

## **Additional Applied Science**

General Certificate of Secondary Education **J251**

### **OCR Report to Centres**

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**June 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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#### Additional Applied Science (J251)

#### OCR REPORT TO CENTRES

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## Overview

This is the first assessment session for the controlled assessment of the new work-related portfolio consisting of a total of 120 marks. The tasks are now set by OCR and taken under controlled assessment conditions. Centres should note that the marking criteria have been amended.

Centres who have not yet sent staff to training events would be well advised to do so as there was evidence of generous marking from some centres who were clearly still coming to terms with the new criteria. In general, however, the work was of a high standard and centres and candidates should be complemented for their efforts.

For more detailed information, please refer to the Principal Moderator's Report on Unit A193.

With respect to the two written examination papers, most centres entered their candidates for the correct tier of examination. This is to their credit as lower ability candidates that are entered for higher tier papers do not have a pleasant experience and find many of the questions too difficult to attempt.

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 that candidates ran out of time, nor was there any evidence that any group had been disadvantaged by the language or by any cultural issues.

There has been a continued improvement in candidates answering the three six-mark questions. The majority of candidates performed well. Many wrote extensive answers and a considerable number scored Level 2 and above. 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.

However, there is always room for improvement. Some errors occurred because candidates failed to read both the questions and their answers 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 in order to ensure that they do indeed answer the question that is being asked on the examination paper.

A few candidates are still leaving some questions blank. This may be due to their intention to return to the question later and subsequently forget that they have not yet answered it, or just that they are unable to answer the question. Candidates should be reminded that they gain no credit for unanswered questions. 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 and re-read their completed paper to ensure that they have not left any questions unanswered.

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.

Candidates need to be aware that examination papers are scanned and marked online. Candidates 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 examination papers are designed such that an answer can gain full credit and still be written in the space provided.

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 online at [www.ocr.org.uk](http://www.ocr.org.uk)

## A191/01 Science in Society (Foundation Tier)

### General comments

Most candidates were well prepared for this paper and made a good attempt at answering all of the questions.

The paper included three six-mark questions. Centres that scrutinise the mark scheme for this paper will notice that the marking of these questions is more structured and the mark scheme allows credit for what the candidates know and can do.

The trend for candidates to write outside the allocated area continues. All too often candidates write in any white space that they can find. This is nearly always caused as a result of the candidate failing to think the answer through before commencing to write. It is common to see most of the lines allocated filled with a repeat of the question, before the candidate even begins to answer it. This is a very dangerous practice. Due to the fact that these scripts are marked electronically, examiners do not see the whole page by default and unless there is some indication that the candidate has written outside the allocated window, it is possible that the examiner will fail to spot additional text and the candidate could lose marks. It cannot be stressed too strongly that candidates should attempt to contain their answer in the space provided.

Some centres have not yet come to terms with Appendix B that deals with the mathematical skills required by candidates. Centres would be well advised to read this appendix and prepare their candidates accordingly.

The paper was suitably challenging and discriminated well between candidates. Very few sections were unanswered, suggesting that the paper was accessible to most candidates. There was no evidence that any of the candidates ran out of time. It was also pleasing to see the decrease in the number of no-responses continuing.

**Q1(a)(i)** This question was intended to be an accessible introduction to the paper. However, it caused more problems than expected. This was due to a significant number of candidates failing to understand the meaning of the word 'facility'. Candidates who simply entered the name of a person's job, failed to score on this part of the question. Good answers included two facilities such as a swimming pool and sports centre and then gave the name of two jobs such as life guard and fitness instructor.

**Q1(a)(ii)** A similar problem to that in part ai also occurred with this question as most candidates failed to understand the meaning of the word 'regulation'. This often resulted in answers such as "being a good listener" or "not getting personally involved". This type of answer failed to score. Good answers included references to Health and Safety and Data Protection.

**Q1(b)** This question was not answered well. Most candidates failed to understand what a baseline assessment is. All too often, answers referred to a simple assessment to check if a person was capable of carrying out an exercise programme. Although credit of a single mark was given for the idea of carrying out a fitness test, few candidates went on to say that this was done at the beginning of the programme and used to monitor any improvement.

**Q2** This question assessed grades E, F and G and consequently was structured to allow even weaker candidates to score marks. Candidates who produced a correct addition to the drawing, then went on to correctly label part of the drawing and gave a correct role and

function of part of the drawing, were awarded Level 3 with 5 or 6 marks. Many candidates scored well on this question reaching Level 2 with approximately one-fifth reaching Level 3. Candidates should be advised that when asked to label a diagram, their label lines should clearly indicate what the labels are pointing to.

**Q3(a)(i)** Most candidates knew that speed was calculated by dividing distance by time. However, fewer realised the meaning of writing the answer to two significant figures. Those candidates who gave the answer as 8.33 scored one of the two marks. Centres would be well advised to ensure that candidates understand what is being asked for when writing an answer to a calculation to a specific number of significant figures.

**Q3(a)(ii)** Many candidates scored one mark on this question for understanding that Jason's speed would vary throughout the race. However, very few went on to say that the reason for this was so that Jason's coach could improve his performance. Many simply stated that it was so that his average speed could be calculated.

**Q3(b)** Candidates simply had to write down the names of two performance enhancing drugs to score two marks for this question. Most candidates scored one of the two marks by writing down steroid, stimulant or amphetamine. Candidates that wrote down cocaine or cannabis were not credited. Some candidates misread the question and described the effects of the drugs rather than naming them. Answers that included testosterone, creatine or diuretics were all credited.

**Q3(c)** Most candidates scored all three marks on this question. Candidates that linked two or three correct statements scored two marks.

**Q4** To perform well on this six-mark level of response question, candidates had to include three distinct areas in their answer. Good answers **described** how the blood was taken, gave an **explanation** of why some of the procedures were carried out and then wrote about what **tests** were performed and why they were done. Candidates who wrote a good description of the procedure with an explanation e.g. use a pressure collar to make veins more visible, sterilise the area to stop infection and remove the blood with a needle or syringe, were immediately awarded Level 2. Those who then went on to write about a test such as testing the blood for glucose or iron to check for diabetes or anaemia were then awarded Level 3. Most candidates performed well on this question.

**Q5(a)** This question was overlap with the Higher Tier. Almost half the candidates failed to score on this question. Although an answer of 32 was required to be awarded all three marks, credit was given for correctly entering the data into the formula, (one mark awarded), or not giving the answer as a whole number - when two marks were given. This is an example of where candidates would be well advised to read the question very carefully.

**Q5(b)** This should have been an accessible question with candidates simply reading the data from a BMI chart. However, most candidates failed to score this mark. Candidates clearly need more practice at extracting data from charts and graphs and this skill will be assessed again on future papers.

**Q5(c)** In order not to penalise those candidates who gave an incorrect answer to 5b, examiners were instructed to award an 'error carried forward' mark for this question. This resulted in most candidates scoring this mark.

**Q5(d)** Most candidates scored well on this question. Credit was given for any reference to exercising and maintaining the diet. References to cutting out smoking and reducing alcohol consumption were not credited.

- Q6(a)** Although most candidates scored at least one mark for this question, far fewer managed to score both marks. Credit was given for an answer of 1250 and a further mark for  $m^2$ . These points were marked independently. Common errors included 125,  $m^3$  or simply missing off the units.
- Q6(b)** This was intended as a very straightforward question for Grade G candidates and a high majority managed to score at least one of the marks. Just over half the candidates managed to score all three.
- Q6(c)** Credit was given for any circle drawn around the three-pronged-tail and a second circle drawn around the gills. Common errors included not noticing that the question asked for two features and drawing rings around three or four features; drawing rings round the pictures rather than the drawing; or simply drawing rings round the wrong features.
- Q7** This question was overlap with the Higher Tier. This was the last of the three Level of Response questions. To achieve Level 1 candidates had to compare both paints and perform some kind of test upon them. If the test included a description of chromatography they were then awarded Level 2. If an explanation was added as to why chromatography would work e.g. reference to  $R_f$  values, then Level 3 was awarded. The quality of the answer then determined whether the lower or higher mark was awarded for that particular level.

## 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 the six-mark extended-writing questions and are structuring their answers better, although some do not tackle all the aspects required in the question and so limit the level they can achieve. In order to access the higher marks, they need to include more detail and scientific points in their responses. Many candidates are hampered by lack of knowledge of, for example, practical techniques and so choose to describe completely inappropriate experiments.

Most candidates were able to successfully substitute numbers into a formula and evaluate the result but the use of correct significant figures was less successful.

### Comments on individual questions

**Q1(a)** Candidates were expected to give examples of what the named practitioner does, as shown in the given example of a paramedic. Many answers referred instead to their responsibilities e.g. 'make sure that ...' without saying what they might actually do.

In (i), there were some good descriptions of the role of the public analyst and 'checking for contaminants' and 'checking that the ingredients match the label' were popular, successful choices. However, many answers, such as 'checking standard of food' or 'making sure that food is safe', were too vague and there was also a lot of confusion with public health e.g. checking hygiene of restaurants.

The role of an environment officer was better understood for (ii), with some good responses which referred to testing water and/or air quality, identification of flood risks, monitoring industrial sites and protection of wildlife. Again marks were lost for vague statements such as 'they protect the environment' or 'they stop pollution'. A significant number of candidates thought that environment officers cleared litter off the streets or dealt with graffiti.

The role of the scene of crime officer was the best known of the three with good answers referring to preservation of the crime scene, searching for and collecting evidence. Some candidates still think that their role is similar to CSI officers and refer to identifying the criminal or investigating the crime.

**Q1(b)(i)** Candidates were asked to comment on the accuracy and precision of the results for all 3 schools but many only discussed school B, correctly identifying it as the school with results that were both accurate and precise. Good reasons why the results were/were not precise appeared more often than why they were/were not accurate.

**Q1(b)(ii)** Few candidates understood the significance of all the measurements being higher than the actual value and identification of a systematic variation occurred rarely. Most just described how the measurements varied.

**Q1(b)(iii)** Candidates did not show understanding of the meaning of repeatability, with most thinking that it concerned measurements done by different students. Better candidates did understand that the results were reproducible because the measurements of different students were close together.

- Q2** There were some good descriptions of how the turbidity data could be collected and most candidates showed an understanding of what was required. However, many descriptions were lacking in detail or missing some vital part such as not measuring how much water was used to cover the X. Good comparisons of the two graphs were seen less often. Some candidates stated the relationship between the suspended solids and the turbidity and but few went on to do any detailed comparisons between the two graphs e.g. identifying that the pattern was similar or giving specific dates for a relevant comparison. A significant number of candidates did not attempt to address both parts of the question.
- Q3(a)(i)** This was a well-answered question with most candidates correctly using the formula to calculate the BMI as 32, although some lost a mark by not reading that the answer should be given to the nearest whole number and so quoting large numbers of decimal places. Some were able to substitute correctly into the formula but were then unable to evaluate this correctly, while others struggled to square the height correctly.
- Q3(a)(ii)** This was another well-answered question with most candidates able to read a value from the table correctly. However, a significant number wrote the answer as “overweight” instead of giving the numerical value as 29.
- Q3(a)(iii)** Most candidates could identify that there had been a move to a lower BMI category. A few simply said that the BMI had gone down with no reference to the category and some just referred to reduction in body mass.
- Q3(a)(iv)** Very few candidates were unable to identify either diet or exercise as the best way to continue to improve the BMI category and most gave both. A few responses were too vague e.g. ‘to lose more weight’ with no indication of how this should be achieved.
- Q3(b)(i)** Most candidates were able to correctly substitute values into the formula to calculate the fitness score but many were unable to give their answer to 3 significant figures as required. Some did not multiply the total pulse rate by 2 and others showed no working so that no credit could be given if the final answer was incorrect.
- Q3(b)(ii)** Almost all candidates could use their calculated value for the fitness score to read off the correct fitness level from the table.
- Q3(b)(iii)** Most candidates identified that his fitness had increased and/or that he had been exercising to achieve this but some did not understand that the exercise must be aerobic/cardiovascular in order to improve the effect of exercise on pulse rate as measured for the fitness score and so described improvements in stamina or endurance instead. Very few candidates could describe how this training would affect the body such as improving circulation, slower heart beat etc.
- Q4** The process used to separate and identify the biological molecules in the collected tissue was not well known and the fragments collected were often examined with a microscope. Higher ability candidates did know that electrophoresis was used and there were some good basic descriptions of the process but explanations of the process were rare. Candidates were able to achieve some credit for realising that the relevant molecules were from DNA and that identification was achieved by matching results with those from a suspect or a database.
- Q5** The difference between qualitative and quantitative testing was not well understood and only better candidates linked the correct term with the appropriate indicator in (a). Even fewer were able to explain the difference between qualitative (the idea of what is present or a yes/no answer) and quantitative testing (finding amount or idea of a numerical answer) in (b), with many saying ‘one tests the quantity and the other the quality’ or answering in terms of accuracy or detail of results. More candidates knew that the given indicators were used to test for acidity/alkalinity of the solution in (c) but many confused it with what you would see so discussed colour change etc. A few were confused with other testing kits, such as for glucose.

- Q6** Chromatography was frequently quoted as the method to be used to analyse the paint samples and there were some good descriptions that included an idea of the need to then compare the results for the two samples. However, the details were often sketchy and many of the methods were not reproducible. Explanations for separation in terms of different speeds/distances and the final step to link the separation and comparison of the two paints were not well done and were often omitted altogether. Poorer responses did not identify chromatography as the best test to choose and suggested the use of indicators or microscopes.

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

## General comments

As in the previous session, this paper contains eight questions, two for each of the four modules in the unit.

It was good to see that most candidates felt able to attempt all of the questions and that there was no evidence that candidates had run out of time.

In general, candidates were not good at doing the calculations in the paper. Centres need to be aware that some of the marks on this paper are always going to be associated with numeracy, so plenty of practice beforehand would help their candidates to achieve good grades.

The advent of extended-response six-mark questions makes it more important than ever for centres to teach all of the module content, instead of selecting the easier parts. Each extended-response question may test just one specification statement; if the candidate has to rely on their general knowledge instead of the teaching they have had, they may not gain enough marks to access the higher grades.

## Comments on individual questions

- Q1** For part (a), although less able candidates attempted to provide a value without drawing a straight line on the graph, many had no difficulty in using a ruler to join the points and then read a value off the graph. The majority of candidates correctly identified the property of the rope being measured in part (b)(i), and half of them were able to provide a coherent explanation of safety margin for (b)(ii). Finally, the majority of candidates were able to correctly match the three materials with their properties.
- Q2** This question proved to be harder than the previous one. Part (a) required candidates to label the parts of a camera. The majority could correctly identify the viewfinder and lens, but many often confused the aperture with the focal plane. Most candidates were able to correctly identify the converging lens for part (b), but only a minority of candidates earned full marks for the ray diagram of part (c). A few candidates who drew the rays correctly forgot to label the image, forfeiting a mark. Although a focus point off the central axis was accepted, it was good to find that many candidates drew rays with the correct symmetry, and with the help of a ruler.
- Q3** Although a minority of candidates were unable to complete the word equation in part (a), it was good to find that the majority were able to write down the reactants and to have a sensible attempt at the products. Water was a common incorrect answer for the second product. Able candidates were able to earn full marks. Part (b) also appeared on the Higher Tier paper, so was one of the hardest questions on this paper. The calculation of part (b)(i) was only done correctly by a few candidates, suggesting that most of the others had only a loose grasp of the concept of concentration. However, many higher ability candidates managed to make more sense of part (b)(ii), successfully analysing the table of data and making sensible conclusions.
- Q4** This was the first of the extended-response six-mark questions, and it was well-answered overall. High ability candidates made two or more sensible suggestions and justified them with appropriate science for full marks. Too often, candidates of lower ability would not be specific enough in their choice of material and frequently used the vague term **insulation**

to describe it, sacrificing a mark or two in the process. Their use of science might be equally vague; many asserted that their material would block sound, without suggesting how (e.g. absorbing the sound in pockets of air).

- Q5** This second extended-response six-mark question proved to be much harder than the first one. This was because the majority of candidates either seemed to know very little about the differences between organic and non-organic farming, or assumed that the difference was in the way that the wheat was processed into bread. Despite this, there seemed to be a general consensus of opinion that organic was healthier than non-organic.
- Q6** This question was about the use of materials. For part (a), most candidates were able to identify at least one property of a metal which makes it suitable for an axe-head. Candidates who listed three or four of the properties listed lost marks. Many candidates were able to choose the correct material and justify it with data from the table for part (b); it was noticeable that lower ability candidates often ignored the table of data and suggested another material altogether. Only a minority of candidates could identify the correct description of a composite material for (c)(i) or suggest the name of a composite material for (c)(ii). Rubber was a common incorrect choice.
- Q7** This question was about the use of microorganisms to process food. The majority of candidates could state one such food for part (a), with milk being a common incorrect answer. The word equation for anaerobic respiration of sugar in part (b) proved to be difficult. Although most candidates were able to select the correct three chemicals, only a minority could correctly identify the two products. However, it was good to find that most of the candidates knew how to apply a doubling-time to calculate the population of a sample of bacteria for part (c)(i), although far fewer were able to do the more complex calculation of (c)(ii). Only a minority of candidates could suggest a practical way of removing bacteria from a bottle before filling it with wine; many wanted to freeze it to kill the bacteria or keep the bottle cool to stop it growing.
- Q8** Only a small minority of candidates earned the majority of the marks for this extended-response six-mark question. This was not just because it was about chemistry, but because many candidates did not answer the question that was asked. Instead of describing how to make the crystals from the reactants, most candidates concentrated solely on making large crystals, usually just by using large quantities of the reactants.

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

## General comments

A full range of ability was seen in this paper and there were a significant number of candidates for whom the Foundation Tier paper would have been more accessible. There were no signs, however, 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.

An important message that centres must pass back to their students 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 electronically. This session, there was evidence of candidates not following this advice. Whilst examiners make every effort to check for work written outside the framework, there is a possibility that work could be missed, especially where candidates have not indicated that their answers have been continued elsewhere.

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 read each question carefully and thoroughly, noting in particular, any words that are emboldened. Question 1(a) is a good example where careful reading of the question would enable the candidate to complete three of the four boxes in the balanced symbol equation.

Candidates should also be encouraged to highlight or underline key words in questions before attempting an answer. These key words include: describe, explain, state and suggest, and candidates should be made aware of what these terms are asking them to do in their answers.

## Comments on Individual Questions

**Q1(a)** This question differentiated well. Able candidates were able to extract key information from the question and complete the balanced equation. Word equations were not accepted.

**Q1(b)(i)** Candidates appeared to be unfamiliar with this type of calculation and few gained full marks here. Credit was given for a correct calculation with an allowed 'error carried forward' in the initial data used.

**Q1(b)(ii)** This was a well-answered question with many candidates correctly identifying that this was not the best concentration, with relevant data to confirm their answer. Candidates, however, often missed the third available mark by not making reference to less copper sulphate used or to less cost.

**Q2** Candidates needed to explain the science behind their choices of materials and/or design features for controlling noise from other flats to gain Level 2 or Level 3. Many candidates were able to list a series of design features but this limited their responses to Level 1. Linking design to relevant science opened up the second level. Using the term 'soundproofing' without a scientific explanation was not sufficient.

**Q3** Many candidates were able to access Level 1 with their responses by correctly identifying increased costs but did not then go on to discuss the reasons for these increased costs, which would have given access to the higher levels. An economic argument of supply and demand affecting the cost of potatoes, although not answering the set question of the cost of production of potatoes, was a frequently seen response and was allowed by the

examiners. Good responses gave a range of potential sources of costs that could be affected by a number of reasons, which the candidates then discussed. Examples of these costs and reasons, although not exhaustive, are listed in the mark scheme.

**Q4(a)(i)** This was a good discriminating question, answered well by higher ability candidates. A common error seen was to multiply all numbers by 3.

**Q4(b)(i)** This was well answered. A few candidates, however, did not apply the term 'elastically' correctly.

**Q4(b)(ii)** Candidates who had a clear knowledge of the definitions of the terms 'plastic' and 'elastic' gained these marks. Vague statements often did not refer to returning or not returning to original shape or size.

**Q4(b)(iii)** This was a challenging question and highlighted a need to practise the mathematical skills for this paper.

**Q5(a)** A well-answered question but some candidates named two properties and failed to gain any marks because they did not go on to explain these properties, as asked for in the question.

**Q5(b)** This is an example where careful reading of the question gives a good insight into the answer required. Candidates are told that the metal head has higher thermal conductivity and they are asked to explain what this means in terms of the head feeling colder than the handle. An understanding of the term thermal conductivity should lead to the correct response. Transfer of coldness was a common misconception seen.

**Q5(c)** Many candidates were able to correctly identify and name a composite material but few were then able to describe its composition in terms of a named background matrix and a named fibre.

**Q6(a)** A well-answered question, with most candidates being able to identify the parts of a camera.

**Q6(b)** A discriminating question with good candidates drawing parallel rays coming into the lens to be focused on the focal plane. Many candidates drew an object before the lens and did not realise that a distant object generated parallel rays. Candidates should be reminded of the need to draw ray lines as straight lines with a ruler. Although straight hand drawn lines were accepted, wobbly ones were not.

**Q6(c)** Many candidates gained the focus mark in their answer but were not precise enough to gain the 'move lens' mark as they failed to indicate which way to move the lens.

**Q7** Few candidates were able to discuss any aspect of scaling up a laboratory process to an industrial scale. A common misconception was to make everything bigger e.g. extra large filter paper and giant Bunsen burners. Credit was given at Level 1 for understanding that machinery was used in the scaled-up version.

**Q8(a)** This was a good discriminator as able candidates realised that carbon dioxide is produced in anaerobic fermentation and that by counting up the carbon and oxygen atoms, they could balance the equation.

**Q8(b)(i)** This is another example of where carefully reading the question gives an insight into the answer required. The only aspect of the equation that was missing from the stem of the question was oxygen, which was indicated by the term aerobic respiration. Common errors were to include the organism *Acetobacter* or wine in the equation.

**Q8(b)(ii)** This was generally well answered but terminology was often used loosely, with candidates referring to a rapid growth in bacteria rather than a rapid growth in the numbers of bacteria.

**Q8(b)(iii)** Candidates needed to get both responses correct to gain the mark available.

# A193 Additional Applied Science – Work-related Portfolio

## General comments

This is the first assessment session for the work-related portfolio for unit A193. The work-related portfolio consists of three elements worth a total of 120 marks. The tasks are set by OCR and taken under controlled assessment conditions. The elements are classified as for the previous specification, but the marking criteria have been amended.

- Standard Procedures (x4) 24 marks
- Suitability Test (x1) 48 marks
- Work-related Report 48 marks

The majority of centres followed the new criteria well although there was some generous assessment particularly in the standard procedures and in the work-related report.

Many candidates produced good quality practical work, which was well presented and suitably assessed. Interesting work-related research was seen. Centres need to ensure, however, that they clearly understand the difference between primary and secondary sources. The interest and enthusiasm of many candidates has been portrayed by highly detailed and often original portfolio work. Well done to these candidates.

The samples for moderation were selected electronically and moderators found that the majority of centres despatched the requested samples efficiently. Most samples were clearly labelled with both centre number and candidate number, and most work was attached to the new record card, although moderators did receive several samples without the marks adequately recorded. It is essential that the record card is fully completed and attached to the candidates' work.

Several clerical errors where the marks sent to OCR were not the same as the marks on the record card were noticed and corrected. Centres are advised to check their recording and arithmetic for all submissions of practical assessment marks, and to check particularly that marks awarded for the standard procedures are allocated correctly.

Most portfolio work was well organised and presented using treasury tags, which allow moderators to read and locate the work easily. Annotation of candidates' work in the form e.g. Aa 6 (i.e. the marking criteria reference) is useful to moderators in allowing them to locate the work easily and to see the assessment decision for both the assessment strand covered and the level reached.

To support centres with their candidates' portfolio assessment, OCR offers a free coursework consultancy service where up to three full or part-completed marked portfolios will be checked and the centre issued with a report on the assessment decisions completed by the centre. Where a centre's assessment decisions were not in agreement with those of the moderators, centres are encouraged to use this service for future submissions.

## Standard Procedures

For 'Element 1: Standard Procedures' candidates need to follow four standard procedures from a choice of eight, which are posted on OCR Interchange. Each standard procedure is marked out of 6 marks giving a total of 24 marks for this element.

Each standard procedure is assessed under three strands:

- collect primary data
- process primary data
- manage risks when carrying out standard procedures.

The majority of centres used the set standard procedures as directed on Interchange with the full range of these being seen in the candidates' portfolios which were moderated. Good practice was seen by centres where the instructions given by the centre were attached to candidates' work and, clearly, candidates were suitably directed to access the requirements of the marking criteria.

**Strand A:** for the higher mark bands there should be no errors or inaccuracies in recording; units need to be correct and evidence of consistency of significant figures should be evident. Either repeats need to be completed as appropriate to show accuracy of results or evidence of some comparison of candidates' outcomes to staff results should be provided.

**Strand B:** processing of data for Strand B needs to show well drawn graphs where appropriate, with suitable scales. It is not always appropriate to plot graphs or to display data as bar charts, so mathematical techniques can be used. Means, ranges, percentage errors etc., from class as well as individual data, can be used to give candidates opportunities to demonstrate their mathematical skills. Moderators found that assessment was generous for the higher mark bands when minimal evidence was seen or when answers contained errors.

**Strand C:** managing risks during experimental work should allow candidates to demonstrate how they managed the risks of the experimental procedure and how they worked safely whilst carrying out the set procedures. Their work should include both a detailed and workable risk assessment - with basic comments for the lower mark bands, up to a critical evaluation for the higher mark bands. This is a new approach for this specification and centres need to ensure that candidates complete more than just a risk assessment. Assessment was often generous for this strand.

### Suitability Test

For 'Element 2: Suitability Test', candidates are required to complete one suitability test from a choice of three, which are posted on OCR Interchange.

The Suitability Test is assessed under six headings, Strand A to Strand F.

- Strand A Researching the purpose of the test
- Strand B Planning and risk assessment
- Strand C Collecting data
- Strand D Processing and analysing data
- Strand E Evaluating
- Strand F Justifying a conclusion

Each strand is assessed out of 8 marks, giving a total of 48 marks for this element.

The range of suitability tests which were available on the web site worked well and examples of all were seen in the candidates' portfolios which were moderated. No one test was considered to be the most popular.

Centres need to ensure that where candidates are aiming for higher mark bands that they do explain the purpose of the test and support their aims by suitable selected research; that their plan is comprehensive and well structured; that they have collected suitable data to allow a range of processing and analysis, and that the work has been evaluated to a high level. The final conclusions need to link to the purpose of the test and to explain fully how 'suitable' the test/material /device chosen has been.

## **Strand A**

The aim of this strand is for candidates to demonstrate that they can collect and use secondary information to describe the purpose of the material, device or process, and its relevance in the workplace. This session, for up to 6 marks, candidates adequately identified and researched the vocational aspect of their chosen test. Suitable descriptions of the desirable properties or characteristics were included, although future candidates need to ensure that they do not research just one property or test, as this was a common problem. Practical work focussing on many repeats, and not looking at the range of properties for suitability, does not adequately support the requirements of a suitability test. Care needs to be taken that centres do not interpret this as an investigation. For 8 marks, candidates were not always giving a full description of the desirable properties with an explanation of why these were necessary. Work assessed at this level needs to be sufficiently detailed and appropriately written to show higher level scientific understanding.

## **Strand B**

The aim of this strand is to assess how candidates can manage the risks for their experimental procedures, and show their ability to plan and organise their procedures to demonstrate the suitability of the chosen material device or procedure. Candidates need to include a workable risk assessment related to all aspects of their work, concentrations of solutions and more focused information is needed for the higher marks. Lengthy generic risk assessments are not necessarily an indicator for higher marks. Good practice was again seen where centres allowed candidates the opportunity to plan their own experimental work and complete a variety of different tasks. Candidate autonomy and independence would further confirm the higher assessment decisions. Higher level candidates should also be encouraged to explore more imaginative improvements to apparatus and techniques and not merely focus on repetition as a means to increase reliability of conclusions. The quality of written communication for this strand is based on how the plan is written and understood, alongside the scientific content in the planning.

## **Strand C**

Candidates for this strand need to collect and record sufficient data to support experimental procedures in order to demonstrate the suitability of their chosen material, device or procedure. Good practice was seen by centres where the quality of the data was evidenced by staff annotation. For 6 marks, candidates need to be devising their own format, which can be further supported by staff annotation. Correct recording of data with units, carrying out appropriate repeats and showing that data is suitably precise and reliable needs to be demonstrated by candidates gaining 6 marks. For 8 marks, centres need to ensure that the data has a high level of precision and reliability and that it is linked to the requirements of strand A. Moderators found that several candidates were not referring back to all of the criteria they had referred to at the start.

## **Strand D**

The aim of this strand is for candidates to demonstrate that they can process and analyse the data they have collected to support the desirable properties or characteristics of the material, process or device they have chosen. Higher level candidates need to ensure that they collect sufficient data from their research and experimental work to enable them to produce high quality graphs or charts or suitable mathematical techniques. Graphs assessed at 5 marks or above should be well-produced with minimal errors. For 7-8 marks, a quantitative indication of the uncertainty of the data is needed. Analysis of data collected needs to include a range which will support the suitability of the material etc. Again, one set of repeated data and one test is insufficient to support the higher marks. Candidates need to take care that they link their

outcomes with the purpose of the test, even for 3-4 marks. All trends and patterns need to be interpreted and supported quantitatively for the higher marks.

### **Strand E**

This strand allows candidates to evaluate the methods used, the quality of the data and the management of the risks. In addition, assessment is linked to how the candidates have structured their information and the appropriate use of the relevant scientific terminology. The marking criteria have been structured to challenge the higher level candidates. Centres need to be aware of the key words given in the marking criteria i.e. 3-4 marks 'comments', 5-6 marks 'discuss', 7-8marks 'evaluate'. Several candidates were only describing methods and stating improvements. For 7-8 marks, evaluations with explanations are needed for both methods and data. Candidates may link any variation or quality of data to relevant limitations of the experimental techniques and with the suitability of the material, device or procedure. Both discussion of procedural methodology and flaws in the experimental design should be included. Many centres awarded 8 marks to candidates for managing risks successfully. For the higher marks, however, the safe running of the experimental work needs to be supported by a high quality risk assessment. Although moderators aim to support centres' marking of this strand, assessment was generous for 7-8 marks.

### **Strand F**

The aim of this strand is for candidates to show their ability to use the data they have collected and their scientific knowledge to conclude the suitability of their chosen material, device or procedure. Candidates need to draw correct conclusions from the overall pattern of their results, clearly linked to the purpose of the test. In addition for 7-8 marks, a discussion of any limitations, such as a range over which the suitability is applicable, is required. Simple statements were seen but not the depth needed to support the higher mark bands. For the quality of scientific communication assessed in this strand, centres, again, need to be aware of the key words given in the marking criteria e.g. 'limited', 'adequate', 'full' and 'effective', in addition to the non-persuasive and persuasive manner of the presentation. Care needs to be taken that candidates do not automatically gain 6 marks. For 8 marks, the information should reflect a high quality piece of writing that is well presented and structured, and can support full and effective use of relevant scientific terminology. The key to a high level conclusion is that it is suitably persuasive and fully suits the purpose. There was a considerable amount of generous assessment for this strand in this session.

### **Work-related Report**

For 'Element 3: Work-related Report', candidates are required to complete one Work-related Report, which is posted on OCR Interchange.

The Work-related Report will be assessed under six headings, Strand A to Strand F.

- Strand A Collecting primary data (information)
- Strand B Collecting secondary data (information)
- Strand C The work carried out
- Strand D Skills used in the work place
- Strand E Scientific knowledge applied in the workplace
- Strand F Quality of the presentation

Each strand is assessed out of 8 marks, giving a total of 48 marks for this element.

The work-related task posted on the website seemed to allow centres to continue to build on any vocational links or organised visits that they may have made previously. Candidates, generally, were completing suitable work-related reports, with at least one primary source. Centres need to

ensure, however, that candidates are aware of the difference between primary and secondary research.

Centres need to be aware of the descriptors used in the marking criteria for strands C, D and E. The marking depends on how the candidates have used their information i.e. 1-2 marks when there is a relevant statement, 3-4 marks when candidates are identifying, 5-6 marks when they are explaining, and 7-8 marks when they are analysing. The higher level descriptors are much more challenging and candidates need to take care that they are not just increasing the quantity of descriptions and explanations rather than analysing the relevant factors involved.

### **Strand A and Strand B**

The aim of these strands is to demonstrate that candidates can collect and select suitable information from both primary and secondary sources, and reference these sources correctly and accurately.

Primary information is that which is collected by the candidate directly from their own observations and experiences. It is hoped that centres will be able to give candidates the opportunity to collect data either from a visit or from a practitioner. If a face to face opportunity is not possible, candidates can obtain their data from telephone conversations, letters or electronic means of discussion. Secondary information is information that has already been collected and presented by someone else for some other reason than to use for this work-related report. There is a wide range of secondary information that can be accessed from published material e.g. books, policies, market research results etc., as well as material on the internet and candidates' own notes.

For both strands A and B, candidates need to show evidence of suitable selection of their collected information throughout their report; 7-8 marks for strand A cannot be awarded where details of an interview is just attached to the back of a report. Many candidates simply referenced several websites but this is insufficient for full marks to be given. References need to be accurately recorded or identified throughout the text. Detailed referencing should show ISBN numbers for books, full web site addresses and dates of internet access for online sources and details of the source/date/any further relevant details for primary sources. Many candidates did not record any information on their primary source and moderators needed to locate names within reports in order to confirm these sources. A fully detailed reference should allow the reader to be able to access the information used directly from the reference quoted; a bibliography here also supports good practice. Assessment was often generous for these strands.

### **Strand C**

The aim of this strand is to assess how candidates use their research to report on the organisation or work place chosen, the purpose and implementation of the work taking place as well as factors influencing the location and effect on society.

Candidates need to appreciate that the use of their own words are preferred to excessive downloaded information. Where information is taken directly from websites it is good practice that candidates include references directly beneath this extracted data. Care needs to be taken that where candidates have focused on a particular job role, that they do sufficient research in order to obtain information to support Cb and Cc. As well as the purpose of the work, candidates need to include how the work fits into the wider picture. The level of understanding of the topics needs to be reflected in the marking requirements i.e. 'identify', 'explain' and 'analyse'. Generous assessment was often seen here.

## Strand D

This strand is to assess how candidates use their research skills from both primary and secondary sources and their scientific understanding to find out about technical skills, expertise, qualifications and personal qualities used in the workplace.

Candidates gave several good descriptions of technical skills applied in the workplace, and good practice was seen where candidates had focused on particular examples and had fully described the skills. The addition of visual material helped some candidates explain their chosen skill. However, assessment for 7-8 marks work should not be generic and needs to link directly to the chosen organisation and include reasons why. Why and how expertise is needed, as well as explanations of the relevance of the personal qualities and qualifications needed in the job roles is required for Db. Material needs to be suitably selected from the candidate's research and link directly to the organisation the candidate is studying. Assessment for 7-8 marks was generous for this strand as candidates were explaining but not evaluating.

## Strand E

The aim of this strand is to assess how candidates use their research skills to understand how scientific knowledge is applied in their chosen job role. In addition, candidates need to recognise how different factors affect the work done in organisations that use science.

There were many portfolios where candidates were linking the scientific knowledge to the chosen job role, and good examples were seen where scientific knowledge was explained in relation to nursing and midwifery. Centres, however, do need to watch the level of assessment for Ea. It is important that candidates do not just cut and paste pages of interesting information but select the relevant information which directly underpins the job role chosen. The reports of higher grade candidates should be showing a suitable selection of focused, detailed information. For strand Eb, centres need to ensure that candidates are explaining or analysing the impact of financial or regulatory factors. Explanations rather than descriptions are necessary for 5-6 marks and lengthy descriptions are not always indicative of 6 marks. Health and Safety continues to be a useful regulatory factor. However, the impact of such regulation on the work described still needs to be focused on. There was evidence that in some candidates' work, the marks awarded for strand Eb could not be upheld by the moderators as the financial and regulatory factors were merely identified, with no clear link to their impact on the job described. Candidates who wish to access 8 marks need to check that their work is fully reflective of the higher level criteria.

## Strand F

The aim of this strand is to assess how candidates can organise and write a scientific report using relevant scientific or technical vocabulary and suitable visual material.

Candidates need to carefully read and use the marking criteria for the assessment of this strand on the *quality* of the presentation. For strand Fa, the key areas for gaining 5 marks and above are: relevance, organisation, structure and suitability for purpose, as well as contents and numbering. Candidates should not, however, be automatically awarded 6 marks just for including contents-listing and page numbering in their reports. Care also needs to be taken when awarding 8 marks for strand Fb in that the visual material should be suitably 'informative' and used appropriately; suitable labelling and related notes written by the candidates could support the higher marks. Graphs and charts may be used to convey relevant information. Again, when awarding 8 marks, candidates need to be showing full and effective use of appropriate scientific terminology. Spelling, punctuation and grammar should be almost faultless. Candidates gaining high marks need to be producing accurate scientific reports written to a high standard.

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