GCSE

Additional Applied Science

Gateway Science Suite

General Certificate of Secondary Education **J251**

OCR Report to Centres June 2015

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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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OCR REPORT TO CENTRES

A191/01 Science in Society (Foundation Tier)

General Comments:

Most candidates were well prepared for this paper and made a very 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 majority of candidates made an excellent attempt at answering these questions and were well prepared as to how to structure their responses.

The trend for candidates to write outside the allocated area continues. In the past, candidates have tended to 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. Now, the trend is to write on additional answer booklets. This practice should be discouraged. All too often this results in rambling responses that drift away from the original question. Candidates need to be taught and encouraged to write concisely and only use the space provided for their answer.

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.

Comments on Individual Questions:

Q1(a)
Most candidates scored the first easy mark to this question by correctly identifying the tennis club and leisure centre. Fewer candidates gave a good answer such as coaching or training and instead gave a more vague response such as tennis courts or exercise machines.

Q1(b)
Part (b) was also well answered with most candidates scoring both marks. The most common error was to draw more than one line from each box. This negated the response and the candidates were not awarded the mark.

Q1(c)
This question was slightly more challenging with good responses inferring that the Health & Safety regulations were to ensure that no harm would come to the trainee. Weaker responses often simply referred to the maintenance of the equipment.

Q1(d)
This question required the candidates to understand the meaning and differences of the three words “lifestyle, health and fitness”. A significant number of candidates simply used the same words to answer the question, such “health is having a healthy lifestyle.” Good answers gave specific examples such as smoking and drinking for lifestyle; injury, illness or disease for health; and strength, stamina or flexibility for fitness.

Q2
This question was overlap with the higher tier paper.

Q2(a)(i)
This question discriminated well between candidates of differing ability. Many scored both marks for providing a correct answer but a single mark was awarded for evidence of a correct method even when the final answer was in error. It cannot be stressed too strongly that candidates are well advised to show their working in order to increase the possibility of salvaging at least one of the two marks available. The most common error was simply to divide 80 by 2 and get the answer of a BMI of 40.

Q2(a)(ii)
Most candidates answered this question well and examiners used an error carried forward to ensure that candidates who had answered 2ai incorrectly, could still score this mark. However candidates who gave an answer to the previous question of 40, and stated that this was overweight rather than obese, were not awarded the mark.

Q2(b)
A wide range of responses were accepted as answers to this question but all had to be personal details specific to Martin. Some candidates failed to read the question carefully and repeated the example from the previous question such as BMI, weight or mass. These answers were not credited. Good answers included details such as age, date of birth and medical history.

Q3
This question proved to be quite difficult for most candidates. Good answers gave reasons for justifying Shelly's decision and then went on to give reasons to explain why the other possibilities were incorrect. Credit was given for a correct reference to the meal and the expectation that glucose levels would rise after a meal and then start to fall. Evidence to suggest that the graph did not show oxygen, carbon dioxide or lactic acid was that these would not be expected to rise and fall after a meal and that the person had rested and therefore the production of lactic acid would not take place. Most candidates scored one or two marks on this question.

Q4(a)(i)
Most candidates successfully identified the correct answer of the 15^{th} percentile. The most common error was to read the axes the wrong way round and end up with an incorrect answer of the 97^{th} percentile.

Q4(a)(ii)
Only the most able candidates managed to gain credit on this question, by stating that 85% weighed more and 15% weighed less. Examiners used error carried forward so that candidates who incorrectly answered the previous question were not penalised twice for the same error.

Q4(a)(iii)
Examiners used considerable leniency when marking this question and any suitable answer, correctly qualified, was credited. Good answers included "no need to worry as the baby is only just below average", or that "parents should worry as the baby was underweight."

Q4(a)(iv)
Most candidates correctly identified the 50^{th} percentile as the percentile with the greatest number of babies.

Q4(b)
APGAR or any other suitable measurement was accepted for this answer. Good answers included height, developmental tests, or heartbeat. The most common incorrect response was weight but this had been excluded from any suitable answer by the wording of the question. Candidates are well advised to read questions most carefully to avoid errors of this kind.

Q5
This question should have been straight recall from the specification. However, few candidates scored full marks. Candidates could have scored six marks for simply correctly referring to three of the four areas specified. However, it was clear that most candidates did not understand words such as *accreditation* and *common practice*. Most candidates who did score, did so by referring to Health & Safety and training staff. There was little evidence that candidates understood the need for equipment to be checked and a common misconception was to make sure that it would work rather than write about precision and accuracy.

Q6(a)(i)
This question discriminated well and credit was given for understanding that the water was acid and then for correctly stating that the blue litmus turned red. Both marks were awarded independently so candidates who stated that the water was alkaline because blue litmus had turned red, were awarded one mark.

Q6(a)(ii)
Most candidates failed to score on this question and most candidates simply guessed at one of the three responses. Only those who knew the correct answer went on to explain why this was a qualitative test. Good responses included that no numbers were involved or that it was a yes or no test.

Q6(b)
Even more able candidates struggled with this question and it was clear that an element of guesswork was involved. Most scored a mark for identifying that C was the river water but few scored either of the two marks for completing the table correctly.

Q7(a)
Although this was an overlap question, the quality of responses were not always as good as expected. Most candidates scored their marks by stating why they thought the pollen grains were the same. Good answers referred to the shape and the appearance of the spikes. However, fewer candidates went on to explain or describe why the pollen grains might be different. Very few noticed the round structures on the surface of the pollen grains in the EM. However, the most common error was failing to understand the scale and realising that both structures were the same size. Most thought that size was a difference rather than a similarity and consequently this did not score.

Q7(b)
Most candidates scored one of these two marks but very few went on to score both. It was pleasing to see that the vast majority candidates followed instructions and wrote down four ticks and did not jeopardise scoring the marks by having more or less responses.

Q7(c)
This questions was an easy end to the paper and almost all candidates scored at least one mark with many scoring both of them.

A191/02 Science in Society (Higher Tier)

General Comments:

The paper produced a good spread of marks although few achieved the highest mark. There was no evidence that candidates struggled to complete it on time and most candidates attempted all the questions.

Most candidates are now tackling the six-mark extended-writing questions better, with more trying to structure their answers. There are still many that do not address the question, just writing anything they know that might be relevant in order to fill the space. This means that they 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 ensure that they have included something about all the parts asked for in the stem of the question, including more details and scientific points in their responses.

Many candidates did not make full use of supplied data in their level of response answers and most struggled to use numerical data such as percentages and magnification scales correctly.

The meaning of the scientific terms required for this specification were not well known, with many candidates just guessing based on the words present in the term.

Comments on Individual Questions:

Q1

Most candidates could correctly substitute values into the formula given in **1(a)(i)** and then evaluate to find the value for the BMI. Not squaring the value for height was the most common error. Many then went on, in **1(a)(ii)**, to correctly identify this BMI as representing a healthy weight (or to carry forward their error in the first part to identify it as obese). Underweight was the most common error in this part.

In **1(b)**, most were able to identify some relevant pieces of information that the nurse would need to collect prior to an operation. Some candidates did not really address the question, giving answers more appropriate to a fitness test, such as diet, exercise or fitness levels. Others used information which had already been used e.g. height or weight.

Q2

There were some good answers to the labelling of the heart in **2(a)** with candidates making good use of the given labels. The valve and the atrium were the best known with vein and ventricle respectively being the most common errors. Artery or atrium were the most common errors in labelling the ventricle, and vein and valve the most common errors for artery. The vein was the least well known with all other alternatives commonly appearing.

Most responses to **2(b)** ignored the structure and gave general descriptions of the function such as ‘allows blood to flow in/out of the heart’. The prevention of backflow by the valve was the best known. References to thickness of walls, pressure or better blood flow were rarely seen.
In **2(c)**, most candidates thought that each substance must be transported by a different component of the blood, often correctly identifying that oxygen is transported in the red blood cells and one of the other substances transported in the plasma. Lactic acid was correctly identified as being in the plasma most frequently, with platelets as the most common alternatives. Many candidates thought that carbon dioxide is transported by the white blood cells rather than the plasma.

Q3

Most candidates could identify at least one local health care organisation for **3(a)**. Some did not go on to describe what they did and others chose either non local organisations (such as the National Health Service or charities) or organisations not providing health care such as gyms. In **3(b),** most were able to describe the role of two health care practitioners. A few described a role without linking to a specific practitioner and others chose personal trainers or coaches. The role of the NHS outside the local community was less well known for **3(c).** The most common correct response was the provision of free health care.

In the level of response question in **3(d)**, most candidates showed that they understood why patients need to be informed of the risks before undergoing an operation. Responses were often restricted to lower levels due to lack of detail or limited use of the data provided. Many candidates were distracted by a misunderstanding of the meaning of the 85% increased risk on Friday resulting in them concentrating on the advice not to have the operation on a Friday. Benefits of having the operation were usually limited to increased survival and the risks to possible death, especially on a Friday.

Q4

There were some good descriptions of the collection, preparation, storage and analysis of the crime scene blood samples, with the best responses clearly explaining why the procedures were carried out in this way. Candidates clearly knew about crime scene procedures and most were able to use this knowledge to focus on blood samples. Others did not focus on the blood as the question asked, instead writing a general account of sample collection, including hair, fingerprints, footprints etc.

Q5

In **5(a)(i),** most candidates could correctly identify one piece of equipment used to measure the volume of the water from the results given, with many identifying all three.
Candidates found it more difficult to justify their choice for **5(a)(ii).** Most marks were gained for justifying the choice of the conical flask as the equipment used for the more rounded volumes. A few were able to recognise that the extra graduations on the measuring cylinder allowed for greater precision.

In **5(b),** candidates struggled to explain the meaning of random and systematic errors. Most just used the more general meanings of random and systematic, with explanations of systematic in terms of computers or intended errors being common.

Question No. 6

The level of response question in **6(a)** produced some good responses comparing both the similarities and differences between the drawing and the electron micrograph of the pollen grain. Some responses were limited by only considering evidence in either support or contradiction of the conclusion. Few candidates understood the meaning of the magnification marked underneath the diagrams with most concluding that this showed that the grains were different in size instead of using it to show that they were very similar in size.

In **6(b)**, most candidates were able to identify at least one disadvantage of an electron microscope with expense, inability to use with living specimens and lack of portability being the most popular choices. Common errors included inability to zoom in, lack of magnification and inability to separate mixtures. Some described advantages instead of disadvantages.

Most candidates could identify at least one difference between an electron micrographs and chromatograms for **6(c)**. A few candidates only made one choice.

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

General Comments:

This paper performed very similarly to its predecessors, with many candidates able to earn at least half of the marks. It was good to find that even weak candidates felt able to answer every question, even if they didn't always manage to earn the marks.

As ever, Foundation Tier candidates are not good at doing calculations, and often manage to misread the question, preferring to answer a question of their own devising instead.

Comments on Individual Questions:

1 Most candidates correctly identified the loading of the rope for part (a). The calculation of part (b) was often ignored by weak candidates; some strong candidates didn't read the question carefully enough and squared the diameter before writing it in the answer space. It was pleasing to find that many strong candidates were able to complete the calculation correctly. Although most candidates were able to identify one safety property for part (c) (usually quality), only a minority identified the second one (consistency).

2 Part (a) was poorly answered by most candidates. Many were unable to name a composite material, often supplying an alternative material for skis; aluminium was a popular incorrect answer. Few candidates could describe the general structure of a composite material for part (a)(ii), let alone the structure of their chosen composite material (often glass fibre). For part (b), candidates were required to state and explain one important property of the skis. Most candidates earned a mark for their explanation, but only a minority managed to name a property for the second mark. Part (c) proved to be very straightforward, with most candidates being able to link each type of material with its important properties.

3 This six-mark question was about the use of acoustic materials. Although most candidates correctly described the wood as reflecting the sound, a significant number of candidates assumed that the holes in the polystyrene tiles were there to let the sound escape from the auditorium. A few candidates clearly remembered a similar question in a previous paper and assumed that the wood and tiles were there to stop sound getting into the theatre from outside. Although many candidates were able to correctly state the effect of the materials on the sound from the stage, only a minority bothered to state the effect that this would have on the sound heard by the audience.

4 It was good to find that many candidates could correctly identify the position of the image for part (a)(i). Similarly, many candidates were able to state and explain a suitable property for the tube in part (a)(ii), although some confused the reason with the property. Part (b) was less well answered, with few candidates able to state the type of lens in part (b)(i), and only a minority of candidates were able to give a reason for their choice. Most candidates, despite the stem stating that the lens was made of plastic, chose to state another material (such as glass) for the eyepiece lens. Although some candidates knew that red and green light look yellow for part (b)(ii), only a minority could use the data provided to explain the action of the filter. Too many candidates ignored the data altogether and tried to explain reasons for shining yellow light on a stage.

5 Many candidates managed to earn high marks for this six-mark question about the production of milk. To earn high marks, they had to discuss husbandry of the goats, treatment of the milk and its delivery to the supermarket. Candidates often glossed over the treatment aspects, or made vague statements about "cleaning the milk" or even suggested that extra nutrients and additives were mixed into it.

6 It was good to find that the majority of candidates were able to correctly calculate the amount of mixture required to spray the trees for part (a). However, only a minority of candidates could calculate the mass of copper sulfate required for part (b).

7 About half of the candidates were able to complete the word equation of part (a) correctly. The six-mark question of part (b) also appeared on the Higher Tier paper, so was aimed at candidates working at grades D or C. Most candidates ignored the stem and described how to prepare crystals of a soluble salt instead of an insoluble one, earning at most a couple of marks. Too often, they could describe a step without bothering to explain what it was for. Some weak candidates even **started** their procedure with crystals of magnesium carbonate.

8 Most of this question also appeared on the Higher Tier paper; as expected, many weak candidates failed to earn many marks for it. For part (a), only a minority of candidates had sufficient command of language to explain why the data might be inconclusive. Although some candidates were able to state and explain a sensible inference from the data in part (b), many ignored the data completely and gave their own ideas about the source of the food poisoning. Most candidates were able to state one type of microorganism for part (c) and many could state both. Similarly, many candidates were able to state a food made by microorganisms in part (d), as well as name the microorganism which was used in the process.

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

General Comments:

A full range of ability was seen in this paper. There were, however, a significant number of candidates for whom Foundation Tier of entry would have been more accessible.

An important message that centres must pass back to their students is to emphasise the importance of clear handwriting and to follow the guidance about writing within the framework of the paper (or using additional sheets) as scripts are scanned and marked on-line. There is still evidence of candidates not following this advice and in particular candidates writing below the allocated space for an answer.

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.

At this level, in a Higher Tier paper, candidates need to be able to write using scientific terminology and to be precise in their answers. There were a number of instances where candidates wrote everything they knew about the topic covered in the question but failed to gain marks as they had not answered the question set. It is vital that the candidate reads each question carefully and then looks at the mark allocation, before attempting an answer. It is not good practice to repeat the question as the introduction to an answer.

Comments on Individual Questions:

Q1(a): Careful reading of the question would have given the candidates guidance in completing the balanced symbol equation for the reaction stated. Many candidates found difficulty completing the equation with a significant number of no responses seen.

Q1(b): This practical procedure is covered in *Topic B4.3 :Making useful chemicals* and it would be hoped that candidates were able to attempt this type of practical themselves as part of their course structure. It is also one of the standard procedures that candidates are expected to undertake. A significant number of candidates confused making a soluble salt with the procedure in the question which asked for a sample of an insoluble salt. Again, careful reading of the question gives a clear starting point for the procedure and that it is an insoluble salt that is being made. There were, however, good examples of clear procedures with explanations from a number of candidates.

Q2(a): Common responses to this question were that all the victims ate at more than one place or that they ate at different places which does not answer the question set.

Q2(b): This was well answered with candidates using data to justify their answers.

Q2(c): Many candidates gained one of the two marks on offer by correctly stating that the bacteria grew/ reproduced on the food but few went on to explain that bacteria produce toxins and so failed to gain the second mark. Bacteria ‘spreading’ was insufficient to gain credit. A significant number of candidates failed to read the question carefully and gave details of bacteria causing food poisoning with details of symptoms rather than relating their answer to how the bacteria cause the poisoning.

Q2(d): This was well answered with many candidates gaining full marks.

Q3(a): Few candidates gave the correct response of tension with weight being a common answer.

Q3(b): It is pleasing to note that the majority of candidates were able to successfully carry out this calculation and gain both marks. A common error seen was a failure to square the diameter of the rope when calculating the cross sectional area. An error carried forward was allowed for a correct calculation of breaking strength using this incorrect cross sectional value for 1 mark.

Q3(c): Many candidates gained a mark for a correct reference to safety but then did not go on to give any further detail to gain the second mark.

Q3(d): Candidates who were not familiar with the definition of plastic behaviour gave an incorrect answer of 6kN which is where the plastic broke on the graph.

Q3(d)(ii): This question was a good discriminator. A common misconception seen for the difference between elastic and plastic was that elastic stretches but does not break and that plastic stretches and breaks.

Q4:This question was a good discriminator with many candidates being able to correctly name another composite material but fewer being able to describe its structure and link this to its properties. Failure to read the question carefully meant a number of candidates used carbon fibre again as their example and linked this to another object e.g. ski helmet.

Q5: A full range of responses were seen in candidates' answers to this question. Good candidates were able to link a suitable material to a specific location in the theatre and then explain why this was a suitable material for that particular location. Weaker candidates were able to link a suitable material to a location but without any explanation.

Centres should practice six-mark Level of Response questions by encouraging candidates to make links in their answers rather than a series of unrelated statements i.e. this is suitable here because ….. or this is done because ….. .

Q6(a): This was generally well answered. Ray lines needed to be straight and continuous to gain marks and they needed to meet at the reflectors. A common error seen was that of diagrams showing total internal reflection.

Q6(b)(i): This was a well answered question showing good recall. A common error was 'reflects' rather than 'refracts' the light in the third space.

Q6(b)(ii): Few candidates, having correctly identified yellow as the correct colour, then went on to correctly identify a reason for this colour to gain the second mark.

Q7: Candidates must read a question carefully and plan their response before putting pen to paper. This question clearly asks the candidate to describe and explain 2 distinct things related to the production of milk for sale. They are asked to describe and explain how the milk will be tested before sale and then how the milk is processed before sale. Many candidates went no further than stating that the milk had to be tested to ensure that it was safe to put on sale and did not name or describe a test that could be done on the milk and so could only score at the first level. Some candidates named and described pasteurisation but failed to state why milk is pasteurised again restricting their marks to the first level. Candidates must fulfil both parts of the question to access the highest level. A significant number of students related their answer to selectively breeding goats to produce high milk yields and there were also some references to male goats producing milk for sale!

Candidates should be encouraged to read their answers and check back to the question set to confirm that their answer relates to what the question has asked them to do. This is particularly important with these longer six-mark answers.

Q8(a): Very few candidates gained both marks on this question. A number did correctly calculate that the total volume was 5L but could not take the calculation any further.

Q8(b): This was well answered with most candidates correctly calculating 30L.

Q8(c): Again, not carefully reading the question proved to be the downfall for many candidates. They are asked to choose the most suitable grade and to link this with the reason for choosing it with a single line. Unfortunately, many candidates drew 3 lines linking each grade to a particular reason which is not what the question has asked them to do.

A193 OCR Repository

General Comments:

Centres with candidates of varying abilities continue to support this applied science qualification. The interest and enthusiasm of many candidates has been again portrayed by highly detailed and often original portfolio work. The work related portfolio consists of three elements worth a total of 120 marks. The guidance for the tasks are provided by OCR and taken under the stated controlled assessment conditions. The elements are assessed using the set marking criteria for this specification. The work-related portfolio consists of three sections:

- Standard procedures x4 marks out of 24
- Suitability test x1 marks out of 48
- Work-related report x1 marks out of 48

Overall assessment by centres continues to improve in this the third assessment session for the revised specification. The standard procedures still remains an element where marking was found to be generous in comparison to moderation decisions; 5-6 marks were being awarded for work which is not of a sufficient high scientific level and standard. Good quality well-presented and suitably assessed portfolios were seen by many. Well done to these centres.

The samples for moderation were selected electronically and in the majority samples were returned efficiently. There were still however, a number of centres who had not completed the applied record card and had only given a total mark for each element. This makes it extremely difficult for moderators to check the individual marks for each strand. It is essential that the record card is fully completed and attached to the candidates' work.

Clerical errors where the marks sent to OCR were not the same as the marks on the Applied Record Card were still seen. Centres need to note that this can be minimised by the use of the electronic record cards which averages and adds all the marks for the portfolio work, this is recommended. Centres are again asked to ensure that candidate numbers are written on all work presented for moderation. The use of treasury tags and not plastic wallets is also recommended as this allows moderators to easily read and locate the work. Annotation of candidates' work in the form e.g. Aa 6 (i.e. the marking criteria reference) is also recommended. Any additional teacher comments do support the moderation process and is appreciated by moderators.

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

Comments on Individual Elements

Element 1 Set of Standard Procedures:

Candidates need to submit four standard procedures from a choice of eight which are posted on the OCR website. 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:

- Strand A Collect primary data
- Strand B Process primary data
- Strand C Manage risks when carrying out standard procedures.

The standard procedures carried out by candidates were generally suitable but it is recommended that centres enclose a copy of the task sheets or instructions given to their candidates. The OCR sheets provide a brief but centres need to provide experimental procedures based on the brief provided. Centres need to ensure that the instructions given to their candidates suitably allow them full access to the marking criteria. In several places the marking criteria refers to a skill as 'specified by the procedure' so if a mean is to be calculated or graph to be drawn the instructions given to candidates needs to state this. When allocating marks this should be done on a six mark basis for each skill for each standard procedure, then an overall mark out of six derived for each activity.

For **strand A**, candidates do not need to devise their own format for the recording of their results, but they need to ensure that accuracy is confirmed and a suitable range of data is provided to support top mark bands. Many centres are now providing evidence to suggest that high scoring candidates had recorded their data accurately, though it is still recommended, where appropriate, that candidates do repeat readings to ensure 'a full range' of data has been recorded. For 5-6 marks there should be no errors or inaccuracies in recording, units need to be correct and evidence of consistency of significant figures should be evident. The recording of one or two measurements or weighings does not suitably reflect a demonstration of 'full range' of data.

For **strand B**, many centres are now including in their procedures opportunities for candidates to perform a suitable range of mathematical and graphical techniques to process quantitative data obtained from the procedure provided. Means, ranges, percentage errors etc., from class as well as individual data can be used to give candidates opportunities to demonstrate their mathematical skills. Examples of more specific techniques have included, calculation of refractive indices for different types of glass, in vital signs monitoring changes before and after exercise, to generate data which can be processed to give line graphs. For freshness of milk if the time taken for the resazurin to turn colourless was plotted over the age of the milk, candidates working at higher levels could have calculated a rate of colour change as an inverse relationship, calculations of theoretical, actual and percentage yields and their variations for the inorganic preparations can give candidates opportunities to demonstrate higher level skills. Candidates still need to ensure that data is plotted carefully and where bar charts have been drawn it was pleasing to see the inclusion of range bars to enhance the display of the data and increase the level of demand for the candidates. Simple bar charts however, were still often poorly drawn and labelled by many candidates.

For **strand C**, risk assessments were provided in most scripts seen, however a risk assessment alone does not support an evaluation of how risks were managed during the procedure. Good practice was seen from centres where detailed but usable risk assessments were provided by candidates, which in addition was supported by evaluative comments on the outcomes of the way the risks were managed during the session. Candidates just recording how they followed the risk assessment and what happened during the practical should not be credited with full marks.

All eight procedures were seen and moderated this session. Good practice was seen where the instructions given by the centre clearly were suitably directed to access the requirements of the marking criteria.

Element 2 Suitability Test

Candidates are required to complete one suitability test from a choice of three which are posted on the OCR website. Evidence from portfolios moderated indicated these worked well and examples of all were seen. This session the thermometer and the mouthwash were the most popular. The Suitability Test is assessed through six strands, each with a mark 0 to 8, giving a total of 48 marks for this element.

- 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

Please continue to note that candidates aiming for the higher mark bands do need to explain why the chosen properties or characteristics are necessary and select and relate relevant secondary data. Plans need to be comprehensive and high level candidates need to be given the opportunity to work on their own planning so they are able to demonstrate independent thought. One test is insufficient to support 'the suitability' of the chosen device, material etc. Final conclusions need to link to the purpose of the test and to fully explain how 'suitable' the test/material /device chosen is.

It is important that all candidates concentrate on more than one chosen property for this element. It is necessary to find the suitability of the material, device or procedure chosen and this cannot be fully achieved by focusing on only one specific property, no matter how complex the experimental work may be.

Good practice was seen where centres had clearly recorded the marks for each sub strand and shown in the scripts where evidence could be located. Comments on their reasons for assessment decisions also give additional support for individual marks. Evidence of internal moderation is to be encouraged to ensure all teachers are making consistent decisions. Centres need to appreciate that work assessed at 7-8 marks should be reflective of A/A* GCSE work. The level of coverage of the criteria needs to be such that the candidate work demonstrates high level scientific understanding and independent thought and decision making.

For **strand A**, candidates need to collect and process secondary information which gives a description of the purpose of the material, device or process and its relevance in the workplace. Some candidates used science that set the scene very well, with thoroughly-researched work which was relevant to the test chosen. Providing references of sources used was seen as good practice for higher marked candidates, as was limited 'cut and paste' material. Many candidates listed desirable features, but then did not support their research with further confirmatory findings or experimental procedures. The intention is that the initial research is an opportunity for candidates to consider what would be desirable before investigating further. Some centres have given candidates opportunities to complete surveys, for instance by asking the users of the device or material what they look for, what is important etc., and this generates useful data and broadens the outcomes of the investigation. It can also offer candidates more independence in organising what they plan.

Work reflective of 7-8 marks needs to show suitable selection with detail which is specific. Work assessed up to 5-6 marks tended to reflect some relevant research and a description of the required properties or characteristics. Assessment tended to be generous where candidates had just listed properties and completed minimal explanations of two or more. The level of detail and explanation for the higher mark bands needs to show suitable scientific understanding and a higher level of reasoning.

The aim of **strand B** is to assess how candidates can manage the risks for their experimental work and show their ability to plan and organise their procedures for the suitability of their chosen material, device etc. Centres still need to note that lengthy risk assessments containing generic and repetitive information are not reflective of higher marks. Risk assessments need to be suitably detailed and be usable documents which focus entirely on the hazards of the procedures being investigated. General laboratory rules which are common safe practice are not needed in full. A statement of their coverage is sufficient. For strand B(b), the marking criteria does state 'Devises methods to compare suitability'. If candidates only investigated one criterion for suitability their plans are of only limited complexity. Good practice was seen where centres allowed candidates the opportunity to plan their own experimental work or put together different suggested ideas and complete a variety of different tasks. Higher level candidates could be encouraged to use their own quantities or variables 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 science content involved in the planning. Candidates scoring 7-8 marks for this strand should be presenting a well sequenced plan, which can be clearly followed and understood by the reader. It needs to show independent thought and organisation by the candidate and to include a range of procedures which will allow the suitability to be proven.

For **strand C,** candidates need to collect and record sufficient data to demonstrate the suitability of their chosen material, device or procedure. Centres need to be aware that as there is only one strand for C, generous assessment can easily lead to a lowering of this mark. It is important that candidates are fully covering the directive laid down by the marking criteria. Where 5 marks and above are awarded, there needs to be clear evidence that candidates have devised their own format for the recording of the primary data they have collected. In many scripts, it was often not clear how much or little guidance had been given to the candidates. Several candidates had been awarded full marks where recording was all similarly structured by all class members. Higher ability candidates need to be thinking independently and given opportunities to devise formats to record and collect data to cover an appropriate range, with values well-chosen across the required range to demonstrate suitability. Please note that one set of data from one experimental procedure is insufficient to support higher level data collection.

For **strand D**, candidates need to demonstrate that they can process and analyse the data they have collected and link it to the purpose of their tests. It is therefore essential that sufficient data is collected both from research (eg costs, ease of use, appearance etc.) and experimental work to enable them to produce high quality graphs or charts or process it using 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. One set of repeated data and one test is insufficient to support the higher marks. Candidates need to take care that, even for 3-4 marks, they link their outcomes to the purpose of the test. All trends and patterns need to be interpreted and supported quantitatively for the higher marks. Assessment up to 5-6 marks tended to be supported and few candidates were given 1-2 marks.

Strand E expects 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 for this strand and how they have used relevant scientific terminology. Centres need to note that the marking criteria has been devised 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'. Assessment continues to be generous by many centres where candidates were only describing methods and stating improvements. Work was very basic with simple statement e.g repeat, use different apparatus, human errors, not enough time. For 7-8 marks evaluation 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. Lack of

consideration of the quality of data was often the reason for a difference in the moderated mark and that awarded by centres. For strand E(c), many centres awarded 8 marks to candidates for managing risks successfully. For the higher marks, the safe running of the experimental work needs to be supported by a high quality risk assessment. Although moderators aim to support centres on their assessment, for strand E(c), assessment was generous with many candidates gaining 7-8 marks.

The aim of **strand F** is for candidates to show their ability to use their data collected and their scientific knowledge to conclude the suitability of their chosen material, device or procedure. Centres need to be aware that when writing conclusions candidates need to use the range of the results gathered in their tests and clearly link it to the suitability of the purpose. Candidates are still writing conclusions at the end of each individual part of their work but often are not drawing these together to form an overall conclusion concerning the overall effectiveness, suitability of their investigative work. Detailed discussion of any limitations, such as a range over which the suitability is applicable was rarely seen. Simple statements were often introduced but the depth needed to support the higher mark bands was not given. 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 again considerable amount of generous assessment this session for this strand.

Element 3 Work-related Report

Candidates are required to complete one work-related report which is posted on the OCR website. The work-related report is assessed through six strands each with a mark 0 to 8, giving a total of 48 marks for this element.

- 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

Centres continued to endorse this applied qualification by giving candidates the opportunity to use a wide range of professionals and visiting speakers, and to go on visits, which supported the importance of science in the work place for this work-related report. Interesting work-related research was seen, however centres need to ensure that they clearly understand the difference between primary and secondary sources.

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 is a relevant statement, 3-4 marks candidates are identifying, 5-6 marks explaining and 7-8 marks analysing. The higher level descriptors are 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. 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. It was pleasing to see this session that many centres had followed this advice and assessment for work-related reports was much more in line with the required standard. The use of side headings based on the strands/skills could be used to help candidates organise their work.

The aim of **strands A and B** is to demonstrate that candidates can collect and suitably select the required information from both primary and secondary sources and reference these sources correctly and accurately.

Candidates still need to ensure that for the higher mark bands for both strands A(a) and B(a) they are providing evidence of suitable accurate selection of their collected information throughout their report. For 7-8 marks, details of an interview with no evidence of its use is insufficient to support this level. Assessment was often generous.

Primary information is that which is collected by the candidate directly form their own observations and experiences. The understanding of the use of primary sources is continuing to improve and nearly all reports moderated indicated access to such sources. This was good to see. It was noticeable, however, that many reports were lacking in the identification of these primary sources and suitably referencing them. For a detailed reference of a primary source it would be usual to cite the person's name, the year or date the information was provided, the fact that it was through personal communication and the person's affiliation. More than one reference is also needed where higher marks are awarded. Good practice was again seen by centres who had organised site visits and where candidates were given the opportunity to gain information from a number of different people.

Secondary information is that which has already been collected and presented by someone else for some other reason than to use for this work-related report. Many candidates had listed large numbers of website references with no indication of how these were used. Candidates need to ensure that when referencing information found by a search engine, the source material, and not the search details should be cited. 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 or identification of references at appropriate places throughout the text. Detailed referencing should show ISBN numbers for books, full web site addresses and dates of internet access for online sources.

The aim of **strand C** 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 ensure that firstly they look at the structure of the organisation chosen. This was very often omitted where candidates had focused their reports on nurses, physiotherapists and professionals who tended to work from home or in the wider community. Care also needs to be taken that, where candidates have focused on these particular job roles, they do sufficient research in order to obtain information to support strand C(b) and C(c). As well as the purpose of the work, candidates need to include how the work fits into the wider picture. This was not always covered and work tended to just identify or may be to describe. Work tended to be quite limited where candidates had only used information from a single interview. For strand C(c), just the inclusion of a map showing the location of the chosen organisation is insufficient to support 5 marks. In addition, both the reason for the location **and** an effect on society is needed even for the lower mark bands. Several omissions are still being seen.

Strand D assesses 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.

Generally, candidates are now including information on 'technical skills' rather than identifying general related skills involved in their chosen job role. Many produced good information, both textual and visual, on the technical skills and expertise needed, although most reports were descriptive or explanatory and analysis was rather limited. Although an abundance of research was included in many reports for strand D(b), why and how the expertise is needed, as well as explanations of the relevance of the personal qualities and qualifications needed in the job roles, was rarely seen. Candidates continue to use their researched information on qualifications to support 5-6 marks but higher level discussion is required to support the top mark bands.

The aim of **strand E** is to assess how candidates use their research skills to understand how the 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.

Some good work was seen for this strand where candidates had clearly understood how the science they were familiar with linked into the job roles. Good practice was seen where the level of scientific knowledge was explained and work was not just cut and paste and placed in a report. However, centres still need to watch that the quality of the explanation and analysis work needs to reflect A/A* level where 7-8 marks are to be awarded. Please note, explanations rather than descriptions are necessary for 5-6 marks with lengthy descriptions not always indicative of 6 marks. Higher grade candidates should be showing suitable selection and focused detail. Health and safety continues to be a useful regulatory factor, however, the impact of this on the work still needs to be focused on. There was still evidence that in some candidates' work the financial and regulatory factors were merely identified and there was no clear link to the 'impact' on the work described, Two relevant examples are required even for 3-4 marks and this was not always evident. This meant that marks awarded to candidates in some instances for strand E(b) were not upheld.

Strand F assesses how candidates can organise and write a scientific report using relevant scientific or technical vocabulary and suitable visual material

The key areas for 5 marks and above for strand F(a) are: relevance, organisation, structure, suitability for purpose, as well as contents and numbering. Candidates should not automatically gain 6 marks if a contents and numbering of pages is included.

Care still needs to be taken when awarding 8 marks for strand F(b) in that the visual material is suitably 'informative' and used appropriately; suitable labelling and related notes written by the candidates could support the higher marks. Graphs and charts can be used to convey information. When awarding 8 marks, the candidates need to be showing full and effective use of the relevant 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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