a logical description and included all elements of the mark scheme. There were some nice descriptions of the insertion of aquaporins into the membranes.

Q.6 The first part of the quality of extended response question required a description of ventilation in humans and was answered well by many candidates, many getting all the marking points. Weaker responses wrote about the volume of the lungs increasing during inspiration rather than the thoracic cavity. Many good explanations of how the muscle contractions would lead to an effect e.g. contraction of the intercostal muscle causes the rib cage to move upwards. Some weaker responses listed the intercostal muscles and diaphragm together and then only mentioned the movement of one of these. Fewer responses gave an explanation of the effect of the pleural membranes, those that did explain this, did it well.

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The second part of the question required a description of ventilation of the gills in a bony fish. was generally very good, sometimes better than the first section. The only issue was some candidates seemed not to be familiar with the term buccal cavity. Responses sometimes referred to the mouth cavity or the floor of the mouth. Sometimes responses referred to the buccal cavity lowering.

The third part required a description of the advantages and disadvantages of the insect tracheal system compared to humans. This was the weakest section of the question. Some candidates failed to mention oxygen as passing directly to the cells in the insect. Responses which referred to gases or air were not given credit. Many responses gave information about spiracles closing to reduce water loss. Very good responses realised that insects did not use haemoglobin. Very few candidates gave the disadvantage of chitin mass or the rate of diffusion limiting the size of insects.

Q.7 Option A – Immunology and disease

In part (a) the vast majority of candidates knew that the mosquito acted as a vector for malaria. Most candidates were able to explain that multiplying inside human cells means that the malaria parasite avoids triggering an immune response, but few could explain that this was due to the plasmodium antigens not being detected outside the host cell. Part (iii) was well answered generally although many candidates went into far too much detail on how variation is generated by meiosis which was not required by the question.

Many candidates were able to calculate the magnification of the image using the scale bar in (b), but a surprising number were unable to convert the units and therefore lost marks. Most candidates showed good understanding of the principles of vaccination and understood the importance of inducing an immune response while avoiding triggering the symptoms of malaria. It was pleasing to see that candidates were able to use the information given in the stem of the question in combination with the underpinning knowledge they had learned about immunisation when answering this section.

Some candidates were let down by poor quality of expression in their answers in (c). In particular, many missed the first marking point in part (i) by not being able to clearly describe the appearance of a negative test result although most would probably have had recent experience of reading the results of Covid antigen tests which look virtually identical to this test and are based on the same principle. The majority of candidates understood the mechanism of action of penicillin and most realised that *Plasmodium*, being a protoctistan parasite, would not have a cell wall to be weakened by the antibiotic. However, some candidates missed out on the mark as they made the incorrect assumption that malaria was caused by a Gram negative bacterium.

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Q.8 Option B – Human Musculoskeletal Anatomy

Part (a) was generally well-answered with most candidates being able to identify the cell type in hyaline cartilage. Many candidates knew that cartilage lacks blood vessels but failed to go on to explain that diffusion had to be through the matrix. Weaker candidates identified the cells as osteocytes. The majority of candidates correctly identified the function of the rings of cartilage with some better responses explaining that they prevent collapse during inspiration.

In part (b), a good number of candidates correctly identified compact as the bone type and recognised that spongy bone would reduce the mass of bone. Few candidates went on to explain that this would reduce the energy required to move the bone. Far too many confused spongy bone with bone marrow or made reference to ease of diffusion through the air spaces. The calculation was well done, as was the role of the Haversian system.

Part (c) was well answered with candidates being able to correctly interpret the x-rays. Many answers in c(ii)II were hampered by language skills. Most could identify that the patient was young and inactive but did not convey that this meant that the arthritis was unlikely to be osteoarthritis, as this type mainly affects older patients or that it was unlikely to be owing to wear and tear. (d) was more problematic for candidates, many could not identify the correct systems, and far too few made reference to the evidence on the graph. Many claimed that 100m sprint would take over 30 seconds and suggested glycolysis as an energy source. In d (ii) only the very best candidates used the information and referred to the need to control energy usage and this was often poorly expressed. Weaker candidates only made reference to fair testing and ability to compare, or merely wrote " to make sure that diet is the only thing that affects the results. In part (iii) graph interpretation was poor, although most managed to pick out that glycogen stores did not fall as low or that recovery of glycogen stores was improved. Few recognised that the athlete would be able to train harder/ longer/ at a higher intensity as a consequence.

Q.9 Option C – Neurobiology and behaviour

Part (a) was generally well answered with many candidates correctly identifying the labelled area of the brain and stating the function of the autonomic nervous system. Some candidates did not gain the mark in part (i) due to vague descriptions of the two views of the brain seen in image 9.1. Candidates should be encouraged to use precise terms such as "plane of view" to describe the appearance of such images. The calculation of actual diameter question was well answered on the whole although some candidates had trouble with converting between units.

Some excellent and well-reasoned responses were seen in part (b), although not all candidates were able to access all 3 marks in part (ii). The most common error was to omit that the cerebral cortex is involved in higher brain functions, the first marking point.

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Many candidates gave detailed and reasoned responses to the questions posed in (c). One common error in part (i) was to simply describe the sequence of events in response to stress as shown in the diagram but to omit the inhibitory effect of rising cortisol levels on the stages in this sequence. Part (iii) in particular was very well answered with many candidates gaining the marks available here.

Although the vast majority of candidates gave good answers in (d), some missed out on the mark in part (i) because they did not use evidence from image 9.5. It should be impressed on candidates to use information given in the stem of the question when asked to do so and not to simply state the definition of key terms. Many good responses were seen in part (ii), but several candidates missed out on the mark for the type of selection by focussing solely on the role of sexual selection and omitting the contribution of natural selection in producing camouflaged colouration in the female grouse.

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BIOLOGY

GCE A level

Summer 2024

PRACTICAL ENDORSEMENT

Overview of the Component

A number of centres were observed, all of which demonstrated a good understanding of the requirements of Practical Endorsement.

Aspects of good practice seen during the visits include:

- A suitable plan of practical work. The plan was incorporated into Scheme of Work and was often also kept as a separate document, available to all members of teaching staff. A suitable plan showed the specified practical, the CPAC to be assessed in the practical, and the proposed time in the teaching year where it would be carried out. Please note this plan, with these details, must be available to the monitor if you are visited.
  The plan should also allow for the development of skills within Practical Endorsement and should cover all elements of each CPAC over the two years of teaching. It is not necessary to assess CPAC on every practical performed.
- The maintenance of accurate and up-to-date Teacher and Candidate Records.
  This is vital. Most centres now record their outcomes in an Excel Spreadsheet, often showing the CPAC element. However, if teacher records do not show this level of detail (i.e. the element assessed) then teachers should annotate the candidate work showing the element achieved (e.g. *CPAC 3(a)*✓ or CPAC 3(a&b)✓*).*
  Monitors will always check to ensure all elements of each CPAC are covered and will ask teachers how they ensure all aspects of the skills are achieved by each candidate.
- Candidates are aware which CPAC are assessed in a particular practical and understand what they need to do in order to succeed.
- Practical books are used in 'real time' at the bench by candidates when collecting experimental data.
  We do not expect to see practical books which are in immaculate condition! Candidates should **not** write on scraps of paper and later copy the work up neatly into practical books.
- There is simple annotation of the candidate work shows where the candidate achieves or fails to achieve a CPAC, (e.g. with *CPAC 3(a)*✓ or *CPAC5(b)*✗*).* It is good practice to give feedback to candidates in order that they can improve on their skills in future. Feedback on how to improve may be given verbally or in writing.
  Important note: Many centres now record the CPAC element assessed in a practical which helps ensure all aspects of CPAC are covered.

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- Records of candidate performance show a progression in candidate attainment. It is not necessary for a candidate to succeed and obtain a CPAC every time. Early in the course there will be occasions where a candidate may struggle to achieve a skill. This should be reflected in the teacher records of candidate performance. We do **not** expect to see every candidate getting every criterion each time they are assessed. Indeed, when this happens there will be legitimate concerns about whether the work has been appropriately assessed. We expect to see that there are places where candidate work is marked 'not achieved'. The key question is, 'Is the candidate competent at the end of the course and **not**, is the candidate competent all the way through the course.'
- There is evidence of standardisation across **all** subject teachers when Practical Endorsement is delivered by a team of teachers.
- There is evidence of standardisation across **all** subject teachers where Practical Endorsement is delivered by a team of teachers.
  It is a requirement of Practical Endorsement and is recorded in the monitor's report of the centre. Standardisation must be implemented for a centre to pass the monitoring visit. This standardisation may be carried out by cross marking of candidate work or by meetings in which some candidate work is discussed. Please expect questions on how you do this if visited by a monitor.
  A number of centres write descriptors of minimum standards necessary to achieve a CPAC in a practical. This is good practice and particularly helpful in large departments where there are many teachers of the subject. See for example, CPAC Pen Portraits on the EDUQAS website

Comments on individual questions/sections

Assessment of Practical Endorsement

Centres are reminded that in order to award a pass for Practical Endorsement, a candidate needs to 'consistently and routinely meet the criteria'. Although this does **not** mean a candidate gets a CPAC every time it is assessed, it does means that a candidate develops these skills as the course progresses. In other words, there should be evidence that the candidate gains a pass for each CPAC statement on a number of occasions particularly towards the end of the teaching programme. It is important that suitable opportunities have been built into the assessment plan which allow candidates to generate this evidence.

It is understood that some practical work will need to be carried out in small groups. If these practicals are used to assess candidates, each candidate must generate suitable evidence that he or she **independently** meets the criteria. Centres must give careful consideration to how group work is conducted so that individual candidates can be assessed on their own performance.

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Notes on assessment of CPAC

The Monitor finds it difficult to expand on comments from previous years. It is important that centres read through these comments carefully to ensure they are compliant with our expectations.

As a general rule, set high standards for the achievement of CPAC skills early in the course. Be clear on what you expect from candidates and ensure they understand why they have failed to meet the standard (if they fail) and they understand what to do to achieve it next time.

CPAC 1

The assessment of this CPAC requires the candidate to correctly follow written instructions to carry out an experimental technique or procedure.

In the vast majority of cases, the monitor accepted the teacher's judgement unless there was strong evidence to suggest the CPAC was incorrectly awarded.

Please note, where a teacher feels it is necessary to intervene and correct a candidate's technique, explain the intent of an instruction etc. then the candidate should not be awarded the CPAC.

CPAC 2

This is the most difficult CPAC for candidates to evidence since it involves higher level skills. Your plan should show you know where and when you are going to assess **each element** of this CPAC. It is also important that sufficient time is given to candidates to develop the necessary skills before assessment occurs**. Generally, we do not expect to see this CPAC assessed in the first two terms of an A level course.** However, we do expect to see evidence of some assessment of this criterion by the end of the first year of the A level course. This skill may be evidenced by a candidate planning to carry out a procedure and then adapting their approach, as necessary.

It is **not** necessary to assess every element of CPAC2 each time this CPAC is assessed. However, it is a requirement that each element of CPAC 2 is met during the course. If you are monitored, the monitor will look at the coverage of each element.

CPAC 3

There are many opportunities to assess this skill in Biology. It is not necessary to assess this skill every time a practical is completed. Do **not** use practical work to assess this where hazards are minimal; rather select practical work where there are some meaningful hazards / risks.

CPAC 3(a) requires candidates to identify hazards and assess the risks associated with the hazards. A simple written risk assessment is the easiest and best way of evidencing this aspect of the skill.

CPAC3(b) should be assessed by observation of candidates conduct during a practical session.

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CPAC 4

This CPAC deals with both qualitative and quantitative data.

CPAC4(a) making accurate observations. There were a few occasions where this CPAC where the evidence in the candidate work showed that candidates were **not** working to the required standard. The following points show be borne in mind when assessing this CPAC:

- Observations should be made directly into candidate practical books. Do not award this CPAC if the candidate writes results on to scraps of paper and copies up later.
- Do not award this CPAC if you provide a template table to the candidates for recording results. Templates may be useful to teach candidates a good approach to recording data early in the course but when it comes to assessment candidates **must** devise their own tables. Where necessary, remove table templates to allow candidates to construct their own.
- The tables which candidates construct **must** have appropriate headings and units, where relevant.
- The units must be written in the table column head and not in the body of the table. If units are missing, do **not** award criteria.
- An important aspect of this skill in biology requires candidates to draw suitable diagrams. It is therefore important that centres teach candidates what is expected in a good diagram (e.g. see page 18 of Microscopy skills resource) and then assess candidates diagrams in light of that).

CPAC4(b) obtaining accurate, precise and sufficient data .....

Please carefully check candidates' data.

- Is it recorded to appropriate precision? We still notice that some centres are too lenient on this. If data readings are not always consistently recorded by candidates, then do **not** award the criteria. Make sure that recordings are to the correct number of decimal places.
- Is there sufficient data? Is the data what you expect? Please set suitable standards at the beginning of the course. It does not matter if a candidate did not always achieve the criterion.

CPAC 5

This important higher-level skill should be assessed from early in the course. There are no shortage of suitable assessment opportunities. CPAC 5 has two elements:

(a) Uses appropriate software and/or tools to process data, carry out research and report findings.
(b) Sources of information are cited demonstrating that research has taken place, supporting planning and conclusions.

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CPAC5(a) There should be evidence of candidates processing data using graphs and calculations. Centres should require candidates to use software (e.g. Excel) to draw graphs on a number of occasions.

- Make sure graphs are constructed correctly, i.e. there is a title, each axis is correctly labelled, points plotted correctly, an appropriate scale used, etc. Candidates will need to be shown how to use Excel to correctly title graphs etc. It is evident that candidates do not always know how to use Excel appropriately. Some Excel graphs are disappointing and show the candidate does not know how to use this powerful tool.
- Processing data also involves carrying out calculations. This may involve transformation of data using mathematical equations, statistical analysis etc.

CPAC5(a) also includes 'carry out research and report findings. The report does not need to be long; it may simply the conclusion they draw from their data. However, neither is it is not appropriate to award this CPAC for a one-word answer. A conclusion requires a reasoned response to the data observed. The research maybe internet or book based.

CPAC5(b)

This is not a difficult CPAC to evidence, but it is still not getting enough attention from many centres and as a result is often poorly evidenced in candidate work. Just a few centres are to be commended for having candidates demonstrating referencing on multiple occasions; a few of these even using the Harvard System (which exceeds our requirements for this CPAC).

Please try to get candidates in the habit of evidencing this every time they source information. This should happen from **early** in the course and you want it to become second nature to candidates.

The information referenced may be, for data or a quote; the information may come from a textbook, journal, website EDUQAS data sheet.

Summary

- Successful delivery of Practical Endorsement needs careful thought and planning. Make sure that there are ample opportunities for candidates to evidence all elements of each CPAC statement over the two years of the course. We do **not** expect candidates to achieve each CPAC every time practical work is assessed. Where CPAC is met every time by all candidates then that is an indicator that a centre may not be appropriately assessing.
- Ensure that candidates are clearly informed which CPAC is assessed in a particular practical session.
- Make Practical Endorsement a servant of the subject. Use Practical Endorsement to make better biologists. Do not let it become an end in itself.
- Make sure that candidates are informed whether or not they have achieved Practical Endorsement before the final outcomes are submitted to Eduqas in accordance with JCQ requirements.

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Supporting you

Useful contacts and links

Our friendly subject team is on hand to support you between 8.30am and 5.00pm, Monday to Friday.

Tel: 029 2240 4252

Email: science@eduqas.co.uk

Qualification webpage: AS and A Level Biology | Eduqas

See other useful contacts here: Useful Contacts | Eduqas

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.eduqas.co.uk/home/professional-learning/

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