

Additional Applied Science A

Twenty First Century Science Suite

General Certificate of Secondary Education J632

Examiners' Reports

June 2011

J632/R/11

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

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

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Chief Examiner's Introduction

Overall, the candidates taking the Additional Applied papers in this session performed extremely well with the free response question proving to be the most challenging. The papers were constructed to allow candidates to feel that they had every opportunity to demonstrate their knowledge and understanding while at the same time discriminate between candidates of differing abilities. It was intended that candidates should feel that they had a positive experience in taking the examinations.

Most candidates found the papers accessible and demonstrated satisfactory knowledge and understanding of the course content. However there was a small but noticeable decline in standard on the Materials and Performance paper. Most candidates had been well prepared by their Centres and due to the fact that questions towards the end of the papers were answered equally as well as questions at the beginning of the paper, there was no evidence that candidates ran out of time. Most Centres had also entered their candidates for the correct tier of examination. Foundation tier candidates who are entered for a higher tier paper generally do not have a pleasant experience taking the examination.

There was no evidence that any group had been disadvantaged by the language or by any cultural issues.

As always, there are lessons to be learned and specific points relating to each paper are picked up in the individual reports from each Principal Examiner. Some issues however occurred across the suit of papers and these are detailed below.

Centres and candidates should be aware that these papers are scanned and marked online. Candidates who write out of designated areas are at risk of their answers not being fully marked and are well advised to ensure that they write their responses in the appropriate answer lines and spaces.

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

There was evidence from Harnessing Chemicals that some candidates were getting better at performing simple calculations and using chemical symbols. However, when answering questions that include numerical calculations, candidates are always asked to show their working. It is vital that they do this. Candidates are very good at answering calculation questions intuitively or performing simple mental arithmetic and then writing down the answer. Providing the answer is correct, this is not a problem as they will gain full marks. However it is a very risky strategy. A simple mistake in their mental calculations will lose candidates all of the marks. If they had written down their working, the chances are that they would have salvaged at least one of the marks available for the question.

Candidates, particularly at foundation level had a tendency to leave some questions blank. This will guarantee that they get no marks for the question. At least attempting the question opens up the opportunity of scoring some of the available marks. Many of these questions are set in context. Candidates should always take notice of the context as it can affect the way the questions should be answered.

As in previous sessions, questions which required candidates to recall a piece of knowledge proved to be much harder than those which required candidates to process information supplied in the question. Vocabulary is still a problem for many candidates. Several modules require

candidates to use many specialist terms which do not appear elsewhere in GCSE Science; centres might usefully consider more testing of these special words as part of their teaching. This was the first session that this specification used an electronic means of requesting and selecting the portfolios for moderation. This did make the moderation process much more efficient and the majority of Centres were very responsive in returning scripts for moderation and returning the Centre Authentication form with the candidates' work. There is now no necessity to send MS1 forms to Moderators or to include these forms with the sample. It is however important to ensure centre numbers and candidate numbers are recorded on the record card. This year Moderators did discover many clerical errors where the marks on the MS1 forms were not the same as the marks on the Work-related Portfolio Record Card. It is hoped that centres will ensure suitable checks are completed to make sure that these errors are reduced to a minimum. This seems to be an on-going problem and showed an increase this year.

Most portfolio work was well organised and presented using treasury tags which allow moderators to easily read and locate the work. Centres are advised not to include candidates' work in plastic pockets or ring binders.

Annotation of candidates' work in the form e.g. A(a) 6 is useful to Moderators in allowing them to easily locate the work and to see the assessment decision for both the assessment strand covered and the level reached. This practice should be encouraged.

Limited scaling occurred this session, usually at the higher mark bands or where no evidence was included for the standard procedures. For work generously assessed, work was not sufficiently detailed, data collected by candidates was limited or not recorded to a suitable level of precision and reliability. In some cases for the suitability test, the tasks set were not suitable in that, they did not allow the candidates opportunity to gather sufficient data to obtain the higher level marks. Several evaluations were seen which were not at a high enough level for A grade work. For the work related reports centres need to ensure they have fulfilled all the criteria of the strand to reach the top mark (e.g. 6 marks cannot be achieved if collection of relevant information does not include a practitioner or workplace source.) For standard procedures where no evidence was included it was usually possible to award 3 marks, however, without some evidence, it is not possible to confirm that measurements or observations were made to an appropriate degree of accuracy for the fourth mark.

Centres should be reminded that 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 assessment completed by the centre.

The following reports provide more detail on how candidates performed on specific questions, highlighting areas of concern and applauding improvements from previous years. Please encourage your colleagues to read these reports.

A324/01 Additional Applied Science A – Life Care – Foundation Tier

General Comments

This was an accessible paper giving candidates a good opportunity to demonstrate their knowledge and understanding of health care provision. There was no evidence of any candidates having insufficient time to complete the paper or of being disadvantaged by language or cultural issues and a full range of marks was generated by the questions set. Most candidates appeared to be well prepared for this examination and a good use of scientific language was seen. As in previous reports, an important message that Centres must pass back to their students is to emphasise the importance of clear handwriting and following the guidance about writing within the framework of the paper as scripts are scanned and marked on-line. Should candidates require more space they should use additional pages. Candidates should also be reminded to bring a pen, pencil and ruler to the examination as drawing graphs does require the use of a pencil and a ruler.

Comments on Individual Questions

Question No.

- Q1 This was an accessible introduction to the paper and almost all candidates scored full marks here.
- Q2 Most candidates gained 2 marks here but a common error was not reading the question carefully and only putting 2 ticks.
- Q3(a) Most candidates correctly read 82°C but there were a significant number of 80.2°C responses.
- Q3(b) Most candidates correctly identified sweating as a body response. Some candidates offered 'skin reddens' but many lost this mark by describing it as being a result of blood vessels moving to the skin surface. Few used the term vasodilation. This was an overlap question with the higher tier paper.
- Q4(a) It was encouraging that many candidates were able to correctly plot the given points. Some candidates lost a mark by failing to use a ruler to draw the best line through the points. It was also difficult for Examiners, where candidates had used ink to complete their graph and had made mistakes, to then correctly identify the new points. The front cover of the examination paper does state that a pencil and a ruler are 'required other materials'. Pencils should be sharp as a tolerance of half a square is allowed on plotting points and drawing the graph lines and a very thick pencil can often exceed this.
- Q4(b)(i) This was well answered.
- Q4(b)(ii) Exercise was a common answer to this question. Exercise will increase heart rate but not to the rapid peak and fall indicated in the question. About half the candidates correctly identified the fear/excitement/adrenaline rush of an amusement park ride as being the reason.
- 4(c) A significant number of candidates confused a weak pulse with a slow pulse and so failed to gain the mark.

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- Q5(a)(i) Few candidates were able to name the key bones in the knee joint. Tibula was a common error seen.
- Q5(a)(ii) This was often well answered with many candidates aware of the structures involved in a joint.
- Q5(b)(i) Good answers here related the role of the physiotherapist to assessment/treatment and rehabilitation of muscular/skeletal problems. Weaker candidates gave vague statements that could be ascribed to any health practitioner.
- Q5(b)(ii) This was generally well answered but, as above, marks were lost by role descriptions being too vague. Centres should ensure that candidates can identify the names of different health practitioners from the description of their roles, highlighting the problems caused by vague job descriptions. Fitness coaches were not considered to be health practitioners.
- Q5(c) Again well answered by many candidates although there were still instances of only 2 boxes being ticked instead of the 3 asked for.
- Q6(a) A minority of candidates gained full marks on this question. Those awarded 2 marks often had B and E in the right place but failed to prioritise the chest pains over the suspected broken arm and the small cut. There was a concerning number of students who prioritised the need for hearing aid batteries over physical injuries.
- Q6(b)(i) Most gained this mark but a common error seen was the suggestion of talking to the patient or manipulating the arm, showing a misunderstanding of what the term non-invasive technique means.
- Q6(b)(ii) Few candidates gained both marks here because, as above, they appeared not to fully understand the term non-invasive. Quick was a common (correct) response but few realised that an operation, with all its associated risks, was not necessary.

A324/02 Additional Applied Science A – Life Care – Higher Tier

General Comments

The candidates generally were well prepared for this examination and able to demonstrate a good understanding of health care provision. There is now a significant bank of past papers for this specification and many centres appear to be using these to good effect to familiarise candidates with the style and demands of questions set.

As in previous reports, an important message that Centres must pass back to their students is to emphasise the importance of clear handwriting and following the guidance about writing within the framework of the paper as scripts are scanned and marked on-line. There was continuing evidence of candidates not following this advice. Should candidates require more space they should use additional pages. Candidates should also be reminded to bring a pen, pencil and ruler to the examination as drawing graphs does require the use of a pencil and a ruler.

There were no signs that any group had been disadvantaged by the language or by any cultural issues and there was no evidence of any candidates having insufficient time to complete the paper. Candidates should be encouraged to look at the number of marks available for each question section and check that their answers contain at least that number of separate points.

Comments on Individual Questions

Question Number

- Q1(a) Most candidates correctly identified sweating as a body response. The highest scoring candidates correctly identified vasodilation but some then lost this mark by describing blood vessels moving to the skin surface. This was an overlap question with the foundation tier paper.
- Q1(b) Candidates could often name a public health campaign but failed to gain a second mark by going on to describe anything about the campaign. Candidates should take into consideration the mark allocation of a question and check their answers to confirm they have at least two separate points if the mark allocation is two.
- Q2(a)(i) A significant number of candidates were unable to name the key bones in the knee joint. Spelling of bone names was generally poor and tibula was a common error seen.
- Q2(a)(ii) This was well answered but there were still a few candidates who got the roles of tendons and ligaments reversed.
- Q2(b)(i) Good answers here related the role of the physiotherapist to assessment/treatment and rehabilitation of muscular/skeletal problems. Weaker candidates gave vague statements that could be ascribed to any health practitioner.
- Q2(b)(ii) This was well answered with many candidates realising that trust is built up through regular contact between patient and health practitioner.
- Q3(a) Many candidates gained full marks on this question. Those that were awarded 2 often had B and E in the right place but failed to prioritise the chest pains over the suspected broken arm and the small cut. There were a concerning number of students who prioritised the need for hearing aid batteries over physical injuries.

- Q3(b)(i) Few candidates gained both marks here because they appeared not to fully understand the term non-invasive. Quick was a common (correct) response but few realised that an operation, with all its associated risks, was not necessary.
- Q3(b)(ii) This question proved challenging for many candidates. Many correctly identified 'uses sound waves' as the description for ultrasound but could not match the other 3 techniques to their descriptions. Most candidates did, however, correctly match descriptions to their diagnostic uses.
- Q4(a)(i) A significant number of candidates failed to gain marks on this graph plotting question through being unable to choose a correct axis scale. There were many examples of the scale starting at 0 followed by 90, 130, 160 etc as in the provided table. The scale chosen needed to be suitable to fill at least half the graph space. Pencils and rulers should be used in drawing graphs. The front cover of the examination paper does state that a pencil and a ruler are 'required other materials'. Pencils should be sharp as a tolerance of half a square is allowed, so plotting points and drawing the graph lines with a very thick pencil can often exceed this. It was also difficult for Examiners where candidates had used ink to complete their graph and made mistakes, to then correctly identify the new points.
- Q4(a)(ii) The line should be ruled, clean and clear. Either best fit lines or point to point lines are acceptable here.
- Q4(b)(i) Candidates needed to extrapolate their graph lines in order to gain this mark.
- 4(b)(ii) A significant number of candidates confused a weak pulse with a slow pulse and so failed to gain the mark.
- 4(b)(iii) A majority only gained one mark in this question because they only gave one reason and so only had one mark point available. Candidates need to be reminded to look at the question mark allocation and make sure they have at least the same number of reasons as marks allocated.
- Q5(a) Strong candidates gave three distinct functions of the NHS and this was obviously a topic that had been discussed in their lessons. Weaker candidates gave three versions of the same function and so could only score 1 of the 3 marks.
- Q5(b)(i) As mentioned earlier, candidates need to ensure that they give two distinct points in a 2 mark answer.
- Q5(b)(ii) A common correct response given was that the cancer may be terminal and so too late for treatment. Examiners were also looking for the idea that any medical condition can have a number of possible treatments which are dependent on cost as well as medical implications.

A325/01 Additional Applied Science A – Scientific Detection – Foundation Tier

General Comments

Candidates performed well on this paper and were well prepared for the examination. There was no evidence that any of the candidates ran out of time.

The paper is now marked by electronic marking after first being scanned and then fed electronically to examiners. It is now more important than ever that candidates use legible writing and restrict their responses to the boxes, spaces and lines that have been provided rather than writing in margins and other areas that may not be visible to examiners in the electronic copy. The quality of candidate's handwriting was often poor, making it hard for examiners to credit candidates for correct answers. Also all too often candidates attempted to cross out answers and then write responses in the nearest available space. This is a risky strategy unless the response is clearly indicated. Candidates should be instructed to completely cross out incorrect responses and write the new response after their initial crossed out response and not to write over the top of it.

Comments on Individual Questions

Question No. 1

Candidates were asked to name a piece of equipment and explain how they could ensure that it was giving correct results. Many candidates however simply gave the name of a piece of equipment that did not provide results such as a test tube or a beaker. This made it impossible for them to gain any credit. Good answers included a colorimeter that needed to be calibrated using pure water. However even much simpler answers, such as a microscope and look at the same slide through another different microscope were credited.

In part (b) a specific job was being asked for. Those candidates that described what law enforcement or consumer protection meant, did not score. Good answers included CSIs or forensic scientists and for the second part, public analysts or food standards officer.

Question No. 2

Part (a) was well answered with most candidates scoring all three marks. Common errors included calling the objective lens "the lens" and the stage "the base".

Part (b) proved to be more testing but nearly half the candidates were able to give the correct answer that it increased in both cases.

Part (c)(i) and (c)(ii) were both well answered which shows that the candidates understood what resolution meant even though they may have had difficulty explaining it.

Part (d) was also very well answered with over 90% of candidates being awarded the mark.

In part (e) the correct answer of 50 scored both marks. However once again too many candidates (20%) failed to show their working and thus lost out on the opportunity of being awarded one of the two marks for writing 10×5 .

Most candidates were awarded the first mark for part (f)(i) by placing a ring around an electron. However for part (f)(ii) most candidates elected to draw a box around one the protons or neutrons not realising that an electron is a negatively charged particle.

Part (f)(iii) should have been an easy tailpiece to the question but many candidates simply failed to say that it uses electrons. Most referred to being able to see electrons or being made of electrons and failed to score.

Question No. 3

Part (a)(i) was not well answered with most candidates giving semi quantitative as their answer.

Part (a)(ii) was well answered with a simple response such as 'it gives a number' or 'tells you how much', being credited. Part (a)(iii) required the simple answer of blue. Candidates who gave any other colour such as purple or blue-green did not score.

Part (b) required both parts to be correct for the mark to be awarded. Good answers gave a pH of 4 and stated that this matched the test of the drink.

Part (c) was not well answered. A good candidate quoted an example such as Clinistix but any named colour testing kit was credited. Marks were even awarded for colour changing thermometers. Candidates who said 'for testing urine' were not credited but those who said 'testing urine for glucose or diabetes' were.

Question No. 4

Most candidates found this question quite challenging.

Some candidates thought that there was a printing error and proceeded to draw in a fifth box. This error was not penalised. Good answers gave the correct responses as EADB.

Question No. 5

Part (a) was also a challenging question. Some candidates realised that they had made a mistake and proceeded to cross out drawn lines. When they added yet more lines, often drawn by some circuitous route, marking the script proved to be very difficult. Candidates would be well advised to first draw the lines in pencil so that any errors could be erased before adding the final lines in ink.

Part (b) was generally well answered with suggestions such as graphs, drawings, tables, power point or even audio all credited.

Question No. 6

Part (a) was well answered with almost all candidates giving the correct answer of six.

Part (b) was slightly tougher with one third of candidates failing to correctly measure the length of 39 to 41 mm.

Finally part (c) proved to be the most challenging. Yet again the correct answer of 0.004 was credited with both marks and many candidates failed to show their working and lost the opportunity of scoring a mark for writing $40 / 10000$. An error carried forward was used so that those candidates who failed to measure the length of the starch grain correctly were not penalised for the second time when performing their calculation.

A325/02 Additional Applied Science A – Scientific Detection – Higher Tier

Comments on Individual Questions

Although this examination was relatively short, there was no evidence that candidates were short of time. Most candidates were able to make some response to all questions.

Candidates showed a good knowledge of the basic techniques of chromatography and microscopy but struggled to discuss the details of how they work.

Comments on Individual Questions

Question No.

- Q.1(a) Most candidates were able to successfully identify at least one way in which public laboratories ensure the reliability of their data, either for a discussion about the equipment or for mention of accreditation, proficiency tests or common procedures. Some just discussed what makes for good laboratory practice or the need to repeat procedures without covering the idea of comparison with other laboratories.
- Q.1(b) Many candidates had a good knowledge of the main things that good laboratory practice depends on. Some muddled the answers to parts a) and b) and wrote accreditation, proficiency tests and/or standard procedures here. Others wrote single word answers that did not clearly address the issues.
- Q.2(a) Many candidates could correctly identify all the parts of the microscope. Some clearly remembered using the microscope without understanding what they were doing e.g. turning wheel for focussing knob.
- Q.2(b) Resolving power was not well understood with few referring to the ability to distinguish between two points although some showed they had the right idea by discussing the detail of the image. Many candidates just gave a description of the pictures e.g. 'less blurred' and some muddled resolving power with depth of field or focus. Explanations of the limitations of resolving power to light microscopes in terms of wavelength or aperture were rare.
- Q.2(c) Most candidates correctly identified the presence of an arch and a whorl in the given fingerprint.
- Q.2(d) Better candidates understood that the overall magnification of the microscope depended on the magnification of its two lenses but many candidates were too vague, referring to the magnification of 'it' or just 'the numbers on' or 'strength of' the lenses. Some had not read the question properly and described measuring the fingerprint and its image.
- Q.3(a)(i) Most candidates realised that testing with litmus is a qualitative test although a significant number thought it was quantitative.
- Q.3(a)(ii) Most candidates gave good explanations of how a quantitative test differs from a qualitative one but a surprising number of candidates confused the words quality and quantity, saying, for example, that qualitative was how much and quantitative was the colour.

- Q.3(a)(iii) The blue colour of litmus in alkaline solution was too often confused with the colour of universal indicator with blue/purple and purple appearing frequently.
- Q.3(b) Most candidates understood the idea of colour matching and could successfully explain their choice of pH 4 for the drink.
- Q.3 (c) There are many examples of colour testing kits used in medical diagnosis that the candidates could choose. Some answers were too vague such as 'urine tests' or 'blood tests' and some were not clearly linked to medical diagnosis such as 'colorimetry' or 'chromatography'.
- Q.4 Most candidates could give reasons for at least two of the steps in the standard procedure to prepare a sample for viewing in an electron microscope, with the need to view the image on a screen because the eye cannot see electrons being the best understood. Many candidates thought that the sample needed to be dried and fixed in order to kill living organisms rather than to stop it from being changed during its preparation.
- Q.5(a) Very few candidates understood that amino acids will not show up unless they are developed. Most explained the analysis part e.g. 'so that you know what amino acids are present' or were too vague e.g. 'to get more accurate/reliable results'
- Q.5(b) many candidates successfully calculated the R_f value, either by using the scale or by measuring the distances moved. Incorrect answers included using the wrong spot, poor measurement and incorrect use of the equation given.
- Q.5(c) An encouraging number of candidates understood that it was the balance of the attraction between solute and solvent and solute and medium which determined the movement of the solute up the paper. All the incorrect attractions appeared regularly.
- Q.5(d) The best methods for separating a variety of mixtures were well understood with most candidates successfully identifying paper chromatography, gas chromatography and electrophoresis as the best methods for the given examples. The most common errors were filtration to separate the colours of felt tip pens and distillation to separate small quantities of gases or liquids.
- Q.6(a) Most candidates could successfully measure the length of the image of the starch grain although some confused the units, measuring in cm but leaving the mm units given. Too many candidates had no concept of size when calculating the size of the grain from the magnification and so saw no problem in giving the length of the actual starch grain as 400,000 mm. Some knew that they should be dividing by 10,000 but struggled to manage the powers of 10.
- Q.6(b) Depth of field was another concept that was poorly understood with only a few candidates knowing that it is about clarity of 'near and far'. Candidates frequently discussed resolution or resolving power instead and some improvised with the wording e.g. how deeply a scientist would go into their field of research.

A326/01 Additional Applied Science A – Communications – Foundation Tier

General Comments

This paper appears to have provided good discrimination between those candidates who understand the topic and those who simply guess or rely on common sense and everyday knowledge. Centres have done a good job in persuading many of the latter class of candidate to be more like the former.

The maximum mark earned on this paper was about 30, suggesting that most candidates had been entered for the correct tier.

It was good to find that the vast majority of candidates felt able to have a go at all of the questions, even if they didn't manage to earn the marks. Only two questions had a significant number of gaps. One dealt with visual codes (which has been examined many times in previous sessions). The other concerned calculations based on an oscilloscope trace, suggesting a lack of practical experience with this device.

One question had a slightly unusual change of style, with candidates being required to join just one box to another out of two columns of four. Many candidates appear to have gone straight to the task without reading the question, attempting to join each box in the left-hand column to a box in the right-hand column.

Comments on Individual Questions

- Q1 The vast majority of candidates correctly identified the LED for part (a). Some candidates selected the battery as the input instead of the switch for part (b), but otherwise most candidates completed the block diagram correctly. It was good to see in part (c) that most candidates understood the meaning of the terms transmission rate, error rate and range; very few candidates earned no marks at all. Weak candidates appeared not to understand part (d) and moved on to the next question. Those who did answer the question usually earned both marks for their description of a visual code.
- Q2 It was distressing to find that a third of the candidates did not know that wireless transmission used radio waves for part (a), despite the presence of a picture showing blank space between the computer and printer. For part (b), candidates often confused modulation and demodulation, but most knew that the computer transmitted the information to the printer. The vast majority of candidates could name two memory storage devices for part (c), with very few repeating the device already mentioned in the stem.
- Q3 Most candidates correctly identified encryption for part (a), with many weak candidates opting for compression instead. Although many candidates could correctly identify one feature of video signals for part (b), only a minority could identify two. Weak candidates often failed to achieve the mark for their written response to part (c)(i) because they could not express themselves clearly enough. However, most candidates knew that governments issue radio licences for part (c)(ii). It was good to see that a third of the candidates were able to correctly match all three radio bands to their frequencies for part (d), a big improvement on previous sessions.

- Q4 The vast majority of candidates were able to complete the block diagram correctly for part (a). Only half, however could correctly sequence the statements about the digitisation process for part (b) and only a minority could identify two advantages of analogue transmission.
- Q5 This was the first of two questions which also appeared on the Higher Tier paper. Many candidates found it hard Lack of language skills prevented the majority of candidates from earning the first mark and very few were able to calculate the voltage level from the information provided, suggesting that they were unfamiliar with oscilloscopes. In part (c), many candidates ignored the instructions and drew lines to join all of the boxes instead of just one pair. Very few candidates earned both marks, possibly because they didn't understand how to calculate a frequency or period. Similarly, many weak candidates offered simplistic incorrect answers for part (d), such as faster or cheaper, earning no marks.
- Q6 Nearly all candidates earned the mark for part (a). Part (b) proved to be much more demanding, with many candidates confusing running costs with purchase cost. Too many only matched one of the criteria instead of both, losing the mark. The multiple choice nature of part (b)(i) meant that most candidates were able to pick up one mark, but very few earned both; many wanted to include both the modulator and demodulator. Part (b)(ii) proved to be the hardest question of the whole paper, with too many candidates appearing to treat the block diagram as a flow chart.

A326/02 Additional Applied Science A – Communications – Higher Tier

General Comments

This Higher Tier paper was designed to discriminate between candidates operating a grade A and grade C. However, about half of the candidates entered for this paper appear to have been operating at grade C or below. They would have had the same result with a much more enjoyable exam experience had they been entered for the Foundation Tier paper instead. This is especially true for the not inconsiderable number of candidates who only earned a handful of marks.

It was noticeable that the omission rate was very low for most questions, only rising to a significant level for those questions which required candidates to write extended prose to explain their answer. One question had a slightly unusual change of style, with candidates being required to join just one box to another out of two columns of four. Many candidates appear to have gone straight to the task without reading the question, attempting to join each box in the left-hand column to a box in the right-hand column.

Comments on Individual Questions

- Q1 This was the first of two questions which also appeared on the Foundation Tier paper. As expected, strong candidates were able to earn high marks for most parts of it. Only weak candidates struggled to find the words to express themselves clearly enough to earn the mark for part (a). Just under half the candidates could calculate the voltage level from the information provided in part (b), but most felt able to offer an answer. In part (c), too many candidates appear to have answered the question without reading the instructions first, joining every box in the left-hand column to a box in the right-hand column. The majority of candidates offered simplistic incorrect answers for part (d). Unqualified responses of faster or cheaper for the benefits of digital transmission earned no marks.
- Q2 This question also appeared on the Foundation Tier paper. Although the vast majority of candidates selected the correct radio with an appropriate reason for part (a), only a minority were able to do so for part (b), with many candidates confusing purchase cost with running cost. Strong candidates had no trouble completing the block diagram of part (b)(i) correctly. Many weak candidates appeared to know what blocks needed to be present but could not put them in the correct order. Only strong candidates could correctly state the meaning of the arrows of a block diagram, with many weak candidates appearing to confuse it with a flowchart or a circuit diagram.
- Q3 This question proved, as intended, to be significantly harder than the previous two. Only a minority of candidates could use the information from the circuit diagram to correctly complete the block diagram, with too many weak candidates not even using names of electrical components. Many weak candidates declined to answer part (b), although candidates who had a go often earned at least one of the marks. Although most strong candidates had no difficulty in writing down a digital code for part (c), many weak candidates moved straight on to the next question. It was good to find that very few offered Morse code, the example given in the stem of the question.
- Q4 This question about signal transfer provided good discrimination. The vast majority of candidates had a go at writing an answer to part (a), with most able to correctly describe the role of the carrier wave. However, too many candidates had clearly no

idea of the function of the modulation and demodulation processes. Part (b) proved to be equally challenging, with many confusing compression with encryption or even modulation. As expected, only the most able candidates were able to recognise the frequency modulated carrier wave of part (c).

- Q5 Although the majority of candidates were able to explain the meaning of encryption for part (a), only the most able could explain the calculation of part (b). Candidates who used trial-and-error to find combinations of numbers which worked often failed to earn the marks because they offered no convincing explanation with their sums. As always, few candidates were able provide a correct definition of bandwidth for part (c). It was good to find that many candidates were able to correctly identify the radio frequency used for television broadcasts, a big improvement from previous sessions. However, the majority of candidates struggled to express themselves clearly enough in part (d)(ii) to earn the second mark for their explanation for the need for radio broadcasts to be licensed. Many weaker candidates appeared to confuse licensing with censoring.
- Q6 It was good to find that many candidates could earn marks for completing the block diagram of the simple TV system of part (a). The advantages of analogue transmission proved to be too hard for most candidates in part (b), but the majority were able to identify a communication system which used optical fibre as the link. A worrying number of candidates gave mobile phones as their answer, suggesting that they have never seen an optical fibre.

A334/01 Additional Applied Science A – Agriculture & Food – Foundation Tier

General Comments:

The candidate performance was fairly similar to previous examination sessions. There were some pleasing aspects of improvement such as

- Very few scripts showing little knowledge and understanding
- Very few “no responses” ie no attempt to answer a question
- Many genuine attempts to write a full explanation
- Very few examples of poor technique by ticking too many boxes or drawing too many lines

Comments on Individual Questions:

- Q1 This question showed a good range of marks.
- (a) Only about half of the candidates chose the correct answer “horticulture”, a common incorrect answer was “arable farming”.
- (b) The vast majority of candidates were able to give a correct way in which insects damage plants, with common correct answers being “eat them”, “kill them”, and “cause disease”.
- (c)(i) The majority of candidates knew that insecticides kill insects.
- (c)(ii) The majority of candidates correctly identified that chemical control results in different types of insect being killed quickly.
- (c)(iii) Many candidates were unable to suggest a correct disadvantage of using chemicals on plants, often offering incorrect vague answers such as “harming the plant”.
- (d) A wide variety of acceptable answers was written to explain how insects can be useful to plants, with the most popular suggestion referring to their role in pollination.
- Q2
- (a) Most candidates were able to offer at least one advantage of keeping mini-cattle, the most common correct answer being that they eat less food so are cheaper to keep.
- b) There was some confusion about gathered and whole organism harvests, with the result that candidates tended to score 2 marks or 0 marks; very few scored 1 mark.
- (c)(i) The majority of candidates correctly identified “high yield” as an advantage of intensive farming.
- (c)(ii) ...And “encouraging the spread of disease” as a disadvantage.
- (d) About half of the candidates were able to suggest a correct disadvantage of keeping mini-cattle, many who did not score gave answers about “buying new equipment”.
- (e) Most candidates chose at least one correct response.

- Q3 (a) The majority of candidates were unable to identify the missing stage in the life cycle as "germination".
- (b) It was pleasing to note the high number of correct answers to this question, which tested candidates' ability to interpret information from a graph.
- (c) Only a minority of candidates were able to work out the average growth rate.
- (d) Just under half of the candidates correctly expressed the idea that most growth of the trees had already taken place in the first 50 years.
- (e) This question asked candidates to consider reasons why tree harvests are sometimes less than that expected. Very few candidates gave one correct answer, with even less giving two.
- (f) Over half of the candidates were able to give an acceptable alternative way of measuring tree growth.
- (g) It was pleasing to note that virtually all candidates know that paper is a useful product of trees.
- Q4. Parts (b), (d) and f were common to the higher paper and proved to be challenging.
- (a) Less than half of the candidates were able to identify the missing stage in the chain of food production.
- (b)(i) More than half of the candidates could not name photosynthesis as the process used by plants to make food.
- (b)(ii) A minority of candidates were able to state the word equation for photosynthesis.
- (c) The majority of candidates know that the part of wheat used to make bread is the seed.
- (d) Many candidates incorrectly stated that yeast "gets bigger".
- (e) Very few candidates realised that yeast dies as bread cooks.
- (f) A reasonable number of candidates were able to express the idea of "supply and demand" with respect to the way the price of bread can change during the year.

A334/02 Additional Applied Science A – Agriculture & Food – Higher Tier

General Comments

The performance of the candidates was similar to previous examination papers, particularly last year's, with the majority of marks being awarded from questions 1 to 3.

It is good practice to always attempt explanations where 2 or more marks were available.

The question on genetic modification still remains the most challenging and the most poorly understood by most candidates, and knowledge seems confused with aspects of cloning i.e. tissue culture and cuttings.

A small but significant proportion of candidates scored 5 or less marks thereby demonstrating a virtually complete lack of knowledge in almost every area of the paper. These candidates are better advised to enter for the foundation tier.

Comments on Individual Questions

Question No. 1. This question was based on growing trees in a forestry commission plantation.

- 1(a) was very poorly answered, with many inserting pollination in box 3 (despite the top box containing the same word). Candidates should be familiar with the correct terminology used within the plant life cycle.
- 1(b) was often correct.
- 1(c) had many correct answers, but a significant proportion had answers running into several metres, so those candidates cannot have read the question carefully enough, since they are given the answer for ash trees, and the graph with its reduced rate of growth is clearly seen, so a value below that of ash trees should have been picked up on.
- 1(d) Mostly correct.
- 1(e) This part was very poor, with many references to protected trees/ lack of sunlight/lack of carbon dioxide. There were references to soil, water, temperature, which only needed a descriptor (i.e. lack of) in order to score a mark.

Question 2 was about the various stages involved in bread making.

- 2(a)(i) mostly correct.
- 2(a)(ii) Although most of the words for the answer to this part are in the stem of the question, there were some incorrect combinations of the listed reactants.
- 2(b) Virtually nobody realised that yeast needed sugar in order to grow and produce carbon dioxide. Only a few mentioned respiration, and many thought that yeast trapped air to make it expand.
- 2(c) Supply and demand was given by some candidates, but there were many references to weather and to a lack of wheat grown in the winter. Many also did not consider the availability of wheat, but could relate the increased/decreased cost of bread to the

changing prices of something connected with wheat such as ingredients/transport costs.

Question 3 This question was about keeping and breeding cattle.

- 3(a) This part needed 4 comments to score 2 marks. There were vague statements about space, which needed to be qualified, though many did score at least one mark for one set of advantages and disadvantages.
- 3(b) This was not well answered considering the multitude of options available.
- 3(c) Many candidates did not seem to understand what was meant by 'rear' and many put down two different types of farming i.e. arable and dairy, instead of methods. Some even mentioned batch and tissue culture.
- 3(d)(i) There was confusion over AI and IVF. Those who attempted to describe selective breeding did not apply their knowledge to what was specifically asked in the question, and looked at it in general terms of 'selecting the best characteristics such as high milk/meat yield'. Many candidates did specify that the process should be repeated, but could not get a mark because the idea of many repeats was not clear enough, or that a long time was needed.
- 3(d)(ii) Many thought the answer was to do with expense, though there were some answers that considered a reduced gene pool and that the process would take a long time.
- 3(e) Very few scored full marks, though some did take advantage of the 'prompts' in the question, but even so the scores generally showed a lack of understanding. Many could identify the correct cycle and the effect of hormones but could not give a valid reason for its usefulness. There was confusion with AI and which animal (male or female) was affected, and many talked about the process being 'speeded up'.

Question 4 was on genetic modification in plants.

- 4(a) DNA was mentioned by the majority of candidates, though anthocyanins was also a popular answer.
- 4(b) Many references to anthocyanins again, with some referring to bacteria and mice, so this part was answered incorrectly for the most part.
- 4(c) Many thought this was to do with taking cuttings/plant breeding. Although there were references to anthocyanins, many stated that it was the purple colour that was transferred, rather than the DNA/gene that codes for it. There were also vague references to bacteria, and only one candidate mentioned that a virus may be involved.
- 4(d) Some candidates understood that the purple colour was transferred, but nearly all could not understand that it was the DNA that was responsible for the instructions to make it in the plant.
- 4(e) very few candidates gained these marks, with many talking about safety to humans which was implied in the question as tomatoes are a food. Most did not appreciate that the genes could get out into the environment. A large number of candidates talked about cloning/cuttings/AI/selective breeding, and appeared to be unclear as to what biotechnology meant.

A335/01 Additional Applied Science A – Harnessing Chemicals – Foundation Tier

General Comments

Many of the candidates performed well on this paper. It was pleasing to see that with help they could perform basic calculations and also that many had a good knowledge of chemical names and symbols. It would appear that students are benefitting from 'hands on' experience through practical work and this has been reflected in their improved ability to deal with formulae etc. Some of the longer written answers that required explanations proved difficult for many candidates.

Candidates need to be reminded to use the information from the question to help with their answers.

Comments on Individual Questions

Question No.

Q.1 This was generally a well answered question. Most candidates knew the descriptions of the apparatus for measuring volumes and mass. The reaction showed that some candidates did not bring forward the information from the stem of the question (magnesium) and few knew the general equation between acids and metals to produce hydrogen gas.

The practical knowledge required to show how to produce good crystals was well demonstrated as was the idea that filtration should then be used as a separation technique.

Much help was given with the calculation and it was pleasing to see that many of the candidates were able to substitute the correct figures and with the help of a calculator work out the correct answer. It was obvious that some candidates still did not have a calculator with them. There is always going to be a simple calculation on this paper so candidates need to be reminded that it is their responsibility to supply one.

In the last part, many candidates understood that extra water would make the crystals have a larger mass but then failed to answer the question about the effect of this on the calculated % yield.

Q.2 There were many correct examples of large scale chemicals that would be used in a school lab. and many candidates knew that this was known as bulk production.

The comparison between a renewable resource (sugar cane) and a non renewable resource (crude oil) was not well expressed. Many knew about the role of catalysts in chemical reactions.

Q.3 The hazard warning symbol was identified successfully by many candidates and many also knew the correct formula for hydrochloric acid. The general equation describing the reaction between an acid and a carbonate was not well known. Some candidates opted to write the formula for carbon dioxide which needed to be correct with a subscript 2. The incorrect use of formulae in advertising does not help matters here.

The concentration calculation was not well done. Without a formula to help many found it difficult to work out the ratio required.

Fine scale production was well known but the formation of an ester from an alcohol and a carboxylic acid was poorly answered.

Q.4 Many candidates were confused between an emulsion and an emulsifier. They needed to explain what might happen to the different liquids in order to produce an emulsion and what dispersed meant. Some failed to spot that the examples had to be food or cosmetics.

The testing was understood from a safety aspect very well but not from the aspect of consistency / composition of the product. National procedures were not well explained.

Q.5 Yet again few knew that the HSE was responsible for regulation of the industry. The identification of the various chemicals and their properties was patchily answered. Many thought that the pH scale worked the wrong way round, giving acid answers for the values higher than 7. Some abandoned the list of chemicals altogether despite clear instructions not to do so. Some described the hazard label (highly flammable) rather than select a highly flammable chemical from the list.

A335/02 Additional Applied Science A – Harnessing Chemicals – Higher Tier

General Comments

The paper was challenging but no candidates appear to have been disadvantaged by language or cultural issues. A number of candidates found the examination very difficult and a few of these failed to respond to most of the questions. These candidates might have been better served if they had been entered for the foundation tier. Apart from these, most candidates attempted all of the questions, so there was no indication of time pressure or other constraints.

Comments on Individual Questions

Q1 Although the role of the Health & Safety Executive is explicitly mentioned in the specification this was not well answered.. There are always some questions which require recall of such facts. The chemicals listed in part b are also taken explicitly from the specification and it is reasonable to expect that candidates are familiar with them. Many candidates have, in the past, correctly defined the word hydrocarbon but fewer than half were able to correctly identify butane as an example. Most candidates recognised the importance of pH in the second part of the question, but as the names of alkalis do not contain the word alkali, most resorted to naming the two explicitly acidic compounds. Surprisingly, water was rarely given as a product of neutralisation in the third section. Many candidates offered the names of the two potassium salts instead.

In part (iv) a significant number responded by explaining that the symbol meant highly flammable instead of giving an example. It is important to stress to candidates that they must answer the question asked. It was pleasing that most candidates were able to name ammonia as the compound made from nitrogen and hydrogen. The calculation in the last part of this question was routinely done well with a good number of candidates getting both marks. The most common wrong answer was 20 - demonstrating a clear lack of understanding of what concentration means.

Q2 Contrasting the values of continuous and batch processing is a common theme in these papers, but the advantages of continuous processing seem to be much more accessible than the expense of setting up the equipment. In defining a catalyst, many candidates recognised the link with changing the rate of a reaction, but the rest of the definition was less well known. Some weaker candidates could only relate to the word catalyst in connection with car exhaust gases. The explanation of the word exothermic was largely well known, but a surprising number of candidates seemed not to have met the word before. Most candidates were confident that they could change the rate of a reaction, although some missed the mark by specifying the use of a catalyst or just changing quantities (and not concentration or temperature) of reagents.

Q3 The solid mixture in this question is defined as having "two or more dry ingredients". As such, things like concrete and cake (which include liquids and then undergo a chemical reaction) and paracetamol (which is a single substance) are not correct. A dry cake mix or a paracetamol tablet are both quite acceptable responses. A similar distinction prevented many candidates scoring full marks in part b. Immiscible liquids will mix when shaken, but an emulsifier is needed to prevent separation into two layers. Finally the definition of a suspension was not well recognised. Although

specialised language can be a challenge, candidates will benefit from being carefully introduced to technical words and their meanings.

- Q4 Most candidates scored well on parts of this question, particularly the middle sections. The concept of sustainability in the specification is couched in terms of use of renewable resources, use of energy, yield and disposal of waste products. Most candidates preferred to focus their response on pollution (too vague) or safety, which suggests that they had not really grasped the concept. However, the idea that development of a new drug would require much testing for safety purposes was well understood and the correct formula for ibuprofen was deduced by almost all candidates. Most had a concept of a functional group in an organic molecule and would have correctly identified an example if given the chance. However, once again their grasp of technical language let many down as they gave examples and used the wrong words. ("a functional group is a group of molecules" or "...a molecule in an atom"). Calculating the relative formula mass for paracetamol proved to be quite straightforward for most good candidates, but some lost marks by assuming that a formula which ends NO_2 contained two atoms each of nitrogen and oxygen, thus getting an answer of 165 rather than 151.
- Q5 Very few candidates appeared to have used the information in the table to identify the insoluble salts Lead sulfate was the only substance which not present in the list of compounds and higher tier candidates are expected to be able to recall the formula. The second part of the question highlighted the limitations in candidates understanding of a practical technique with which they should be familiar. Most seemed to understand what was meant by washing, but had little or no idea why it was done. Many poor answers seemed to focus on cleaning the filter funnel (or even the paper) so that it was ready for the next experiment, although a few candidates appreciated that the precipitate would otherwise be contaminated by solutions from the reaction in which it had been made. Completing the balanced equation in the third part of the question was challenging, even though the formulae required were ones that students should recognise. A disappointing number of candidates who spotted the name "hydrochloric acid" in the question, managed to squander a mark by giving the formula as HCL rather than HCl. A good number of candidates correctly calculated the yield in the last part of the question at 80% - and a few who did not appear to have a calculator got a mark for correctly showing their working - but a disappointingly large number of candidates calculated the theoretical yield as a percentage of the actual yield and got 125%, without apparently seeing this as a problem.

A336/01 Additional Applied Science A – Materials & Performance – Foundation Tier

General Comments

There was no evidence of candidates having time difficulties with the vast majority completing all questions in the time allowed. It was also clear that the vast majority of candidates were entered for the correct level paper.

Candidates should be aware that the marking is done from scanned images of their scripts. Consequently, if candidates change their minds, any alterations must be made clearly and unambiguously. Any marks that are ambiguous (possibly made with the intention that the examiner could give credit to either of two possible responses), where only one is correct, will not gain credit.

Candidates should be encouraged to give an answer especially with the 'tick box' type of question. Failure to read the question as to how many ticks are required also caused problems for some. Where candidates have to link boxes there were problems when candidates made a number of 'crossings out' and there were so many lines that it was difficult to decide which boxes the candidates wanted to indicate, this type of question also asks for 'straight lines' to be drawn from one box to the next.

Comments on Individual Question

Question No.

- Q1 This was a generally well answered question which also proved to be a good discriminator with able candidates often scoring full marks. In (a) the vast majority used the words hard and stiff but some weaker candidates put them down in the wrong order. Part (b) proved a little more difficult with some candidates drawing two lines from the left hand boxes and so automatically losing both marks and others confused high and low thermal conductance, perhaps showing a misunderstanding of conductance. Part (c) was well answered.
- Q2 Again a well answered question which showed discrimination in the answers, indeed many able students scored full marks on both questions 1 and 2. In part 2(a) weaker candidates sometimes mixed up the two electrical properties, making the outer layer of cable a conductor and the pins of the plug an insulator, the least well answered box was for the pins of the plug being rigid. A confusing set of responses were those by candidates who put the correct mechanical properties in the column for electrical properties and vice versa for electrical properties. Part (b) was well answered with the most common answers being either for personal use to look at their own images or as a rear-view mirror in a car. The word 'reflection' unqualified was deemed insufficient as an answer worthy of credit. Part (d) required candidates to give reasons for using different types of glass; this was well answered 'To be able to handle the steam' was sometimes wrongly used for translucent glass and similarly 'to stop people seeing through' was deemed incorrect for a stained glass window.
- Q3 This question proved a little more difficult. In part (a) often no job was stated or vague answers such as 'so he knows best' were given with no reference to the properties of a material so a simple response such as, 'An electrician must know if materials are conductors or insulators.' was rarely seen. Responses to part (b)(i) were very disappointing; most candidates explained why safety was important but had no

concept of safety margin, missing the idea of a product needing to be able to hold/withstand more than required for its purpose, in order for it to be safe. In part (b)(ii) many candidates incorrectly gave agencies instead of an inspector or officer of the agency or otherwise gave principals of a company eg manager. Part (c) was better answered with many knowing either BS or ISO but few knowing both.

Q4 This was an overlap question with the higher paper and as expected proved to be the hardest question on the paper. In (a)(i) where there were six boxes and candidates were expected to fill in two of these boxes many candidates either attempted to name all the parts of the camera or tried to hedge their bets by filling in all six boxes with the words aperture and shutter. In part (a)(ii) the vast majority thought the special coating on a camera lens was for the protection of the lens to prevent scratching. Parts (b) and (c) were equally disappointing with few knowing any of the required terms. Many pupils gave reflection for refraction, did not know the unit and appeared to have no understanding of focal length.

Q5 In part (a) the more able candidates were able to realise the importance of repeating an experiment to get reliable results but fewer appreciated the need for similarity of results. Weaker candidates often confused reliability with accuracy, a surprising minority thought the experiment was repeated 9 times but they were not penalised for this. In part (b) a detailed diagram proved crucial for attaining high marks. Candidates find it surprisingly difficult to actually state 'take a measurement of ...' and leave it to the examiner to guess whether any measurements are actually taken eg 'Keep adding weights and see how it bends/stretches until it breaks.' does not explain what measurements are actually made and could not be expected to gain full marks. There was a general difficulty in expressing ideas for their investigation and very few picked up on the idea of repeating their test with other samples.

A336/02 Additional Applied Science A – Materials & Performance – Higher Tier

General Comments

Candidates' performance was rather weaker than in previous sessions. Many candidates demonstrated a lack of understanding of some of the basic terms (such as 'strength' or 'toughness'). The specification demands that candidates should be able to: "give two examples of artefacts whose materials are selected for complementary mechanical behaviours" and "give two examples of artefacts whose materials are selected for matching thermal behaviours". Neither of these situations were well answered by the majority of candidates. Many candidates fell back on the unfortunate and inadmissible option of referring to the same artefact as exemplified in the stem of the question.

It did not appear that any candidates were limited by time, but there was evidence of candidates entered for this higher tier paper who would be better suited to the demands of the foundation paper.

Comments on Individual Questions

Question No.

- Q1(a)(i) Many candidates attempted to complete the labelling of all six boxes, a substantial number making their attempts void by repeating 'shutter' and 'aperture' three times each.
- (a)(ii) Very few candidates were able to identify the correct reason. The majority thought that the coating would protect the lens from scratches.
- (c) These terms were not well known. Very few candidates took the opportunity to use the diagram as an aid to their answer.
- Q2(a)(i) Although the majority of answers were correct, there were also a wide variety of alternatives given, demonstrating a poor grasp of the graph provided.
- (a)(ii) Most answers appreciated that repeating the experiment was a key factor, but often the language used by candidates made answers too imprecise to credit.
- (b) Candidates have improved in their ability to describe experimental details, but this knowledge is still weak and few candidates mentioned all the key factors.
- Q3(a)(i) A variety of spellings of the word 'decibels' was met. The abbreviation 'dB' was not accepted because it was provided in the following table.
- (a)(ii) Few responses were correct, suggesting that the scale is not well understood.
- (b) Many candidates able to suggest both a material and the mechanism for noise reduction. Some candidates suggested moving to a different room, both here and in the following part, not an acceptable answer to the question.
- (c) It was apparent that many candidates had been taught the principles required to answer this question, but their recall was weak. The most common mistake was to suggest wrapping the equipment in some way.

- Q4(a) A substantial minority of candidates re-used the example given of a camera, thus invalidating their answer. Most evidently made up an answer on the spot, and could not rely on a prepared situation as required in the specification. A substantial number of answers did not refer to thermal properties at all.
- (b)(i) The majority simply divided the 'y' value by the 'x' value for one data point.
- (b)(ii) This was also poorly done, with most answers consisting of a description of the copper-silicon curve, rather than how this differed from pure copper.
- (b)(iii) This should have been an easy mark, since almost any 'property' other than tensile strength would have been accepted. However, some candidates chose two properties that are 'opposites' or descriptions that are not properties, such as 'mass' or 'volume'.
- Q5(a) Full marks could be obtained here by simply translating the example given to a similar, but different example, such as 'shin or knee pads'. Astute candidates, who had not prepared an example, did exactly that. Those who were starting from scratch often omitted to name a 'material', or gave reasons in terms of the simple property; for example a bicycle frame needing to be 'strong', so that it will not break. A more explicit reason was required, such as 'to support the weight of the rider'.
- (b) As with the previous part, many candidates did not answer the question. Many gave properties that were not mechanical; some did not name specific materials. There were however some good answers, showing good preparation.
- (c) Only a small number of candidates understand momentum. The minority that included the term in their answer used it in a vague way, often referring to the helmet 'lowering' the momentum.
- (d) The lack of understanding of momentum shown in part 'c', was repeated here. Only a few candidates were able to substitute in the equation provided. Fewer still could evaluate that equation to give the correct answer. The majority of candidates did not appreciate that the value of 'u' was zero.

A337 Additional Applied Science A – Work related portfolio

General comments:

This was the first session that this specification used an electronic means of requesting and selecting the portfolios for moderation. This did make the moderation process much more efficient and the majority of centres were very responsive in returning scripts for moderation and including the Centre Authentication form with the candidates' work. There is now no necessity to send MS1 forms to moderators or to include these forms with the sample. It is however important to ensure centre numbers and candidate numbers are recorded on the record card.

Moderators did discover many clerical errors where the marks on the MS1 forms were not the same as the marks on the Work-related Portfolio Record Card. It is hoped that centres will ensure suitable checks are completed to make sure that these errors are reduced to a minimum. This seems to be an ongoing problem and showed an increase this year.

Most portfolio work was well organised and presented using treasury tags which allow moderators to easily read and locate the work. Centres are advised not to include candidates' work in plastic pockets or ring binders.

Annotation of candidates' work in the form e.g. A(a) 6 is useful to moderators in allowing them to easily locate the work and to see the assessment decision for both the assessment strand covered and the level reached. This practice should be encouraged.

Where scaling occurred this session, it was mainly due to Centres being too generous at the higher mark bands or where no evidence was included for the standard procedures. For work generously assessed, work was not sufficiently detailed; data collected by candidates was limited or not recorded to a suitable level of precision and reliability. In some cases for the suitability test, the tasks set were not suitable in that, they did not allow the candidates opportunity to gather sufficient data to obtain the higher level marks. Several evaluations were seen which were not at a high enough level for A grade work. For the work related reports centres need to ensure they have fulfilled all the criteria of the strand to reach the top mark (e.g. 6 marks can not be achieved if collection of relevant information does not include a practitioner or workplace source.) For standard procedures where no evidence was included it was usually possible to award 3 marks, however it is not possible to confirm that measurements or observations were made to an appropriate degree of accuracy for the fourth mark without some evidence.

Centres should be reminded that 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 assessment completed by the centre.

Standard Procedures:

A good range of standard procedures were again seen this session. These included measurement of vital signs (temperature/blood pressure etc), testing for diabetes, seed germination, growing bacteria, testing milk quality, chromatography, colour change of indicators, investigation of unknowns (linked to forensic) colorimetry, measurements from electrical circuits and measurements of physical properties of materials e.g. density, strength etc..

Good practice was seen by centres where suitable instructions for the standard procedures were attached to candidates' work and candidates clearly knew how to record their measurements or observations to support the fourth mark. Centres can supply tables to their candidates for recording their measurements or observations, as the drawing of an appropriate table/format is not assessment requirement for standard procedures.

Statements from teachers that candidates have followed instructions safely and without guidance also support the assessment.

The majority of centres had noted the guidance previously given on the allocation of the fourth mark and are now correctly allocating it for recording to the appropriate degree of accuracy and not for processing results. Care however needs to be taken that where candidates are recording observations rather than measurements they are given the opportunity to give full detailed observations for the fourth mark. Rather than recording just a colour, if a colour change is needed both the colour before and the colour after needs to be recorded and where there is a precipitate or just a solution detailed observations need to be given. Check this regarding work involving Benedict's test and milk quality testing.

Please again note that if units are given in a table provided then the fourth mark can be given for just numerical accuracy, however if no units are provided to candidates, the results recorded must be supported by appropriate units and to the appropriate degree of accuracy. There are still a lot of omissions of units in recording.

Suitability Test:

A good range of suitability tests were offered this session. Examples of these included suitability of thermometers, soil testing kits, pH testing, glucose testing, chromatography procedures, suitability of materials for diving boards, fishing lines, plastic bags, electrical appliances, chromatography (paper/solvent) requirements, antacids and suitability of materials used in construction.

Good practice was again seen where centres allowed candidates the opportunity to plan their own experimental work and complete a variety of different tasks rather than repeating the same test or task many times. Candidates should also be encouraged to explore more imaginative improvements to apparatus and techniques and not merely focus on repetition as a means to increase reliability of conclusions.

The work candidates carry out on thermometers is still one of the most popular suitability tests and there was a wide variety of the quality of work seen by candidates. Again most tended to explain the purpose of the test, but many lacked enough detail on the properties and characteristics of the thermometer to gain higher marks. Several scripts were seen this session where candidates had used a water bath as a control. This can be recommended to lift the level of the practical work. Care still needs to be taken to ensure that single step experimental procedures are not considered to be complex and the quality of the data, collected to ensure that reliability, is checked. Conclusions need to link to the purpose of the test to fully explain how 'suitable' the thermometer is.

The interpretation of the requirements for a suitability test rather than an investigation continues to improve.

Strand A and Strand B

Most candidates were able to adequately identify the workplace or vocational aspect of their test, but care needs to be taken to ensure that even for 4 marks a description of the desirable properties or characteristics are given. When determining the suitability of a material for purpose it is important that a range of factors are considered. For 8 marks candidates need to give a full

description of the desirable properties with an explanation of why these are necessary, this generally was not sufficiently detailed.

Candidates looking at different types of wire used for different purposes, need to check that practical work is not just repeated but a range of different tests are considered which support the concept of suitability. The practical work carried out by the candidates needs to support the desirable properties they have mentioned and not just to find the resistance of the wire under test.

The use of volumetric techniques in analysis of the suitability of antacids, a range of testing procedures for the suitability of plastic bags and the use of a range of qualitative and quantitative tests in forensic approaches, give candidates the opportunity to access the higher mark bands.

Moderators are encouraged to support the centre's assessment of strand B, however if annotation on candidates' work is given to support strand B(a) -student autonomy and independence, this would further confirm the assessment decisions. In order to achieve 8 marks candidates should be showing evidence of independent thought in their approach to the experimental task.

Strand C and Strand D

Centres need to still be aware that to achieve 6 marks for Strand C candidates need to devise their own format, correctly record data which include all units, carry out appropriate repeats and show data is adequately precise and reliable. There seemed, this session to be many more candidates not recording units and not discussing repeats. For 8 marks evidence needs to show 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.

When writing a conclusion candidates need to link clearly to the purpose of the test and also to the related scientific theory, consequently many candidates scored 4-6 marks, with very few giving enough detail to score 7-8 marks. Centres still need to check that this strand is not over marked. Care needs to be taken by candidates that for the higher mark band they include a correct conclusion from the overall pattern of the results with a clear link to the purpose of the test and a discussion of any limitations, simple statements were seen but not the depth needed to support the higher mark bands.

For strand D (b) again limited evidence was seen on an evaluation of the method used to assess the most suitable material/procedure or device. Candidates need to focus more on the requirements of the criteria if they want to achieve the higher mark bands. Work needs to show detailed descriptions and explanations.

Strand E

Generally moderators supported the assessment for the structure and organisation of reports, but care still needs to be taken to ensure that candidates do not automatically gain 6 marks for including contents and numbering the pages. Several submissions were seen where contents did not link to the work recorded. In addition work should be effectively organised and the level of the report should allow the inclusion of sufficient appropriate scientific vocabulary. For 8 marks the report 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 report is that it is focused on a chosen audience. There was a considerable amount of generous assessment this session for this strand.

Work related Report:

The range of work related reports this session seemed much more varied than in previous years. Reports on farming, engineering, sport, health, and technical professions were more commonly seen, as well as the popular nursing, midwifery and physiotherapy ones.

Candidates who had been on visits tended to describe the work environments in a much more personal way than those who used Internet research. Interviews tended to give very descriptive information about practice and individual's knowledge and ideas of the different professions.

Strand A

Centres still need to be aware that for strand A (a) for 6 marks relevant information needs to be collected from a variety of sources which includes a practitioner and /or workplace. Several centres this session were over marking on this strand. Best practice is where candidates integrate their interviews into the whole report and not just include the information in the form of a questionnaire in the appendix. It is hoped that use of the information gathered in the interview/visit is integral within the report where 8 marks are being awarded.

For strand A (b) (c) references generally were well recorded and direct quotations were identified throughout the text. Detailed references should show ISBN numbers for books and for online references, full web site addresses and dates of internet access. 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. The citing of references within the text and referencing illustrations and charts, continues to improve.

Strand B

For strand B (a) the quality of the content was generally suitably assessed, although there was still evidence of copying and pasting with no references. Candidates need to appreciate use of their own words and descriptions are preferred to excessive downloaded information. Some good work was seen for 8 marks where candidates clearly described the skills, qualifications and personal qualities required and explained the relevance of the qualities required for the work described.

Centres need, however, to check that they assess Strand B (b) appropriately. This strand includes a description of the nature of the work and its purpose and place in the wider organisation, some centres were particularly harsh in this assessment as they were assessing only the place in the wider organisation and ignoring information given on the description of the nature of the work.

Centres still need to ensure candidates are describing the impact of a financial or regulatory factor. Candidates who wish to access 8 marks need to check that work is fully reflective of the higher level criteria. Explanations rather than descriptions are necessary and lengthy descriptions are not always indicative of 8 marks. Higher grade candidates should be showing suitable selection and focused detail.

Health and safety continues to be a useful regulatory factor, but 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. This meant that the 6 marks awarded to candidates for strand B(c) were not upheld.

Strand C

For Strand C, work moderated is indicating that candidates are now linking the scientific knowledge to the work involved. The assessment of this strand seems better this session. Good practice was seen where the level of scientific knowledge explained by candidates linked to the specific job roles. Good detail was seen in work relating to the farming industry, electrical work, brewing, nursing and midwifery.

Strand C (b) was again much better with several good descriptions of technical skills provided. Good practice was seen where candidates had focused on one example and had described the technical skill applied in the workplace, and supported this by good visual material. For higher marks candidates explained how the technical skill was applied and some good high level work was seen this session.

Strand D

Generally strand D was suitably assessed, and again as for the suitability test, care needs to be taken when awarding 6 marks to ensure that information is effectively organised and the contents and page numbers are accurate and suitably linked.

Care needs to be taken when awarding 8 marks for strand D (b) 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.

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