OCR
Oxford Cambridge and RSA

GCSE

Additional Applied Science

Gateway Science Suite

General Certificate of Secondary Education **J251**

OCR Report to Centres June 2016

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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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.

The trend for candidates to write outside the allocated area was reduced this year by the introduction of an extra answer sheet at the end of the paper. However many candidates failed to clearly identify which question they were answering. Indeed, it was not uncommon for these additional answers to be incorrectly identified with candidates writing down the incorrect question number. Candidates should be advised that this jeopardises their chances of being correctly awarded the marks that they deserve.

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:

Question 1
1(a)(i) Most candidates only scored one or two marks with only the most able being awarded all three. Credit was given for red cells, fights disease and clots blood. Less able candidates often referred to protecting the body and producing scabs. Neither of these answers were credited.

1(a)(ii) Most candidates scored one mark for either correctly identifying bone or muscle as the appropriate answer. Fewer went on to give cartilage, ligaments or tendons as the correct answers.

1(a)(iii) Well answered with most candidates giving heart and lungs as the correct response.

Many candidates managed to correctly calculate 5 m/s as the correct answer in part (b). Those candidates who simply gave the correct answer were awarded both marks but this is a risky strategy. Candidates who correctly gave the calculation as 100/20 were credited with one mark even if they obtained the wrong answer. Candidates should be encouraged to always show their calculations in order to have a chance of scoring one of the two marks even when their final answer is incorrect.
1(c) This was a level of response, six mark question. Candidates were specifically asked to provide exercises for both aerobic fitness and muscle building. Only candidates who stated whether their examples of exercises were aerobic or muscle building went on to be awarded full marks. A simple list of exercises scored a maximum of three marks.

Question 2
2(a) This was not well answered as most candidates failed to read the question carefully and appreciate that both knowledge and skills were required in their answer. All too often candidates list either knowledge or skills but not both. Another error was that some candidates failed to identify which healthcare practitioners they were talking about and these responses did not score.

2(b)(i) This was however well answered with most candidates achieving a total of 9 for the APGAR score.

2(b)(ii) This was the second six mark level of response question. The question was generally well answered. Examiners were looking for a conclusion as to whether the "student" was correct or not, and an explanation of their answer. Credit was also given for a description of how the APGAR test is carried out and what the results mean.

Question 3

3(a) This was the third, six mark level of response question and was overlap with the higher tier paper. Good answers selected appropriate information from the table and then used the information to produce conclusions about the quality of water in River A and River B. Candidates that simply made observations were limited to Level 2 and 4 marks. Good answers made several observations and concluded that River A was more polluted than River B. The most common error was that some students thought that because there was a bigger variety of organisms living in River B, then that river was the most polluted.

3(b)(i) Good responses stated that litmus just indicated acid or alkali and that universal indicator gave an idea of the pH.

3(b)(ii) Learning definitions can be very beneficial when attempting question papers of this type. Good answers stated that a qualitative test gives a 'yes or no' answer and that semi quantitative gives an idea of the amount of material contained.

Question 4

4(a) Most candidates scored one or two marks. Candidates are well advised to draw simple straight lines when answering questions of this type and not to make numerous crossings out as this can be very confusing to examiners when deciding whether to award the mark or not.

4(b)(i) Candidates tended to score either 0 or 2 marks. Once again candidates were awarded both marks for a simple correct answer. However they would be well advised to show their working so that they can score the method mark even if their calculation is incorrect.

4(b)(ii) Credit was given for an error in measurement or an error in calculation. The most common incorrect response stated the crime was committed somewhere else and it was clear that the candidate failed to understand the nature of the question.

Question 5

5(a) This was well answered with most candidates correctly identifying C and D. The most common error was to give three or four responses and each additional incorrect response cost the candidates one of their two marks.

5(b) This is another example of where candidates would benefit from learning definitions. Only the most able candidates stated that the reference material was the banned food dye and that it was used to compare the unknown dyes to.

5(c) Part (c) proved to be a difficult end to the paper. Correct answers stated that different dyes may have the same colour or the same Rf, but answers such as these were few and far between.

Credit was given for stating that dye B was darker of a different colour to dye D.

A191/02 Science in Society (Higher Tier)

General Comments:

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

Many candidates attempted to structure their answers to the six-mark extended-writing questions and so were able to cover the information required in the question. However, many did not address the question and just wrote down anything that might be relevant in order to fill the space. This meant that they did not tackle all the aspects required in the question and so limited the level they could achieve. In order to access the higher marks they must make sure that they have included something about all the parts asked for and include some detail and scientific knowledge in their answers.

Generally, candidates carried out the calculation questions well.

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:

Question 1

1(a)(i) Stronger candidates were able to correctly identify three components of blood and their functions. Red and white blood cells were the components seen most frequently although some had their functions the wrong way round. A few candidates misunderstood the question and gave answers such as veins or arteries.

1(a)(ii) Fewer candidates were able to correctly identify three different parts of a joint and their role. Many named different types of joints or confused the functions assigned to each part.

1(a)(iii) Most candidates were able to gain one mark, either for correctly identifying the organs as the heart and the lungs or by identifying the heart and importance of checking function before exercise. Reasons for the need to check the lungs were often too vague. The liver and the kidneys were the most common incorrect organs chosen.

1(b) Most candidates were able to divide the distance by the speed to get a time taken of 20 seconds. The most common error was to multiply the distance by the speed to get a time taken of 500.

1(c) Most answers to this level of response question were rather unstructured and it was often unclear which practitioner the candidate was referring to as the comments were just linked to 'they do …'. Many just gave vague ideas about the roles, such as 'treat the injury' rather than describing methods used by the practitioners. Good practice was often confused with doing the job properly and there were lots of references to qualifications and knowledge needed.

Question 2

2(a)(i) Most candidates could identify some of the missing observations in the Apgar score sheet, but few could identify them all. The missing observation for pulse caused the most problems with answers including 100 being common as were random ranges between 0 and a 100. Some thought that lots of grimacing should appear in the score = 0 column rather than none.

2(a)(ii) Almost all candidates could determine the missing test score, with 2 being the most commonly seen incorrect value.

2(b) Answers to the second level of response question lacked specific information related to use of the growth chart. Candidates were held back by a lack of knowledge of what is meant by a percentile leading to vague answers such as 'tells you if baby is underweight or obese'. The best answers described what the midwife would do to see where the baby was on the chart, find the percentile and then describe how it was used to track progress over a period of time. Few understood that movement from one percentile to another was of particular significance and that babies on low or high percentiles could be perfectly healthy.

Question 3

3(a) There were some very good responses linking features of a photograph to its explanation and most candidates showed an understanding of at least 1 of the terms given. The links between sharpness and focus and between depth of field and near and far focus were the best known. The most common error was to link detail with black and white.

3(b)(i) Most candidates could calculate the area of the rectangle by multiplying the length by the breadth (=135). Errors seen included adding the two lengths instead of multiplying them and doubling the answer at the end.

3(b)(ii) Many candidates misunderstood the question and suggested reasons why the crime scene might be bigger or smaller or somewhere else. Better candidates understood that this was about measurement but answers still often lacked any detail as to why the measurements may be incorrect e.g. use of equipment, uneven ground etc.

Question 4

4(a) There were some good answers to this level of response question, with the best answers outlining the key features of each river and then reaching a conclusion about the levels of pollution in each river. Common errors included lack of understanding of pH and the idea that the presence of organisms meant that the water was dirty rather than healthy.

4(b)(i) Few candidates understood the possible reasons for variations in measurements of the same thing. Most marks scored were from answers describing why the samples of river water might vary.

4(b)(ii) The meanings of the terms repeatability and reproducibility were not well known and answers were often based on writing about repeating and reproducing results. e.g. 'repeatability is when the results are repeated and reproducibility is when results are reproduced.'

Question 5

5(a) Most candidates recognised that a sweet would need to be withdrawn from sale if it contained a banned food dye and so identified C and D as needing to be withdrawn although a few added E to their list. Some only chose one of the sweets and others were confused about the difference between sweets and dyes.

5(b) The calculation of the Rf value proved challenging for most candidates. A few correctly identified the distance moved by the dye and by the solvent but were unable to use them correctly to calculate the Rf value, either multiplying them together or dividing them the wrong way round.

5(c) Few candidates understood that it was possible for two different dyes to have the same Rf value and so thought that the sweets must contain the same dye with different colours rather than a different dye with the same Rf value.

5(d) Many candidates thought that the paper in chromatography should be described as solvent or aqueous rather than the stationary phase.

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 good marks. It was good to find that even weak candidates felt able to answer most questions, even if they didn't always manage to earn the marks. Some candidates lose marks by misreading the question and answering a question of their own devising instead. This was especially obvious when candidates drew four lines to join boxes, when prompted for only one or two. The language of the examination was inclusive and there was no evidence that any were disadvantaged by this or cultural issues. There was little or no indication of time pressure or other constraints for most candidates.

Comments on Individual Questions:

Question 1 Most candidates were able to make a secure start to part (a). A good proportion were clear about the idea of an extension to the length of the cord although some had simply attempted to guess two more lengths in the sequence.
Part (c) was a mystery to most candidates. A few were able to use the graph to estimate the extension for a force of 25N. Few, if any, candidates were aware that the energy stored in the cord is given by the area under the graph.

Question 2

Candidates were comfortable with the requirements for part (a) although a number of them drew four lines to match the four optical properties, despite being prompted for two lines. Part (b) was poorly answered as few seemed to realise that IR from the lights would cause heating and thus discomfort for the subject. A few confused the use of IR for “night vision” cameras or for “red-eye reduction”.
The ray diagram in part (c) was also poorly completed with few candidates extending the last ray on the right direction and a large proportion being unaware of the importance of the focal plane of the lens.

Question 3

The electrical symbols in part (a) were very poorly known with most marks being awarded for recognising the switch and the lamp. The other two components were almost uniformly unfamiliar. The use of the switch to turn the lamp on and off was common but most candidates who tackled the idea of controlling the brightness of the lamp preferred to use the Power Supply for this.

It was very pleasing that the calculation in part (c)(i) was often done very well and achieved two marks – although some candidates were less secure about the effect on the theatre if the air conditioning was set too low.

Question 4

Many candidates approached this six-mark question with some confidence and often a good level of knowledge, although some were very vague about details. To obtain full marks the candidate needed to describe processes involved including sowing the crop, care of the crop as it grows and finally the harvesting and storage of the wheat.

Question 5

This six-mark question was less well done, although perhaps simpler than previous ones which have involved making salt crystals. Many candidates showed little familiarity with the equipment shown and seemed unclear as to how to use scientific language to describe the process. A few chose to measure the mass of salt required but descriptions of the mixing process were disappointing – and the use of precision apparatus like a volumetric flask was almost unknown.

Question 6

Most candidates scored some marks on this question, although there were very few who got full marks. The characteristics of bulk chemicals were often well known and the raw materials were frequently deduced correctly. The word equation in part (c) was much less well known than previous similar questions although a few recognised that water is usually a product of neutralisation.

Question 7

This six-mark question was common with the higher tier paper and few foundation candidates understood the processes of fermentation adequately to progress beyond level one. Many correctly named yoghurt and cheese as being the likely products of fermentation (although some other highly unlikely products also featured). Full marks could be obtained by describing and explaining enough of the process to obtain a product. Descriptions were often sketchy – but explanations rarely even featured (condemning the response to level one).

Question 8

Most of this question was also common with the higher tier paper, but often attempted much more securely than question 7. In part (a) the requirement was to identify and justify the properties required for the frame of a tennis racket. Many responses stated that it needed to be hard or flexible (or, indeed, soft or rigid) but made no attempt to explain why this was important. Part (b) required the candidates to consider the best material to use, given some data about the properties. Many candidates were able to create sensible answers, either identifying carbon fibre as the best choice (with justification) or at least comparing this with aluminium.

Part (c) was disappointing as very few candidates noticed the instruction to “draw only **one** line” and many drew four or more.

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:

Question 1
1(a) Many candidates successfully answered this question but a significant minority just named properties without any explanation as asked for in the question so failed to gain any marks. Giving properties for the strings as opposed to the frame or repeating properties given in the stem were also seen a number of times.

1(b) This question was generally well answered and candidates were able to apply the information from the data table. A common error was the belief that high density was a good property for the frame.

1(c) Very few candidates understood what low thermal conductivity meant and that heat would not flow easily from the hand to the handle and so the handle would therefore feel warm.

Question 2
2 This question asks the candidate to explain how fermentation is used to convert milk into other foods. Unfortunately many candidates did not link the process of fermentation to the use of micro-organisms and the steps involved using these micro-organisms in fermentation. The majority of candidates could correctly identify a product of fermentation of milk (e.g. yogurt) and some were able to describe the role of initially pasteurising the milk to remove unwanted bacteria. Few, however, went on to describe the introduction of further micro-organisms and subsequent culture of the milk to produce an end product with a longer shelf life.

Question 3
3(a) This was a well answered question with many candidates gaining at least one mark from those available.

3(b) Even given the prompt words, very few candidates scored all 3 marks though most did score at least one mark.

3(c) Many candidates found difficulty completing the equation with a significant number of no responses seen.

Question 4

4(a) It is pleasing to note that the majority of candidates were able to successfully carry out this calculation and gain both marks.

4(b) Many candidates were able to use the graph and find the extension of the cord at 25N but were then unable to use this information to gain the second mark available in the calculation. Common errors seen were the inability to read the scale on the x-axis or the introduction of a second decimal place in the value read off for the extension.

4(c) Candidates needed to give a reason for correctly identifying elastic behaviour (as asked for in the question) to gain this mark.

Question 5

5 Candidates needed to identify stages involved in the production of wheat on a farm and then go on to explain the need for each particular stage e.g. explain why the farmer ploughs the field. Many candidates achieved a Level 1 response but few could describe (with reasons) an aspect from all of the stages involved in wheat production from ploughing through to harvesting to gain a Level 3.

Centres should practice 6 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 ….

Question 6

6 Careful reading of this question would have helped many candidates as very few wrote out a set of detailed instructions to prepare a certain volume of a solution of cooking salt. Most got no further than, in many cases, correctly completing the required calculations. They then completely ignored the rest of the question which basically asked them to describe how to make a solution of salt in water. Those that did go further often became confused and referred to filtering, evaporating and crystallising as part of the process.

Question 7

7(a) Candidates scored well on this question if they understood the term ‘optical property’.

7(b) Candidates who knew that incandescent lamps emit infrared radiation and so can get hot and burn people gained marks here.

7(c)(i) and (ii) Very few candidates appeared to be familiar with lens diagrams and being able to identify the position of the focal plane.

7(c)(iii) Generally well answered showing that candidates understand the basic operation of the camera.

Question 8

8(a) Most candidates correctly drew a series circuit to gain one mark but very few knew the correct electrical symbols and so failed to gain the second mark.

8(b)(i) The stem of the question states that the diagram shows the flow of heat into and out of the theatre but candidates failed to use this information in their answers. They could not, therefore, explain why Zoe needs to be aware of this diagram in being able to keep the temperature of the theatre constant throughout the performance.

8(b)(ii) A common error in answers to this question was simply adding up the average power values without regard to the numbers of each type of heat source.

A193 OCR Repository

General comments:

A range of levels of portfolio work has been seen and sampled this session, although candidate entries have decreased. Next year will be the final session of this applied qualification and hopefully candidates who enjoy applied science courses will go on to study OCR Technicals or Nationals L2. 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 marks out of 48

Generally centres were assessing each strand within the accepted tolerances and many candidates produced a good quality portfolio which was well presented and suitably assessed. Where assessment was generous it tended to be where the higher marks were awarded. Centres are to be congratulated on the range of professionals that had talked to or been interviewed by many candidates. Much more detail from different primary sources was included within the work-related reports and the interest and enthusiasm of many candidates has been portrayed by highly detailed portfolio work. Well done to these candidates.

The samples for moderation were again selected electronically and moderators found that the majority of these were returned efficiently. There were however a number of centres who had still not completed the applied record card correctly and several clerical errors were found. Centres are recommended to use the electronic record cards which averages and adds all the marks for the portfolio work. Centres are also asked to ensure that candidate numbers are written on all work presented for moderation. The majority of portfolio work this session was stapled or collated using of treasury tags which allowed 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) was also included in the majority of work seen and this 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 is issued with a report on the centre assessment decisions. Where a Centre's decisions were not in agreement with those of the moderators, they are encouraged to use this service for future submissions.

To access this service, Centres are asked to send photocopies up to three pieces of marked, annotated work for the 2017 series to:

The Science Team, OCR, 9 Hills Road, Cambridge, CB1 2EU.

Please accompany the scripts with a letter on centre-headed paper detailing any issues and provide an e-mail address where the report is to be sent.

Comments on Individual Elements

It is evident from much of the work seen that many members of staff have worked hard in the preparation, delivery and marking of the candidates' portfolio work and this appreciated and they should be congratulated.

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:

- Collect primary data
- Process primary data
- Manage risks when carrying out standard procedures.

Most centres are now giving clear instructions to their candidates based on the task information and marking criteria provided by OCR, which suitably allow them to fully access the higher level marks. The guidance is again as in previous years that: **for skill a** candidates do not need to devise their own format for the recording of their results, but they do need to ensure that a suitable range of data is collected. Accuracy should be confirmed where 5-6 marks are to be awarded. It is recommended that where appropriate either repeats are completed or evidence of some comparison of candidates' class data or staff values are recorded for comparison. Centres however do need to note that the carrying out of repeats does not automatically give candidates 6 marks. For 5-6 marks there should be no errors or inaccuracies in recording, units need to be correct and evidence of consistency of accurate values and 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.

Many candidates have now fulfilled **skill b** by processing their collected data by using a suitable range of mathematical and graphical techniques. A good range of techniques are now evident in candidates' work. Means, ranges, percentage errors etc., from both class and individual's data are enabling candidates opportunities to demonstrate their mathematical skills. Examples of more specific techniques have included, magnification calculations, calculation of refractive indices, 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 can calculate 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 however 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 are still often poorly drawn and labelled by many candidates.

Assessment continues to be generous for **skill c** where 5-6 marks are being awarded. Candidates are just recording how they followed the risk assessment and what happened during the practical and are not evaluating how or why the experiment was safely carried out. Good practice is seen where candidates discuss how and why the precautions taken have led to successful and safe outcomes.

Most candidates now are supporting their practical work with a risk assessment but many are including very repetitive generic information. Risk assessments need to be usable documents which are focused on the particular standard procedure being carried out.

Element 2 Suitability Test

Candidates are required to complete one suitability test from a choice of three which are posted on the OCR website. 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

The advice again is reiterated in that the suitability of a material device or process needs to be supported by more than one property or characteristic and therefore candidates need to investigate more than one experimental procedure for this element. In addition centres still need to ensure that the high level candidates are given the opportunity to do individual work and planning so they are able to demonstrate independent thought.

The aim of **strand A** is to research the purpose of the test. Candidates therefore need to collect and interpret researched information which gives a description of the purpose of the material device or process and its vocational relevance or use. The intention is that the initial research is an opportunity for candidates to consider what would be desirable before investigating further. Many candidates do not do this and the properties are threaded through their reports or located in a conclusion. Many just produce an introduction of 'cut and paste' material which often is very interesting but not suitably focused on the requirements of the chosen suitability test. They need to clearly state/describe the desirable properties or characteristics which are necessary for the suitability with detailed explanations for the higher mark bands. The level of detail and explanation for the higher mark bands needs to show suitable scientific understanding and a higher level of reasoning. Assessment tended to be generous where candidates had just listed properties and completed minimal explanations of two or more. Just coverage of more than one property does not automatically give the candidate 7-8 marks. Work assessed up to 5-6 marks tended to reflect some relevant research and some description of the required properties or characteristics. Candidates also need to ensure that they focus their research on more than one property or test. The focus is on the suitability of material/device or procedure for the use required. Full marks cannot be awarded therefore where candidates have only looked at only one aspect of suitability. References of sources used is seen as good practice.

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.

Generally the work seen was much more reflective of 5-6 marks rather than 7-8 as the majority of candidates' work comprised a risk assessment and a method. There was however an increased number of candidates this session who had discussed how they were going to structure and carry out a number of tests both experimental and research-based to test their proposed properties and this did support a higher level of assessment. Much of the work moderated not only demonstrated devising a comprehensive plan but also supported independent thought as candidates worked on different routes and procedures. 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. Candidates just writing one method however complex cannot be awarded 7-8 marks. 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 for **strand C** need to collect and record sufficient data to support experimental procedures to demonstrate the suitability of their chosen material, device or procedure. It was the case that 6 marks were again commonly awarded and although annotation was indicating candidates had devised their own format, 6 marks were not always justified by the quality and range of data collected. Centres are encouraged to ensure that for this strand candidates are fully covering the directive laid down in the criteria. As there is only one strand to this skill, generous assessment can easily lead to lowering of this mark. For 8 marks centres need to ensure that data has a high level of precision and reliability and that it is linked with the requirements of strand A. Several candidates were not referring back to all of the criteria they referred to at the start. 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 researched work e.g. 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. Again 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 are now recognising the requirements of the **key words** given in the marking criteria i.e. 3-4 marks ‘comments’, 5-6 marks ‘discuss’, 7-8marks ‘evaluate’. Assessment tended to be better for this strand this session with many centres having assessed work correctly for work marked from 3-6 marks. The higher level candidates still need for 7-8 marks to evaluate with scientific explanations both methods and data and support Ec for 8 marks with evidence of the safe running of the experimental work by a high quality risk assessment (assessed in strand B). Candidates can link any variation or quality of data to relevant limitations of the experimental techniques and with the suitability of the material, device or procedure. Where candidates had structured their work under the headings Method/Data/Practical coverage was better and in many cases the higher marks were now supported.

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 still need to be aware that when writing conclusions candidates need to use the range of the results gathered from their tests and clearly link it to the suitability of the purpose. Candidates do need to give final conclusions in order to bring all their investigative work together. In addition for 7-8 marks, a discussion of any limitations, such as a range over which the suitability is applicable. 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.

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 reasons for their assessment decisions are also supportive of the awarding of the various mark bands. Evidence of internal moderation is again 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.

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 five 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 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

This year it was pleasing to see that the majority of candidates had used primary sources in their work-related report. Most candidates had been given the opportunity to use professionals which supported the importance of science in the work place. Centres however still 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. Many candidates are now referencing work from secondary sources well.

The aim of **strand A and strand 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. Improvement has been seen this year for both strands Aa & Ba as candidates are generally providing suitable evidence from their sources and using it appropriately throughout their reports. Although some reports were seen with information from questionnaires or interviews just attached in an appendix, more reports were demonstrating use of this researched material. Primary information is that collected by the candidate directly from their own observations and experiences. It is still noticeable that many reports are lacking in detailed referencing of these primary sources. For a detailed reference of a primary source it is advised 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 that had organised visits and where candidates were given the opportunity to gain information from a number of different people. Health/sports centres were very popular this session. Secondary information is that already collected and presented by someone else for some other reason. The majority of these sources continued to be web based, with candidates listing a large numbers of web site references. It was pleasing to see that more and more candidates are now indicating why and how they have use this type of information. Candidates need also 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. As stated in the introduction the correct assessment is dependent on the candidates producing work reflective of the key words identify/explain/analyse given in the marking criteria. Candidates choosing professions such as personal trainers, physiotherapists, mechanics etc. need to ensure that they do look at a whole organisation and how these employees contribute and carry out sufficient research in order to obtain information to support Cb and Cc. Some good 5-6 work for Ca was evident from many candidates with clear explanations of the roles of the employees. Many still gave a generic description of a job role, but this is not sufficient for the higher marks. For Cc 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 were still evident in many of the scripts moderated.

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. The majority of candidates are now considering both technical skills and expertise. Many good descriptive reports often alongside explanations, supported with visual material were seen on a wide range of technical skills involved in their chosen job roles. Although assessment for Db was still generous with why and how expertise is needed as well as explanations of the relevance of the personal qualities and qualifications needed in the job roles not being fully discussed. Large quantities of descriptive information were often included, length rather than depth of understanding tended to be awarded the higher marks in many cases. Assessment at the top end was often generous.

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. A lack of science was noticeable with 5-6 marks awarded where information had just been downloaded. This is only reflective of 3-4 marks. Good practice was seen where the level of scientific knowledge was explained and linked to the job role being researched. Good work was seen linking to e.g. midwives, physiotherapists, radiotherapists, personal trainers, agricultural workers. Centres still need to however watch that just quantity of science information isn't been awarded with higher marks, although a range needs to be discussed, the quality of the work needs to reflect A/A* level where 7-8 marks are to be awarded. Again 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. For Eb candidates reaching 5-6 marks did tend to explain the impact of financial or other regulatory factors, health and safety being popular. Also two relevant examples are required even for 3-4 marks, this was not always evident. This meant that the lower marks awarded to candidates in some instances for strand Eb 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. Generally marks were upheld for this strand. The key areas for 5 marks and above for Fa are: relevance, organisation, structure, suitability for purpose, as well as contents and numbering. Care still needs to be taken when awarding 8 marks for Fb 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. Again, 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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