

Additional Applied Science A

Twenty First Century Science Suite

General Certificate of Secondary Education **GCSE J632**

Report on the Units

June 2010

J632/R/10

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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. The papers were constructed to allow candidates to feel that they had every opportunity to demonstrate their knowledge and understanding while at the same time discriminating between candidates of differing abilities. 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. Most 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. However in A335 Harnessing Chemicals, A334 Agriculture and Food, and A336 Materials and Performance, a significant minority would have benefited by sitting the foundation tier of the examination rather than the higher. This error in entry policy was most noticed on A326 Communications where approximately half the candidates would have benefitted from being entered for the foundation tier. Foundation tier candidates who are entered for a higher tier paper generally do not have a pleasant experience taking the examination. On the positive side, many Principal Examiners noticed a marked improvement in candidate's ability to answer extended answer questions. There was no evidence that any group had been disadvantaged by the language or by any cultural issues

Centres and candidates should now 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. Candidates would be well advised to ensure that they use the appropriate answer lines and spaces in which to write their responses.

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

Candidates are well advised to read questions carefully. Each year a number of candidates lose marks unnecessarily because in their haste to complete the paper before they run out of time, they fail to read the question carefully. It cannot be stressed too strongly that reading and re-reading the question is time well spent. Candidates would also be advised to pay similar attention to their answers. Answers should always be re-read to ensure that they do indeed answer the question.

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 that they had difficulty answering, however this was not as prevalent as in previous sessions.

Leaving questions blank will guarantee that they get no marks for the question. At least attempting the questions opens up the opportunity of them scoring some of the available marks. Candidates should be encouraged to at least make an attempt with every question.

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 have memorised 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.

Report on the Units taken in June 2010

In terms of the work related portfolio, it was found that the portfolio tasks had been set as to allow access to the assessment criteria at appropriate levels and the marking was generally in agreement with them. The majority of the candidates studying this qualification are now competently completing six suitable standard procedures, appreciating the assessment needs for the suitability test and carrying out a wide range of interesting research for the work related report.

The majority of Centres again were very responsive in returning scripts for moderation and returned the Centre Authentication form with the candidates' work. Most work was well organised and presented using treasury tags which allow moderators to easily read and locate the work. These factors help to support an efficient moderation process and this is appreciated. Moderators did however discover several 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 in the future Centres will ensure suitable checks are done to make sure that these are reduced to a minimum. This seems to be an ongoing problem.

Limited scaling occurred this session however where scaling of candidates' work occurred, it was again mainly at the higher mark bands. However, it should be noted that several Centres had followed the guidance given from the moderators' reports supplied in June 2009.

The following reports provide more detail on how candidates performed on specific questions, highlighting areas of concern and applauding improvements from previous years.

Please ensure that your staff are encouraged to read these reports. They are available on line at www.ocr.org.uk

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

General Comments

The candidate performance was fairly similar to the five previous examination sessions, although a reduction in entry numbers was noted.

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/ description instead of a one word answer
- very few examples of poor technique by ticking too many boxes or drawing too many lines.

There was a wide range of marks; from 2 to 33 out of a possible 36 marks.

Comments on Individual Questions

- a) The vast majority of candidates gained full marks for this question although a small number failed to provide enough detail and just wrote ‘more serious’. This was not sufficient to gain the mark because it did not relate to the condition of the patient.
 - b) This question was generally well answered with most candidates scoring a mark for the radiologist. The GP served as a good distracter and was frequently selected rather than the nurse; however it was pleasing that all the answers were words selected from the list supplied.
 - c) This question was more demanding as the candidates had to know the correct term rather than choosing it from a list. However, most candidates were able to identify ‘physiotherapist’ as the correct answer, although there was a very wide range of spelling, The most common alternative answer, was a ‘fitness instructor’.
- 2 The majority of candidates scored at least 1 mark and a significant number of candidates scored full marks for this question. The most common wrong answer was ‘because it was a temporary fix’, rather than the realisation that it was a legal requirement.
- 3
 - a) On the whole, the quality of the bar charts was very good with clear lines precisely drawn.
 - b) This question was better answered than on previous occasions with the majority of candidates achieving at least one mark for correct substitution. Those with calculators went on to score both marks, although a common error was calculating 20/40 as 2.
 - c) (i) This question was very poorly answered. The majority of candidates latched on to non-invasive technique and answered ‘X-ray’. Either they had not read the question, or they did not appreciate that you would not use an X-ray to look at ligaments and tendons. A worrying minority talked about moving or manipulating the knee.

Report on the Units taken in June 2010

- 7**
- a)** Nearly all candidates got the mark for side effects or risks, but only the better ones appreciated the need to balance the risks against the benefits. Some candidates were almost there, but their answers were too vague as they wrote which one is 'best' or more suitable.

 - b)** A minority of candidates either left this question blank, or simply gave 'National Health Service' as their three answers. The majority however, scored two marks by recognising that the NHS was either free, government funded, or provided health care. Very few references were made to the other features in the specification such as monitoring trends, allocating resources or the provision of specialist care.

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

General Comments

The overall performance of the candidates in the paper was good and most candidates were correctly entered for this Higher Tier. There was good evidence that the candidates had been well prepared for the examination and were able to demonstrate a good understanding of health care provision, with the more able individuals showing good data handling and comprehension skills. 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.

All candidates should, however, be encouraged to make some attempt at every question as a blank space cannot gain any marks. 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. It is vital that schools 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.

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. They should also be encouraged to read the question carefully and think about their response before putting pen to paper.

Comments on Individual Questions

Question 1 was an overlap question with the Foundation tier.

- 1
 - a) Generally well answered but it is useful to point out that the question asks for the 3 **best** answers and the choice that a significant number of candidates of Colin having too much alcohol the previous night causing the coach to alter his training programme does not fall into this category.
 - b) Defining the terms accuracy and reliability proved difficult for many candidates and reference to acceptable explanations in the mark scheme is useful guidance. 'Trustworthy' without any further elaboration of why the data was trustworthy was a common response for reliable and few candidates made the link to consistency or repetition of data.
- 2
 - a) A failure to read the question carefully was a common error here. Candidates are asked for samples from the body to test for microbes and a significant number chose hair or DNA which are commonly tested in forensics for identification purposes but not for the presence of microbes.
 - b) This was well answered with candidates identifying the link between rapid treatment and the limiting of the spread of infection.
 - c)
 - (i) Candidates did not gain the mark here if they only identified the expected change to the figures and gave no reason for this predicted change.

- c) (ii) This was a good discriminating question and the better candidates were able to link limited funds available to a need to prioritise with examples of where this prioritisation may occur.
- 3 a) Correct labelling of the heart tended to be Centre dependant. Well prepared candidates scored full marks on this section whilst others were unable to identify any of the chambers of the heart. A common error was the labelling of the valve as a semi-luna(r) valve – simply labelling the structure as a valve at this level was sufficient but incorrect naming of the valve negates the mark.
- b) To gain marks here the candidate needed to compare the artery and the vein. Arteries have thick walls (without stating veins have thin walls) is insufficient but arteries have thicker walls implies the comparison and is acceptable. Careless use of language was common in this answer and lost candidates marks – arteries are thicker than veins and arteries have thick cell walls were 2 frequently seen answers. To gain both marks candidates needed to compare structure **and** function as asked for in the question.
- 4 a) Few candidates gained full marks on this question and it is a good example of the candidate being aware of the number of marks on offer and having 3 distinct points in their answer – numbering or bullet pointing their 3 reasons would help them. The question also guides them to use the table to help them with their answer but just copying out the ‘against Botox’ boxes from the table is not using the information and gains no marks. Very few candidates were aware that it is a legal requirement to give informed consent before this type of treatment.
- 5 a) Most candidates scored at least 2 marks drawing the bar chart. A common error was a failure to label both axes. Candidates should be encouraged to use a ruler when drawing lines in a bar chart.
- b) It was pleasing to see that virtually all candidates attempted this question and most gained full marks indicating more confident mathematical skills than seen in the past.
- c) (i) X-ray was not an acceptable answer to this question as the damage is stated as being to tendons and ligaments and X-ray would not be suitable to show this damage. This was a good discriminator as only the most able candidates picked this point up and correctly identified a named type of scan eg MRI.
- c) (ii) This was generally well answered and candidates who scored full marks here often went on to gain full marks in part (iii). As to be expected, a small but significant number of candidates got the functions of ligaments and tendons reversed.
- 6 a) Candidates failed to read this question carefully and many did not realise that the assessment was done to assess the risk of the diagnostic test to Adanna and to assess if she was fit enough to undergo the tests or the course of treatment. This question was a good discriminator and only the highest achieving candidates gained marks here.
- b) A wide range of drug therapies were acceptable in this answer. A common misconception seen was that chemotherapy involves the use of radiation.

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- c) A good discriminating question with weaker candidates missing the main point of the expensive cost of the drug limiting its prescription while more able candidates were able to discuss the problem of limited funds, an expensive drug and the need to prioritise treatment.

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

General Comments

The paper provided candidates with stretch and challenge, enabling more able candidates to show the full extent of their capabilities. Most 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.

There were however several issues which centres would be well advised to take note of.

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 write over the top of it.

Comments on Individual Questions

- Part (a) proved to be straight forward for most candidates even though they had to identify the statement that was not a stage in the process.

Part (bi) was also straightforward, but a significant number of candidates gave "to ensure good working conditions" as the incorrect answer.

In part (bii) most candidates identified "to check the quality of their work" as the correct answer.

Part (c) was not so straightforward. This question required ticks placed in three correct boxes for three marks. Although most candidates successfully chose the first box, only the more able scored both of the other two marks. The most common incorrect response was "paying for employee's lab coats to be washed and replaced."
- Part (a) was mostly well answered but careless checking of the diagram often resulted in candidates writing down "objective lens" for the 'stage'. A second glance at the diagram would have clearly indicated to them that was an incorrect response.

Part (b) usually scored two marks. Indeed, simply writing down 800 would have ensured that two marks were credited. However all too often candidates gave an incorrect answer, and only those who had followed the instructions to show their working were subsequently credited with a mark for writing down 20×40 .

Part (c) usually scored two marks but linking magnification to "show things in colour" was a common incorrect response. Candidates that drew two lines going from a left hand box to more than one right hand box lost the mark. There were occasions when candidates made an attempt to rub out lines and then replace them with another. Centres should be aware that if the lines are not completely erased, the high contrast in scanning can partially replace these lines making it unclear which line is the candidates intended choice. The lines should either be completely erased or crossed out with a small zigzag line.

- 3** Part (a) should have been two easy marks. However all too often, candidates failed to read the instructions carefully enough and drew a circle around the picture. This resulted in one of the two marks not being awarded. Any other indication of correct responses was credited. Centres should be aware that examiners could clearly see the circles added by candidates to the picture on their electronic scans.

Part (b) should also have been two easy marks. However many candidates gave the wrong size or failed to include the units. One mark was given for 20 and the second mark for adding cm.

Part (c) required two other ways of recording data. Only drawings, written notes or a voice recorder were credited. Any references to video, photos, or CCTV were not credited.

- 4** Part (a) required a tick in the top box. It was surprising how many candidates thought that both electrons and light were used in electron microscopes.

Part (b) was not answered well. A common incorrect response was a positive nucleus surrounded by positive electrons.

Part (c) was well answered with most candidates scoring both of the marks. Any candidates that ticked more than two boxes lost one of their two marks for each additional box that was ticked.

Part (d) was well attempted by candidates. Credit was given for any disadvantage that referred to cost, size or being hard to use or prepare samples. Any advantage that referred to increased magnification, resolution, depth of field or gives a 3D image, also scored. Credit was not given for repeating any advantages or disadvantages given in an earlier part of the question or for vague answers that referred to zooming in more, or more accurate.

- 5** In part (ai) only the more able candidates realised that the dot to be circled was still on the start line. Some candidates failed to read the instructions carefully enough and circled a dot on the second run.

Part (a_{ii}) was not answered well with a variety of different answers being given.

Similarly in part (a_{iii}) only the most able candidates realised that the correct answer was 6. Candidates that wrote down a series of correct letters were also credited.

In part (a_{iv}) A, C, and E were required, but those candidates who simply wrote down A were also credited. Many candidates found this to be a difficult question as even though they did not need to know about 2-way chromatography; they needed to mentally work out what would happen when the chromatogram was run in a different direction.

Part (b) was well answered with most candidates scoring both marks. The most common incorrect response was to transpose the two lines to the solvent and the paper.

Part (c) produced a variety of responses with only the most able understanding that it was to identify an unknown dye. Any reference to matching up with the dyes that they do not know, was credited.

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- 6** In part (ai) C was the required response but credit was also given to those candidates who wrote down both C and D.

Part (aii) was correctly answered by almost all candidates.

Part (bi) was also well answered. Most candidates scored both marks but a significant number only managed to get two of the lines correct.

Part (bii) was not well answered. Many thought the correct response was quantitative or semi- quantitative. Only the rare few realised that litmus was an example of a qualitative test.

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

General Comments

Although the time available for 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.

Comments on Individual Questions

- 1
- a) Most candidates could correctly identify the 2 processes not involved in the collection, storage and preparation of scientific evidence.
 - b) (i) This was poorly answered by most candidates and answers usually referred to the quality, safety, accuracy and legality of the tests. Only the most able discussed the reliability of the tests, standard procedures and the idea that the laboratories had to meet set (usually high) standards.
 - b) (ii) Many candidates knew that proficiency tests were carried out to check the quality of work. All the incorrect responses were given regularly.
 - c) Most candidates were able to correctly identify two ways of ensuring good laboratory practice. The most common correct answers referred to training of staff, health and safety, avoiding cross contamination and the maintenance of equipment.
- 2
- a) This question differentiated well between candidates of different abilities with only the better candidates able to correctly label all the microscope parts. Many candidates referred to the lens and magnifying lens rather than talking about the eyepiece and objective lenses. There were a wide range of incorrect labels.
 - b) Most candidates could correctly link either magnification or resolution with its explanation. Many candidates thought that the terms needed to be matched to two or three explanations rather than just one for each keyword.
 - c) (i/ii) Few candidates were unable to identify the pictures showing greatest and least depth of field. The commonest error was to reverse the answers.
- Q3
- a) The majority of candidates could describe the shape and identify the spikes shown in the image. A small minority did not realise they were being asked about the image, and gave information about pollen grains.
 - b) (i) Most candidates successfully measure the pollen grain to produce a measurement within the acceptable range. The commonest error was to give the value in cm even though units of mm were clearly given in the question.
 - b) (ii) A very large number of candidates converted mm to cm by multiplying by 100 rather than dividing. A small number showed division by 100 in their working but were unable to produce the correct answer for this.

- 4
- a) The majority of candidates understood that an electron microscope uses a beam of electrons instead of light. A significant number thought that it used both electrons and light.
 - b) About half of the candidates knew that atoms had a 'positive nucleus surrounded by negative electrons'. Most of the other candidates chose the opposite answer 'negative nucleus surrounded by positive electrons'.
 - c) Better candidates understood that electron microscopes cannot be used if the object is living or moving. A significant number identified living objects only, in spite of being clearly asked for 2 responses. Opaque or thick were the most common incorrect responses.
 - d) Most candidates were able to correctly identify either an advantage or disadvantage of an electron microscope. Most popular correct disadvantages chosen were either cost or size. A substantial minority believed that colour was an important disadvantage. Nearly all of the candidates were able to identify an advantage. The most common ones stated were to do with the magnification and resolution. More able candidates discussed the depth of field and 3D images. A few candidates chose information from earlier parts of question 4.
- 5
- a) (i) Many candidates could not identify the insoluble spot. The common wrong answer was the less soluble of the spots which had travelled with the solvent.
 - a) (ii/iii) Most candidates could see that 3 colours had been separated from spot x, incorrect answers were usually 2. However, they struggled to identify the total coloured spots separated by the 2 way method.
 - a) (iv) Very few candidates were able to identify the dyes which would not have been separated by solvent 2 alone.
 - b) Many candidates could correctly link both mobile phase and stationary phase with the correct description but a significant number made 3 links, one to each description.
 - c) Only the best candidates realised that the standard reference dyes were there for comparison to help them to identify the unknown dyes. Many candidates concentrated only on 'standard' and discussed their reliability eg that these dyes helped the system to run clearer or faster.
- 6
- a) Few candidates were unable to identify at least one advantage of gas chromatography, especially its greater separating power.
 - b) (i/ii/iii) Candidates showed that they had a good understanding of the given gas chromatogram, correctly identifying the components with retention time of 5 minutes, equal concentrations and greatest concentration.

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

General Comments

The performance of candidates on this paper was broadly similar to that of previous seasons, with about half of the candidates earning about half of the marks. Most candidates fared better on questions with an objective format, with their powers of written communication often failing them in questions which required free writing. Those questions which required recall of factual information proved to be much harder than those which required candidates to just process information.

The oscilloscope and signalling questions suggested that many candidates had not had enough practical experience of circuits or instruments for communication systems. More significantly, the majority of candidates earned no marks at all for the questions which involved quantitative work. Centres need to realise that about 10% of marks are for calculations, so some extra practice at those few opportunities for calculations in the specification could benefit their candidates a lot.

Comments on Individual Questions

- 1 Most candidates found part (a) an easy start to the paper, with the vast majority earning two of the marks, often getting the tuner and demodulator in the wrong order. Nearly all candidates recognised the processor for part (b), but very few could successfully identify the frequencies of the radio bands in part (c). Many weak candidates either didn't understand the question of part (d)(i) or couldn't express themselves clearly enough to earn the mark - many assumed that each station had to have its own frequency and couldn't imagine the consequences of their all having the same frequency. The last part was easier, with most candidates getting at least one of the two points correct - many incorrectly felt that the manufacturer allocated the frequency for each station or that the receiver was tuned by adjusting the aerial.
- 2 Many candidates found this question hard, with many earning no marks at all, suggesting that they had not had the chance to make measurements with an oscilloscope for themselves. Only strong candidates could relate the stated amplitude to the trace on the screen and the vertical scale, and very few correctly calculated the period. Almost none could identify the correct way of calculating the frequency.
- 3 This question discriminated well between strong and weak candidates. For part (a), candidates had to realise that wireless communication required the use of radio waves - many weak candidates focussed on other aspects of the printer, such as mass of print rate. Similarly, for part (b), strong candidates realised that the battery was the key to using a printer anywhere, but many weak candidates used the mass instead. Most candidates earned one of the marks for part (c), usually because they failed to recognise that encryption is only possible with digital data.
- 4 This question was about the different types of link for communication systems. It was good to find that the majority of candidates could correctly match the link to its signal for part (a), but part (b) was a disappointment. Only a minority of strong candidates mentioned a system which could use an optical fibre link, with many suggesting infra-red through free

space or mobile telephones. Only a minority knew any advantages that optical fibre has over wire or radio wave. Similarly, although many candidates knew that sound was an example of an analogue signal, few realised that it needed encoding before placing on a link (compressed and decoded were popular incorrect responses).

- 5 This was the first of two questions which also appeared on the higher tier paper. As such, it was expected that weak candidates would not be able to earn many marks. This was certainly the case for part (c), with very few candidates able to sequence the stages of transmitting an analogue signal in a digital format. For part (a), weak candidates often lost marks by repeating themselves or failing to express themselves clearly enough. However, it was good to find that the majority of candidates were able to correctly identify reflection, absorption and interference.

- 6 As expected, only the strongest candidates earned marks for this question. Most candidates failed to identify the switch and LED as the input and output devices for the circuit (microphone and loudspeaker were popular incorrect suggestions). Morse code was the most popular digital code, but only a minority of candidates suggested it, and only strong candidates could clearly describe a situation where sounds transmit a coded message.

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

General Comments

As in previous seasons, about half of the candidates entered for this paper would have had a more pleasant exam experience earning the same grade by answering the questions on the Foundation Tier paper instead. Half of the candidates only earned about a third of the marks, so only a minority were operating above grade C. This means that many of the questions are pitched at too high a level for many candidates to be able to earn many marks.

Centres need to realise that 10% of the marks in these papers are for numerical work, so an extra emphasis on the few opportunities provided in the specification might prove beneficial to their candidates. The oscilloscope question is a case in point - very few candidates were able to earn marks on this question.

As ever, questions which require candidates to recall facts prove harder than those which involve processing information provided or explaining how things work. Centres should consider more testing of factual information in the run-up to the exam?

Comment on Individual Questions

- 1 This question also appeared on the Foundation Tier paper, so, as expected, the majority of Higher Tier candidates earned most of the marks for it. Most candidates were able to provide three distinct key factors for the walkie-talkie, almost all could correctly identify the meaning of reflection, absorption and interference, but only a small minority of strong could correctly sequence the steps involved in transmitting an analogue signal with a digital format - the treatment of the signal at the receiver proved to be most problematic.
- 2 This question was poorly answered by most candidates, suggesting that they had insufficient practice at using an oscilloscope in practical work. Although most candidates had a go at calculating the amplitude from the data provided, very few were able to get the right answer. Candidates who confused amplitude with peak-to-trough could earn half marks. Almost none were able to calculate the frequency, despite being given the answer. Many candidates didn't bother to answer the question at all.
- 3 This was the second question which also appeared on the Foundation Tier paper. It was disappointing to find that only half of the strong candidates were able to correctly name the input and output devices for the given circuit - centres need to spend more time making sure that their candidates can put names to the symbols used in circuit diagrams. However, most candidates fared better with the rest of the question. Morse was a popular example of a digital code, and the majority of candidates could describe an example of messaging with sound.
- 4 Part (a) of this question required candidates to identify the factors of a printer which made it portable. Only a minority realised that both running off batteries and using wireless communication were required - the majority of candidates opted for only one of these. It was disappointing to find that the vast majority of candidates failed to describe analogue and digital formats, preferring to describe their advantages or disadvantages instead.

However, it was good to find that half the candidates earned half the marks for part (b)(ii), showing that they had a good understanding of the benefits of digital transmission of information.

- 5** Many candidates found this question about radio receivers difficult. Completing the block diagram correctly proved hard. Half the candidates correctly placed a loudspeaker at the output, substantially fewer placed an aerial at the input (microphones were popular as incorrect answers) and only a small minority suggested that a tuner and demodulator might be necessary. This was disappointing as similar questions have appeared in past sessions - perhaps centres could invest more time in going over past papers with their candidates? However, many candidates identified the middle block as processors, although very few could state what made them different from the input and output blocks - mainly because of their poor quality of written communication. Part (c)(i) required candidates to recall a fact about broadcast bands - which most of them could not do. Although some candidates could describe amplitude modulation (without overuse of the terms amplitude and modulation), only the strongest could give an adequate definition of the term bandwidth.
- 6** The most likely mark for a candidate on this question was zero. Part (a) was the hardest, with many candidates suggesting an example with a mobile component (such as mobile telephones or satellite links) which is impractical for wire or optical fibre. Too many opted for another link which involved radio waves, losing marks. Application of error-carried-forward in part (b) allowed many candidates to earn marks for their block diagram of an incorrect part (a), although too many wrote the name of a signal instead of a physical device in the input and output blocks.

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

General Comments

The candidate performance was fairly similar to the five previous examination sessions, although a reduction in entry numbers was noted.

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/ description instead of a one word answer
- very few examples of poor technique by ticking too many boxes or drawing too many lines.

There was a wide range of marks; from 2 to 33 out of a possible 36 marks.

Comments on Individual Questions

- 1 This question on growing strawberries showed a good range of marks. Parts c) and eii) were also on the Higher Tier and therefore targeted at Grades D/C.
 - a) The majority of candidates correctly identified the response for a gathered harvest, although a common error was to select “machines are used”.
 - b) (i) Only about half the candidates knew that weighing the crop would be the best way of finding the crop yield.
 - b) (ii) The majority of candidates correctly identified “looking at the crop” as a qualitative method.
 - c) A wide variety of acceptable answers were written to explain why a raised bed would give a better strawberry crop. Vague answers such as “no pests” were not accepted.
 - d) About half the candidates were able to identify the correct sequence in the chain of food production. A common error involved the position of A (process).
 - e) (i) The majority of candidates knew the type of microorganism involved in fruit damage.
 - e) (ii) There was much confusion about the correct conditions for storing fresh strawberries. Many candidates could not distinguish between the use of a fridge (storage) and a freezer (preserving).
- 2 This question was based on using microorganisms.
 - a) It was pleasing to note the high number of correct responses in identifying methods of measuring microorganism growth.
 - b) (i) Very few candidates had a clear understanding of the term “aseptic”.

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- b) (ii)** However, many candidates were able to explain why using microorganisms required care.
- c) (i)** The simple description of the two graphs was well done.
- c) (ii)** The explanation of why the level of alcohol did not increase after 8 days proved to be more demanding. Few candidates realised that most of the sugar had been used up or that the yeast would have died.

3 This question was based on vicuna wool. All parts, except a), were common with Higher Tier and therefore targeted at Grades D/C. It produced a wide spread of marks.

- a)** Surprisingly, only about half the candidates were able to identify a non-woollen product such as meat, manure or leather.
- b)** The majority of candidates knew that artificial insemination could be used with vicunas. A common error was to select “organic farming”.
- c)** Responses to this question about factors affecting the growth rate of vicunas was rather disappointing, with few candidates achieving three correct answers. Vague answers such as climate and weather were common.
- d) (i)** Almost all candidates realised that vicunas would produce the lowest yield per year but many failed to offer an acceptable explanation. An unprocessed answer such as “It produces 190 g in 2 years”, was not accepted. Many candidates also failed to get the correct answer when dividing 190 by 2.
- d) (ii)** It was pleasing to read the many well expressed and correct answers to explain why a vicuna sweater was so expensive.

4 This question was based on wheat plants.

- a)** The majority of candidates correctly linked the type of farming product to an example.
- b)** It was pleasing to note the many correct answers concerning a plant’s life cycle. This type of question has had a poor response in previous examinations.
- c) (i)** For some reason, candidates did not realise that they had to compare the two diagrams of wheat plants. It was possible that they had not read the first line of the question, linking wheat grains and flour. Vague answers such “modern inventions” and “organic farming”, were common. Since it considered a very accessible question, two answers were required for 1 mark.
- c) (ii)** Not many candidates realised that wheat plants could be developed using selective breeding; “artificial insemination” was a common incorrect answer.
- d) (i)** Few candidates (about one in six) could select the correct word equations for aerobic and anaerobic respiration.
- d) (ii)** This lack of understanding also showed in the very few correct responses (less than one in ten) to explain why bread rises when yeast is added.

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

General Comments

The candidate performance was fairly similar to the six previous examination papers. There were some pleasing aspects of improvements such as more genuine attempts to write an explanation/ description.

However, the general performance of candidates in response to questions based on topics in bold (Higher Tier) in the specification remains a problem.

It would appear that many good “grade C” candidates are being entered without being taught the necessary Higher Tier material. As in previous examinations answers on genetic modification showed an almost complete lack of knowledge and understanding on the topic. The significant number of candidates scoring less than 10 marks indicates a flawed entry policy; taking this examination would not have been a pleasant experience.

Comments on Individual Questions

- 1 This question was based on growing strawberries.
 - a) A correct explanation of the difference between a gathered and a whole organism harvest was achieved by only about half the candidates. A common misconception was that a gathered harvest involved machinery.
 - b) This question on growing strawberries plants on raised platforms was also on the Foundation Tier and it produced similar answers. There were many vague responses such as “there will be no pests” and “they will get water”. The raised platforms would ensure less damage, rather than no damage, from pests.
 - c) Very few candidates knew the missing stages (growth, processing) in the food production chain.
 - d) This question on storage of fresh strawberries was also on the Foundation Tier and it produced similar answers showing some confusion between the use of a fridge (storage) and a freezer (preserving).
 - e) (i) About half the candidates realised that the GM strawberries would not need pure/clean water and could be grown in sea water.
 - e) (ii) As in previous examinations it was apparent that the process of genetic modification is simply not taught to the majority of candidates. An answer approaching a correct description was rare, imaginative and impossible solutions were common. Attempting a past examination paper would have exposed this problem.

2 This question was based on vicunas. It was also on the Foundation Tier and therefore targeted at Grades D/C.

- a)** The majority of candidates realised that artificial insemination could be used to increase vicuna numbers.
- b)** It was surprising to note that only about one in ten candidates could offer three correct factors which could affect vicuna growth, despite a wide range of acceptable answers. As in the Foundation Tier, vague answers such as “climate”, “weather” and “surroundings” were common.
- c) (i)** Almost all candidates realised that the vicuna produced the lowest yield per year. However, only about half the candidates clearly expressed an explanation, repeating unprocessed information such as “it produces 190 g in two years” without a comparison was common. Many candidates also struggled to divide 190 by 2.
- c) (ii)** The majority of candidates correctly used the information to explain why a sweater made from vicuna wool was so expensive.

3 This question was based on microorganisms. It proved to be a rather demanding question with the majority of candidates only scoring 1 or 2 or 3 marks. The candidates’ lack of knowledge of Higher Tier material was clearly exposed.

- a)** Candidates did not seem to realise that there were two marks on offer to explain the importance of using aseptic techniques. A simple vague statement was common resulting in only a handful of candidates scoring two marks.
- b)** An almost complete lack of knowledge about methods of measuring population growth in microorganisms resulted in only about one in ten candidates scoring any marks.
- c) (i)** Despite this type of question on stages in population growth appearing in previous examinations, only about one in six candidates correctly named the stages.
- c) (ii)** Only a handful of candidates understood that the stationary growth phase was when reproduction rate was balanced by death rate.
- d)** Candidates had to use the two graphs about sugar and alcohol levels to describe the fermentation process. Very few candidates wrote a full description worth three marks, most candidates were content with a single piece of information.
- e)** Few candidates named “continuous” as an alternative process to batch processing of microorganisms.

4 This question was based on plant processes and hydroponics.

- a) (i)** Most candidates offered a low level response such as “because they are underground” to explain why seeds do not need light to germinate. Answers referring to the seed having stored food or the seed did not photosynthesise were expected.

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- a) (ii) Since knowing two conditions for germination was not particularly demanding, both answers were required for a mark.
A correct reference to oxygen was often missing.
- b) (i) Candidates were expected to get all parts of the word equation (rather than the more demanding symbol equation) for photosynthesis correct for one mark.
About half the candidates knew the correct equation.
- b) (ii) Very few candidates offered an acceptable explanation of a limiting factor.
However in **b(ii)** the majority of candidates named such a factor in photosynthesis.
- c) It was disappointing to note the poor responses in describing the advantages and disadvantages of using hydroponics.

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

General Comments

Overall the paper performed well. There were, however, some areas where candidates did not score well, including a good understanding of molecular structures, simple chemical preparation techniques and straightforward calculations on composition and yield.

Comments on Individual Questions

- 1 There was good knowledge of the basic chemical hazard names and symbols. However, few could explain why it was necessary for the emergency services to know what was in a spillage. The idea of taking the correct, safe action to protect the services, the public and the environment and to clean up the spillage without further damage was not well explained. Many candidates merely restated the stem of the question.
- 2 Few candidates seemed to know about the HSE's role in regulation of the chemical industry. Lots of random combinations of letters appeared. Large scale production of chemicals in bulk was known well but the breakdown of H_2SO_4 into its constituent elements and atoms was very poorly answered. The idea that catalysts speed up reactions was well known. The final part of the question asked for identification of the apparatus used in small scale laboratory production of an ester. It is a worry that many candidates could not identify the components successfully. Perhaps more practical experience is necessary to correct this.
- 3 The idea of a suspension being an insoluble solid dispersed in a liquid was not well known and examples were poor. There were many confused candidates who did not read the introductory stem of the question and answered instead about mechanical suspension on cars or bikes. Practice with past questions might go some way to solving this problem. Descriptions of magnesium hydroxide as "inorganic from a never lived source" were poor and few seemed to understand the need for its purity when part of Milk of Magnesia which, of course, needs to be safe to take orally and not to have any side effects after it has been ingested. The proportion calculation seemed to highlight lack of basic mathematical ability, lack of calculators and a lack of knowledge that 1 litre is 1000ml (many thought it was 100ml). More practice with these sorts of calculations is needed.
- 4 It was pleasing to see that many candidates knew about factors that change rates of reaction. Explanations as to why the rates change was less well answered. The acid + carbonate equation completion question was not done well. This forms part of the basic general reaction learning that needs to be done (ie acid + base, acid + metal, acid + carbonate). Many of these reactions do give out heat energy, so the idea of exothermic reactions can be incorporated into the learning at this point.
- 5 The idea of solubility/insolubility was not well understood by candidates and there were few correct examples. Some seemed to pick a chemical name from somewhere else in the paper and just hope that it was insoluble. The processes involved in the production of insoluble silver chloride were picked reasonably well from the list provided and the

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equation was generally completed correctly. The idea of chemical purity was often confused with concentration, and the idea that different grades/purities of chemicals was linked both to price and use was frequently missed. Calculations of percentage yield need to be practised to reinforce the use of proportion and percentage calculated from a fraction. The same problems of lack of basic mathematical ability and lack of calculators seemed to hold the candidates back.

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

General comments

The paper was suitably challenging and no candidates appear to have been disadvantaged by language or cultural issues. A small but significant number of candidates clearly found the examination very difficult and these 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

1 Part (a) was attempted very poorly indeed considering the specification requires that candidates should be able to recall two examples. A few candidates used “common names” (eg limestone) but most simply picked a name of a chemical mentioned elsewhere in the paper (most of which were soluble).

Part (b) tested understanding of the relevant terms and almost all candidates scored at least one mark with many getting two or three marks. The most common error was to use distillation to separate a precipitate and to mix up the terms ‘solvent’ and ‘solution’.

Part (c) was again done well with many candidates completing the equation correctly. Common wrong answers were water and carbon dioxide, perhaps reflecting the number of times these substances are seen in equations for neutralisation.

It was rare to see a two mark answer to part (d). Many candidates identified the idea of different levels of purity or quality – although many were inclined to blame different concentrations. The concept that alternative uses may require different levels of purity was rarely addressed.

Almost inevitably, part (e) drew a pleasing number of perfect calculations – and many responses from candidates who did not understand the idea at all. A small number of candidates wrote down the correct working but managed to get a wrong answer as a result of arithmetic errors. Calculators can be used on this paper and it was clear that many candidates did not have access to them.

2 Despite similarities to questions used in previous seasons, this question was not universally well done. Part (a) was well done by most of the stronger candidates but the purpose of the excess in part (b) was rarely understood. In part (c), most candidates clearly realised that filtration separated a solid residue from the filtrate – but did not understand why it was necessary at this point.

Part (d) was better answered than in previous exams, but assertions that using more of the reagents or heating for longer would yield larger crystals showed lack of practical experience in this area.

In part (e) – the most candidates were aware that the other product would be water, but formulae did not always show an appreciation that the relative size and position of the three characters in the formula for water are significant.

- 3** Candidates are clearly uncertain as to the meaning of the term “suspension” and often confused it with descriptions of emulsions. The formula for magnesium hydroxide in part (b)(i) was largely a matter of guesswork, even though it is one of just over 20 formulae listed in the specification. Most candidates came up with a formula containing the three correct symbols, but few achieved the correct stoichiometry.

As with the previous calculation, in part (b)(ii), many candidates struggled without a calculator. A worryingly large number of candidates seem to believe that one litre contains only 100 millilitres. These answers achieved one mark for working only if the method was clearly shown and so many candidates dropped a mark unnecessarily.

In part (c)(i), the process was rarely explained using even moderately accurate scientific language, but many candidates managed to score one of the marks. However, the final part (c)(ii) was almost uniformly answered badly. Many candidates had not read the question thoroughly, attempting to describe acid being added to the magnesia. However the bulk of candidates did not even mention the pH scale and phrased their answers in terms of the colours of universal indicator.

- 4** In part (a) the term “endothermic” was not well known – but this paled into insignificance compared to part (b). The majority of candidates did not even get close to this, preferring to rephrase the question (“how fast a reaction is” or “how long the reaction takes”). The answer to part (c) was better known – but the task of explaining the ideas concisely was challenging to weaker candidates. A small number of candidates gave exemplary answers.

- 5** In part (a), the curse of the calculation was again present with all too few being able to manipulate numbers reliably. Again, the exact meaning of “litre” was again the downfall of many candidates and very few achieved the correct answer – often ending up with answers appropriate to a study of homeopathy rather than mainstream medicine. Part (b)(i) was also very challenging. Candidates struggled to express their ideas in the sort of scientific language which was required. Many correctly identified potassium chloride as the solute in the solution in part (b)(ii) and sometimes took the inspiration back to the very first question – about insolubility. However, many candidates did not understand the concept of the word and simply guessed.

In part (b)(iii), a few candidates understood the techniques involved, but most responses involved a level of measuring before and after transfer. The commonest error was to mix up using a funnel with filtration. Many quite good candidates think that the process of pouring into a funnel is filtration and this casual use of language is a major cause of lost marks.

In part (c), there is one safety organisation which is responsible for this area –and it is mentioned by name in the specification. Only a disappointing one in five candidates got this right.

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

General Comments

This paper was aimed at candidates working in the G-C range of grades and there was no evidence that they had been entered inappropriately.

It is important to emphasise to candidates the need to answer the question asked, not the one that they wanted to answer. Thus if a question asks for a *'property of a material'* that is suitable for a particular purpose then a candidate can expect to be penalised if they do not mention a specific property.

There was evidence of better fluency in using scientific vocabulary and this improved the accuracy of many answers, some candidates may have gained more marks if they had been able to express their ideas.

The paper was accessible to all candidates; many candidates were able to score 25+ marks showing understanding and scientific knowledge of the topics being questioned. A very few candidates scored less than 10 marks, these candidates showed little understanding of the topics contained in the questions. There were relatively few no responses and no sign of students giving up and leaving answers blank.

There was no evidence that candidates ran out of time.

Comments on Individual Questions

- 1
 - a) Many candidates did not follow the question and therefore tried to join the boxes on the left-most column, in order, to a box in the middle column, even though there weren't enough boxes in the middle column.
'Good thermal conductance' was frequently connected. This distractor was used far more than had been anticipated, consistent with the unexpected failure to read the parts of the question which indicated that **electrical** and **mechanical** properties should be identified.
Although most correctly linked 'outer covering of cable' to 'flexible', 'pins on plugs' was very often linked to 'brittle'
 - b) This question elicited fairly random responses with suction being fairly common and tension and compression often inverted
 - c) 'Opaque' was a very common error, this could be due to the recent use of word opaque to mean translucent!
- 2
 - a) This question again produced a fairly random distribution of responses.
 - b) The answers to this question were rather disappointing because candidates seemed unprepared to give examples of specialised glass even though some are listed in the specification. Examples of ordinary glass in use were common, eg 'for windows/you can see through it; transparent,' or double glazing; to block sound. A significant number of candidates indicated that mirrors use a specialised glass. Property and use were frequently inverted but this was not penalised.

- 3 a)** Some gained a mark for the job by borrowing an occupation from 3bii. Almost all responses included an attempt to describe knowledge needed for the job; this is a great improvement on previous attempts to answer a similar question. Many of these responses described the nature of the work, often indicating what decisions should be taken, but omitted reference to any material property and therefore could not gain the second mark. A minority of responses were fully detailed and related the knowledge of a relevant property to the responsibilities of the job. This too showed a great improvement in attainment in comparison with previous years.
- b) (i)** The responses tended to identify 'so manufacturers can sell more' rather than 'So the product always has the same properties.' Almost all correctly identified, 'So the product is suitable for its purpose.'
- b) (ii)** Many incorrectly identified occupations such as 'manager', 'the boss'; or gave connections with food, whilst others referred to organisations such as 'food agency' or CE.
- b) (iii)** An amazing variety of acronyms occurred such as 'Building Standards', 'Be safe', 'British Steel' with perhaps the most amusing being 'Bog Standard!'
- b) (iv)** Responses very much improved on answers in previous papers. Some candidates may have missed gaining the mark unnecessarily because they did not understand the idea of a safety *margin* and used vague phrases such as 'made strong' rather than 'made stronger than necessary'. Many of those who earned a mark gave good and concise descriptions of a safety margin – well done! Unfortunately many candidates described a safety feature which was not a safety margin.
- 4 a)** This was fairly well answered. For those losing a mark it was usually because one word was in the wrong column, forcing another word into the wrong column to take its place, it was rare to see grouping of 3 words and 1 word.
- b) (i)** There were hardly any non-scoring responses; these usually had the bar for a brick plotted to 20 instead of to 200.
- b) (ii)** Answers based on 'compression' sometimes omitted 'strength'. Some candidates missed a mark unnecessarily (eg 'it is very *good* in compression') but other responses suggested a lack of understanding (eg 'it compresses well').
Some vaguely worded answers were rescued because candidates quoted the units given in the table. Consequently, candidates who find it hard to articulate their ideas should be encouraged to quote directly the information they read in tables in order to support their responses'.
There were some excellent responses, showing clarity of understanding well above that required for this question.
- b) (iii)** Weaker candidates did not distinguish between the mechanical properties such as hardness, strength and toughness. Some responses gave information beyond that required in order to answer the question.

- 5**
- a) (i)** This question was poorly answered although most candidates quoted 2 quantities. A large number quoted 'weight'; a significant number gave both speed and velocity. There were a number of candidates who gave 'non-quantities' such as 'cornering ability' or 'appearance of the car'.
 - a) (ii)** This produced a random distribution of responses.
 - b)** Many scored only one mark for describing how their device aids safety, omitting the relevant mechanical property. Those who scored no marks usually described either non-mechanical features such as traffic lights or features which are essential to design, for example, 'brakes so you can stop' or 'tyres so you can drive'.
- 6**
- a)** The responses illustrated the difficulty candidates experience in distinguishing between an alloy, a composite and complementary materials.
 - b)** Weaker candidates misunderstood the question, many gave other uses for stainless steel or gave other metals which could be used for cutlery - some based their answers on rusting.
 - c)** Low-scoring candidates gave answers which were inappropriate, for example to make it bend more easily or use it more often; some suggested using other metals. Many answers were well-prepared. A surprising number referred to heat treatment, which is outside the specification, and some gave very good descriptions of improving the alloy.
 - d)** Of those who scored one mark, a considerable number described some variation on the 'ball and ring' experiment. Many just wrote 'measure it' without explaining what was being measured. Of those who scored two marks, the great majority had drawn a ruler next to the sample. A high proportion of responses were based on heating and measuring oven shelves, suggesting that they had not measured expansion during their course. Some attempts included a diagram of a microwave oven. Responses which scored 3 marks included a diagram of a rotating pin with a straw and a dial.

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

General Comments

Candidates appeared to be rather better prepared in this session for those questions where references to specific specification items were expected. However, recollection of specification statements was most often weak, and in many cases entirely incorrect. References to mechanical properties in the paper proved difficult for many candidates, who did not make the distinction between types of property and answered in terms of electrical/thermal or optical properties, so losing marks on several questions.

As reported in previous years, a substantial minority of candidates would have been better served by entry to the Foundation Tier.

Comments on Individual Questions

1 Candidates regularly confused 'mass' and 'weight' in part (a). In part (b), candidates were much more certain about 'how' a device improved safety, than they were in identifying which 'property' led to that improvement. A significant number of candidates gave two answers to only one part of the question, and failed to answer the other half, limiting the marks they could achieve.

2 The direct specification statement required to answer part (a) was not well known. Part (b) was tackled better, although too many candidates continued to refer to 'corrosion' which had been specifically excluded in the question. Here, as in many other questions, candidates appear to be unclear as to what is referred to by a 'property', which, considering the focus of this unit is disappointing.

Part 2(di) proved demanding for most of the weaker candidates. Many examples were provided that described simple 'expansion' demonstrations, such as the 'ball and ring' or the 'bar breaker' experiment and bimetal strips also figured regularly. Clearly candidates had seen such experiments. However, good descriptions of a workable quantitative method were rare and in some cases it was evident that candidates did not understand what 'expansion' was.

It was clear that many candidates failed to read the question in part (dii), with 'melting' proving to be a popular, invalid answer, and others describing how expansion occurred.

3 Much of this question was recall from specification statements. However, it was not well answered. Few candidates recognised the need for 'amplitude' in part (aiii), and answers to part (b) were evidently mostly guesses. The given condition, that 'Beth has normal hearing', was ignored in a significant number of answers to part (c)

4 Candidates would give themselves more opportunities to score marks if they would try to explain how they are tackling the question. In both parts (a) and (b) marks were awarded for the correct approaches to the problem, with the final marks for correct evaluation. Often, where a single, incorrect, number was written down, it could be surmised that candidates had used the correct approach, but without the evidence of their intermediate working, it was impossible to credit them. It was common for the numbers in part (a) to be

inverted, and in part (b) the best candidates drew the appropriate triangle on the graph but failed to calculate the area correctly.

A very wide range of answers were accepted for part (c). However, many candidates used non-mechanical properties and thus scored zero. Others chose two components with 'similar' rather than 'complementary' properties. A minority correctly described 'safety helmets', and a small number applied the question, correctly, to other devices as diverse as pencils and hand tools.

- 5** This question proved challenging to most candidates. Very few gave the expected answer of 'refractive index' to part (ai), and an even smaller number recognised that the two lenses in part (aii) would need to be of different materials with different refractive indices. Although some candidates realised that high purity would be required for transmission over long distances, thus giving an acceptable answer to part (bi), many evidently did not understand what an optical fibre did and referred in part (bii) to conduction of electricity or other irrelevant effects.

The requirements of contact lenses asked in part (c) has been a regular question in this paper. It is still not well known. Candidates should appreciate that lenses can be soft or hard, and neither of these properties is necessary in its own right, although each confers different advantages. The question asked candidates to state a 'property' plus a 'reason' for each mark - the 'reason' was often omitted.

The majority of answers to part (di) referred to the pupil. A small number discussed the change in the eye's lens. A very small number described which way the lens will change.

Many could state that the image was enlarged, but this was often qualified with unnecessary descriptions of it becoming 'blurry' or 'fuzzy'.

A337 – Additional Applied Science A – Work related portfolio

General comments

Generally this session it was found that the portfolio tasks had been set as to allow access to the assessment criteria at appropriate levels and the marking was generally in agreement with them. The majority of the candidates studying this qualification are now competently completing six suitable standard procedures, appreciating the assessment needs for the suitability test and carrying out a wide range of interesting research for the work related report.

Where Centres are providing annotation throughout the portfolios with an indication of how marks are awarded against the criteria, this is appreciated by moderators and does support the assessment decisions made by the Centres.

The majority of Centres again were very responsive in returning scripts for moderation and returned the Centre Authentication form with the candidates' work. Most work was well organised and presented using treasury tags which allow moderators to easily read and locate the work. These factors help to support an efficient moderation process and this is appreciated. Moderators did however discover several 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 in the future Centres will ensure suitable checks are done to make sure that these are reduced to a minimum. This seems to be an ongoing problem.

Limited scaling occurred this session however where scaling of candidates' work occurred, it was again mainly at the higher mark bands. Work submitted did not reach the necessary standards required by the assessment criteria ie work was not sufficiently detailed, with limited data at a high level of precision and reliability. Evaluations were also not at a high enough level for A grade work. However, it should be noted that several Centres had followed the guidance given from the moderators' reports supplied in June 2009.

Standard Procedures:

The majority of Centres used a good range of Standard Procedures which allowed access to all four marks. Marks generally were awarded correctly and in agreement with the assessment criteria. Good practice was seen by many Centres where suitable instructions for the standard procedures were attached to candidates' work with detailed evidence of their observations or measurements with a clear indication of the degree of accuracy available. Statements from teachers that candidates have followed instructions safely and without guidance will further support the assessment. A good range of experimental work was seen, popular standard procedures included: testing urine samples, measurement of vital signs (temperature/blood pressure etc), chromatography, acid/alkali indicators, work on current and voltage, density, several linked practical activities to forensic contexts.

Centres had noted the guidance previously given on the allocation of the fourth mark. Most of the work seen this session reflected appropriate allocation of this fourth mark. It is now for the most part correctly allocated for recording to the appropriate degree of accuracy and not for processing results. This was now evident in density and BMI standard procedure work. Limited work was seen to support detailed qualitative observational recording to support the fourth mark, however some good detailed drawings from microscope work were evident from some Centres.

Please again note for future submissions 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 if the fourth mark is awarded. There are still a lot of omissions of units in recording.

Suitability Test:

The interpretation of the requirements for a suitability test rather than an investigation continues to improve. Common suitability tests on materials/devices included suitability of thermometers, plastic bags, antacids, solvents for chromatography with the most suitable procedures including use of pH monitoring, soil testing, glucose testing and the use of chromatography. Centres need to ensure that suitable appropriate science is included and candidates do not focus too much on non-scientific characteristics of the material/procedure/device. Good work was seen where the contexts of the suitability test were accessible and understood by candidates. This allowed them to link their conclusions back to the purpose of the tests and consequently they were able to fully explain how suitable the material /device/procedure was.

Good practice was 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.

In the suitability test on thermometers, there was a wide variety of work seen by candidates. 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. Care also needs to be taken to ensure that single step experimental procedures are not considered to be complex. Centres need to check 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 'carrier bag' activity carried out by many Centres enabled a range of factors to be investigated and candidates were given opportunities to access the higher mark bands but care needs to be taken that full coverage of the higher band criteria is evident when 8 marks are awarded. Future candidates should 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.

In the suitability test on accuracy of equipment, Centres need to ensure there is a variety of equipment available to be tested. Candidates need to explain the purpose of the test, and include sufficient detail on the properties and characteristics of the glassware/measuring equipment if 6 marks or above are to be awarded. Candidates also need to be given the opportunity to complete a range of different tests, rather than repetition, to ensure this leads to a higher level of accuracy and more reliable results.

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 they give full description of the desirable properties or characteristics. Centres still need to check candidates are not only describing fully the desirable properties/characteristics but are explaining why at least one of these is necessary; simple statements and not explanations are commonly seen. The practical work carried out needs to support the desirable properties and care needs to be taken that for strand B (a) 6 marks the candidates are given opportunities to carry out suitable complex tasks to support the suitability of their chosen material/device or procedure.

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 for the suitability of testing processes, are examples of opportunities to support high level assessment. It would also support the moderation if Centres could indicate how much guidance the candidates were given for strand B (a). In order to achieve 8 marks the candidate should be showing evidence of independent thought in their approach to the experimental task.

Strand C and Strand D

In some instances the range of data collected was limited and to award 6 marks for strand C(b) there needs to be 'an adequate amount and range of data, with repeats or checks for reliability'. Generally, however, candidates had collected an adequate range of data and repeats were included, although candidates should take care that repeating is not just automatically carried out without reference to the need. Again for 8 marks evidence should be seen that data has a high level of precision and reliability and that it is linked with the requirements of strand A, so it can be used to support the suitability of the material/device or procedure. Several pieces of work sampled indicated that candidates had not referred back to all of the criteria they laid out at the start.

When writing a conclusion candidates need to link it 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 need to check for future submissions 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 needs to be taken to ensure that candidates do not automatically gain 6 marks for including contents and numbering the pages. This needs to be correct and clearly link to the content of the report. 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.

Work related Report:

Candidates continue to produce a range of interesting and well presented research work. The most popular areas were nursing, midwifery and physiotherapy. Those who described the work environments they had visited tended to give very descriptive information about practice and reports were written in candidates' own words. Centres do now seem to be aware of the need to support strand A (a) for 6 marks with the collection of relevant information from a variety of sources including a practitioner and/or workplace. Financial and regulatory factors tended to be more detailed especially in the case of more able candidates when visits had taken place. 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.

Strand A and Strand B

The majority of candidates are now collecting information from a variety of sources and most reports are showing clear evidence that they had engaged with a practitioner. Best practice was seen where candidates had integrated their interviews into the whole report and not just included information in the form of a questionnaire. Referencing for 8 marks for Strand A (b) showed ISBN numbers for books 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.

The quality of the content for strand B was generally suitably assessed, although there was still evidence of copying and pasting with no references. Candidates need to appreciate that 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. An improvement was seen this session in the inclusion of relevant information for both strand B (b) and B (c). Centres seemed to have directed their candidates to these criteria. Health and Safety continues to be a useful regulatory factor, however again the impact of this on the work still needs to be focused on. There was still evidence however 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 and D;

For Strand C, work moderated is still indicating that candidates are not fully linking the scientific knowledge to the work involved. Several diagrams of hearts, skeletons, muscles in the human body, pregnant ladies, crime scenes, continue to be included in reports but they are not accompanied by explanation of scientific knowledge involved in the work chosen. This strand is intended to allow candidates to explore the science involved in the job and explain how the practitioner would use science in their role. Where good practice was seen the level of scientific knowledge explained by candidates was evidence of their enjoyment of the activity and this was good to see.

Strand C (b) however was again much better with several good descriptions of technical skills needed. A good range of work was seen where candidates had described technical skills applied in the workplace and used a good range of visual material to support this. For the award of higher marks candidates explained how the technical skill was applied and some good high level work was seen here.

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. The use of visual material in a decorative way, limits access to the highest grades. Visual material for 8 marks needs to be suitably 'informative' and used appropriately, suitable labelling and related notes written by the candidates could support the higher marks.

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