

GCSE

**Science B
Gateway Science Suite**

General Certificate of Secondary Education **J261**

OCR Report to Centres June 2015

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This report on the examination provides information on the performance of candidates which it is hoped will be useful to teachers in their preparation of candidates for future examinations. It is intended to be constructive and informative and to promote better understanding of the specification content, of the operation of the scheme of assessment and of the application of assessment criteria.

Reports should be read in conjunction with the published question papers and mark schemes for the examination.

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B711/01 Foundation Tier

General Comments:

The paper differentiated well and performance across the three sections of the paper appeared to be fairly consistent, allowing candidates to demonstrate their knowledge and understanding across Modules B1, C1 and P1.

The longer 6 mark questions, which were marked using a level of response approach, were generally well answered, with candidates generally scoring best on the chemistry 6 mark question.

Candidates demonstrated the ability to apply their knowledge and understanding of science to unfamiliar contexts and were able to analyse and evaluate evidence, make reasoned judgements and draw conclusions based on evidence.

Candidates used their knowledge and skills appropriately to respond to questions about fitness and health, polymers and wireless signals.

Candidates did not seem to have the knowledge required to respond to questions about the effects and risks of drugs, some aspects of carbon compounds (as was also the case in 2014) and the mechanisms of energy transfer.

Overall, examiners felt that the question paper was appropriate to the ability range of candidates intended. There was no evidence of lack of time.

Comments on Individual Questions:

Question 1

This question was about plant growth.

- (a) Most candidates correctly described that shoots grow towards light in part (i), although the second mark for the link between light and photosynthesis, or the idea that a plant has more chance of survival, was rarely awarded. In part (ii) most candidates correctly described that plant roots grow downwards to get water. Candidates who failed to gain credit usually referred to getting nutrients (rather than minerals) or food.
- (b) Many candidates did not appreciate that a hypothesis had been made. Examiners saw a wide range of incorrect responses.

Question 2

This question tested ideas about fitness and health.

- (a) This 6 mark question was targeted up to grade C. Many candidates were able to describe a simple pattern from the graph and give a simple explanation why body temperature increases or decreases and gained credit at Level 2 (3 – 4 marks). To gain credit at Level 3 (5 - 6 marks) candidates needed to describe a detailed pattern from the graph, including data, and explain why temperature increases during exercise in terms of respiration and decreases after exercise in terms of evaporation of sweat.
- (b) The majority of candidates correctly identified 'eat less salt' as a way of reducing the risk of heart disease.

- (c) Carbohydrates was usually correct.

Question 3

This question focused on human health and diet.

- (a) Most candidates correctly described that proteins are needed for growth and repair.
- (b) Good responses in part (i) calculated the EAR as 42g and then identified that source 1 recommended the most protein. When candidates failed to gain credit it was often because they identified source 1 without the correct EAR calculation. In part (ii), candidates who gained both marks appreciated that source 1 is based on age and gender and that source 2 is based on mass or weight. One mark was awarded to candidates who mentioned the factors that affect recommended amounts of protein, without specific mention of source 1 or 2. Credit was not given for the idea that source 1 is only an average, as this is true for both sources.

Question 4

This question tested ideas about the effects and risks of drugs.

- (a) Spine, instead of spinal cord, was a common misconception in part (i). The idea that nerve impulses are electrical signals was not well known in part (ii). Examiners saw a wide range of incorrect responses.
- (b) Good responses described and explained reducing the risks to MS patients in terms of smoking cannabis without tobacco because tobacco is harmful or making cannabis available on prescription only so that it can be more controlled. Candidates who failed to gain credit had usually misinterpreted the question and gave answers in terms of how cannabis helps MS patients or simply suggesting that cannabis should be illegal in all countries.
- (c) 17% was a common misconception in part (i). In part (ii) candidates who failed to gain credit wrote generally without specifying comparisons or percentages. Many candidates scored one mark for implying that there were different opinions.

Question 5

This question was about carbon compounds.

- (a) Candidates who scored the mark here appreciated that compound A contained bromine or that hydrocarbons only contain carbon and hydrogen atoms. When candidates failed to gain credit it was often because they stated that A was not a hydrocarbon because it contains a double bond.
- (b) Polymerisation was not well known. Bromination was a common misconception, presumably because compounds A and B contained the element bromine.
- (c) Bromoethane was a very common misconception.

Question 6

This question focused on perfumes.

- (a) Many candidates were able to give at least one, and often two, properties of perfumes. When candidates failed to gain credit they usually described properties such as colourless or gave vague responses such as safe or not harmful.

- (b) Acid was not well known.

Question 7

This question tested ideas about combustion.

- (a) Good responses described that fuel C produced carbon monoxide, soot and no carbon dioxide. Many candidates also correctly described that fuel C gave out less energy than the other fuels. When candidates failed to gain 3 marks it was usually because they only mentioned one or two correct points from the table.
- (b) Many candidates referred back to the results table and suggested that the amount of energy given out would indicate whether carbon dioxide was made. Answers in terms of the colour of the flame also did not gain credit.
- (c) Many candidates were able to write a correct word equation for the combustion of ethanol. When candidates did not gain credit it was often because they used 'and' or an \rightarrow instead of '+'. Omitting oxygen as a reactant was also a common error.

Question 8

This question was about crude oil.

- (a) Cracking or fracking were common misconceptions.
- (b) Many candidates correctly identified propane, although examiners also saw all the other gases from the list.
- (c) Most candidates were successful in deducing the number of each type of atom in DIPE. Candidates who failed to gain credit usually gave the names of the elements.
- (d) Good responses described the conversion of large hydrocarbon molecules into smaller molecules and gave two correct conditions. Candidates who failed to gain credit often described fractional distillation rather than cracking.

Question 9

This question focused on polymers.

This 6 mark question was targeted up to grade C. Many candidates were able to explain why both LDPE and HDPE are suitable for their uses, giving at least two relevant reasons for each plastic, and gained credit at Level 3 (5 – 6 marks). Some candidates wrote at length about the properties but made no mention of either polymer. Centres are strongly advised to guide candidates away from the use of the word 'it' in examination answers, but rather to make specific reference to the subject of the question.

Question 10

This question was about wireless technology.

- (a) Good responses described two advantages of wireless technology such as the absence of wires and the portability of devices.
- (b) Most candidates correctly identified electromagnetic radiation, although electricity was a common misconception.

Question 11

This question tested ideas about the mechanisms of energy transfer.

- (a) This 6 mark question was targeted up to grade C. At the simplest level, a candidate who calculated the missing energy value from the table scored Level 1 (1 – 2 marks). Marks at Level 1 could also be awarded for writing about the measurements needed in the experiment or explaining what the results showed. To gain Level 2 (3 – 4 marks) candidates needed to address two aspects of the question. As in other 6 mark questions on the paper, candidates had to address all aspects of the question to gain credit at Level 3 (5 – 6 marks). A common misconception was that a temperature increase resulted in energy being produced, with candidates failing to appreciate that the electrical heater was producing the energy which resulted in the temperature increase. Correct descriptions of the measurements that Emily needed to take were rarely seen by examiners.
- (b) Most candidates correctly described two ways of insulating the cup in part (i). Good responses to part (ii) described that air is a good insulator or that the air is trapped (so that there are no or reduced convection currents). The idea of air trapping heat was a common misconception. In part (iii) candidates were often able to suggest that the water would heat up quicker, but fewer appreciated that this was because less energy or heat would be lost. The idea of no heat or energy lost did not gain credit.

Question 12

This question tested ideas about waves that are potentially harmful to human organisms.

- (a) Good responses to this question linked stronger waves to more ozone, or weaker waves to less ozone.
- (b) In part (i) most candidates scored one mark for the idea that UV radiation cause sunburn or skin cancer. To gain both marks candidates also had to describe how UV radiation can damage eyes by causing, for example, cataracts or damage to the retina. This second mark was rarely awarded by examiners as answers such as 'cause blindness' did not gain credit. In part (ii) ways to reduce damage to human skin by UV radiation were well known.

Question 13

This question was about microwaves and infrared radiation.

- (a) This question required candidates to describe that microwaves have a longer wavelength than infrared radiation (or vice versa) or that microwaves have a lower frequency than infrared radiation (or vice versa). Candidates who failed to gain credit usually described the shape of the microwaves and infrared radiation from the diagram given in the question.
- (b) All three correct answers were required for 2 marks, with two correct answers gaining 1 mark. The most common misconception was that infrared radiation is not absorbed by a dull surface.
- (c) Most candidates correctly identified C as the best material for making optical fibres. Good responses then explained their choice in terms of optical fibres using total internal reflection and the fact that material C was cheaper than A.

B711/02 Higher Tier

General Comments:

The level of difficulty of the paper appeared to be appropriate for the ability range of the candidates. Most candidates appeared to have had sufficient time to complete the paper, with the majority attempting most of the questions. There was evidence that some candidates had been entered for the wrong tier. Their scientific knowledge suggesting they would have been better entered for the foundation tier.

Some aspects of the paper were challenging but this enabled some candidates demonstrate their advanced understanding of the subject.

The majority of candidates had attempted all three level of response questions. All three questions showed clear discrimination with only the high level candidates producing level three answers.

Comments on Individual Questions:

Question 1

- (a) (i) Most candidates answered this question correctly. They were able to calculate EAR and identify source 1. A few candidates however lost a mark as they failed to identify source 1.
- (ii) Although most candidates were able to refer to gender, age or body mass in their answer they failed to relate the answers to source 1 and 2.
- (b) The majority of candidates gained one mark, usually by identifying the fact that Jake was still growing. Many candidates confused the need for proteins with energy and assumed Jake was more active than his mother.

Question 2

- (a) Most candidates provided a level 1 answer to this question. Most failed to mention that sweat cools the body when it evaporates. Many candidates confused sweating with vasodilatation showing that this section of the specification is poorly understood. Negative feedback was rarely mentioned in the answer. Candidates providing level 3 answers were able to produce a good explanation showing clear understanding. These candidates were normally the higher achievers. A number of candidates thought that negative feedback was more of a mental state preventing Neil from exercising at a high rate.
- (b) Most candidates understood factors that increase blood pressure. There were a few vague answers that lost the mark such as simply stating diet instead of high fat diet.
- (c) (i) Few candidates could correctly recall fatty acids and glycerol as being the two molecules that make up fat.
- (ii) A common misconception by candidates is that fats are stored in the stomach. Very few mentioned the term adipose. Candidates often confused the storage of fat with glucose as many referred to fat being stored in the liver as glycogen or glucose.

Question 3

- (a) Many candidates failed to grasp the idea that the tobacco was the issue. Most instead referred to the legalities of taking cannabis. This risk had already been identified as part of the stem of the question. Candidates often neglect to read the whole question and this may be an example of where that has happened.
- (b) More able candidates demonstrated a clear understanding of blind trials. Some candidates confused blind trials with double blind trials. A number of lower ability candidates assumed the patients were blindfolded during the process.
- (c) The majority of candidates were able to identify one correct conclusion.

Question 4

- (a) Few candidates could correctly complete the cross. Many assumed it was a three to one ratio.
- (b) Most candidates understand the need for scientists to publish their work.

Question 5

- (a)
 - (i) The majority of candidates were able to explain why the compound was not a hydrocarbon. Common errors included suggesting it was the double bond or referring to molecules instead of atoms.
 - (ii) About half the candidates were able to write the correct molecular formula. Some were able to identify the numbers of each element but then they put the + sign in the formula (i.e. C_2+H_3+Br) or they neglected to use subscript.
- (b) Many candidates gained at least one mark, however very few could provide a full explication of polymerisation including the conditions of high pressure and a catalyst. A few candidates confused the process with cracking.
- (c) Very few candidates understood that the compound was saturated. All of the alternative answers were seen and there was no clear pattern to their misconceptions.

Question 6

- (a) About half the candidates were able to identify acid as the correct answer. Incorrect answers were varied but included ester, carbon dioxide or solvent.
- (b) The more able candidates were able to provide a clear explanation but most candidates struggle with this concept. Many candidates answered incorrectly in terms of weak or strong particles. There were incorrect reference to the nail varnish remover having stronger particles or water not being acidic enough. Some candidates failed to answer in terms of particles or molecules and therefore could not be awarded marks.

Question 7

- (a) Most candidates correctly identified fuel D and provided the correct reasons. Some did not take into account the cost and chose fuel A. In some cases the candidates explain what was wrong with the other fuels but neglected to state what was right with fuel D.
- (b) Only the more able students could balance the equation. Some candidates thought that value of x was carbon turning the oxygen into carbon dioxide. This suggests they had not clearly read the question that states that x , y and z are all numbers.

Question 8

- (a) Many candidates gained the mark for this question. One common error was to think that fraction B was diesel.
- (b) Most candidates were able to interpret the data correctly. Although many identified only one trend when the question asked for trends and there were two marks available.
- (c) Most candidates scored both marks for this question. Some lost one of the marks by using the terms ionic and covalent for the intermolecular forces. Where they got no marks is was often a case of getting the answer completely the wrong way round.
- (d) Very few candidates understood the concept of strong covalent bonds. Many thought it was something to do with the ratio of carbon to hydrogen atoms.

Question 9

Most candidates only identified suitable properties. Very few were able to explain melting point in terms of simple models of the structures. A few students simply quoted data from the table without making comparisons.

Question 10

- (a) Most candidates gained one mark for the idea of poor connection. If they gained a second mark it tended to be for interference. Very few mentioned reflection or refraction.
- (b) Very few candidates understood that digital signals were involved and that these signals were different for the different functions. Many candidates incorrectly referred to infrared or microwaves.

Question 11

- (a) Most candidates gained two marks for a simple description of the data. Of those that calculated the temperature rise a number neglected to add on the initial temperature. Some candidates used the energy supplied instead of the energy absorbed in their calculation. Very few candidates were able to explain the differences in energy supplied and absorbed.
- (b)
 - (i) Most candidates were able to provide one way of reducing heat loss. This was normally the idea of covering the cup in some way. Understanding the difference between heat loss by convection or conduction was rarely evident. Many repeated the stem of the question and stated 'insulate the cup' without describing how. Incorrect ideas included changing the cup or putting it in a vacuum.
 - (ii) Although most candidates could describe the effect on time many incorrectly thought there would be no heat loss.

Question 12

- (a) Most candidates were able to interpret the diagrams. Some candidates incorrectly answered in terms of more or less long waves rather than strength.
- (b) Most candidates did not describe how the CFCs altered the ozone hole, many just repeated parts of stem. Although candidates mentioned ultraviolet radiation they did not always state that there would be more ultraviolet radiation reaching the earth. Also ultraviolet radiation was not always linked to skin cancer, quite often just sunburn. In some cases skin cancer was mentioned but not ultraviolet radiation. Misconceptions tended to be references to rising sea levels and global warming.
- (c)
 - (i) Candidates found it difficult to explain why an international agreement is important. Many simply described what an international agreement was by stating that everyone would stop using CFCs.
 - (ii) Most candidates provided an acceptable suggestion. A common error was to think that the hole was not above the country so that country was not affecting it.

Question 13

- (a) Most candidates were able to tick at least one correct statement. Many incorrectly thought microwaves penetrate about 10cm into water.
- (b) Few candidates could identify that infrared radiation increases the kinetic energy of particles on the surface of the food. Although the question clearly stated tick one box many candidates ticked two boxes.
- (c) Most candidates could identify the correct material. However many lost the second mark for not using the correct terminology. A common error was to refer to reflection or internal reflection instead of total internal reflection.

B712/01 Foundation Tier

General Comments:

The level of difficulty of the paper appeared to be appropriate for the ability range of the candidates. Most candidates appeared to have had sufficient time to complete the paper, with the majority attempting most of the questions. Some aspects of the paper were challenging but this enabled candidates of higher ability to demonstrate their understanding of the subject. Most candidates had attempted at least two of the level of response questions. Candidates found the chemistry level of response difficult. Section D was answered well by most candidates.

Comments on Individual Questions:

Question No.1

Q1(a) Most candidates made a good start to the paper by answering this question correctly.
Q1(b) Most candidates find the concept of a parasite difficult to explain. They cannot distinguish between feeding on animals which many organisms do and feeding on living animals. Few candidates mentioned the idea of the host being harmed.
Q1(c) Very few candidates understood the concept of feeding on different levels. Of those that referred to eating both the caterpillar and the oak few linked the food source to correct level of consumer. Many incorrectly thought it was to do with the mouse eating the caterpillar and then being eaten by the tick.
Q1(d) Most candidates could draw a pyramid of biomass but very few could explain why the shape was different. Some candidates drew too many levels and lost the mark.

Question No.2

Q2 Most candidates gained at least one mark for this question. Candidates were able to identify the classes and gave good descriptions of a spider. They struggled with the features of crustaceans and often thought that this was because they lived in the sea. A few tried to use all four classes.

Question No.3

Q3(a) Most candidates correctly calculated the mean. Some of them however failed to provide the answer to the nearest whole number. A common error was to round down the answer to 7. This was often done with no working out so no marks could be awarded.
Q3(b)(i) Most candidates could complete the bar chart using their calculation from part (a).
Q3(b)(ii) The majority of candidates were able to identify at least one correct conclusion.
Q3(b)(iii) Most candidates understood the need to measure pollution levels another way. A common mistake was to take another sample which would have been repeating the investigation not extending it.

Question No.4

Q4(a) Most candidates correctly identified that the predator has binocular vision.
Q4(b) Most candidates were able to describe an adaptation but fewer candidates could explain the advantage of the feature they had chosen.

Question No.5

Q5(a) Very few candidates understand that the genus is the first part of the binomial name. Many confused genus with class and gave the answer bird.

Q5(b)(ii) Most candidates correctly identified critical as the answer.

Q5(b) (ii) Many candidates gained at least one mark. This normally involved a breeding programme. Few candidates could provide more than one way to help the pheasant. Many candidates repeated the stem and mentioned hunting while there were also references to removing the pheasants and putting them in zoos, cages and farms.

Question No.6

Q6(a) Very few candidates could recall the chemical name for limestone. Many thought it was carbon dioxide.

Q6(b) (i) Most candidates could calculate the mass of carbon dioxide.

Q6(b) (ii) Very few candidates understood that the values were the wrong way round. Most candidates incorrectly thought the statement was true. This may have been because they did not read the statement carefully and assumed as it added up to 10 it must be correct.

Q6(b) (iii) Very few candidates could recall the process as thermal decomposition. Most common incorrect answers were cracking and combustion.

Q6(c) Although a number of candidates correctly identified heating as being involved in the process, they were unable to explain that the limestone was heated with clay.

Question No.7

Q7(a) Few candidates were able to clearly describe the difference between lava and magma. A common misconception was to identify either magma or lava as a solid and the other as a liquid.

Q7(b) Very few candidates related the size of the crystals to the rate of cooling. Of those that did some got it the wrong way round. Many candidates linked it to the type or size of the rock.

Q7(c) Most candidates correctly described advantages and disadvantages. The dangers of eruptions and fertile soil being the most common answers. A number of candidates incorrectly thought housing would be cheaper.

Question No.8

Q8(a) Most candidates gained at least one mark. However many candidates simply quoted figures from the table but failed to compare them. Others compared brass to either copper or zinc but not both.

Q8(b) Most candidates were able to identify copper but few could give the correct reason. They often just listed all the properties of copper and failed to state it was the highest or best conductor of heat.

Question No.9

Q9 Very few candidates were able to apply their knowledge of extraction and purification of copper to silver. There was a lot of confusion over what is used for extraction and what is used for purification. Many candidates also referred to copper in their answer instead of silver. A few candidates were awarded level one for mentioning heating and a few level 2 for mentioning electrolysis or describing processes involved with electrolysis. Most candidates did not write about extraction at all but just attempted to describe the diagram.

Question No.10

Q10(a) Few candidates were able to recall that litmus changes to red in the presence of an acid. Many confused litmus with Universal Indicator solution and listed a range of colours.

Q10(b) Very few candidates understood the difference between a base and an alkali.

Question No.11

Q11(a) Most candidates correctly identified the electric fire.

Q11(b)(i) Very few candidates knew that the electrical component needed to change the voltage was a transformer.

Q11b(ii) Many candidates were able to calculate the power of the lamp. A common misconception was to use the value for cost from the table to give an answer of 0.4W.

Question No.12

Q12(a) Many candidates correctly identified that there were three renewable fuels. All ranges of incorrect answers from 0 to 5 were seen.

Q12(b) Most candidates were able to calculate the wasted energy. Many candidates could also calculate the % efficiency although a few of those forgot to multiply by 100 before giving their answer.

Question No.13

Q13 Most candidates made a good attempt to answer this question. Many produced level 2 or above answers. Most candidates were able to identify at least one method of electricity generation. This was usually solar power. Many then went on to describe where this should be placed. Many candidates then describe a second method, usually wind turbines but failed to explain how these two methods could be used to make sure electricity would be generated for 24 hours.

Question No.14

Q14(a)(i) Most candidates gained one mark for 'Earth' or 'planet' for the second sentence. Very few could identify that most asteroids orbit between Mars and Jupiter.

Q14(a)(ii) Many candidates thought that the dust cloud caused the heat to be trapped and so was a cause of global warming. More able candidates were able to link the blocking of the Sun with a decrease in the temperature of the Earth.

Q14(b)(i) Candidates often failed to describe the complete relationship between distance and time. Many simply stated 'it would be more' without saying what 'it' was and when it would be more. Some candidates incorrectly referred to the distance the planet would travel rather than the time it would take.

Q14(b)(ii) Most candidates correctly identified 220 days.

Question No.15

Q14(a) Very few candidates were able to explain that source C is chosen because the count rate goes down as the card gets thicker. Many referred to distance rather than thickness. Many thought that it was about the size of the numbers or that it was about safety.

Q14(b)(i) Many candidates simply referred to general lab safety by listing goggles or gloves. Often candidates failed to realise the radioactive source was in a fixed position so they mentioned tongs or storage.

Q14(b)(ii) Most candidates answered this correctly, although some thought the radioactive source could be melted down and used again or dumped at sea.

Question No.16

Q16(a) About half the candidates could make the correct calculations. However a few neglected to place the negative sign in front of the body fat difference value.

Q16(b) Few candidates could calculate the mean. Some added the values together and used the total as their answer without dividing by five.

Q16(c) Most candidates completed the bar chart correctly. Some incorrectly used the data for body fat rather than muscle percentage.

Q16(d) Most candidates correctly identified player A. However they often failed to explain their answers in terms of both body fat and muscle percentage.

Q16(e)(i) Most candidates correctly identified egg white.

Q16(e)(ii) Most candidates correctly selected venison but a number of candidates did not just consider salmon and venison but used all the information in the table. Having chosen venison most candidates correctly identified both the high protein and low fat as their reason.

B712/02 Higher Tier

General Comments:

Many candidates had been well prepared for this new style paper, having learned from the experiences of B712/02 in previous years. About 4000 candidates would have been better served by entry to the foundation tier having scored less than 20 marks. Most candidates attempted the 6 mark questions with varying degrees of success. These questions are marked using a level of response mark scheme using the concept of 'best fit'. The biology question on sustainable fishing was targeted at grades up to A/A*. Only a small number of candidates scored level 3 (5-6 marks) on this question. The chemistry question, concerned with the electrolytic purification of silver was targeted at all the grades covered by the paper. This question was poorly answered and electrolysis continues to be a part of the specification that candidates find challenging. Only the best candidates scored level 3 and many weaker candidates omitted the question altogether. The physics question was concerned with the advantages and disadvantages of coal-fired and nuclear power stations. It was targeted at all grades up to and including A*. About 10% of candidates scored level 3 with almost half of candidates gaining level 2 (3 or 4 marks). General messages from the 6 mark questions continue to include candidates needing to address **all** aspects of the question in their answer in order to access level 3. Candidates attempted the data response questions in section **D** well. Very few omissions were seen. In answering questions of this type, candidates need to quote specific examples of the data to support a conclusion, rather than make generalised statements. The required calculations were carried out well.

Candidates continue to perform well in straightforward calculations. Calculations involving more than one step or requiring a change in the magnitude of the units e.g. MW to W were less well answered. The writing of the chemical equation in question 5(a) was correctly answered by about half of candidates.

Overall, assistant examiners and team leaders felt that the question paper, although challenging, was appropriate to the ability range of candidates intended.

Comments on Individual Questions:

Section A

Question 1

- 1(a) The idea of ticks living on other organisms or host and sucking blood were the most seen correct answers. Very few candidates actually used the animals in the food web. Many failed to say or imply that the animals had to be living.
- 1(b) Many candidates scored 2 marks for correctly quoting examples from the food web. There was some confusion concerning the idea of competition between **different** species or types of animals with a number quoting different animals competing which was insufficient to gain marks.
- 1(c) The majority of candidates could draw a pyramid of biomass. Fewer gained the second mark for the explanation of the difference between a pyramid of biomass and a pyramid of numbers. Many just described a pyramid of biomass with no comparison to a pyramid of numbers.
- 1(d) The nitrogen cycle continues to be an area of the specification that candidates find challenging. Only the best candidates scored 2 marks. Frequent incorrect answers were 'nitrogen' instead of ammonia and 'denitrifying' instead of nitrifying.

Question 2

This question discriminated well across the ability range. Most candidates could give an acceptable definition of sustainable fishing. Many of the attempts at evaluating the success of sustainable fishing were vague and often confused the adult fish population with the catch. Weaker candidates described the patterns shown on the graph without an attempt at an evaluation. To gain level 3 (5-6 marks) candidates were required to define sustainable fishing, provide a detailed evaluation and mention two problems that might have been encountered. Many candidates did not suggest any problems. Candidates need to address all aspects of the question to gain level 3.

Question 3

- 3(a) Part (i) was well answered by most candidates with a few losing the second mark for not rounding up the answer. In part (ii) weaker candidates did not understand the question and described how to calculate an average. The best answers referred to the number of flatworms and leeches being the highest and relating that to the amount of pollution.
- 3(b) In part (i) there were quite a lot of incorrect answers with **C** most common. This meant that answers for part (ii) could not be credited. Many candidates correctly quoted '**D**'. In part (ii) many just discussed the idea of **D** being below **C** so that there would be less pollution. They did not explain in terms of the animals present. Candidates frequently scored only one mark usually for the idea of flat worms showing only some pollution. The idea of dilution of pollution was occasionally seen.

Question 4

- 4(a) About half of all candidates correctly identified *Syrmaticus*. Common incorrect answers included Mikado, bird, kingdom and phylum.
- 4(b) The majority of candidates correctly identified 'critical' although 'crucial', 'quota' and 'vital' were also seen.
- 4(c) Only about a quarter of all candidates scored this mark. Many talked about mating and reproduction or chose from the list above.
- 4(d) This question differentiated well between the best candidates. Many candidates started off by quoting the stem of the question which included the word genetics and they failed to make it clear about inherited characteristics or acquired characteristics with many giving examples of giraffes, muscles et cetera without explaining using the correct terminology. Very few candidates scored 2 marks for the idea of Lamarck's ideas having no genetic basis and being based on acquired characteristics.

Section B

Question 5

- 5(a) Weaker candidates frequently scored 1 mark for ' CO_2 ' on the right hand side of the equation. The best candidates correctly wrote the equation identifying the formulae for both carbon dioxide and calcium oxide. Multiples were common. The weakest candidates failed to score usually because they wrote the formula for calcium oxide as CaO_2 .
- 5(b) About half of the candidates scored this mark. Weaker candidates mentioned 'breaking up elements' or changes of state and failed to gain the marks.
- 5(c) This question was poorly answered. It required recalling that limestone is mixed with clay and heated. Limestone was frequently mixed with sand and water which failed to gain a mark.

- 5(d) This question was well answered with candidates able to interpret the data and arrive at the correct order of hardness. The most common error was to juxtapose marble and limestone.
- 5(e) Better candidates scored 2 marks and, although they explained that the rocks were igneous and sedimentary, they also went on to give detailed explanations of how they were formed. Many candidates thought granite was metamorphic. There were many answers that were just based upon how they were formed which did not meet criteria e.g. limestone formed in layers.

Question 6

- 6(a) About a fifth of candidates correctly answered this question. The most common incorrect response was to suggest that the lithosphere was between the crust and the mantle.
- 6(b) Just under half of candidates scored this mark. Many answers were vague e.g. 'too hard to drill through'.
- 6(c) Again this question was well answered by better candidates quoting valid examples of the stages in the process e.g. the idea of a jigsaw fit between Africa and South America. Weaker candidates talked of volcanoes and earthquakes and failed to score.

Question 7

- 7(a) A significant number of candidates did not fully address the question. They were asked to evaluate **each** metal or alloy and then make a choice. Many candidates just made a choice with a correct justification and scored 1 or 2 marks. Brass was often given as the answer and quite often only scored 1 mark.
- 7(b) Some candidates managed to score 2 marks for the idea of less use of landfill or materials not wasted and the difficulty in sorting but many candidates scored 0. Their answers included saving money on making the new car or the idea that recycled materials would not be as good. Marks were also awarded for the idea of saving energy, saving natural resources, the disadvantages of reducing jobs for miners and time taken to recycle materials.

Question 8

Over half of candidates omitted this question or failed to gain marks. There were a lot of poor answers that included wrongly identifying the positive and negative electrodes, talking about positive electrons or the breaking down of the nitrate. Quite a few candidates achieved level 1, 2 marks for identifying that the anode is positive and the cathode is negative and this was sometimes seen by labelling the diagram. There were quite a few candidates who gained 4 marks for descriptions of what happened at the electrodes with most of the markings points used. They did not however say at the anode, silver loses electrons or at the cathode, silver ions gain electrons. There were also quite a few candidates who identified oxidation and reduction. Unfortunately many candidates decided that it was Ag^{2+} despite being told in the question it was Ag^+ . The best candidates scored 6 marks for a correct half equation and the correct identification of oxidation and reduction.

Section C

Question 9

- 9(a) This question was well answered. Most correctly identified the types of radiation. Weaker candidates often offered 'nuclear', 'infrared or ultraviolet'.

- 9(b) This question discriminated well across the ability range. Many candidates thought that overalls can be burnt. Others went to the extremes of encasing them and then burying them. The disposal of radioactive materials with a long half-life was more difficult to answer. Candidates often lost marks for using glass boxes or containers or canisters. However many appreciated the need for them not to be stored under water or near anywhere that there may be an earthquake.

Question 10

- 10(a) Part (i) was well answered by most candidates. Part (ii) was less well done with a number quoting 1.84 pence and scoring 1 mark.
- 10(b) The concept of off-peak electricity was not well understood by all but the best candidates. Many thought that off-peak electricity is at a lower power level or that using off-peak was irrelevant since the vacuum cleaner was only used for one hour a week and the cost difference would be negligible.

Question 11

Around 10% of candidates achieved level 3 (5-6 marks) on this question with a further 40% gaining level 2 (3-4 marks). Many candidates identified advantages and disadvantages but often failed to complete the evaluation so that a score of 3 marks was often awarded. Many candidates thought that nuclear power gave out more energy than coal. Many candidates thought that nuclear power was dangerous because it gave off radiation (they failed to appreciate that radiation was only given off if there were problems). Many said that they were expensive or cheap but failed to say that that was in relation to the building costs. The best evaluation for nuclear power was that there was no carbon dioxide to contribute to global warming and for coal the idea that it's a non-renewable source that will eventually run out. Many times, however, candidates only gave one part of the evaluation e.g. nuclear power less pollution and no global warming. Candidates often quoted pollution without qualifying what it referred to. Very few candidates appreciated the idea of the transport costs involved but all other guidance points in the mark scheme were seen.

Question 12

- 12(a) Only the best candidates gained marks on this question. A number gained 1 mark for recognising that doubling either the light intensity or the surface area resulted in a doubling of the current. Few stated that doubling both would quadruple the current.
- 12(b) This question was well answered. Most candidates could calculate the percentage as 18%. A small number quoted 0.18%, having failed to multiply by 100 and gained 1 mark.
- 12(c) Most candidates calculated the power output of the solar panel correctly in part (i). Few could then use that to calculate the number of panels required in part (ii). There was a lack of understanding that a MW was a million watts.

Question 13

- 13(a) There was a large number of vague answers referring to craters on the moon as evidence for a collision. Very few candidates referred to rocks as required by the mark scheme. Some suggested the idea of oxygen levels but did not qualify it as being in the rock. Others suggested elements but again did not qualify the answer. The best candidates achieved 2 marks for the idea of analysing the rocks and the similarity in the rocks on Earth and on the moon.
- 13(b) Most candidates correctly named 'gravity' but fewer were able to expand on that idea by stating that gravity pulls the moon to the centre of the Earth.

Section D

Question 14

- 14(a) This question was generally well answered. Many candidates correctly calculated the mean difference in body fat percentage. A few chose incorrect data and others made errors in the calculation either by incorrect addition or failing to divide by 5.
- 14(b) Most candidates could choose an appropriate scale and plot the bars correctly gaining 2 marks.
- 14(c) Most candidates scored the first mark for correctly identifying player **A**. Only better candidates achieved the second mark for stating that player **A** had the greatest loss of fat **and** the greatest gain in muscle.
- 14(d) Many candidates scored 4 marks. Those that scored 3 marks often made an error in the calculations of the fat or protein for one of the players. Very few got player **A** wrong. There were a number of candidates who did not attempt this question.

B713 – B763 Controlled Assessment

General Comments:

Overall, centres are coping well with the controlled assessment process and some excellent work with good clear marking has been submitted.

Most centres submitted work that was well organised and easy to follow with all of the appropriate documents enclosed and clear annotations explaining why particular marks had been awarded. This aided the process of moderation and centres are thanked for the effort involved.

Some centres, however, are still submitting work with errors of various kinds:

- There have been a number of clerical errors where marks submitted to OCR differ from those on the work sent to the moderator. Centres are advised to double check the marks on scripts before sending them to the moderator. In particular, if internal moderation has taken place and marks are changed, it needs to be clear which mark is being submitted.
- A significant number of centres have submitted the wrong task for the year. Tasks are only valid for one year and it is not permissible for centres to submit work either using tasks from previous years or from the next year. Any centres that used a task from next year are reminded that they will not be allowed to use this task again in the coming year.
- A number of centres also gave more support to their candidates than is acceptable. No form of writing frame, table grid or guidance notes, other than those provided as part of the task, are allowed to be given to the candidates. Use of such material can reduce the marks available to candidates as their own work has not met the marking criteria.
- Centres are reminded that in signing the CCS160 (Centre Authentication) form they are guaranteeing that the work submitted is each candidate's own unaided work.

Previous reports have given considerable guidance on the application of the marking criteria, how to avoid common errors and the requirements for the award of high marks. Centres are advised to consult the reports written in 2012, 2013 and 2014 in addition to the notes given below.

Comments on each Skill quality:

Research: Work submitted was generally of a high standard. Candidates frequently demonstrated that they were aware of the need to produce a full bibliography with full URLs when referencing internet sites. Few candidates made use of resources other than those on the internet, but when a text book is referenced then page numbers should be given. The range of sources used was generally suitable and relevant to the tasks.

Some candidates put a lot of effort into an analysis of the sources commenting on their likely reliability and accuracy and giving reasons for their decisions. This is not a requirement of the marking criteria and candidates could be advised to use their time to better effect. The main issue for the award of high marks lies in the candidate's ability to "select" relevant information from the sources. This needs to be specific to the bullet points in part one and to be scientifically correct. It is rarely possible to effectively fulfil this requirement by simply cutting and pasting from websites as it usually means that irrelevant material is copied alongside relevant material.

Planning: This was also generally tackled effectively by the candidates. The methods now often include a diagram which helps to explain the plan and detailed information that can easily be followed by someone else. The most common weakness in this skill quality is an insufficient consideration of how errors can be minimised. This is required at all marking points above 2 with the difference between 3 and 6 being in the depth and detail given by the candidates.

In all but the science specification, candidates need to produce a suitable hypothesis. This should be based on the information given in part 2. Candidates make it more difficult for themselves when they choose to investigate something which is not really what the task was asking for. For higher marks candidates need to provide a detailed scientific justification for their hypothesis.

Candidates should clearly indicate any changes they might have made to their plan. For example, candidates need to select a suitable number and range of data points as part of their plan. If the number in the plan differs from the number used in the actual experiment then an explanation of the change should be given.

Collecting: This was one of the highest scoring of the Skill qualities. Candidates generally produced clear tables with full headings and units and quoted data to an appropriate and consistent number of decimal places in line with the equipment they had chosen. Some centres penalised candidates for inconsistency or errors in processed data such as averages. Marking in this Skill quality needs only be applied to raw data. Some centres over marked by giving high marks when all of the raw data had not been recorded and processed data was shown instead. For example, initial and final temperatures should be recorded and not just temperature change.

Candidates are not allowed templates to use in these tasks. If candidates have been given a table to complete then it is unlikely that they would be able to get many, if any, marks for this Skill quality.

Managing Risk: This was also a high scoring Skill quality but some centres are still being too generous. The following comment was made on last year's report and bears repeating, as some centres are still failing to take it into account when giving high marks.

The criteria for 5/6 marks state 'All **significant** risks in the plan **evaluated**'. The risk of having a heart attack whilst squeezing a clothes peg is not significant. Too many times candidates invent spurious risks. 'Evaluated' means that the candidate needs to appreciate and state whether it is a low risk or a serious risk.

The criteria also state '**Reasoned** judgements made to reduce risks by **appropriate specific** responses'. The highlighted words speak for themselves.

Processing data: Graphs were well drawn by most candidates. However, some centres are still giving high marks when candidates have inappropriate scales on one or more axes. A graph does not need to have the point (0,0) on the scale in all cases. As a general rule the data points should cover at least half of the available space.

Some of the tasks have been designed with the opportunity for more able candidates to use more complex mathematical techniques that are relevant to the task, for example, calculating an energy change. However, candidates do not need to carry out an additional complex mathematical technique in order to get high marks if there is not a process which is relevant and adds to the understanding of the task. For example, calculating a gradient may be irrelevant and provide no additional useful information, particularly when candidates do not understand what the gradient shows.

Without some form of processing of uncertainty then full marks are not available in this Skill quality. Range bars are generally the most accessible method for candidates to use.

Analysing & Interpreting: There were some tasks this year in which candidates failed to obtain data that supported their hypothesis or the hypothesis given. For example, in those who undertook the portable stoves experiment, some candidates failed to control the amount of fuel used in each experiment, by either burning a fixed mass of fuel or calculating a temperature change per gram, and obtained data which showed no real trend at all. Candidates should not try to force their hypothesis on to the data. There were some candidates who were given high marks for stating that a trend was supported when only 2 out of four data points followed this trend. They may then have commented that the other two data points were anomalies. This is not good science and is not worthy of high marks. Candidates may obtain high marks by pointing out that the data does not show a clear trend, comparing this to data from secondary sources and making appropriate comments to explain the differences.

Evaluating: Although often marked well by centres this continues to be a Skill quality that candidates find difficult. This is partly because candidates need more space to answer question 4 of part 3 than is available on the standard version. Centres may provide candidates with a reworked version of part 3 with more space available for answers if they choose to, as long as the wording is identical to that provided in part 3. This can be easier for candidates than using additional paper.

Question 4 of the task requires candidates to evaluate their method, their data and to make comments about risk. Many candidates fill the space available but focus primarily on just one of these issues and consequently can only score low marks.

To obtain high marks candidates need to make a “detailed and critical consideration” of the data. This is rarely seen. Although range bars are often included as part of processing, many candidates do not understand the significance of them and how they relate to the quality of the data. Where data is of poor quality, candidates need to try to link this to their method and explain why their plan gave rise to data that did not match their expectations or where there were a number of anomalies. Suggestions for improvement should ideally be derived from this rather than chosen almost at random.

Comments about risk do not contribute significantly to the mark for analysis but can be used to further support the mark awarded in the risk Skill quality.

Conclusion: As with analysis and evaluating, the conclusion should be based on the actual data obtained. In most cases candidates are justified in saying the data supports the hypothesis but in some cases this is not the case and candidates should say so and go on to explain why.

There is also the requirement in this Skill quality for candidates to clearly link their research to their own experiment and to appropriate scientific knowledge and understanding. Question 6 of part 3 provides an opportunity for this but it is to be remembered that evidence for any of the marking criteria can be obtained from any part of the candidates’ work. Annotation helps considerably if marks awarded are related to work from elsewhere in the task.

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