GCSE

Rewarding Learning

Chief Examiner's Report

Single Award Science

November Series 2019

Foreword

This booklet outlines the performance of candidates in all aspects of this specification for the November 2019 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 section on our website at www.ccea.org.uk.

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GCSE SINGLE AWARD SCIENCE

Chief Examiner's Report

Subject Overview

The candidates entered for this series performed in line with previous series. There were very few candidates who seemed to be entered for an incorrect tier. Candidates, on the whole, have been well prepared for these examinations and are confident in attempting all question parts. Overall there is a pleasing increase in the standard of written communication in the extended writing questions. It still remains important for candidates to carefully read question instructions and write legibly. For graph questions plots should be of an appropriate size and lines drawn with a single smooth curve or straight line as appropriate, the exception is in Biology papers where it may be more appropriate to draw a point to point line. The papers rewarded candidates who had clearly learned key terms and facts thoroughly.

Assessment Unit 1 Biology

Foundation Tier

Q1 This question covered sources and functions of Food Types. It was well answered, and the cued questions provided a positive start to the paper for all candidates, with most achieving all 5 marks.

Q2 This question dealt with the effects of smoking. Part (a) was basic recall and rewarded those candidates who had revised thoroughly. It was well answered.

(b) Appeared to be well understood but careless wording - 'men smoked more' – caused many to lose marks in Part b(i).

(ii) This part was correctly answered by the majority of candidates.

(iii) Too many candidates answered vaguely or referred to highly trained staff rather than answering specifically in terms of lung cancer.

Q3 This question on food webs was well answered. Parts (a)(i) and (ii) were answered correctly by the majority of candidates. Candidates who used the food web as instructed to answer Part (iii) generally did so correctly, but a number did not read the instructions and wrote a random food chain, one not linked to the information provided.

Part (b)(i) has been asked many times and was generally well answered. Part (ii) acted as a good discriminator with only more able candidates, those who could apply the information provided, able to answer this correctly.

Q4 This question about continuous and discontinuous variation was well answered by those who read the question carefully and used the information in the table.

(a) **(i)** There were a number who understood the difference between the two but did not use the information provided and so carelessly lost marks.

(ii) There appears to be a number of candidates who do not know the difference between graph types. Too many seemed to guess. There are only 3 graph types on the specification and candidates should be familiar with each type.

(iii) Less able candidates struggled with the calculation.

(b) Less able candidates struggled with both Parts (i) and (ii) and it seemed that confusion exists between genetic variation and discontinuous variation with the definition for the latter often being given.

Q5 This question covered the nervous and hormonal systems and candidates with solid knowledge and understanding obtained all the marks.

(a) Of those who lost marks it was a failure to interpret the flow chart or apply their fact knowledge of a nervous response to a specific setting that proved difficult.

(b) Candidates that had revised facts thoroughly found this question part accessible.

Q6 This question focused on the link between pollution and environmental changes. It required candidates to interpret two graphs and link the trends.

(a) This part was poorly answered even by high scoring candidates. Abiotic factors are not well known and examples could not be given by the vast majority of candidates.

(b) **(i)** Generally well answered with most candidates scoring at least one mark.

(ii) Poorly answered as candidates needed to refer to both graphs and many were unable to link them. It was a good discriminator.

(iii) Poorly answered by all but the top scorers. Candidates did not identify the link between the number of cars and the amount of pollution and thus the effect on lichen numbers.

(c) Few candidates obtained this mark. Answers given seemed to imply they knew the air pollution was spreading or at least shared between countries.

Q7 This question covered DNA and mutations.

(a) Well answered – most candidates are familiar with the term Double Helix.

(b) Surprisingly, a significant number of candidates failed to identify the nucleus.

(c) The definition of the term Genome has been asked many times since being introduced to the specification, yet a number of candidates are still not learning the definition.

(d) **(i) & (ii)** Both parts were well answered.

Q8 This question about respiration and photosynthesis proved to be an excellent discriminator, with those who had thoroughly revised and read the question carefully scoring all (or nearly all) of the marks.

(a) Carelessness lost marks in Part (a)(i) where the two substances were given but in the wrong boxes in a number of papers.

(ii) A good discriminator as only the more able candidates knew the term exothermic.

(iii) Not reading the instruction to place the x in a box lost an easy mark for many candidates.

(b) Only the more able candidates scored in this question. In Part (i) naming the chloroplast proved to be quite difficult, and many lost the mark in Part (ii) by mentioning quicker/ better growth rather than focusing on the food made by the plant during photosynthesis.

Q9 This question was about biodiversity and proved to be accessible only to the more able candidates who understood the concept clearly.

(a) Many answered this question poorly. Instead of explaining the impact on biodiversity they focused on the improved growing of crops for farmers.

(b) Those who scored in Part (a) often scored in this part too, as they clearly understood biodiversity.

(c) This was answered better than Parts (a) & (b) with many candidates showing a knowledge of brownfield sites.

Q10 This question about the discovery of penicillin was challenging, even though Part (b) has been asked many times before.

(a) **(i)** Only the high scoring candidates were able to name Florey or Chain as being involved in the development of penicillin as an antibiotic. Many named Fleming even though his role was explained in the stem of the question.

(ii) Only a handful of candidates could explain the need to purify the penicillin before being used an antibiotic.

(b) This QWC question about the testing of antibiotics before they can be licensed for use was attempted by all but a handful of candidates.

The structure of the banding was tight and this meant that only those candidates who were secure in their knowledge of each stage of testing achieved full marks. Only a few candidates achieved 6 marks. Many candidates gave a good account of drug research and it was pleasing to see so many in Band B. However, some vague answers prevented them moving into Band A - not being clear that *in vitro* testing occurs on cells or tissues while animal testing is on a whole body system.

This QWC question offered all candidates the opportunity to score marks.

Higher Tier

Q1, 2 & 3 These first three questions were overlap questions with the Foundation Tier and were well answered by the majority of the Higher Tier candidates. This would 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. The QWC answers were generally of a higher standard with more candidates able to achieve full marks.

Q4 This question was testing the candidate's knowledge of extinction and food chain terminology set in the context of the Black Rhino population in Africa.

(a) Really well answered – this has been a question on many single award science papers before and it is good to see that candidates are reviewing past papers and mark schemes and familiarising themselves with the correct terminology. An unacceptable answer is one which talks about 'animals dying' or 'no more animals left'. Marks are only awarded if the candidate correctly makes reference to 'species' and not animals – i.e. 'no more of the species left alive'.

(b) Poorly answered by a large number of candidates. A substantial number of candidates did not know how to work out the percentage decrease in the Black Rhino numbers. However, those more able candidates who could get to this stage often lost their third mark for failing to round their answer correctly to one decimal place.

(c) A mixed response – many candidates gave very vague answers which were not worthy of any credit. It is worth noting that with regards to conservation measures the best answers to give are based on the placement of endangered species into nature reserves / sanctuaries. Another good alternative answer is in relation to the introduction of breeding programmes.

(d) **(i)** Poorly answered – this question was looking for specific reference to the thorny bushes/fruit/woody plants eaten by the Black Rhino and not a vague definition of a primary consumer. Simply stating that the Black Rhino was a plant eater was too vague.

(ii) Well answered by the more able candidates. It was essential that reference was made to 'more' in the answer. E.g. 'the grasses can get more light', or 'the grasses have more space to grow'.

Q5 This question was testing the candidate's knowledge of comparing the amount of energy in different foods and respiration.

(a) Very well answered by the vast majority of candidates. Small errors were made by some candidates when working out the temperature rise per gram of crackers, however, all but a few candidates achieved the first mark for cornflakes.

(b) Very poorly answered – only a few candidates achieved this mark. 'To see which released the most energy', was the most common wrong answer.

(c) **(i)** This was reasonably well answered – a good number of candidates scored both marks, and those who did not often got one mark for correctly identifying ethanol as the reagent used to test for fat. It is worth noting that the specification clearly sets out the initial and final colours of the reagents used in food tests and these are – on most occasions – the only answers which are worthy of any credit.

(ii) This question is straight forward recall so the expectation is that most candidates will achieve the mark. However, this was not the case and a substantial number of candidates lost this mark.

Q6 This question was testing knowledge of phototropism.

(a) **(i)** Very well answered – most candidates achieved this mark.

(ii) Again, very well answered, although the spelling was unclear at times.

(iii) A mixed response – some candidates achieved the first mark by stating that the auxin moves down the shaded side. However, the majority of candidates failed to link this to uneven cell elongation. Candidates should be encouraged to use the word 'elongation' when describing the effect of auxin on cells and not 'growth' – although in this case 'more growth on the shaded side' was worthy of credit.

(b) **(i)** Mixed response. Those candidates who found this question straightforward were the ones who had prepared thoroughly for the examination by completing previous past paper questions, where this type of question on phototropism has come up many times. It is standard practice in this question to need reference to 'more light', 'more photosynthesis', 'more growth' to be awarded marks. As this was only a one mark question 'more light – linked with photosynthesis/growth' was required to achieve the mark.

Q7 This question was testing the candidate's knowledge of the body's defence mechanisms to prevent infection by pathogens and immunity.

(a) **(i)** Well answered – the skin was the most common right answer given by candidates. Vague answers, such as, 'scabs' or 'hair in the nose', were not worthy of credit.

(ii) Again, as has been the case on many previous occasions when this question has been asked, many candidates got mixed up between the role of the lymphocytes and phagocytes. Answers must be in a logical order and reflect the sequence of events which happen inside the body when pathogens are found free in the body fluids. Quite often candidates were also getting mixed up between the words 'antibodies' and 'antigens'. Careful completion of past paper questions would help eliminate a lot of the errors consistently made by candidates in this type of question.

(b) Only the more able candidates were able to gain both marks for this question. Some candidates gained one mark for recognising that active immunity was the body producing its own antibodies. However, the second mark proved elusive for most candidates. This was a question which discriminated well between the ability levels of candidates. As noted on the specification and resource material – memory cells are now to be referred to as 'memory lymphocytes' in answers to questions.

(c) Very poorly answered – the majority of candidates found this question very challenging. Careful examination of the stimulus material was required to correctly identify the dramatic drop in the number of cases of measles and hence the year (1967) when the measles vaccine was introduced. Candidates should be encouraged to use a ruler to draw a line down through the x-axis when answering a question like this, as many candidates read the graph incorrectly and gave 1966 as the year when the dramatic drop in the number of cases of measles took place. In this question if the year was incorrect then the candidate could not access either of the two marks.

(d) Well answered – although this has been asked many times before in papers so we would expect to see a much higher number of candidates accessing this mark. When this question is asked it is important to state that 'antibiotics are only used to treat bacterial infections'. Too many candidates were restating what the question said 'measles is a virus' without linking it to the fact that only bacteria can be treated with antibiotics.

Q8 This question was testing the candidate's knowledge of Punnett squares and genetic definitions.

(a) Candidates find wording genetic definitions difficult. However, they are frequently asked on Single Award Biology papers, so it is worth encouraging candidates to learn these accurately. The two definitions on this particular paper are the ones which candidates seem to struggle the most with, although many did achieve both marks which was pleasing to see. When defining the term allele it is only necessary to write down that 'it is a particular form of a gene' without the need to explain this or give examples.

(b) **(i)** Overall this was very well answered. However, when completing Punnett squares it is important that candidates clearly distinguish between the lower and uppercase letters so that the examiner is left in no doubt that the candidate has understood the question. In this case no error carried forward mark was awarded as the outcome required by the question could only have been obtained if both parents were heterozygous.

(ii) Well answered – ECF was awarded if the percentage probability was correct for the candidates own Punnett square, provided the Punnett square had two letters for each genotype, one letter for each parental gamete and all offspring squares were completed.

Q9 This question was testing the candidate's knowledge of genetic engineering in the context of insulin.

(a) Very poorly answered – only the more able candidates achieved this mark. The most common wrong answer was 'alters genes'.

(b) Reasonably well answered. However, it is worth noting that 'cheaper' is not an answer worthy of credit. Another very common wrong answer was 'no side effects'.

(c) Very well answered – very few candidates lost this mark.

Q10 This question was testing knowledge of natural selection and evolution.

(a) Considering that this was the first part of the last question on the examination paper it was reasonably well answered. Candidates should be encouraged to learn off the set bullet points for natural selection and then practice applying these to different situations. When this is taught in this way it is then straight forward for candidates to put this into practice if they come across a similar question in an exam paper. The candidate should always be encouraged to look for the adaptation that means the species is better adapted to the environment they are living in and then work from there.

(b) Poorly answered. Candidates find this concept hard to explain so it is best to stick to the wording used in the specification when it is being taught as this is exactly what is required when giving an answer to this question – 'Darwin's theory of evolution as a continuing process of natural selection, which leads to gradual changes in organisms over time and which may result in the formation of a new species'.

Assessment Unit 2 Chemistry

Unit Overview

The standard and quality of candidate answers ranged considerably indicating the paper successfully allowed for differentiation in candidates abilities. Most candidates were able to access and answer all questions albeit to differing degrees of success. There was very little, if any, evidence of candidates not having enough time to finish the paper.

Foundation Tier

Q1 This question was based on hazard symbols. Most candidates got Part (a) correct. In Part (b)(i), there was a mixed set of answers, just over half of candidates got this answer correct. In Part (b)(ii), the majority of candidates answered this correctly, common answers included deadly, poisonous and dangerous; these were not given credit. Part (c) required the drawing of the explosive symbol and this proved challenging to many candidates.

Q2 This question focused on changes of state. The majority of candidates scored at least one mark in Part (a), if not the two marks. Part (b) was well answered with the majority correctly describing the difference in the arrangement of particles. The common wrong answer was to just describe movement rather than a comparison of arrangements. In Part (c), candidates were being tested on their knowledge of dissolving and this was well answered.

Q3 This question tested the topic of separation. Part (a) asked candidates to match a separation technique with its use; the majority got the chromatography answer correct but many candidates did not get the sublimation. In Part (b), the calculation was carried out correctly by a large number of candidates. Part (c)(i) was not well understood; very few candidates scored 3 marks. Most marks were awarded for A or B correct. Common wrong answers included solid, gas, liquid or combining materials, e.g. 'a sand and salt', etc. In comparison, the separating technique of filtration was well known.

Q4 This question tested the candidates evaluating skills. Information was given about several different plastics. In Part (a), most answers were correct. A large number of candidates answered Part (b) correctly, those who lost a mark did not link weight to causing the chair to break. The addition to the mark scheme of the alternative answer 'lightweight causes the chair to blow away' enabled several candidates to achieve the 2 marks. The final part of this question was very well answered. If a mark was lost, it was for answering cost, which was not correct, or not mentioning a wide range of colours.

Q5 Question 5 focused on the Periodic Table. Part (a) was poorly answered, with many candidates scoring zero marks. Candidates who scored 1 mark it was generally for Hydrogen, those who scored 2 marks answered Caesium and Hydrogen, and very few candidates scored 3 marks. Despite Part (a) being poorly attempted, Part (b) was well answered, with the majority getting 2 marks. Wrong answers included empty, thick, extra etc. In Part (c)(i), only stronger candidates gave mass; for most candidates 'number' was the most common incorrect answer. Again in Part (c)(ii), only the more able candidates scored 2 marks; mostly for gaps, no Noble Gases, groups or predicted properties.

Q6 The topic of acids and alkalis was tested in this question, with a focus on neutralisation. Most candidates scored one out of two marks in Part (a), losing the mark for not recognising that universal indicator can show the strength of a solution. In Part (b), Amy was a common answer with many candidates also getting the other 2 marks. However, some scored the first mark but then wrote about 'toothpaste being good for teeth' or 'we use toothpaste so it must be correct'. A few named Jane but explained why they chose Jane for two marks, some named Rose with poor explanations so did not gain any credit.

Q7 Part (a)(i) tested the candidates' graph drawing ability. The quality of graph drawing is still a weakness for many candidates. However, in this question, some difficulties arose from the graph having a narrow range and candidates finding difficulty plotting points on it. Part (ii) followed on from the graph and asked for the trend. Many candidates achieved one mark with most losing the second mark for not referring to the graph levelling out. Part (iii) was a calculation question which was generally well answered. Part (iv) had varying degrees of success but a large number of candidates were able to identify the reaction as being exothermic. Part (b) asked for the metals to be placed in order of reactivity. The majority of candidates answered this correctly. Again Part (ii) was well answered and the most common incorrect answer was that the experiment was repeated; this improves reliability and does not add to the validity of results.

Q8 This question assessed candidates' quality of written communication using a banded mark scheme and was on the topic of Group One metals. The only candidates who failed to score at least 2 marks had left a blank page. A lot of candidates in the Band C category achieved marks for safety glasses and then gave a lot of information which was not worthy of a mark. Band B candidates knew metals floated, moved on the surface of the water, and made bubbles. Fewer candidates scored marks for disappearing, giving out heat or comparing speed of reactions. Only a few top candidates achieved Band A on this Foundation Tier paper.

Q9 This question was based on the Organic Chemistry topic. In Part (a), a few candidates wrote about fractional distillation when the question asked about the formation of crude oil. Many achieved one mark for dead animals, etc., or two marks for the first two indicative content points, but very few candidates got the third mark for heat/ pressure. In Part (b)(i), many candidates scored 1 mark, leaving out "only", while stronger candidates got both marks for the full definition of a hydrocarbon. Part (b) (ii) proved to be very challenging for Foundation Tier candidates. Very few totally correct responses were seen, although many candidates got one mark for water.

Higher Tier

Q1, 2 & 3 (a) These were common questions with the Foundation Tier paper. There was a higher level of response from these candidates as expected, especially in the QWC question where more candidates scored between four and six marks out of the 6 marks available.

(b) This question part was very well answered.

Q4 This question gave data about carbon dioxide production and focused on carbon dioxide as a pollutant. The majority of candidates answered Part (a)(i) correctly. In Part (ii), there was a mixed response. Some candidates misinterpreted the question and named both greenhouse gases and global warming rather than name the effects of these. In Part (iii), the majority of answers were correct; incorrect answers were using less fossil fuels without explanation, recycling, or tree planting. Part (b) was a calculation that was well done by most candidates.

Q5 This question was on the section of the specification about nanoparticles. Candidates frequently mixed the answers up between Part (a) and Part (b). In Part (b), many candidates did not achieve this mark as both enter skin and damage bodies over time were needed to gain credit.

Q6 This question tested knowledge of the Periodic Table. In Part (a)(i), the majority of candidates got at least one mark for Groups/Periods. Most failed to get the mark for elements in the same Group have similar features. Part (ii) was reasonably well answered by most candidates. In Part (b)(i), frequently Group 7 was given as an answer rather than naming the Group. Part (ii) was well known but Part (iii) was not well answered. Most candidates wrote `three electrons on outer shell` rather than `three electron shells`.

Q7 This question was on the topic of atomic structure. Part (a) asked for the properties of the subatomic particles and most candidates answered this correctly. Part (b)(i) involved calculating the atomic mass of an atom; most candidates were successful in doing this. In Part (ii), the majority scored at least one mark for stating the correct Group number but fewer candidates scored the explanation mark as they were unable to clearly link the Group number to the number of electrons in the outer shell.

Q8 This question was about bonding. In Part (a), many candidates were able to correctly draw the electronic structure of sodium and chlorine. Part (ii) was relatively well answered by most but Part (iii) proved challenging as very few candidates knew what made an ionic bond strong. Part (b) asked for a dot and cross diagram of hydrogen chloride to be completed; many scored both marks with others scoring at least one mark for showing the dot and cross in the bond.

Q9 Question 9 was testing the topic of electrolysis. In Part (a)(i), the definition for electrolyte was poorly answered as was the explanation as to why bauxite had to be molten for Part (ii). In comparison, Part (iii) was well answered by most candidates who knew which electrode was positive and which was negative. In Part (iv), the balanced symbol equation for oxygen reacting with carbon was not well known; many candidates failed to include state symbols. This proved to be a discriminatory question, as did the equation in Part (b). Part (c) should have been a relatively straightforward question asking for a reason why aluminium should be recycled, yet it proved to be challenging for a lot of candidates.

Assessment Unit 3 Physics

Unit Overview

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

Foundation Tier

Q1 This question on household electricity was well received with the majority of candidates showing good knowledge of electric symbols, battery voltages and the classification of conductors and insulators.

Q2 In this question, Parts (a) and (b)(i) were well received with most candidates able to state the conclusion from the graph and use the graph to find the thinking distance. In Part (b)(ii) few knew that you add thinking and braking distances to calculate the stopping distance. In Part (c) most knew either that drinking alcohol increased the thinking distance or had no effect on the braking distance but few knew both these facts.

Q3 This question on electrical cost and the 3-pin plug was well received with most candidates able to calculate the number of electrical units used in Part (a)(i) and showing good knowledge of the pin names, wire colours and safety features of the 3-pin plug in Part (b). In Part (a)(ii) calculating the cost of electricity proved difficult with candidates unsure as to whether to multiply or divide the number of units by the cost of each unit and then how to express their answer in pence or pounds.

Q4 This question on hydroelectric power proved to be a good discriminator with most candidates able to define renewable as not running out in Part (a)(i), recognize water as the source of energy in Part (a)(ii) and state the trend shown in the graph in Part (b)(i). Few realized that HEP stations being built in mountainous areas provides more/faster water flow in Part (a)(iii) or that both a magnet and coil are required to make electricity in Part (b)(ii). In Part (c) very few recognized that using more renewable energy would reduce the use of fossil fuels or air pollution.

Q5 This question on distance-time graphs and road safety was well received with the majority of candidates able to interpret stopping and travelling fastest on a distance-time graph in Parts (a) and (b). In Part (c) the calculation of average speed involved dividing a small number by a larger number and inevitably more than half the candidates had to turn this calculation on its head. In Part (d) most knew that speed bumps were used to slow vehicles down to reduce the number of accidents/fatalities in built up area but had difficulty responding clearly. Few realized that the biggest disadvantage of speed bumps is to slow down emergency service response time, not damage to the cars.

Q6 This question on radiation proved a good discriminator with most able to state the first part of the conclusion but few could state that the activity stops decreasing from eight sheets. It was surprising to see how little knowledge candidates had about background radiation in Part (b), although most realized that having lead instead of aluminium would decrease the activity detected.

Q7 This question on space also proved to be a good discriminator with most candidates able to state that orbit time increases with distance from the Sun in Part (a)(i), name Neptune as the furthest planet in Part (b) and state that gravity is the force in Part (c). Some could give a use of artificial satellites and name the Moon as the Earths only natural satellite in Part (d) but few could recognize orbit speed as the decreasing factor in the table in Part (a)(ii).

Q8 In Parts (a) and (b) of this question candidates had difficulty giving full descriptions for ultrasound or the particle motion of longitudinal waves. In Part (c) candidates could find the amplitude of the wave shown but found it more difficult to recognize the wavelength. In Part (d) most knew that waves transfer energy.

Q9 It was pleasing to see most candidates attempting the QWC, six-mark question, Part (a) about heat transfer inside a food deliver bag. Most recognized that the shiny surface reflects heat or that the foam padding provided insulation or that the heat transfer methods were conduction, convection or radiation. Those that could put this together with a description of either conduction in solids or convection in liquids or gases achieved full marks. In Part (b) most candidates were able to calculate the heat loss through the walls but few realized that to reduce heat loss through the walls could be achieved by installing insulation within the cavity between the walls.

Higher Tier

Q1, 2 & 3 These first three questions were overlaping questions with the Foundation Tier paper and were well answered by the vast majority of the Higher Tier candidates. 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. The QWC answers were more in-depth than on the Foundation Tier and many candidates were able to achieve all six marks.

Q4 This question was on car safety. In Parts (a)(i) and (ii) the vast majority of candidates were able to use the data to spot the trends. Part (a)(iii) was very well answered by all candidates with air bag being the most popular answer. In Part (b)(i) most candidates obtained one mark for spotting the trend, few candidates accessed the second mark as they were unable to recognise the sharper rise in the crashes after seven hours. Part (b)(ii) was very badly answered, very few candidates knew the effect of tiredness on braking distance and most candidates wrote about thinking or stopping distance but not both.

Q5 This question was on transformers and paying for electricity. Part (a)(i) was very well answered by the majority of candidates. In Part (ii) most candidates knew that the voltage increased/current decreased. Very few candidates knew how this reduced the energy lost. Part (b) was very badly answered by the majority of candidates. The most common mistakes were not converting watts into kilowatts and not converting one day into hours. Those candidates who correctly converted pence in pounds were not penalised.

Q6 This question was on forces. Part (a) was very well answered by the majority of candidates. Part (b) was very badly answered with many candidates only achieving one of the three marks. Candidates were unable to calculate the resultant force, most just added the two forces together. Candidates were also not able to convert the answer into two decimal places. Part (c) was on energy changes this was well answered by the majority of candidates.

Q7 This was a question on electricity. In Part (a) most candidates achieved one of the two marks. They knew that electrons were negative but few knew they were repelled by the negative terminal. Part (b) on the variable resistor was very well answered. Candidates knew there was an increase in the length of wire which resulted in the resistance increasing and the current decreasing. Part (c) has been asked on many occasions but was very badly answered in this paper. The majority of candidates thought that a cooker was variable resistor. Part (d) was very well answered with most of the candidates able to extrapolate the graph.

Q8 This question was on fuel extenders and substitutes. In Part (a) most candidates achieved one of the two marks. They were all able to spot the effect on biodiesel but could not fully see the effect on diesel. Part (b) was very well answered by the candidates. Part (c) was very badly answered as most candidates thought that a more efficient engine would make the car go faster.

Q9 Part (a) was very well answered, candidates were able to interpret the data to find an advantage and disadvantage of the CT scan. Part (b)(i) was very well answered. The answers to Part (b)(ii) were far too vague, many candidates wrote the answer 'wear special clothes'. Part (c)(i) was poorly answered even though it is a very common question. Many candidates wrote it was the time for radioactive count to fall to zero. Part (ii) was very well answered. Very few candidates obtained a mark for Part (iii), the majority of candidates thought that the tracer would stop the blood flowing.

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