RECOGNISING ACHIEVEMENT

GCSE

Additional Applied Science

Gateway Science Suite

General Certificate of Secondary Education **J251**

OCR Report to Centres

January 2013

OCR (Oxford Cambridge and RSA) is a leading UK awarding body, providing a wide range of qualifications to meet the needs of candidates of all ages and abilities. OCR qualifications include AS/A Levels, Diplomas, GCSEs, Cambridge Nationals, Cambridge Technicals, Functional Skills, Key Skills, Entry Level qualifications, NVQs and vocational qualifications in areas such as IT, business, languages, teaching/training, administration and secretarial skills.

It is also responsible for developing new specifications to meet national requirements and the needs of students and teachers. OCR is a not-for-profit organisation; any surplus made is invested back into the establishment to help towards the development of qualifications and support, which keep pace with the changing needs of today's society.

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.

OCR will not enter into any discussion or correspondence in connection with this report.

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Overview

It was pleasing to see that most candidates found the papers accessible and demonstrated sound knowledge and understanding of the course content. It was clear that candidates had been well prepared by their centres. Questions towards the end of the papers were answered equally as well as questions at the beginning of the paper indicating that there was no evidence of candidates running out of time, nor was there any evidence that any group had been disadvantaged by the language or by any cultural issues.

Most centres entered their candidates for the correct tier of examination. This to be applauded as weaker candidates that are entered for higher tier papers do not have a pleasant experience and find many of the questions too difficult to attempt.

The majority of candidates performed well with the six mark level of response questions writing extensively and many scoring five or six marks. It was intended that candidates should feel that they had a positive experience in taking the examinations and it would seem that this proved to be the case. The papers were constructed to allow candidates to feel that they had every opportunity to demonstrate their knowledge and understanding while at the same time discriminating between candidates of differing abilities.

Candidates are well advised to read both the questions and their answers very carefully. Each year a number of candidates lose marks unnecessarily because of their haste to complete the paper. It cannot be stressed too strongly that reading and re-reading the question is time well spent. Answers should always be re-read to ensure that they do indeed answer the question that is being asked on the examination paper.

When answering questions that include numerical calculations, candidates are always asked to show their working – it is vital that they do this. Candidates are very good at answering calculation questions intuitively or performing simple mental arithmetic and then writing down the answer. Providing the answer is correct, this is not a problem as they will gain full marks. However it is a very risky strategy. A simple mistake in their mental calculations will lose them all of the marks. If they had written down their working, the chances are that they would have salvaged at least one of the marks available for the question.

A few candidates left questions blank. Leaving questions blank simply guarantees that they get no marks for that question, at least attempting the questions opens up the opportunity of them scoring some of the available marks. Candidates should be encouraged to at least make an attempt with every question.

Candidates need to be aware that examination papers are scanned and marked online so those who write outside of designated areas are at risk of their answers not being fully marked. Candidates would be well advised to ensure that they use the answer lines and spaces provided in which to write their answers. This problem is sometimes exacerbated by candidates crossing out their initial response and then cramming the answer into a much smaller space that may not be immediately visible to the examiner.

The following reports provide more detail on how candidates performed on specific papers, highlighting areas of concern and applauding good performance.

Please encourage your staff to read these reports.

The reports are available on line at www.ocr.org.uk

A191/01 Science in Society (Foundation Tier)

General Comments:

The paper performed well with most students able to gain marks for the graph and matching lifestyle boxes, whilst the more able could demonstrate their understanding in the longer answer questions. There was no evidence of any candidates having insufficient time to complete the paper and the spread of marks suggests there was sufficient scope for differentiation.

Individual questions:

Q1(a) Most candidates scored full marks.

Q1(b)(i) The majority of candidates scored at least one of the two marks for correct plotsQ1(b)(ii) Some candidates gave 180 and scored the mark but there was a huge spread of answers with the most common being 150.

Q1(b)(iii) Most candidates scored at least one mark for a quicker recovery time or lower overall pulse. Better candidates observed both points or used data from the graph to support their statement. A few disagreed with the trainer and therefore scored no marks.

Q1(b)(iv) Most candidates picked up a mark for the trainer 'knowing what type of exercise they were capable of' and a second mark either for some idea of monitoring or devising an appropriate programme. A few lost one of the marks by referring to diet or lifestyle.

Q2 The majority of candidates were able to label lungs and ribs although some confused diaphragm and trachea. Few had any idea of the mechanism of inhalation with ribs expanding, diaphragm moving up and the lungs pushing against the ribs causing their movement. The route taken by air entering the lungs was better understood.

Q3(a)(i) The role of the platelets was not familiar to most and weaker candidates thought that red blood cells were responsible for carrying blood around the body.

Q3(a)(ii) A lot of candidates left this question blank and those attempting an answer were more concerned that these components could not be filtered out because they were too important for the safe running of the body.

Q3(b) Good answers referred to the removal of urea or waste. Poorer answers were too vague referring to kidneys cleaning or filtering the blood. A few candidates appreciated the role of kidneys in osmoregulation.

Q4(a)(i) Despite the eggs on the diagram a number of candidates still drew them in. This question was well answered.

Q4(a)(ii) The majority of candidates were able to show where fertilisation took place.

Q4(a)(iii) A reasonable number of candidates were able to show where implantation will occur although there were a number floating around in the middle of the uterus and quite a few in the ovaries.

Q4(b)(i) The majority of candidates were able to score the APGAR test correctly even if they subsequently added the numbers up to 8 or 6.

Q4(b)(ii) Some candidates took this too literally and explained what is meant by an APGAR test score itself rather than giving the meaning of the specific one they had calculated for the baby in question.

Q4(b)(iii) Many candidates gave good responses for why the score cannot be completely accurate. A few were misled by the baby being premature and tried to give that as the reason for the lack of accuracy.

Q4(c) This was very well answered with just a few candidates focussing on the need to use the procedure as a diagnostic tool.

Q5 The majority of candidates engaged with this question, demonstrating a sound understanding of forensic practice. Some were carried away with DNA, blood and fingerprints rather straying away from the original reference to fibres.

Q6 Most candidates scored at least two marks for the least focussed and the greatest depth of field.

Q7 More able candidates scored well if they had come across colourimeters before. The majority had no idea and confused colourimeters with chromatography or simply left the question blank.

Q8(a) More able candidates were able to calculate the R_f value and score both marks. Some divided the 20 by 12, but others simply wrote 12.

Q8(b)(i) Most candidates were able to identify the correct drink although a minority hedged their bets and gave several options.

Q8(b)(ii) A small number of candidates appreciated that other dyes could have the same R_f value but many thought it was the result of combining chemicals.

A191/02 Science in Society (Higher Tier)

General Comments:

The paper produced a good spread of marks with no evidence that candidates struggled to complete it on time. Candidates are becoming more confident in tackling extended writing answers although they need to include more details and scientific points in their responses to achieve the higher marks.

Comments on Individual Questions:

Q1(a) Most candidates were able to give one reason why a fitness trainer should assess risk, this was usually either to prevent injury or to take medical conditions into account. There were quite a few vague answers such as 'to make sure they are safe' or 'so they won't be sued' and candidates need to learn to be more specific.

Q1(b)(i) Few candidates wrote down the BMI formula correctly with the units rarely included. Most showed that they knew the formula and were able to correctly work out the BMI from the given data although some answers had rounding errors.

Q1(b)(ii) Almost all candidates were able to use the table and their calculated BMI value to correctly determine the weight category.

Q1(b)(iii) Only the better candidates were able to suggest why the calculated BMI might not give an accurate representation of the weight category. There were some good accounts of the effect of muscle mass or bone density variation but many thought that the scales could be wrong or that her age or gender could influence the category.

Q2 Most candidates were able to give an advantage or a limitation of the use of a scanning electron microscope when viewing bacteria but most answers lacked detail. Better answers included scientific terms (eg magnification, resolution, and depth of field) and explained some of the limitations (eg you cannot view living bacteria because of the vacuum, they are not portable because they are large, they are expensive because of running costs etc.)

Q3(a) Very few candidates understood the idea that blood vessels expand/dilate to allow blood to flow closer to the surface (nearly all wrote about blood moving to the surface of the skin) but most realised that the skin would turn red rather than pale. Many then wrote about the skin absorbing cool air rather that the skin releasing heat to the surrounding air. Some candidates wrote about sweating which did not follow from the earlier sentences.

Q3(b) Correct explanations of the cooling effect of the evaporation of water on the skin were very rare. Most candidates wrote about the idea of adjusting to the surrounding air after leaving the warm water.

Q4 Most candidates knew the basic stages of the IVF process, with many able to add extra detail such as the need for counselling and hormone treatment. There were a few very good accounts that included explanations for the various stages eg hormone treatment needed to stimulate egg production, multiple implantation to increase chances of success.

Q5(a) The reasons for some of the steps carried out when taking a blood samples were well understood with the need for sterilisation with alcohol to avoid infection and the need for labelling to link samples with donor being the most commonly seen. Better candidates realised that the pressure collar was used to make the veins more prominent although some confused this with measuring blood pressure. Very few explained the need to take blood from a vein rather than an artery because the vein is at lower pressure. Some candidates misunderstood the question and explained possible reasons for having a blood test.

Q5(b) Most candidates could correctly calculate the APGAR score from the data given and could explain what the score means for the premature baby. Some did not realise that 7 means that the baby is normal and thought that a perfect score of 10 was needed. The limitations of an APGAR score were less well understood with human error, faulty equipment and baby not fully grown all appearing frequently. Better answers referred to the subjectivity of the testing, the closeness of the categories and the idea that the condition of the baby can change rapidly.

Q5(c) The idea of the benefit of carrying out the medical procedure outweighing the risk was well understood although some confused the medical procedure with the need to test the baby and others just restated that the risk is low.

Q6 Candidates showed a good understanding of the differences between random and systematic errors with most correctly identifying at least half of the options. Most common errors were to identify lifestyle factors as having random errors, working out Rf values as having systematic errors and Health and Safety regulations as having systematic errors.

Q7 The majority of candidates had little idea about the use of a colourimeter with many confusing it with chromatography or pH testing. Most marks were awarded for the idea that light is used and that the machine must be set to zero before using it. A few candidates realised that the more concentrated the solution the greater the absorbance and remembered that they had measured increasingly dilute solutions but they often did not understand the difference between solutions of known concentration and the unknown food colouring.

Q8(a) Most candidates could identify at least one of the statements describing how chromatography works, with many correctly identifying both. The most common errors were to either refer to differences in Rf values rather than movement of solute between mobile and stationary phases and/or to link this with changes in Rf values due to solvent evaporation instead of relative attraction of solute molecules to solvent and the medium. A few confused the process with fractional distillation and explained the separation due to differences in how heavy the components are.

Q8(b)(i) Few candidates were able to correctly plot the expected positions of the food dyes on the chromatogram. Most did not understand that they had to do some calculations with the data they had been given and used the given Rf values as the distance moved by the dye. Those that did correctly calculate the values generally did not understand that the dyes would have moved vertically from the same starting point.

Q8(b)(ii) Better candidates realised that two of the dyes had the same Rf value and so would not be separated by the chromatography. Very few described the use of a different solvent or of two way chromatography as a way of overcoming this limitation.

A192/01 Science of Materials and Production (Foundation Tier)

General Comments:

This was the first appearance of this paper which tests understanding of the B components of the specification. It was good to find that, with one exception discussed below, the majority of candidates felt able to answer all of the questions. They also seemed to be prepared for the significant amount of free response and quantitative questions, although this did not necessarily mean that they invariably got the correct answer! There was no indication that candidates ran out of time. It was good to find that the vast majority of candidates were well matched to the paper's tier; few candidates would have benefited from doing the Higher tier paper instead.

Centres need to be aware that in an examination which contains themed questions with no choice, it is important that they ensure that candidates are taught **all** of the content of each of the four modules. A centre which just covers the easier parts may leave their candidates dangerously exposed when a part not covered is the subject of a six-mark question.

Although candidates fared better than expected with the quantitative questions, the vast majority were unable to perform the calculation involving concentration of a chemical dissolved in water. Centres need to realise that 20% of the marks for this paper will always involve quantitative work so they should use every opportunity on the course to help their candidates to learn how to use numbers in calculations.

Comments on Individual Questions:

Q1 The majority of candidates managed to score at least half marks for this question which was about the mechanical properties of materials. Nearly all candidates could correctly identify an important property for the studs and sole of a football boot. Although most candidates were able to state a suitable property of the uppers, only half managed to include a valid explanation for it - perhaps candidates do not recognise that the command word **explain** requires them to not only state a property but justify its choice? It was disappointing to find that many candidates did not understand the significance of the CE mark on a product; a popular misconception was that it meant that the boots were made in Europe.

Q2 The first part of this question was about the effect on bacteria of various stages in the production of yogurt. Only a minority of candidates could correctly identify the effect of three stages, and many could not identify any at all, suggesting that they had a limited understanding of the Science behind yogurt production. Although the vast majority of candidates knew that sperm had to be inserted into a cow for artificial insemination, few were able to provide at least three different stages. Too many responses showed an lack of distinction between cows and bulls.

Q3 This was the first of the six-mark extended response questions. Virtually all the candidates were able to engage with the question about health and safety features in a theatre. Many candidates had only discussed one valid feature and could therefore not gain all marks.. The many candidates, who included no-smoking signs as safety features, earned no credit for it. Weak candidates often concentrated on a discussion of the example provided in the stem of the question, instead of discussing their own examples. Centres need to be aware that this style of question does require a certain amount of prior training, so that candidates know how to access all of the marks available. In this case, they needed to describe and justify at least two examples of safety features (other than the example provided) which might be reasonably found in a theatre.

Q4 This question was about the production of $Mg(NO_3)_2$ tomato fertiliser. It was poorly answered by many candidates, suggesting a general weakness in their understanding of formulae and word equations. Although most candidates knew that the symbol O stood for oxygen (not oxide) only a minority could work out that there were 2 atoms of nitrogen and 1 atom of magnesium in each molecule. Although it was expected that only a minority of candidates would know that the second product was water, it was disappointing to find that so many candidates were unable to use the information in the stem of the question to complete the rest of the word equation. Although most candidates had a go at the calculation, most of them failed to get the correct answer, probably because it involved two steps. Centres need to give their candidates plenty of opportunities to do this kind of calculation during the course.

Q5 The first two parts of this question also appeared on the Higher tier paper, so was designed to be harder than the preceding ones. Although the majority of candidates were unable to say anything meaningful about the data provided, it was encouraging to find that a significant minority were able to provide one piece of evidence to support the assertion made in the stem of the question. It was also good to find that some candidates were able to use the rule provided to correctly calculate a percentage from data correctly read from the graph. The final part of the question was much easier, with many candidates able to correctly identify the purpose all four types of chemical used in agriculture.

Q6 This extended response question about emulsions and suspensions also appeared on the Higher tier paper. It required candidates to know the difference between these two types of mixture. A minority were able to mention just one valid point, usually the need for mixing. Although this question was not designed to be easy, it was expected that candidates would at least know that an emulsion is made by mixing liquids and a suspension by mixing a liquid with a solid.

Q7 This was the last extended response question of the paper. It was designed to be accessible to Foundation tier candidates. However a significant minority failed to answer the question by only discussing the effect of the different shapes and sizes of the racquets, instead of discussing the materials used. It was good to find that many candidates were able not only to name the materials used in both racquets, but could correctly name an important mechanical property (such as density) and explain how this affected performance (less tiring to use, faster swing etc.).

Q8 The last question of the paper was about the use of lights in a theatre. The majority of candidates were able to suggest at least one thing that a lighting technician should learn about during their training. Too many candidates ignored the word **other** in the question and wrote about filters. About a third of the candidates were able to correctly match each type of filter with its effect on the actors. It was good to find that most candidates felt able to do the final calculation

A192/02 Science of Materials and Production (Higher Tier)

General Comments:

A full range of ability was seen in this paper and a significant number of candidates would have been more suited to a Foundation tier of entry. An important message that centres must pass back to their candidates is to emphasise the importance of clear handwriting and following the guidance about writing within the framework of the paper as scripts are scanned and marked on-line. There was evidence of candidates not following this advice.

It is encouraging to see that there is a good understanding and use of correct scientific language and that candidates are also becoming more proficient in their use of mathematical skills.

There were no signs that any group had been disadvantaged by the language or by any cultural issues and there was no evidence of any candidates having insufficient time to complete the paper. Candidates should be encouraged to look at the number of marks available for each question section and check that their answers contain at least that number of separate points. It is also important that candidates carefully read each question thoroughly, noting in particular words that are highlighted.

Comments on Individual Questions:

Q1(a) Many candidates made general references to the overall pattern of data and did not use the specific dates in the stem of the question linked to the data in the graph.

Q1(b) Many candidates were able to correctly calculate the percentages required and this reflects a stronger mathematical set of skills in the candidates.

Q2(a) Candidates with good knowledge of artificial insemination as an example of selective breeding scored well on this question.

Q2(b) Many candidates scored well on this question showing good application of their knowledge. There were, however, a number who thought 80oC was an ideal temperature for maximum growth and reproduction of bacteria.

Q2(c) Many gained this mark.

Q3 Candidates who knew what an emulsion and a suspension were and also able to describe how to make them scored highly on this question. Unfortunately many candidates had a very sparse knowledge of either situation.

Q4 Candidates who did not read the question carefully carried on describing the tennis racquet situation given in the question. Candidates who choose an item from another sport tended to be very general in their description of its new material properties and did not relate these properties to performance indicators in the sport and consequently limited their answers to Level 1 or 2.

Q5(a) This question was a good discriminator for the highest achieving candidates. Few candidates correctly identified the elements present in magnesium nitrate but these candidates often went on to gain the second mark available by correctly identifying the relative proportions of each element. A significant number of candidates believed NO3 to be an element.

Q5(b) Very few candidates were able to complete this symbol equation. Some did gain credit for correctly identifying water (as H2O) as a product of the reaction.

Q5(c) A few candidates were able to calculate the RFM of either potash or potassium hydroxide but were unable to take the calculation any further to gain the second mark.

Q6(a) A well answered question with most candidates gaining this mark.

Q6(b)(i) Few candidates correctly identified yellow as the colour coming out of the filter. Common errors were being unaware that red and green together would produce yellow and believing that absorbing blue would give blue coming out of the filter.

Q6(b)(ii) A well answered question with many candidates correctly identifying infra-red as a heat issue in the theatre lighting.

Q6(c) A well answered question with many candidates gaining all 3 available marks.

Q7(a) Again a well answered question although a few students restated the strong property of metals which indicates a need to read the question more carefully before putting pen to paper.

Q7(b) A well answered question with many candidates gaining both available marks.

Q7c(i) A significant number of candidates were unable to name a composite material and the majority of those who could name the composite were unable to describe its structure. A common error for fibre glass was to describe its structure as glass in fibre.

Q7(c(i) Being able to link the properties of a composite material used in a sports item made this an accessible question and candidates frequently scored 1 or 2 of the 3 available marks.

Q8 Some excellent answers, gaining all 6 available marks, were seen here. Best answers gave a number of items to check with clear explanations of why they should be checked and consequences if they were not checked. Level 1 answers failed to go beyond a short list of thing to check with no linked explanation.

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