GCSE

Rewarding Learning

Chief Examiner's Report

Single Award Science

November Series 2018

Foreword

This booklet outlines the performance of candidates in all aspects of CCEA's General Certificate of Secondary Education (GCSE) in Single Award Science for this series.

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

This booklet forms part of the suite of support materials for the specification. Further materials are available from the specification's microsite on our website at www.ccea.org.uk.

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Assessment Unit 1 Biology

Foundation Tier

This paper was well answered and allowed candidates of all abilities to respond positively to the questions. There was no indication that candidates ran out of time. The language appeared to be appropriate for all and a number of examiners commented positively on the clear pencil drawn graphs.

Most candidates achieved between twenty and forty marks in this paper.

Q1 This question covered food chains and was reasonably well answered. However, there were a number of candidates who could not name the secondary consumer and failed to score two marks in Part (c) as they could not correctly link the increase to NO ladybirds.

Q2 This question covered phototropism and was again reasonably well answered with the majority of candidates scoring at least two of the four marks. Of those that lost a mark they did so by failing to draw a correct arrow for the direction of light or failing to give a full explanation in Part (b)(iii).

Q3 The parts of a cell is new material for this specification and a surprising number of candidates failed to label Parts A and B correctly. The remainder of the question was well answered and it was pleasing that so many had learned the definition of a stem cell.

Q4 This question asked candidates to understand a negative result for a food test, and many found this difficult. A number of candidates failed to gain both marks for Part (b), often losing a mark because they chose fat instead of starch. Many of the more able candidates were able to score full marks in this question.

Q5 This question on microorganisms proved to be a good discriminator. Most candidates failed to get the mark for Part (a)(i) as they did not examine the stimulus material carefully enough or their wording was not clear or detailed enough. Many candidates talked about the fungus spreading out, or the bacteria being dissolved or disappearing. Part (a)(iii) was very poorly answered by most candidates; only a few of the more able candidates secured this mark. Perhaps, as this is new material on the specification, some candidates had not realised that knowing the name of the scientists was important. Part (b)(i) again was very poorly answered; a substantial number of candidates failed to get any marks in this part of the question. Most candidates lost their mark for stating that 'more people' from higher incomes used antibiotics as opposed to the fact that the use of antibiotics was higher. Part (b)(ii) was reasonably well answered – some candidates were able to score at least one of the two marks available for this part of the question.

Q6 This question focussed on the link between sunbed use and skin cancer. It required candidates to interpret a graph and unseen information. Part (a) was reasonably well answered, although only the more able candidates were able to secure both marks for the definition of a mutation. Those who did get one mark usually got it for the idea of 'change'. Part (b) was generally well answered with most candidates scoring at least one mark. Some candidates lost marks for referring to information not given in the graph, such as increased use of sunbeds by females or they referred to 'it' rather than

to skin cancer or cases. Part (c)(i) was very poorly answered and most candidates failed to get this mark, while in contrast Part (c)(ii) was well answered with the most common correct answer being 'wear sunscreen'. Part (d)(i) and (ii) were extremely well answered with only a few candidates failing to gain full marks for these question parts. In Part (iii) the graph was well drawn by most candidates, although some did lose their marks for inaccurately drawn lines at the top of each bar. It was pleasing to see that most graphs were drawn with the correct bar width using the marked out lines provided.

Q7 This question covered the male reproductive system and this identification of the parts is new to the specification. Other question parts have been asked on previous examination papers and so would be familiar to candidates. Part (a) was well answered with most candidates being able to score both marks for correctly identifying the urethra and penis, Part (b) was very poorly answered because most candidates failed to mention 'fluid' as part of their response. Part (c)(i) was reasonably well answered, although a lot of candidates lost their mark through vague answers for example to prevent sperm and egg meeting. Parts (c)(ii) and (iii) were really well answered and Part (d) allowed candidates to successfully identify a number of different reasons for opposition to contraceptives.

Q8 This question proved to be an excellent discriminator. In Part (a) more able candidates focussed on the word 'hormone' and achieved two or three marks. However, a large number of candidates described the role of insulin, failing to read the question carefully. In Part (b), the quality of written communication (QWC), very few candidates left this question out and very few candidates failed to score any marks. The structure of the mark banding was rigorous and this meant that only those candidates who were secure in their knowledge on Type 2 diabetes achieved full marks. Only a few candidates achieved six marks. A lot of candidates were vague – 'insulin controls blood sugar levels' rather than specifying that it lowered levels. Similarly they failed to grasp that not enough insulin was produced or that it didn't work properly, instead stating that no insulin was made. This meant that many stayed in the lower mark band.

Q9 This question was about competitive invasive species, which has been asked in the past. However it focussed on Australia and it appeared that many candidates were confused by an animal native to Ireland being considered a competitive invasive species in Australia. Only the more able candidates with a clear understanding of this concept scored well. In Part (a)(i) many candidates answered this question poorly, instead of defining 'a competitive invasive species' they focussed on the red fox. In Part (a)(ii), extinction was well defined by the vast majority of candidates. In contrast Part (b)(i) was poorly answered, with very few answering in relation to the effect on the native species. Part (b)(ii) was answered well by only the more able candidates.

Higher Tier

The overlap questions (Q1-3) were answered to a better standard by the higher candidates, this was most evident in the QWC question. This seems to indicate that candidates were generally entered for the correct tier. There was no indication that candidates ran out of time and the language seemed appropriate for this level.

Q4 This question covered the genetics section. Most of this information is now higher tier material only. Part (a) was poorly answered with candidates explaining a 'stronger' or 'overpowering' allele. A clear definition had not been learned by the majority of candidates and so they struggled to find the correct language to accurately describe dominant. In Part (b)(i) genotypes were correctly identified by a large number of candidates and in Part (b)(ii) the majority completed the Punnett square

correctly however a number of candidates did not use the same parents as identified in Part (i).

Q5 This covered the immune system and microorganisms. In Part (a)(i) phagocytes were correctly named by most candidates and in Part (ii) many candidates scored two marks for a correct description of phagocytosis. In Part (b) a lot of responses referred to faster/slower response rather than antibodies. A number of candidates referred to injections but failed to mention antibodies. In Part (c)(i) proved to be a good discriminator, many candidates did not explain that bacteria can transfer from your hands to the Petri dishes and did not clearly explain the concept of contamination by bacteria from your hands. For Part (c)(ii) the correct disc was chosen by the majority of candidates but the explanation was often very vague, mentioning the spread of bacteria stopping rather than the most bacteria being destroyed. Parts (d)(i) and (ii) MRSA has been examined on previous examination papers and were well answered.

Q6 The nervous system and reflex and voluntary actions were tested in this question. In Part (a) the difference between voluntary and reflex actions was generally well answered. In Part (b)(i) the more able candidates correctly labelled the neurones but a number did not read the diagram correctly and labelled them the wrong way around. In Part (b)(ii) the effector was correctly identified by most candidates. Part (c) was very poorly answered with the majority of candidates answering in terms of time rather than speed.

Q7 This was a straightforward question about exercise with many of the more able candidates scoring full marks. In Part (a) the majority of responses correctly identified Bradley but fewer offered the correct explanation in terms of his recovery time decreasing the most. Part (b) proved to be a good discriminator with three marks being achieved by only the more able candidates.

Q8 This was a challenging question that demanded a clear understanding of biodiversity. In Part (a) few candidates achieved both marks as they failed to give a complete definition of biodiversity. In Part (b)(i) overall candidates correctly identified the reason for the investigation being valid; in contrast Part (b)(ii) proved very challenging with only a minority of answers focussing on the number of species in a site rather than the total number of organisms. For Part (b)(iii) calculating percentages proved difficult for some candidates. In Part (c) very few candidates received two marks with many vague strategies such as 'move more species in' being given. This perhaps highlights the lack of clarity surrounding this topic. Also some parts are new to this specification and this may have played a part in the poorly detailed answers.

Q9 This is a new topic on the specification and it was extremely poorly answered. Many candidates failed to score any marks. In Part (a) a clear definition of a fossil was not well known. In Part (b) those candidates that achieved one mark did so for explaining/ identifying the process of natural selection as being involved in evolution but they failed to emphasise that this continuing process leads to change over time. In Part (c) only a handful of candidates scored any marks in this question. They could not explain that fossils can be dated and so can show changes in a species over time.

Assessment Unit 2 Chemistry

Foundation Tier

In general the candidates performed fairly well in the paper. Most examiners commented that the majority of candidates attempted all questions, leading to the conclusion that questions were accessible to the candidates. There was evidence that in some centres, new material in the specification was not learned in sufficient detail by candidates. In general, as expected, candidates scored well in questions at the beginning of the paper, especially Questions 1 and 2(a). Questions 4, 10 and 11 provided challenge for most Foundation Tier candidates, thus acting as effective discriminators.

Q1 This question was about the changes of states of matter. It was very well answered by the majority of candidates.

Q2 This question on materials gave the students the opportunity to identify properties of a material and explain the properties that make them suitable for a particular job. Many candidates were able to explain the property but found it difficult to use the words conductor and insulator in the correct context.

Q3 This question gave information about tropical fish and then candidates had to analyse and evaluate the data involving pH and temperature of the water in the fish tank. In Part (a)(i), it was well known that a pH sensor can be used to accurately measure pH. In Part (a)(ii), candidates were asked to quote the most alkaline pH in the table; many candidates incorrectly quoted a pH range rather than the specific value of 8.2.

Q4 This question was based on the new topic of Chromatography. It was quite clear that many candidates were not familiar with this concept and had not learnt it in sufficient detail. Most were able to name the technique in Part (a) but there were varying degrees of success with the remainder of the question parts. In Part (e), the most common error was that candidates said the red colour would not move rather than recognise that when it moved there would only be one colour visible.

Q5 This question tested the candidates' knowledge of the Periodic Table and Electronic Structure; it was answered well by many candidates. Part (c) proved the most challenging with a lot of candidates unable to identify that the two atoms had the same number of electrons in the outer shell. A response of 'similar numbers of electrons' was not given credit.

Q6 This question covered the topic of Reactivity Series. Whilst Part (a) was well answered, Parts (b) and (c) proved more challenging. Some candidates quoted the first four metals (Potassium, Sodium, Calcium and Magnesium) in the reactivity series for Part (c) rather than putting the metals given in the correct order. Part (d) was well answered.

Q7 In Part (a), it was clear that candidates had not learned the definition of atomic number. Part (b) involved interpreting data about atomic radius as presented in a graph, this was well done.

Q8 This question was based on Organic Chemistry. In Part (a), a large number of candidates found it difficult to complete the sentences to name and describe a hydrocarbon. Part (b) involved interpreting data in pie charts; many candidates scored full marks in this part.

Q9 Part (a) expected candidates to recall the definition of a smart material; this was another definition that was not well known. Part (b) involved interpreting data about a thermochromic material. This proved to be a discriminatory question part with candidates unable to express their ideas in a clear way.

Q10 This 6 mark QWC question discriminated between the candidates of differing abilities. This allowed the candidates who knew the topic of Forensic Science well to demonstrate this. Whilst there were very few blank responses, most foundation level candidates, as expected, did not score more than four of the six marks available.

Q11 This proved a challenging question for Foundation Tier candidates. A large number of candidates did not score any marks in this three mark question about covalent bonding.

Higher Tier

Candidate performance in this paper was comparable with the previous series'. The paper was an effective discriminator amongst candidates, with responses ranging from excellent to poor. Many of the candidates who had prepared well for the examination scored highly and their knowledge of the content covered in this paper was evident throughout. However, at the lower end of the mark range it was clear that some candidates would have been better suited to sitting the Foundation Tier paper.

Q1–4 These questions were common to both Higher and Foundation Tier papers. The candidate responses to these questions were generally better at Higher Tier than Foundation Tier. In question three, the common six-mark QWC question, more Higher Tier candidates were able to achieve the higher range of marks, in comparison to Foundation Tier candidates.

Q5 Part (a) was well answered, however, Part (b) involved candidates comparing the number of each element in two chemical formulae which proved to be discriminatory.

Q6 Part (a)(i) of this question involved plotting and drawing a line graph. It was pleasing to see that most candidates did well in this part. In Part (ii), candidates were expected to describe the trend in the results on the graph; the vast majority of responses gained at least one of the two available marks. Candidates failed to acknowledge that the number of bottles from 1990-1992 was constant. Part (b) was based on polymerisation; it was pleasing to see that many candidates understood the process. Part (c), based on incineration of waste, was well answered.

Q7 This question focused on the topic of Rates of Reaction, another new topic on the Single Award Science specification. Candidates found this question difficult and it was evident that collision theory had not been well learned. It was pleasing to see that most candidates attempted the balanced symbol equation in Part (d), although there were varying degrees of success.

Q8 This question was on the electrolysis of aluminium. On the whole, Part (a) was the most accessible and was well attempted. Part (b) showed an increase in difficulty as appropriate as the question progressed. Many candidates failed to achieve these three marks. Surprisingly Parts (c) and (d) proved very demanding for many candidates. One common mistake was that candidates stated that a lit splint relights in the presence of oxygen, rather than a glowing splint. Part (d) produced a range of very vague answers such as; saves money and causes pollution. These were not given credit.

Assessment Unit 3 Physics

Foundation Tier

In general, candidates performed well with most gaining their marks in the more straightforward questions at the start of the paper. However, the more complex standard demand questions at the end of the paper proved challenging for a significant number of candidates. All examiners passed remarks on how few blank spaces there were in papers, leading to the conclusion that each question was accessible to the majority of candidates.

Q1 This question was well received with the majority of candidates showing good knowledge of electric symbols and the flow of current in a circuit allowing them to gain at least five out of the eight marks available.

Q2 In this question, Parts (a) and (c) were well received with most candidates able to calculate a percentage from a pie chart in Part (a) and describe a car safety feature in Part (c). Part (b) proved difficult with few candidates able to draw valid conclusions from the table or describe how the response time of emergency services is affected by speed bumps.

Q3 This question on background radiation proved a good discriminator with most candidates able to state the trend shown in the table and define background radiation as radiation that is found all around us. The calculation in Part (b)(i) proved difficult for many candidates with most not realising they needed to multiply 0.025 by 2. Only those who realised the question was altitude related seemed able to state that cosmic rays were causing this extra radiation and state another job that might be affected by this extra radiation.

Q4 This question on distance time graphs and average speed was well received with most candidates able to recognise when the object was stationary and moving slower from the graph. Most could also draw the correct representation for a journey of constant speed during the journey. Part (b) asked candidates to calculate the average speed for Section A, however a lot calculated the average speed for the whole journey.

Q5 This question on satellites and space proved to be a good discriminator. In Part (a) most candidates gained a mark stating either that the USA launched more at the start of the time period, the USSR launched more at the end or a general statement that overall the USSR launched more. Very few candidates were able to deduce the date of the change from the graph. In Part (b) most candidates knew that gravity keeps the satellites in orbit but few could state a valid reason why telescopes in orbit are better than on the Earth's surface.

Q6 This question on the topic of heat transfer, which is new to the specification, was well received with most candidates able to state that copper is a conductor in Part (a) and state the energy types produced by the fire in Part (c). Some could also state that convection is how heat transfers through water in Part (b). Few candidates could state the type of energy stored in the wood in Part (c) was chemical.

Q7 This question also proved to be a good discriminator with most candidates able to state one part of the trend in Part (a), give one source of light at night in Part (c) and define renewable in Part (d). Few candidates could state the full trend shown by the graph and most struggled to explain how the output power would change in the winter.

Q8 In general this question on thinking, braking and stopping distances was not well received by candidates with a lot of very vague answers in Parts (a) and (b). In Part (c) candidates found it difficult to define friction as the force that opposes motion in Part (i) and to explain that rain will reduce friction, so making braking distance longer in

Part (ii).

Q9 It was pleasing to see most candidates attempting the quality of written communication (QWC), six mark question, stating at least two valid points to gain some marks. In Part (b) few recognised that the return time should be divided in half to calculate the depth of the sea.

Higher Tier

The Principal Examiner included some new topics in this paper. As in the Foundation paper the responses varied from centre to centre. It was noticeable that some centres had either not highlighted the new material or candidates had not learned it in sufficient detail.

Candidate performance was often variable in this Higher Tier paper. A significant number of candidates showed very good understanding of the key concepts as well as high ability in answering the more applied questions; consequently these candidates did very well in this paper. A significant number of candidates did less well suggesting that they were not suitably equipped, at this time, to cope with the demands of a Higher Tier paper.

Q1–3 These standard demand questions were common to the Foundation and Higher Tier papers. Generally, the performance of the Higher Tier candidates in these questions was better than the performance of Foundation Tier candidates. Higher Tier candidates were usually able to give fuller explanations in Question 1 (a)(ii), Question 2 (a) and Question 3 (a)(i).

Q4 This question was generally well answered by the majority of candidates. In Part (a)(i) most candidates were able to suggest two ways of improving validity. Part (ii) was very badly answered with many candidates unable to convert watts into kilowatts and minutes into hours. Candidates need to realise that data is taken from real life situations and it would not cost £21,000 a week to run an LCD TV. Part (b) was very well answered. Part (c) was a question on transformers, most candidates were able to achieve two of the three marks, they could name the transformer and knew it increased voltage but did not know why this was the case.

Q5 Part (a)(i) was very well answered by the majority of candidates, Part (ii) was very badly answered, very few candidates used the information in the table to answer the question. Parts (b)(i) and (ii) were very well answered by the majority of candidates.

Q6 This question was very badly answered by candidates. In Part (a) many candidates thought that the starting energy was heat and the useful energies produced were sound and light. In Part (b)(i) many candidates answered that convection was the correct method of heat transfer. In Part (ii) of the candidates who knew that conduction was the correct method of heat transfer very few knew in terms of particles how the heat was transferred, only a handful of candidates wrote about free electrons in their response.

Q7 This is also a new topic to the specification and was very badly answered. In Part (a) most candidates multiplied the mass by the velocity and then squared that answer, many candidates also failed to convert the answer from joules to kilojoules. Part (b) has been asked many times in previous series but the answers were still very poor. Most candidates did not include any forces in their answers.

Q8 This question was very well answered by the majority of candidates. In Part (a)(i) most candidates were able to achieve one of the two marks. Part (ii) was very well answered. In Part (b)(i) candidates must remember to write in the unit, those candidates who did not achieve in this question used the unit million rather than billion. In Part (ii) candidates must refer to a singularity rather than a single point. Those candidates who did not score in this question wrote about the formation of the Sun rather than the Universe. Part (c) was very well answered.

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